

# Conducting Field Schools to the Bamfield Marine Sciences Centre

FINAL REPORT

June 2020



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**PART A: THE ACCIDENT OF SEPTEMBER 13, 2019, IN  
THE CONTEXT OF A UNIVERSITY FIELD SCHOOL**

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# I. Introduction

This report is provided to the University of Victoria in response to the University's interest in assessing planning and operating field schools to the Bamfield Marine Sciences Centre (BMSC) (<http://www.bamfieldmsc.com>). It stems from the September 13, 2019, bus accident that occurred on the Bamfield Main road between Port Alberni and Bamfield. This accident resulted in deaths of two students, Emma Machado and John Geerdes, and caused injuries to numerous other students.

The goal of this initial report is to discuss and make recommendations regarding the way such programs are operated in the future as well as to comment on the University's emergency response actions.

## A. Terms of Reference

The author has been engaged to provide an objective and expert opinion of the University of Victoria's field schools to the BMSC and to make recommendations related to these. The consideration and implementation of these is entrusted to the University.

The author was asked to consider the following:

- Pre-trip information provided to students by the University of Victoria
- Pre-trip planning and operations of the University of Victoria
- Pre-trip, during-trip, and post-trip actions of the University of Victoria
- Events occurring during the trip and at the accident site, communications, and response to the accident
- Whether the trip to the BMSC is appropriate in the way it is carried out by the University of Victoria
- What are best practices for trips to the BMSC and what improvements might be implemented in the future
- Pre-trip, during-trip, and post-trip actions of the University of Victoria

## B. Investigation and Methodology

This report has been prepared by Mr. Ross Cloutier, Principal, Bhudak Consultants Ltd. The author reviewed the following documents provided by the University of Victoria, parents, students, and stakeholders; conducted numerous interviews; conducted site visits; and engaged in personal research. All parents of students on the bus and all surviving students who were on the bus were provided the opportunity to speak or correspond by email with the author.

- University of Victoria Department of Biology student pre-trip information and planning documentation
- University of Victoria Off-campus Activity Risk Management Policy (2019)
- University of Victoria Guidelines for Participation in International Activities
- University of Victoria website
- University of Victoria contract and correspondence with BMSC
- University of Victoria contract with transportation provider
- University of Victoria Campus Security Incident Report
- Extensive email correspondence with parents of students on the bus, as well as with students who were on the bus
- Personal interviews with 14 families of students who were on the bus
- Personal interviews with seven students who were on the bus
- Personal visits with the Machado and Geerdes families
- Personal interviews with 51 University of Victoria staff (some were interviewed more than once)
- Personal interviews with transportation providers
- Personal interviews with BMSC staff
- Site visit to BMSC
- Pre-trip information and planning documentation from other universities who use BMSC
- Site visit to the accident site
- Personal research

## C. Acknowledgments

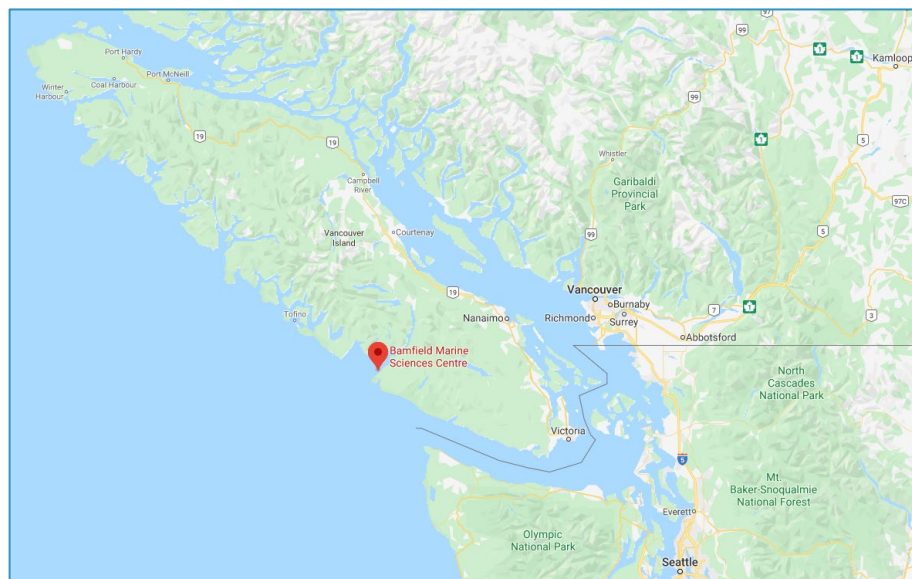
The author would like to thank the parents and students who participated in this review, especially Ethel MacIntosh and Jose Machado, the parents of Emma Machado; and Mary Murphy and Gregg Geerdes, the parents of John Geerdes.

## II. The Bamfield Marine Sciences Centre

### A. About the Centre

A field school to the Bamfield Marine Sciences Centre (BMSC) is the highlight of many University of Victoria biology students' studies. It plays a significant role in students' choosing to study at this university. There is little doubt that the BMSC provides a worthwhile educational experience for undergraduate and graduate university students. At no time is this report questioning the benefit of experiential science trips to the BMSC. The facility provides a valuable and desirable teaching and learning venue that offers knowledge opportunities to instructors and students that cannot be attained in classrooms.

The BMSC is a world-class research and teaching station that supports global leadership in coastal science. Established in 1972, the BMSC is a shared ocean-side campus of the Western Canadian Universities Marine Sciences Society (WCUMSS) in which the Universities of Victoria, British Columbia, Alberta, Calgary, and Simon Fraser University are member institutions. It is located on the outer west coast of Vancouver Island, British Columbia. Situated within the traditional territory of Huu-ay-aht First Nations and adjacent to 13 other coastal First Nations whose territories overlap with Pacific Rim National Park Reserve in Barkley Sound, the BMSC has provided ocean access to a wide diversity of marine and cultural sites of the Northeast Pacific Basin for over 48 years. Barkley Sound is renowned for some of the richest marine biodiversity in the world that is virtually uncompromised by human disturbance in this remote region. The BMSC also holds 65 ha of old growth rainforest that serve as a study area and reserve for terrestrial biota. There are no comparable facilities in Western Canada and no other marine science centres located on the coastline within 1,000 km between Washington State and Alaska.



Map showing location of Bamfield Marine Sciences Centre



## B. Research at BMSC

As the only Canadian university-based marine research facility on the Pacific coast and the only Canadian marine research facility located directly on the open-ocean coast, the BMSC provides unparalleled access to the ocean. With a fleet of 12 vessels, students embark on over 1,200 educational boat trips annually. A dive centre supports over 460 sub-tidal scientific SCUBA dives annually. A BMSC Dive Team, internationally recognized as leading underwater naturalists, were recently invited by the BC government to showcase their “Live Dive” for BC high schools. In 2017, one of BMSC’s marine educators was shortlisted among the top three scholars in the internationally renowned Rolex dive scholarship competition. At the heart of BMSC is a highly specialized seawater delivery system that moves over 3,000 L of fresh seawater per minute to 3,000 m<sup>2</sup> of lab space for living labs, including long-term animal care for sensitive organisms such as sharks, hagfish, and invertebrates. BMSC is unique in that it provides modern laboratory facilities on the “doorstep” to collection sites and holding facilities, thus enabling research that would otherwise be impossible. Careful management has helped to establish an unparalleled research and education environment that continues to lead among such facilities world-wide.

BMSC supports world class and award-winning research, with over 350 scientific papers published over the last six years (~5 annually led by undergraduates). Among the Canadian principal investigators who base their research programs at the BMSC are four Fellows of the Royal Society of Canada, five Tier I Canada Research Chairs, two Steacie Fellows, two Sloan Fellows, two Fellows of the Institute of Advanced Research, five recipients of NSERC accelerator grants, one Alberta Innovation Scholar, and one Marsh Award winner. BMSC attracts internationally recognized scholars looking to develop long-term programs, such as one Howard Hughes Medical Institute Early Career Scholar from Texas, and a professor of evolutionary biology from the University of Bern, Switzerland, who is committed to a long-term research program on stickleback at the BMSC.

Research at the BMSC was fundamental to the development of the fields of fish respiration and comparative biochemistry and physiology and is contributing to emerging research leadership on biodiversity and ocean health. Current programs address many contemporary objectives in Canadian science, such as understanding the interface between human influence on marine ecosystems, invasive species and the ecology and evolution of Pacific salmon.

Another example of the type of inquiry done at BMSC is in new laboratory studies that are bridging research of emerging technology of DNA barcoding. Since 2016, over 1,000 students have collected the DNA from over 1,500 organisms representing local biodiversity. Some of these specimens were new contributions to the international DNA Barcode of Life reference library, especially plankton, where over 30% of samples did not match any pre-existing records, representing cases where students may have very well discovered new species. These samples are now part of the permanent scientific record, their vouchers curated at the Royal BC Museum, and their curation forever associated with the student who discovered them.

## C. Programs at BMSC

These unique facilities support educational opportunities from field schools and university credit courses. Over 26 university credit courses are open to senior undergraduates, graduates, and other qualified persons and are directly credited towards member university degree programs. Courses focus on themes ranging from ecology, evolution and conservation, to archaeology, ethnobotany, and science

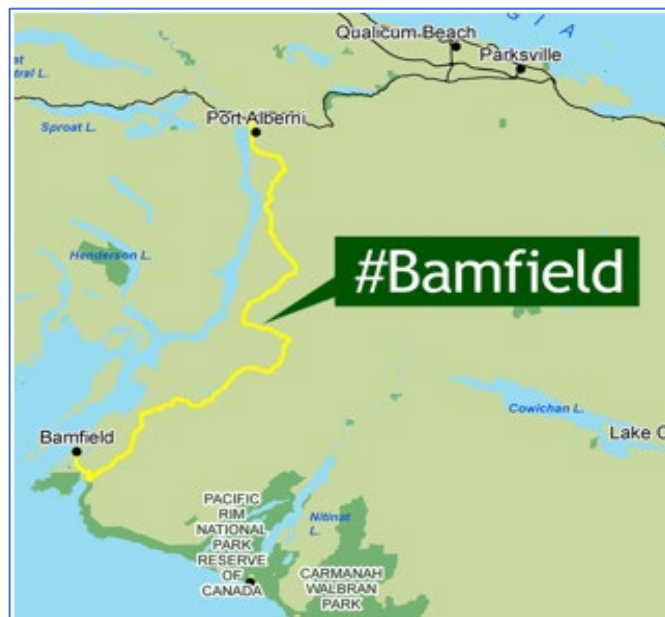


journalism. Students experience hands-on, accredited learning in a living laboratory – an intense immersion experience.

BMSC also hosts multiday field school experiences ranging from junior high school to university programs that started in the 1970s. BMSC has received competitive federal funding from the Natural Sciences and Engineering Research Council (NSERC) PromoScience program every year since the program's inception in 2001. In 2005, BMSC's field school program received the prestigious Michael H. Smith award for Science Education in recognition of their continued success in inspiring young people in the pursuit of science. With this funding BMSC provides bursaries to First Nations groups and under-resourced schools and has developed new First Nations-specific programming in partnership with local Huu-ay-aht First Nations. Over the last few years, BMSC's field school program engaged over 6,900 youth, 871 educators and 245 different groups.

Most classes visiting the BMSC are from British Columbia and Alberta (59% and 39%, respectively) and 59% of the students are female. First Nations groups include the local Huu-ay-aht First Nation, Chief Napeweaw Comprehensive School (AB), Lake Cowichan First Nation Youth Group, Ucluelet First Nation, Yellowknives Dene First Nation (NWT), and schools with a large percentage of aboriginal youth including the Bamfield Community School. Any estimate of First Nations youth participation is conservative because it counts only students who self-identified or who were part of field school from a First Nations school, while excluding First Nations students who attended as part of other groups and did not self-identify. PromoScience funding, coupled with private donations and BMSC fundraising, enable the BMSC to host First Nations groups that do not have the resources to travel to Bamfield, let alone pay for programs. Such activity is consistent with the longstanding success of BMSC programs to engage First Nations groups. For almost 30 years, groups attending BMSC have been able to participate in guided tours of local First Nations heritage sites that are part of the local science learning habitats in which the students are studying. For example, Huu-ay-aht First Nation knowledge holders conduct guided tours of the settlement site of Kiixin, a Canadian National Historic Site of the oldest long house near BMSC.

The success of BMSC arises from its longstanding reputation for experiential science learning that inspires youth and teachers across Canada and provides young students an unmatched opportunity to make genuine discoveries in ocean science and Canadian biodiversity in this breathtaking region.



Map of the Bamfield Main Road Location – Port Alberni to Bamfield

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### III. Planning the September 2019 Trip to the BMSC

#### A. Scheduled Logistics

The University takes several required steps when booking a trip to the BMSC. Using a detailed checklist, the Department of Biology manages the related workflow. A summary of the steps used for the field trip of September 13-15, 2019, follows.

January 2019	The department booked BMSC dates for September 2019.
March 2019	The department received confirmation from BMSC regarding booking details and deposit payment deadline, group size confirmation, BMSC vessel reservations, and diet and medical information required by BMSC.
June 2019	The department booked arrangements for transportation to BMSC.
August 26, 2019	The department sent advance notice by email to Biology 184 students about the optional field school to BMSC and its dates.
September 3, 2019	The department sent a follow-up email to students who responded to the advance notice and included additional information about going on the trip as well as what the trip information and registration process would include.
September 5, 2019	<p>At the first Biology 184 class lecture, the department provided all lecture sections with the same information about the BMSC trip.</p> <p>Two chaperones who had been to BMSC previously were identified and it was arranged for them to speak with BMSC regarding arrival logistics (that is, the locations of keys, bedding, and room assignments).</p> <p>The department confirmed whether the bus driver needed one night's accommodation in Bamfield on September 13.</p>
September 9, 2019	Registration day. Students could sign up on a first-come, first-paid basis. Receipts were provided. The group gender breakdown for dormitory accommodation was determined.

September 10, 2019	<p>The department sent an email to trip participants with housekeeping and logistical details for joining the trip.</p> <p>The department activated the inReach satellite communicator for chaperone use. The satellite device's Quick Reference Guide was provided to one of the chaperones. The senior laboratory instructor briefed the chaperones on the use of the satellite device.</p>
September 13, 2019	<p>Trip departure date.</p> <p>The chaperones were provided a trip participant list sorted by first name.</p>

### **Observations**

1. The trip planning checklist is adequate and provides a good basis for ensuring that the appropriate planning steps are taken on a timely schedule.
2. The cycle of notification, information, and registration is compressed because the trip dates occur early in the fall semester. These stages would be more relaxed for trips held at other times of the year.

## **B. Information and Joining Instructions Provided to Students**

The email correspondence sent from the department to the BIOL 184 students contained the following information.

August 26, 2019	<p>Advance Notice of the Optional Field School to BMSC sent to BIOL 184 students containing the September 13-15, 2019, dates, cost of \$240.00 per student, an outline of activity inclusions, a note that the department would provide more trip details on the sign-up day of September 9, and an email address requesting a reply from students who were interested in going on the trip.</p>
September 3, 2019	<p>This second notice thanked students for responding to the August 26 Advance Notice email. Seventy students indicated interest in going on the trip, but the bus can only accommodate 45 students, so group size is limited to that number. Students were notified that a first-come, first-paid registration would open at 7:45 a.m. on September 9. This notice includes an incorrect date stating that dinner is not provided on September 14 when it means September 13.</p>
September 9, 2019	<p>In-person briefing given to lecture groups by the senior laboratory instructor. This included repeating the logistical information provided by email including transportation logistics and departure time; what clothing, bedding, personal and educational items to bring; and what to expect at the BMSC.</p>

September 10, 2019	This was a Notice regarding housekeeping items for the September 13-15 trip and included information that departure time is 3:00 p.m., arrive 15 minutes before departure, take 5-hour drive to BMSC, driver wants to arrive at BMSC before dark, bus would stop for dinner along the way, what meals are included on Saturday and Sunday, time of arrival back at the University on Sunday, clothing and equipment list to bring, notice that some students on the trip have a peanut allergy, request for cursory medical information for BMSC, and lab instructor names.
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### **Observations**

1. The written joining instructions provided to students gives very cursory information about activities that the student will be participating in at the BMSC. The BMSC has a webpage of information specifically designed for university students.
2. The University has guidelines for the administration of Waiver and Informed Consent forms. None were used by the Department of Biology, but the Department of Anthropology does use a version of these forms for their Barkley Sound Archaeological Field School.

### **Recommendations**

1. A detailed information package should be provided to students that includes more information about activities that will be participated in while at the BMSC and a link to the BMSC informational webpage. This should be available prior to the point in which students register and pay for the trip. The in-person information session held in each lecture class is a particularly good practice and should form the basis for a more comprehensive written information package.
2. The University's procedures for the administration of Waivers and Informed Consent should be reviewed and departments informed as to what is correct process, form structure, and content.

## **C. Trip Schedule and Arrival Time**

BMSC hosted 112 field school groups in the 2018-19 fiscal year with 16 groups being from universities. Group size averaged 30 students, plus educators, and totaled approximately 3,400 participants.

Only eight groups out of 112 (7%) arrived later in the evening in the 2018-19 fiscal year; the University of Victoria accounted for two of these groups.

### **Observations**

1. The University of Victoria is in a small minority of schools who arrive to the BMSC after dark. Given the University's proximity to the BMSC, it seems reasonable to expect the University's groups to be able to arrive during daylight hours. This would require leaving Victoria by at least 12:00 noon and adhering to an organized and disciplined travel schedule.

### ***Recommendations***

1. The University should ensure that all future trips to the BMSC travel to and arrive during daylight hours.

## **D. Emergency Contact Information**

During the response to the September 2019 bus accident, the University had a student class list available but did not have complete emergency contact information for families of students. This omission delayed emergency responders' determining the location of some students, and the University's attempting to contact parents and families. The lack of readily available emergency contact information caused much confusion and angst among University staff and families. Some students arranged their own rides directly from Port Alberni to their homes, or those of relatives or friends. The police and the University lost track of where some of those students had gone. Numerous student cell phones were lost at the accident site which compounded the difficulty locating students.

Although the opportunity to collect this information is present in the University's general student registration systems, it is described as optional; therefore, if students do not fill this out, there is not adequate emergency contact information. The University spent many hours compiling emergency contact information after the accident occurred.

### ***Observations***

1. Emergency contact information is crucial information during emergency response.

### ***Recommendations***

1. The University should require the collection of emergency contact information for each student.

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## IV. Risk Management

Operating university field schools necessitates conducting a hazard assessment for each specific trip and developing a complementary hazard control program (risk management program). These can be simple or detailed depending on the complexity of the field school. At appropriate decision-making points, identifying specific activity hazards, building scenarios, and implementing actions is intended to mitigate each hazard and scenario.

The discussion that follows provides context and framework for much of the content that follows later in this document.

### A. Decision-Making Points

Conducting field schools requires intentional decision-making on the part of the University and host department at a variety of logical **decision-making points**. These include:

1. Initial planning stage. During early planning, decision-making, and consideration about field trip activities and location, an assessment of the educational merits of the trips and a hazard assessment and control (risk management) program is developed, along with standard operating procedures. Some organizations have an administration- or faculty-level approval process (centralized) for planning first-time field schools, while others leave this to the host departments to carry out (de-centralized).
3. Annual adoption of a recurring trip. When making the decision to adopt a previously planned itinerary for the coming year, factors that may change from year to year are considered. This may include, for example, changing conditions from summer to winter seasons, impacts of weather from rainy to dry, or changes in key staff or field school location.
4. Proximate decisions. This decision point occurs immediately prior to the beginning of a field trip, generally within a few days of its start date, to assess and consider whether there are any macro or department level influences that would impact running the trip. For example, a ski trip might assess avalanche conditions or expected temperature, while an international cultural exchange trip may consider recent events in the foreign country.
5. On-site decisions. This decision point occurs during the field trip. Decisions are made by staff or service providers who have authority to amend itineraries and make program adjustments as necessary. For example, it may become necessary to make on-site itinerary or program changes or provide initial response to events or emergencies.

For recurrent field schools such as those to the BMSC, the goal is to achieve initial planning that is extensive enough to create standard operating procedures that apply from trip to trip. These may include the following: implementing consistent registration procedures, adopting adequate communication protocols, contracting a consistent transportation provider, developing a suitable staffing structure, and ensuring staff familiarity with program activities. This needs to be reviewed annually. From there, the focus will shift to proximate and on-site program-level decision-making.

### **Observations**

1. The Department of Biology may have conducted initial risk management planning and documentation in the early stages of adopting trips to BMSC, but even if so, that was done a long time ago. A renewed and concerted hazard assessment and control program would assess current programming of field trips to the BMSC.
2. Department of Biology staff need to conscientiously make proximate decisions within a few days of BMSC field schools and ensure that on-site staff have enough rank to be able to make appropriate on-site decisions.
3. Department of Biology staff refer to the leaders of the September 2019 BMSC field school as chaperones, group leaders, and teaching assistants, and this creates confusion. The actual roles and responsibilities associated with each of these different titles varies widely.

### **Recommendations**

1. The Department of Biology should renew the BMSC field school hazard assessment and control documentation. See Appendix 2 for a template.
2. University Administration should provide direction to departments regarding suitable field school supervision standards, terminology, and group leader qualifications.

## **B. Hazard Assessment and Control (Risk Management) Program**

An effective method for identifying and controlling hazards is paramount to developing a field school risk management program. This is followed by the application of planned actions intended to prevent and address these hazards.

A **hazard assessment and control (risk management) program** assesses the activity being undertaken, identifies hazards specific to that activity, and plans actions to eliminate, reduce, or control the hazard. This includes:

- Decisions **not to engage** in an activity; for example, a decision not to drive the Bamfield Main road in certain road conditions.
- Actions taken to **reduce the likelihood (frequency)** of incidents; for example, contracting a professional transportation provider and driver, or using vehicle-to-vehicle radio communications.
- Actions taken to **reduce the consequence (severity)** of incidents; for example, choosing to wear seatbelts and carrying appropriate First Aid and communication equipment.
- Actions taken to **inform participants of trip activities and hazards** and to receive acknowledgement that participants understand these; for example, identifying the well-known program hazards such as falling on seaweed-strewn rocky beaches, the risks of falling into cold ocean water, and the need to wear personal floatation devices to keep from drowning.

Once hazards are identified, hazard control solutions then tend to fall under the following general categories:

- **Eliminating actions:** removing the hazard from the trip or substituting the activity with a less hazardous one; for example, deciding not to engage in an activity.



- **Engineering solutions:** implementing modifications that alter the way the trip is done, including equipment, communications, and processes that reduce the exposure to risk and that allow appropriate incident response; for example, implementing vehicle-to-vehicle radio communications.
- **Administrative decision-making:** implementing controls that alter the way the trip is run, including timing of itineraries, standard operating practices, and operational procedures; for example, implementing a policy to contract travel to a professional transportation company, or to travel only in daylight hours.
- **Using Personal Protective Equipment (PPE):** requiring that appropriate equipment be worn or used by individuals to reduce exposure or consequence; for example, wearing seatbelts on buses, personal floatation devices in boats, or goggles when appropriate in the lab.

### **Observations**

Applying the concepts above to recent University of Victoria trips to the Bamfield Marine Sciences Centre lead to the following reasonable observations:

1. Actions to reduce the likelihood of incidents were taken through the engineered and administrative solution of chartering a professional transportation company and driver to transport students to the BMSC. The assumption made was that contracting this service would provide a higher level of safety than having University staff or students driving numerous 15-passenger vans or smaller University-owned buses to the BMSC. Even after considering the September 2019 accident, this is still a valid strategy.
2. While the likelihood (frequency) of a bus accident was low, and administrative actions such as chartering a commercial bus and driver were put in place to mitigate transportation hazards, the consequence (severity) of this accident was serious. It could be that an earlier bus incident in Bamfield, using Wilson's Transportation as the provider, should have created pause about continuing to use this firm, but that was a very different type of incident and it would be logical to conclude that Wilson's, as the transportation provider, would have made any operational adjustments necessary.
3. Actions to reduce the consequence of incidents were taken by the engineered solution to improve communication along the road by taking a satellite communicating device. This was an SOS device and did not have voice capability, so it is not the best alternative, but in its defense, it was the technology used to notify the University of the September 2019 event.
4. Actions to reduce the consequence of incidents with personal protective equipment, that is, by wearing seatbelts were not taken. Students were not required by the transportation company to wear seatbelts even though the bus was equipped with them.
5. Actions to reduce the likelihood of incidents were not taken by administrative decision-making to control the time of departure, keep to a daylight itinerary, undertake a hazard assessment, or make use of resource road VHF radio protocol.
6. Actions to reduce the consequence of incidents were not taken by administrative decision-making to have a planned emergency response, a readily available emergency contact list, or an extensive First Aid kit at the scene.

7. Numerous administrative and engineered actions on the part of the BMSC could be implemented to assist their clients getting to the BMSC.

### **Recommendations**

1. The University should update their BMSC field school hazard assessment and control program. See Appendix 2 for a sample hazard assessment of a field school to the BMSC.

## **C. Standard Operating Procedures**

It is customary for an institution to develop standard operating procedures before running a field school. Like the hazard assessment and control process described above, operating standards that can be applied consistently from year to year should be developed. This still requires an occasional review to assess currency; making proximate and on-site decisions may be also still be necessary.

Standard operating procedures could include the following:

- Being familiar with BMSC's operating procedures and activities for field school, recognizing the BMSC as an expert subject matter provider
- Determining what constitutes the target student group for the field school
- Developing trip planning and logistics checklists
- Developing student and group equipment checklists
- Providing appropriate educational materials and joining instructions about the trip to students
- Gathering necessary personal, medical, and emergency contact information from students
- Adopting suitable transportation methods
- Adopting suitable communication systems
- Determining suitable staffing ratios and qualifications
- Applying appropriate decision-making points, planning timelines and trip itineraries
- Planning suitable emergency response protocols in the event of an incident
- Ensuring students are covered by their own or university insurance programs for field school activities
- Considering incident likelihood and consequence through scenario planning; that is, what are the most likely and most consequential events that could happen?

### **Observations**

1. There is a lack of written, department-specific standard operating procedures, and while some of the above topics have been covered by the University, there are gaps that should be addressed.

## **Recommendations**

1. A refreshing of BMSC field school planning is necessary and should be carried out by the Department of Biology and approved by the University's Administration.

## **D. Scenario Planning**

Scenario planning is part of the hazard assessment and control process and is the anticipation of a set of uncertainties, or “different realities,” of what could happen on a specific field school. This is an exercise that enables field school planners to develop scenarios of reasonably foreseeable incidents, create a mock-up concept of what the incident might be, and anticipate what an adequate response might entail for different scenarios.

While there is some subjectivity regarding how events might be categorized by one person or another, there are four possible categories of scenarios to prepare for:

1. High likelihood-high consequence. These are not justifiable risks in an educational setting, so educators should choose not to engage in them. Expecting high consequence events on a frequent basis would not be tenable for any type of education programming.
2. High likelihood-low consequence. For these types of events, the most likely, frequent incidents are identified, and programming and risk management practices are adjusted to reduce their likelihood. For example, previous programming might demonstrate that slips and falls on slippery seaweed-covered rocks along a certain beach causes numerous incidents. This would then be accompanied by defining an adequate response that includes use of appropriate footwear, communicating informational warnings to participants, and considering the possibility of moving the activity to a different location.
3. Low likelihood-high consequence. The September 2019 bus accident falls within this category – not likely, but with high severity. While recognizing the remote chance of these types of incidents happening, the high consequence potential dictates the need to prepare for and implement an adequate response if they do occur. Controls are implemented to reduce the potential consequence if they were to occur, for example the transportation company requiring seatbelts. High consequence events are to be avoided at all costs and stringent efforts implemented to prevent them. Quality response planning is necessary.
4. Low likelihood-low consequence. In scenarios in this category, we accept that these are accepted as part of day-to-day programming and absorbed into daily operations. Like the slippery rock beach example above, logical educational progressions, attentive leadership, and appropriate personal protective equipment are commonly used as preventative measures.

## **Observations**

1. Multiple low likelihood-low consequence events, if left unchecked, can evolve into high consequence events. For example, a combination of ill-equipped students, deteriorating and inclement weather conditions, poor and exposed route selection, inadequate group control, and poor leader judgment can combine to form a high-consequence, deadly hypothermia incident. The first two of these hazards (ill-equipped students, deteriorating and inclement weather) are external environmental hazards, while the last three (route selection, group control, and judgment) are subjective leadership hazards. While any one hazard in and of itself might be

considered a low-level influencer, when the hazards combine they create the potential for a predictable and typical high-consequence event – typical because many high consequence events are caused by the aggregation of many smaller influencers into one large, serious incident. Eliminating one or more of the influencers can change the outcome.

2. Low likelihood events will not occur often, if at all, over the lifetime of a program; but if they are of high consequence, their occurrence will have serious impacts. The high likelihood-high consequence incidents are often more readily recognized and obvious – so they can present less of a real risk to the organization. The lower consequence events can generally be dealt with by competent group management, and safety systems can be implemented at the program level.
3. Terminology. Likelihood equals frequency and consequence equals severity. The terms are interchangeable. The combination of likelihood (frequency) and consequence (severity) equals the level of risk.

### **Recommendations**

1. The Department of Biology should work with the BMSC to undertake a scenario planning exercise that looks at possible events at the BMSC and ensures that appropriate prevention and response systems are in place for each hypothetical event. Scenario planning is articulated in a hazard assessment and control document (which could also be called a risk management plan).

## **E. Emergency Response for Field Schools**

The University of Victoria has several well-written documents, such as the Critical Incident Response Procedures, Critical Issue Response Coordination Protocol for Executive, and Emergency Response Plan. These documents do a good job describing on-campus response, as follows:

- Framework for response
- Response team structures
- Roles and responsibilities
- Activating plans
- Critical incident response procedures
- Notification systems
- Emergency Operations Centre structure

### **Observations**

1. The University's existing emergency response planning documents are aimed primarily at responses to on-campus incidents and lack defined responses to field school or off-campus incidents.
2. Field school emergency response plans would include some slightly different topics than campus-response plans might; for example, urgent and remote accidents, response team structure, protocols for gathering information at remote accident sites, communication systems

for remote accident sites, organizational structure for managing remote accidents, integrating with external response agencies, and agency contact numbers.

3. The lack of a pre-planned field school response was apparent in the initial response periods of the September 2019 bus accident, and a more efficient and appropriate response in the initial stages would have been possible.

### **Recommendations**

1. The University's emergency response planning documentation should be reviewed and amended to better facilitate field school and off-campus emergency response.

## **F. Equipment and Training**

A university field school needs to ensure that appropriate clothing and personal protective equipment (PPE) is available to participants. Some of this, such as personal clothing and sleeping bags, for example, will be provided by participants, while items such as personal floatation devices and field and lab equipment will be provided by the university or service provider.

In addition, institutions need to ensure that appropriate group emergency response equipment is available, such as First Aid equipment designed for the size of group and suitable communication devices. Whether provided by the university or a service provider, the crucial considerations are appropriate planning and availability when needed, along with someone who knows how to use it. Field school group leaders should receive First Aid training and learn how communications equipment works.

In this case the teaching assistants were given a brief lesson on the DeLorme satellite communicator before the trip, and they carried the instruction manual with them. This doesn't mean they were familiar with its use or could reasonably predict what would happen when used.

### **Observations**

1. Emergency response equipment on the September 2019 trip was cursory at best, and the University needs to revisit what is taken along on field schools.
2. The contract with the transportation provider required the transportation provider to provide a satellite telephone. There is no evidence that this was on-site or used in the response.
3. The University or transportation provider should provide a VHF radio on the appropriate resource road frequency, obtain permission to use it, and implement resource road radio call point procedures.
4. Whenever it is possible, voice communications are infinitely better than relying solely on an emergency satellite transmitter, and voice communication strategies should be prioritized.

***Recommendations***

1. The University should evaluate the level of emergency response equipment carried on field schools and the level of training required of group leaders.
2. The Department of Biology should be more attentive to the terms included in service provider contracts, ensure the terms are appropriate and consistent, and check to see that contracted services are provided.

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## V. Communications

The University's field school group leaders should have access to appropriate communication systems on field trips. Cell phone, satellite telephones, and other satellite communication devices are all reasonably priced and institutions cannot readily justify not having them. In the case of BMSC field schools these will be useful during travel to the Centre as well as being available during terrestrial and water-based program activities while at the Centre.

Once departing from Port Alberni, the two-hour drive to Bamfield has no cell phone coverage. Most of the program activities at BMSC would also not have cell phone coverage because there is poor coverage at the Centre and at locations where most of the on-water and terrestrial program activities take place.

The fact that the University carried a satellite communicator demonstrates foresight; much of the local and commercial traffic does not carry a similar device.

### A. Satellite Telephones vs. Satellite Communicators

The September 2019 University of Victoria trip was supported by a DeLorme (Garmin) inReach SE satellite communication device that was purchased by the Department of Biology in October 2017. This inReach device uses Iridium satellite technology to enable sending an SOS message to a 24/7-staffed Houston-based Emergency Response Centre (ERC). It also allows for sending text messages to other contacts.



There is much confusion within the University about this device with many staff calling it a telephone. It is not a telephone because it does not have voice capability; it only provides SOS notification and text capability. This device did work on September 13 and is how the University found about the bus accident: through a phone call from the Texas-based ERC to University Campus Security. On-scene personnel (group leaders and students) were unfamiliar with the device and did not think it worked at the time, though it did.

Satellite devices have some operational limits because they must have good “visibility” of the sky. Trying to communicate through heavy forest canopy or hills impacts their ability to reach a satellite. Because satellite telephone devices need to transfer voice data in two directions (duplex) they tend to be less reliable than a one-direction SOS satellite communication device (simplex) that transmits only an emergency signal and location to an ERC.

The University of Victoria's inReach SE Satellite Communicator



While the telephone is much better than the SOS device because of the ability to communicate by voice, devices like the inReach satellite communicator have more connectivity. Some also have texting capability to landline or cellular telephones. As telephone and satellite technology continuously improves, the reliability of satellite telephone connectivity also improves, and the University should stay up to date.

### **Observations**

1. As foresightful as it was to carry the inReach device on this trip, a satellite telephone, accompanied by an appropriate telephone call list, assuming it could connect, would have reduced the response time and confusion that was associated with this accident. On-scene personnel would have been able to talk directly to University administrators and security staff without the time that was lost through the Houston-based ERC trying to find an appropriate person at the University to talk to, on-scene personnel would have been able to raise the level of urgency at the University that was not adequately absorbed by Campus Security using the inReach device, voice communication would have been immediate and ongoing directly to the accident scene, and significant time would have been saved by on-scene personnel not having to drive to where there was cell phone coverage to call emergency responders.
2. The east-west orientation of the Bamfield Main road, combined with hills and forest cover to the south, may have blocked a satellite telephone from connecting to outside emergency contacts. By carrying the inReach device the University recognized the risks associated with BMSC field schools. The University may decide to carry both types of satellite communications devices in the future.

### **Recommendations**

1. The University should review its communication protocols for BMSC field schools and provide satellite telephone technology when possible. It may be necessary to carry out first-person research about where this technology works on the Bamfield Main road and where it does not. This could be mapped.

## **B. VHF Radio Use on Resource Roads**

British Columbia has thousands of kilometres of forest service (resource) roads used by forestry and other resource industries, commercial transportation, and the general public. Many vehicles on these roads utilize VHF mobile 2-way radio communications to help anticipate when they will encounter other road users and, thereby, avoid collisions.

A radio communications protocol has been implemented on British Columbia resource roads. The protocol consists of a set of dedicated VHF radio channels, standardized call procedures, and signage. The road to Bamfield falls under this VHF radio protocol, and the University, as well as transportation companies, should be using these radios. Calling procedures are posted on a road information sign at the start of the road, the VHF radio frequency to use is posted at the start of the road, and call-point signage (when to radio) is installed along the length of the road.

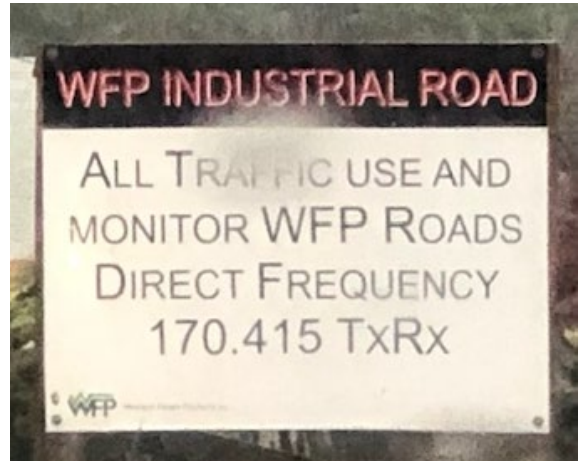
The bus transportation company, West Coast Trail Express (WCTE), provides daily transportation between Victoria and Bamfield from May 1 to September 30 (<https://trailbus.com/>). Although WCTE carries a satellite communicator, they rely almost entirely on VHF radio communications on the Bamfield Main road and state that almost always during evenings and weekends someone is monitoring the radio frequency.

## VHF Radio Calling Procedures

If radio calling procedures are posted on the road being travelled (which they are on the Bamfield Main road), the posted procedures shall be followed. In the absence of posted procedures, follow normal resource road call point procedures which specify calling road name, location, and direction of travel. Travel in the direction of increasing kilometres is called as the “Up” or “Unloaded” direction (that is, going toward Bamfield) and travel in the direction of decreasing kilometres is called as the “Down” or “Loaded” direction (that is, going toward Port Alberni); use of either term is permissible. The VHF radio frequency for the Bamfield Main road is 170.415 MHz.



Sample Call Point Sign on the Bamfield Main Road



Western Forest Products Bamfield Main Road Radio Frequency Sign (with raindrop)

The default call order (unless otherwise posted) for all resource roads is as follows:

1. Road name (Bamfield Main).
2. Location. Call at every other km mark starting with 0 km (that is, every 2 kilometres).
3. Direction of travel (“Up/Unloaded”) or (“Down/Loaded”).
4. Number of vehicles if travelling in a convoy.
5. Vehicle type (optional).

### **Observations**

1. Implementing VHF radio calling procedures may not have prevented the September 2019 bus accident. Local resident use of VHF radio is highly variable on this road and it is not known if the passenger vehicle the bus met was radio equipped. However, this should be considered a standard operating procedure.

### **Recommendations**

1. The University should ensure that VHF radio vehicle-to-vehicle communications are implemented on the Bamfield Main road. This will entail acquiring the proper radio equipment, a licensed radio operator, and permission from Western Forest Products to use the posted radio frequency.

## C. Western Forest Products Web Page

Western Forest Products (WFP) maintains a WFP Industrial Road Information web page (<http://www.wfproadinfo.com/>). While the page covers numerous other WFP work areas, there is a link on this page for the road to Bamfield. Road conditions may change quickly, and the information on this site might not be current, but it is an attempt by WFP to provide a venue for sharing information about the road. The site provides a map of the road location, notices of open or closed road sections, current road status, status of logging truck activities, road grading condition, locations of road and bridge work being completed, and the date and time of the update.

The web page is updated by Twitter using @WFPRoadInfo and with the #Bamfield hashtag. This site provides relatively current information about the road condition and is a good reference for field schools who are travelling to Bamfield.

### ***Observations***

1. The idea of a live webpage that contains current road information is a good one. The WFP Road Information page provides the most public source of road information, but many road users will not know it exists.
2. There is interest on the part of the BMSC in creating a central hub for Bamfield Main road information. This could function in conjunction with the WFP site.

### ***Recommendations***

1. The WFP web page relies upon the occasional Twitter postings of WFP staff. A way to ensure these posts are current and posted at least daily should be found.

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## VI. Transportation

### A. Bus Transportation

There is much discussion of whether a bus is an appropriate mode of transportation on the Bamfield Main road, and if so, which type of bus is best. In this case, the Premier of British Columbia, who is for all intents and purposes the head of the Insurance Corporation of British Columbia, entered the conversation. Irrespective of that, the reality is that for numerous decades a wide variety of commercial transportation providers have driven thousands of groups on the Bamfield Main road without serious incident.

There are two main transportation companies who provide bus service to the BMSC, Wilson's Transportation Ltd. and West Coast Trail Express.

**Wilson's Transportation Ltd.** is a Vancouver Island transportation company that has been in business for close to 60 years. They are Vancouver Island's largest charter transportation company with over 140 vehicles in service. The University of Victoria, and many other school and university groups, have used Wilson's charter buses to transport students to the BMSC for many years. They are a long-standing and experienced bus transportation provider that has transported many groups to Bamfield. Within the scope of their normal operations, Wilson's Transportation Ltd. provides transportation on many Vancouver Island resource roads in addition to the Bamfield Main road. They transport hundreds of groups on resource roads per year.

**West Coast Trail Express** have over 30 years of experience driving the Bamfield Main road daily between May 1 and September 30 each year. They operate daily shuttle bus services between Victoria to Bamfield. They also provide year-round charter bus service as well as hiking equipment sales and rentals, primarily for West Coast Trail and Pacific Rim National Park hikers.

The following observations can be made about bus transportation to the BMSC.

#### **Observations**

1. It has been possible to safely drive buses to the BMSC over a period of many years without incident. The September 2019 accident was very unfortunate, and both operators have driven thousands of similar trips without another serious incident. Wilson's Transportation Ltd. drives this road over 70 times per year, while West Coast Trail Express drives the road over 100 times per year.
2. Wilson's Transportation Ltd. has a wide variety of bus types from which to choose, and the choice is at least partially determined by the size of bus the client requests. The primary bus used by West Coast Trail Express is the Thomas Transit-Liner C2. This vehicle is heavily built, is more like a school bus than a highway bus, makes use of school bus style safety features, and includes seatbelts.

3. The road is extremely hard on buses. Radiator leaks, broken windows, flat tires and breakdowns are common. New highway buses cannot be used on the road because the rough road breaks the buses' cosmetic features.
4. Buses with air suspension provide a smoother ride but may not give the driver the same feel for the road as a bus without air suspension. However, both air suspension and non-air suspension buses are used.
5. The road is rough but not dangerous when driven with care and to the speed appropriate for changing road conditions. The September 2019 accident was not due to excess speed.
6. Bus drivers for charter groups are service providers and are not in charge of the group schedule or group discipline. They are responsible for transportation safety. Charter group leaders dictate the schedule, stops, duration of stops, and group discipline. This is slightly different on summer daily scheduled West Coast Trail Express trips where the company itself is responsible for the schedule, as well as transportation safety.
7. The posted speed limit on the Bamfield Main road (by WFP) is 70 km/hr but company policy for both firms (as well as the BMSC) does not allow drivers to exceed 60 km/hr on the Bamfield Main road. Most of the time, due to rough road conditions, they do not drive as fast as 60 km/hr.
8. While West Coast Trail Express carries a Garmin Satellite Communicator text device, they rely almost exclusively on VHF radio on the Bamfield Main road, where daily, evening, and weekend communications are generally available during the summer months. This enables the driver to know where other commercial vehicles are.
9. Darkness does make a difference to drivers on the Bamfield Main road. Few organizations who charter from transportation providers want to drive in the dark, but some feel they need to do so for logistical reasons, that is, they cannot otherwise get to Bamfield in one day without overnighting along the way; for example, groups travelling from Alberta or the British Columbia interior.
10. Most local residents driving the road do not pull over or yield to commercial vehicles or transport buses.
11. The September 2019 accident is a very unfortunate "one-off" accident, and such accidents are not a frequent occurrence. Over the past 30 years neither transportation business has observed other single-vehicle bus accidents on the Bamfield Main road. They see more accidents on the paved roads leading up to the gravel road, and most accidents involve local residents in personal vehicles. The only other bus accident West Coast Trail Express has observed in the past 20 years is when a bus collided with a logging truck – which was a radio call point issue. An earlier incident that occurred a number of years ago, involving Wilson's Transportation Ltd. and University of Victoria students, occurred in the Bamfield townsite area and not on the Bamfield Main road proper.
12. Making procedural changes to bus charter transportation to the BMSC may not significantly impact the likelihood of future incidents. The number of incidents will remain very low. However, the goal must be to have zero incidents.

## **Recommendations**

1. In many ways, the basis of this report revolves around an evaluation of whether buses are suitable transportation vehicles for groups on the Bamfield Main road. Buses clearly are and can be used safely when driven appropriately to road conditions, with driver spatial awareness, during daylight hours, with care, with enforced travel itineraries, and with applicable communication and safety technology. These factors are those that should be applied by the University for future transportation needs.
2. Recognizing that charter transportation companies are not in charge of schedules, trip itineraries, or group discipline and enforcement, the University should develop bus transportation protocols and be sure that appropriate staff are on the bus to implement their use. The University should not look to the driver to enforce these procedures but should contract transportation providers who can provide what the University needs in order to achieve them, including safety equipment and seatbelts. These protocols will include such things as pre-determined itineraries, decision-making that adheres to these itineraries, resource road radio systems, and arrival during daylight hours, among other topics.

## **B. Marine Passenger Service to the BMSC**

Lady Rose Marine Services operates the motor vessel Frances Barkley from Port Alberni to Bamfield. This is a year-round service. The MV Frances Barkley is a cargo and passenger vessel with passenger capacity of 144 persons. There are three scheduled round trips per week. Charter rates are available for group charters on the remaining days of the week.

**Charter cost** is two to three times higher than charter bus costs from Victoria to Bamfield and group discounts are not given. Estimated cost of a round trip charter from Port Alberni to Bamfield is \$795.00 per hour x 7 hours x 2 trips (to and from Bamfield) = \$795.00 x 14 hours = \$11,130 + taxes. In addition to this, road transportation (by bus) to and from Port Alberni would still be required.

**Scheduled sailings** of the MV Frances Barkley are on Tuesdays, Thursdays, and Saturdays at a round trip cost to Bamfield of \$85.00 per passenger. Scheduled sailings to Bamfield leave Port Alberni at 8:00 a.m. which, for groups from Victoria, would require an overnight stay in Port Alberni the night before. Return to Port Alberni is at 5:00 p.m., after which an evening return trip to Victoria would be required.

Transporting groups by the MV Frances Barkley requires the following:

- At least a 14-hour charter at \$795.00 per hour plus tax
- Bus transportation to and from Port Alberni from Victoria
- Overnight accommodation in Port Alberni in order to catch a morning ride to Bamfield
- Lengthening the trip schedule by at least one night and day

## **Observations**

1. If the University is averse to driving the Bamfield Main road in the future, using the MV Frances Barkley is a viable, although more expensive, marine transportation alternative. Using the ship necessitates bus transportation on paved highways to and from Port Alberni and overnight

accommodation in Port Alberni. The BMSC has arranged low-cost dorm style accommodation in a Port Alberni school gymnasium (mattress provided) which may be workable.

2. Using the MV Frances Barkley's scheduled departures to Bamfield is economical but would mean changing the current Friday departure day to early Tuesday, Thursday, or Saturday morning, necessitating an overnight stay in Port Alberni the night prior.
3. The current Friday to Sunday field school itinerary for BIOL 184 has the appearance of a very short program, and it may be worthwhile for the Department of Biology to reconsider the length and schedule of the BIOL 184 field schools to the BMSC. This trip is the field school highlight for first-year biology students, demand is high, and depending upon how the trip is run, increase in costs may be small.

Two possible, but expanded, alternative schedule examples are included here:

- A Saturday to Tuesday itinerary over a holiday weekend could make use of the Frances Barkley with the addition of one more night and day at the BMSC and one overnight in Port Alberni. Bus transportation from Victoria to Port Alberni would still be needed on Friday evening and from Port Alberni to Victoria Tuesday evening. On the current itinerary, which goes to the BMSC on Friday, students miss Friday afternoon classes; on this new itinerary, students would miss Tuesday classes. This itinerary enables the use of the regularly scheduled Saturday and Tuesday Frances Barkley service and net savings on bus charter could be used to offset the cost of passenger fare on the MV Frances Barkley. Programming time spent at the BMSC expands from the current 1.5 days and 2 nights, to 2.5 days and 3 nights.
- A Saturday to Monday itinerary on non-holiday weekends could make use of the MV Frances Barkley's posted schedule on Saturday and a bus charter on Monday. This would entail a Friday evening charter from Victoria to Port Alberni, an overnight in Port Alberni, scheduled MV Frances Barkley trip to the BMSC on Saturday morning, chartered MV Frances Barkley from Bamfield to Port Alberni on Monday, and a bus charter on Monday from BMSC to Victoria. The programming time spent at the BMSC expands from the current 1.5 days and 2 nights, to 2 days and 2 nights.

### ***Recommendations***

1. Using the MV Frances Barkley may be useful for some University of Victoria field schools, and a review of a variety of schedules using this ship should be carried out.
2. There is still a significant amount of trauma for some students and families over the University of Victoria's mode of transportation to the BMSC. The next scheduled field school to the BMSC may be associated with the anniversary of the September 2019 accident and create similar impacts. The alternative is to use very conservative bus transportation methods as described in the Conclusion of Part A of this report. University counsellors who are working with the students presently will be able to give some perspective on student reaction to bus transportation in the short term.



## C. Fifteen-Passenger Vans

Over the period of many years there has been much discussion about using 15-passenger vans to transport groups. Numerous 15-passenger van accidents have led the United States Department of Transportation National Highway Traffic Safety Administration to issue warnings about the use of these vehicles. Many organizations in both the United States and Canada have banned their use. After a 2008 Bathurst High School accident where a van collided with a semi-trailer truck and seven students and a teacher died, New Brunswick, and some other provinces banned 15-passenger van use by schools. Nova Scotia had already previously banned 15-passenger van use from transporting students. No such ban exists in British Columbia.

Some observations about the use of 15-passenger vans are as follows:

- Many of the accidents, including the Bathurst High School accident, were found to be due to road conditions, tires in poor condition, and driver error, not in the vehicle design itself.
- The weight distribution of single rear-wheel 15-passenger vans concentrates the weight of the fuel tank and passengers over the driver's side rear wheel, that is, over one rear tire. Combined with the extra weight and raised center of gravity resulting from a roof rack full of equipment, potential for tire blowout and roll-over is high. Numerous organizations have been using a dual rear wheel axle conversion available for these older model vans that prevents vehicle rollover and rear wheel blowouts.
- Recent redesign of vehicles, like the new Ford Transit van, may include dual rear wheels and all-wheel drive, making this a much safer vehicle and an ideal choice for transporting groups over roads such as the Bamfield Main road. This vehicle can take 15 passengers and equipment inside and does not require roof rack storage. Some universities and commercial groups are now using these vehicles, including the Thompson Rivers University Adventure Studies Department which has a fleet of them.
- Users of older model 15-passenger vans can find a series of safety precautions developed by the United States Department of Transportation National Highway Traffic Safety Administration at <https://www.nhtsa.gov/road-safety/15-passenger-vans>.



Ford Transit 15-Passenger Van

***Observations***

1. Even with the above discussion, the use of dual rear wheel, all-wheel drive, 15-passenger vans would not reduce the risk of transporting 45 students to the BMSC. The University would then need three vehicles to transport the same number of students, thus increasing the level of exposure resulting from one commercially driven bus to that of three vans. Additionally, it is not likely that the University would have the in-house expertise to provide three professional drivers with the necessary skills and road experience to safely drive the Bamfield Main road.

***Recommendations***

1. Transportation methods to the BMSC should make use of professional charter bus companies or the Lady Rose Marine Service and the MV Frances Barkley.

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## VII. An Increased Role for BMSC

As the destination for marine science research and educational programs, the BMSC staff have local knowledge, expertise, and experience to make safety recommendations related to travel and communications for clientele of the Centre. To date, this knowledge has been underutilized, and the University should work with the BMSC to disseminate the BMSC staff's knowledge to the benefit of as many clients as possible, including universities, schools, tourists, and visitors to Bamfield, as well as local commercial suppliers.

The following points represent the BMSC staff's suggestions as to how they could help client groups provide safer field school programs. The points follow two main themes, transportation and communications.

- **Road Safety Improvements:** BMSC is recommending that the Province adopt the road improvement recommendations from the Bamfield Road Reconciliation Group. The BMSC ownership group should throw their weight behind these recommendations.
- **“Real-time” road condition communication with BMSC:** Current communication about the road is relatively limited to a Facebook Page maintained by the community and WFP's Twitter feed site (<http://www.wfproadinfo.com/>). BMSC is recommending that all clients liaise with dedicated BMSC staff before leaving on their trip to the Centre to receive an update on road conditions. BMSC is exploring production of a dedicated webpage to centralize this information.
- **Time and seasonality of travel:** Groups should restrict travel to and from Bamfield to daylight only. Although 95% of field school groups have typically arrived by 6:00 p.m. in the past, BMSC is recommending that all travel occur during daylight hours only. BMSC also recommends considering seasonal influences on travel, with the main season being between March and October (8 months).
- **Vehicle evaluations:** All vehicles should be properly equipped for travel on the Bamfield Main road. For example, vehicles should be equipped with standard safety equipment, spare tires, seatbelts and mechanisms of communication (e.g., satellite telephones and/or satellite communicator, VHF radios with permission to be on WFP call point channel). Drivers should require seatbelts to be worn.
- **Alternative forms of transportation:** BMSC has been working closely with the MV Frances Barkley to facilitate ferry traffic when required. Off-season winter groups should consider travel by the MV Frances Barkley. This also provides an option when road conditions are not favourable.
- **Driver road familiarization:** Any driver (bus or otherwise) conveying students should be familiar with the Bamfield Main road, its condition, risks, courtesy protocols, and communication challenges prior to driving students on the road. BMSC could provide this orientation.
- **Safety Orientation and Practice:** Any school or university group leader planning a visit to the BMSC should participate in a pre-trip safety orientation with BMSC staff to discuss and assess hazards associated BMSC programs and explore travel and communication options on the Bamfield Main road. This could include hazard assessment training for staff and researchers by

the BMSC, and completion of an approved Field Level Hazard Assessment (e.g., including evaluations of vehicle, driver qualifications, route conditions, logging operations orientation) and associated controls.

- As background related to this topic, no new staff at BMSC are allowed to operate any vehicle without a check-out by experienced BMSC staff. Due to the operating environment, a valid driver's license in itself is not considered to be sufficient qualification. Staff are instructed on Bamfield area road hazards and safety, VHF radio use, location of road-side emergency equipment, tire changing, and vehicle jacking safety. Staff need to have experience in the environment before operating vehicles.
- **Terrestrial Trip Plan:** BMSC recommends requiring a pre-trip vehicle check before any passenger-carrying trip, and developing a corresponding BMSC program activity trip plan that includes trip itinerary, the hazard assessment and control program, and a communication plan (e.g., check-in and call points, similar to WFP's standard operating practices and VHF radio calling procedures described above).
- **Cancellation Policy:** When evidence cannot be provided to BMSC that the previous recommendations have been fulfilled, BMSC suggests that it should have the right to refuse or cancel a booking.
- The BMSC has arranged for **dorm-style accommodation** in a Port Alberni school gymnasium, mattresses included, and are willing to facilitate this for groups. This may be an economic alternative for groups needing to stay in Port Alberni the night prior to catching the MV Frances Barkley to Bamfield the next morning.

### **Observations**

1. The BMSC could provide a valuable and expert source of information about conditions on the Bamfield Main road and the role it plays serving its clientele needs to be expanded. As the local field school service provider, the BMSC is best situated to provide timely and expert advice to its clientele with a wider scope of safety-related services.
2. In addition to the suggestions made by the BMSC staff above, adding a pilot car and driver in front of the bus on the Bamfield Main road section when the bus is carrying students is an option discussed by the Department of Biology, bus transportation providers, and BMSC staff. This could be provided by the University, transportation company or by the BMSC. If provided by the transportation company it would likely be uneconomical. If provided by the BMSC, BMSC's regular day-to-day business in Port Alberni could be scheduled to coincide with bus trips to and from the Centre. This would serve to supplement current protocols for bus transportation to the BMSC.

### **Recommendations**

1. The University should encourage the BMSC to take on the responsibility of developing a central information hub for the use of groups and transportation providers travelling to the BMSC. Such a site would fulfil a broader public safety purpose as well by serving the local First Nations communities, tourists, and local commercial services. Groups travelling to the BMSC should be provided access to this site and daily updates be pushed to both the institution and field school group leaders. It should provide broader information than current road conditions, such as all of the information found on the WFP site, information on cell phone and satellite telephone blackout areas, standard operating procedures, best practices for satellite telephone and emergency

satellite communicator use, VHF radio use and call point information, driver protocols for road use (working vehicles have the right of way at single lane points, etc.), and BMSC travel updates and recommendations.

2. The University should encourage the BMSC to develop a “pilot car” service from Port Alberni to and from the BMSC for groups who want this. This vehicle could provide local knowledge and expertise, advanced warning to oncoming traffic, vehicle-to-vehicle radio communication, advanced First Aid supplies, and be a safety net in the event of flat tires or other incidents along this section of the road.

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## VIII. Staffing

While BMSC staff provide instruction and safety supervision during educational activities at the Centre, they are not University of Victoria staff and do not provide University supervision. They are not able to make decisions on behalf of the University, to enforce University policies or procedures, or conduct student discipline. BMSC staff are also not responsible for the travel period between Victoria and the BMSC, and back again, which means that the University needs to provide adequate levels of staffing at all stages of its field school.

On the September 2019 trip, the Department of Biology enabled a supervisory model in BIOL 184 where volunteer “teaching assistants” acted as “chaperones” or “group leaders” (all three terms are used in the Department’s field school literature). These group leaders were not hired as employees of the University, although their status as “volunteer workers” may entitle them to WorkSafeBC coverage. This staffing model has since been described by Department of Biology staff as “an exception” and “not the norm.” Normally the senior laboratory instructor would accompany the trip and act on behalf of the University with faculty authority.

### ***Observations***

1. The University of Victoria’s contract with the BMSC refers to students as “Travelling Chaperone” and “Group Leader,” so this was a planned staffing model.
2. Using students as group leaders on BMSC field schools assumes a best-case trip scenario. This level of group leadership assumes that everything will go well on the trip and that there will be no unforeseen event that requires institutional decision-making or authority. The September 2019 accident demonstrated the inadequacy of this model and its assumptions.

### ***Recommendations***

1. The level of staffing provided for the September 2019 field school was inadequate and the University needs to clarify what is the appropriate employment status, qualifications, experience, training, and preparation for leading field schools. If there is a difference identified between curricular and extra-curricular trips this also needs to be clarified.

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## IX. Conclusions

### A. The September 2019 Accident

The September 2019 accident that resulted in the deaths of Emma Machado and John Geerdes, and injuries to numerous other students, is an extraordinarily sad and unfortunate event. It is life-changing for many families. As discussed in the Scenario Planning section above, a series of what seem like non-related and low influence events can combine to form a much larger and catastrophic event. A change in any one of the following influencers may have changed the likelihood, although we will never know for sure.

- Late group departure from Victoria
- Road construction delays
- Length of stops for dinner and sightseeing along the drive
- Narrowing of the road at the accident site
- Soft road shoulder from recent road grading
- Misjudgment of the road width
- Meeting of the two vehicles at a road narrowing point at the same time
- Bright car headlights restricting bus driver vision
- Attempt by both vehicles to go through the narrowing point at the same time
- Lack of driver courtesy to allow the other to go first through the road narrowing point
- Enforcing the wearing of seatbelts
- VHF resource road radio call-point procedures

### B. Options for Future Trips to BMSC

#### Bus Transportation

Bus transportation is an appropriate mode of travel to the BMSC site. Buses, with little procedural change, will continue to be used by dozens of groups per year to drive to Bamfield. However, the University of Victoria, with support of the BMSC, could make a number of changes to their own trips.

**Social license** is defined as the ongoing approval or broad social acceptance of an organization's operations by the public, community, and other stakeholders, and the influence of social license requires a conservative approach to future procedures.

If the University continues to use bus transportation for future field schools to the BMSC, it should consider adding the following systems and review the effectiveness of their implementation on an ongoing basis. With appropriate road improvements a number of the following considerations may not be necessary.

- Consider the most appropriate **bus type**. This could be a vehicle such as the Thomas Transit-Liner C2 used by West Coast Trail Express rather than a vehicle designed primarily for highway transport.
- Add a **pilot vehicle** provided by either the University of Victoria or the BMSC. The BMSC should consider offering this service to other client groups who desire it as well. This vehicle should be driven by a University or BMSC staff person; practice VHF resource road vehicle-to-vehicle radio protocols; and carry expanded First Aid equipment, a satellite telephone, and a satellite emergency communicator. Call-in points should be implemented for the convoy, and call-ins should be done by a passenger in the vehicle so the driver is not distracted.
- **VHF radio system**. The bus used should carry a VHF radio and practice appropriate resource road call-in procedures.
- Field school group leaders should carry both a **satellite telephone and/or satellite emergency communicator** with text capability and a comprehensive emergency contact list. This should be carried during marine and terrestrial outings while at the BMSC as well.
- Field schools to the BMSC should be staffed by a University **senior lab instructor or other faculty employee**. Teaching assistants and other volunteers are suitable as additional staff persons if needed.
- Set a disciplined **travel schedule** and keep to it.
- **Travel and arrive** to the BMSC in daylight.
- Carry appropriate **First Aid** and emergency response equipment for the size of group. Have appropriate First Aid-trained staff for the size of the group.
- The pilot car and bus drivers should assume that **local traffic** will not pull over for commercial traffic.
- Drivers must drive to the **road conditions** and not to an arbitrary speed limit.
- The University should make use of **BMSC's expertise** and implement the suggestions described in the BMSC section above.

### **Ferry Transportation**

Using the MV Frances Barkley is an appropriate and reliable transportation mode to Bamfield. It does, however, add cost and would likely require program changes if used.



## C. Fall 2019 BIOL 184 Student Trip to the BMSC

That the Fall 2019 BIOL 184 students were not able to complete the field school to the BMSC is unfortunate. There is very widespread support from students and families for these students to be given the opportunity to go to the BMSC again as soon as reasonably possible. Although not all students will participate, many will appreciate the opportunity. Careful consideration should be given as to how this trip is planned, the transportation modes used, and in choosing staffing.

## D. Expanded Opportunity for Biology Students at the BMSC

While the following comment is outside the main intent of this review, field schools to the BMSC play a large role in why students take biology courses at the University of Victoria. Field schools are very positive events in the life of university students and need to be understood as much more than just an experiential learning opportunity for a small number of “first-come, first-paid” students.

Beyond the experiential learning opportunity, first-year university student field schools serve the following outcomes:

- Develop a sense of community early in students’ studies.
- Develop strong and supportive peer relationships among students.
- Motivate students to achieve better grades.
- Reduce first-year dropout rates.
- Develop mental health resilience.
- Enhance self-esteem.
- Develop connections to the Department of Biology and its brand.
- Provide career path direction.

Currently 70 to 80 students apply for 45 spaces. The broader benefits of field schools to the BMSC justifies an expansion of these programs and needs to be considered.

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**PART B: ANALYSIS OF THE UNIVERSITY OF  
VICTORIA'S RESPONSE TO THE ACCIDENT OF  
SEPTEMBER 13, 2019**

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## I. Introduction

As part of the broad emergency management process, incident response is followed by post-incident analysis. The analysis seeks to identify what lessons may be learned from how the response was managed. The information gained in the analysis is then used to develop a higher level of forward planning, operational change, and management training, as well to evaluate the management of the incident.

Administrators at the University of Victoria requested this post-incident analysis in order to assess the actions undertaken immediately after the accident and in the months that followed.

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## II. The Accident

### A. Timeline

Many of the following times are approximate and are based on the University of Victoria Campus Security Incident Report and City of Port Alberni interviews.

#### Friday, September 13, 2019

- 7:55 p.m. Bus accident on the Bamfield Main road occurred.
- 8:15 p.m. (approximate time) DeLorme inReach satellite communicator SOS message sent.
- 9:15 p.m. Port Alberni RCMP received a call from the International Emergency Response Coordination Centre (IERCC)<sup>1</sup> in Houston, Texas and started their response.
- 9:30 p.m. (approximate time) Campus Security received a call from the IERCC and started their response.
- 9:45 p.m. Port Alberni Fire Department received call out and mobilized to the accident scene.
- 10:30 p.m. Campus Security contacted Department of Biology staff to ask for a list of field school participants.
- 10:44 p.m. Department of Biology Chair notified of the incident.
- 10:45 p.m. (approximate time) Campus Security contacted Student Affairs leadership to inform them that an accident had taken place and to prepare for further briefings as information becomes available from accident first responders.
- 10:49 p.m. Campus Security notified by IERCC that there were injuries, extent unknown.
- 11:00 p.m. (approximate time) British Columbia Ambulance Service transported 17 students to the West Coast General Hospital in Port Alberni and the Cowichan District Hospital in Duncan. Three students were subsequently airlifted to Victoria General Hospital.
- 11:20 p.m. Department of Biology sent a list of students to Campus Security and the IERCC. This was subsequently sent to the Port Alberni RCMP by the IERCC.

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<sup>1</sup> The International Emergency Response Coordination Centre is a global search and rescue coordination centre for satellite emergency notification devices, such as the DeLorme inReach model carried by the University staff on this trip.

- 11:30 p.m. (approximate time) The City of Port Alberni opened a Reception Centre at the Echo Recreation Centre. A full City of Port Alberni/Alberni-Clayoquot Regional District Emergency Operations Centre was not employed.
- 11:30 p.m. The University of Victoria contacted the BMSC and identified a BMSC staff who may be able to assist. It was determined that one staff member would travel to the scene from Bamfield and another would travel to the scene from Port Alberni. Neither of these people were able to reach the scene as they were turned back by First Responders. One BMSC staff member attended the Reception Centre in Port Alberni and brought coffee and food for students and responders but was informed they would not be allowed to talk with students or the bus driver.

### **Saturday September 14, 2019**

- 2:00 a.m. (approximate time) Campus Security was notified by the RCMP that there were fatalities.
- 2:00-3:00 a.m. Families started receiving phone calls from their children, and others, that the accident had occurred.
- 5:00 a.m. The Reception Centre in Port Alberni was closed when students were provided with hotel rooms.
- 5:00 a.m. (approximate time) Student Affairs leadership arrived at Campus Security to begin to notify unit leaders and assemble on-site professional staff from across various units to begin preparations for identifying and mobilizing student supports.
- 7:00 a.m. The University Critical Incident Response Team (CIRT) met at the University.
- 7:30 a.m. (approximate time) Key on-call staff and/or unit leaders from areas including Counselling, Health, Residences, and the Office of Student Life arrived for incident briefings and to prepare for students returning to campus and/or prepare staff to respond to inquiries related to support.
- 10:00 a.m. (approximate time) Student Affairs leadership opened the University Welcome Centre with key student support personnel from across Student Affairs including all units within Student Services, as well as key personnel from the Office of the Registrar, Campus Services, and Athletics and Recreation. This team included case managers, psychologists and counsellors, physicians, nurses, various advisors, and other student supports that normally respond to student crisis. The Office of Indigenous Academic and Community Engagement (IACE) was also briefed to assist with supporting Indigenous students impacted by the accident.
- 10:45 a.m. Students who had been transported to the Victoria General Hospital arrived on campus.
- 11:25 a.m. Students arrived at the University from the Cowichan District Hospital in Duncan. They were accompanied by an RCMP member.
- 3:00 p.m. Bus arrived at the University with students from Port Alberni.

### **Sunday September 15, 2019**

- 10:00 a.m. The Welcome Centre was re-opened to be a central hub over the weekend for on-campus student and family engagement, and to support continued resource referrals.

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## III. The Response

### A. Local Agency Response

**Emergency response** refers to actions taken after an emergency incident to organize the response, provide care to injured persons, and help minimize negative impacts. This includes coordinating first responders, volunteers and response agencies; setting up emergency communication systems; accessing the accident scene and assessing the on-site situation; providing emergency medical care to the injured; evacuating injured persons; coordinating temporary shelter for evacuated persons; and organizing supplies and equipment for those assisting in the emergency response.

When emergencies happen in rural communities and isolated locations, the demands on local response agencies and healthcare facilities can quickly exceed available resources. In this late-night incident, 48 people needed to be treated, transported, and cared for. Numerous response agencies became involved, including the International Emergency Response Coordination Centre (IERCC) in Houston, Texas; Port Alberni RCMP; Duncan RCMP; British Columbia Ambulance Service; Port Alberni Fire Department; City of Port Alberni Chief Administrative Officer; Port Alberni Recreation Department; Port Alberni Emergency Social Service volunteers; 442 Transport and Rescue Squadron from Comox; West Coast General Hospital in Port Alberni; and the Cowichan District Hospital in Duncan. Forty-one people were initially transported to Port Alberni and seven to Duncan.

The first notification of the incident was received by the **International Emergency Response Coordination Centre (IERCC)** in Houston, Texas, via the DeLorme inReach satellite communicator carried by the Group Leaders. The SOS function on this device was used to notify the IERCC, who then contacted by telephone the Port Alberni Royal Canadian Mounted Police (RCMP), the University of Victoria Department of Biology office, and University of Victoria Campus Security. As it was after hours, there was no answer at the Department of Biology office.

Later in the evening, Department of Biology staff provided a **class list of student names** to Campus Security and the IERCC who then provided this list to the RCMP.

The Department of Biology's contract with the bus provider, Wilson's Transportation, stated that the bus would carry a satellite telephone, but there is no evidence that this was available or used at the time of the accident.

There is **no cellular telephone coverage** along the 85-kilometre Bamfield Main road between Port Alberni and Bamfield although the RCMP have their own radio repeater infrastructure in the area. In addition to notifying the IERCC with the DeLorme inReach, a student from the bus and passing motorist drove toward Port Alberni until they could get cell phone coverage to call 911. This drive would have taken approximately 45-60 minutes.

The **Port Alberni RCMP** received notification of the accident at approximately 9:15 p.m. and responded to the scene. The RCMP initiated services such as British Columbia Ambulance Service (BCAS) response, traffic control, bus transportation for students from the accident scene to Port Alberni, and

notification of the accident to the City of Port Alberni. The RCMP had staff posted at the Port Alberni Reception Centre throughout the night

**British Columbia Ambulance Service dispatched ambulances** from the cities of both Port Alberni and Duncan. Students were transported to hospitals in both cities.

Students and group leaders were transported by ambulance or bus in two different directions from the accident scene. Eighteen persons were transported by ambulance with seven taken south to Duncan and eleven taken north to Port Alberni. Thirty persons were transported by a bus provided by the Port Alberni School District to the West Coast General Hospital in Port Alberni. Three persons were later airlifted to a hospital in Victoria, two in critical condition and one in serious condition. Students who went to Port Alberni were triaged at the hospital and then sent to the Reception Centre to await further overnight arrangements. Most were housed in Port Alberni hotel rooms for a few early morning hours until they were transported back to Victoria by bus.

The **City of Port Alberni set up a Reception Centre** for students at the Echo Recreation Centre to provide students a place to gather after being triaged at the West Coast General Hospital in Port Alberni. The Reception Centre registered the students, collected personal and contact information, and offered refreshments and a warm, dry place to wait. Volunteers organized hotel rooms for the students. The Reception Centre did not offer services such as first aid, emotional support, or trauma support. The Reception Centre received and recorded 35 students and group leaders. Five students did not go to the Centre from the hospital.

Costs associated with services provided in Port Alberni were covered by Emergency Management British Columbia (EMBC) as eligible costs related to the response to the accident.

**442 Squadron** responded by helicopter and airplane to the accident scene but could not land because of forest cover.

### **Observations**

1. Although group leaders at the scene were uncertain if the inReach satellite communicator worked, it did, and it relayed the first notification of the accident to outside agencies.
2. The names of persons who went to either Duncan or Port Alberni, and of those who were airlifted to Victoria were not clearly tracked by the RCMP; or, if there was such tracking, it was not clearly communicated to others, and no one knew specifically where individual students were. This caused untold work and delays on the part of Campus Security who spent most of Friday night trying to determine the location of each person, caused anxiety on the part of parents who were phoning Campus Security and the RCMP looking for answers, and required extensive follow up for the RCMP, who a day later were still phoning parents trying to determine whether they knew where their child was.
3. Campus Security spent most of Friday night phoning back and forth with the Port Alberni RCMP trying to get information on where students were and the status of their injuries. Campus Security did not find out until approximately 2:00 a.m. that there were fatalities.
4. The IERCC and RCMP requested emergency contact information from the Department of Biology. Because it was after hours, Department of Biology staff had to attend the University to gather this information. This list was provided by 11:20 p.m.

5. There have been many comments by families about the difference in care that was received between the Duncan and Port Alberni hospitals. This may have had something to do with the smaller number of students that were transported to Duncan (seven students) than Port Alberni (40 students). Staff in the Duncan hospital were visibly concerned about the traumatic impacts of the accident on the students, lent students cell phones to make international calls to their parents, and stated that they would not let the students get on another bus for transport from Duncan to Victoria because it could be traumatic for them. Students who were transported to the Port Alberni hospital have quite different, and often, negative stories of how curtly and dismissively they were treated.

## **B. University of Victoria Response**

### **i. Notification**

At approximately 9:30 p.m. on Friday, September 13, 2019, Campus Security were notified via telephone from the IERCC that the IERCC had received an emergency transmission from the Department of Biology's inReach satellite communicator. The IERCC had already called the primary University phone number that was provided in the inReach registration information, but this was the Department's administration office number which was not attended after hours.

Campus Security contacted the Department of Biology administrator at home to find out what Department of Biology trip was using the inReach device, and to get a class list of student and staff participants. The administrator went to the University to produce the list, which took until 11:20 p.m.

Campus Security also contacted the Port Alberni RCMP Detachment. The original calls went to a general RCMP dispatch number, which caused delays for Campus Security. At this point the RCMP were not able to provide detailed information about the event.

### **ii. Initial Response**

Various University planning documents describe the callout and management structure for critical incidents. Notification of most incidents will come to the Campus Security Dispatch. If the call is a critical issue, Dispatch will notify the on-call Campus Security Management staff. A manager will normally make a preliminary assessment of the facts and, if necessary, invoke the assembly of a Critical Incident Response Team (CIRT). The CIRT is initially comprised of the Campus Security, a University Executive, University communications staff, and a Senior Leader from the affected Department. If it is deemed necessary, a Site Response Team (SRT) or an Emergency Operations Centre (EOC) could be activated.

- An SRT's role is to travel to the scene of an incident and gather information; maintain communications with the CIRT; provide first-hand information about the incident to the CIRT/EOC; consult and coordinate with on-site external response agencies; request and coordinate subject matter experts, as required, to assist in the local response; coordinate on-scene care and services, as required, for staff and students involved in the incident.
- A CIRT can evolve into an EOC when an incident warrants it. The EOC is a central command group, and facility, responsible for carrying out the principles of emergency response and management. It does this through some form of Incident Command structure. An EOC is responsible for strategic direction and operational decision-making during an emergency and ensures appropriate incident response, resources, and coordination. The common functions of



an EOC are to gather and analyze information, make decisions, maintain continuity of the response, and communicate decisions made to management and operational staff. Its intent is to organize and “professionalize” the response.

University criteria for activating a Site Response Team (SRT) or Emergency Operations Centre (EOC) state: *“Emergency events that may threaten the health, safety or environment of the campus community and/or potentially disrupt its programs and activities meet the threshold for either a Site Response Team or Emergency Operations Centre activation.”*<sup>2</sup>

Campus Security spent the period between notification at 9:30 p.m. Friday night and approximately 2:00 a.m. Saturday trying to gather information about the event. At 10:49 p.m. they were informed there were injuries. At about 2:00 a.m. they were notified that there were fatalities and that the group participants were being transported to Port Alberni and Duncan. Details about the incident were sketchy and vague.

By 2:00-3:00 a.m. on Saturday, September 14, parents living in Canada and abroad started receiving phone calls from their children, relatives, and friends about the accident. This would have been about the time that students started arriving at hospitals and got into cell phone range. Numerous students lost cell phones at the accident site and borrowed phones from other students and hospital staff. By 5:00 a.m. some parents were already waiting at Vancouver ferry terminals to make their way to Port Alberni and Victoria.

At 7:00 a.m. on Saturday, the University’s Critical Incident Response Team (CIRT) met and were briefed on the situation status. Roles and needs were discussed but neither an SRT nor an EOC was initiated.

At 11:25 a.m. on Saturday, students who had been routed to the Cowichan District Hospital in Duncan arrived on campus, followed a few hours later, at 3:00 p.m., by students who had been routed to the West Coast General Hospital in Port Alberni. University staff who were in attendance state that when they saw the students arrive back on campus, they began to realize the emotional impact of the event and the extent of trauma students were experiencing. Students arrived without shoes or jackets; some were dressed in hospital scrubs; many had lost their packs, computers, and cell phones; many had not slept; most had no toiletry or personal care supplies; and many were in shock and traumatized. Not all students came back to campus via the transportation provided because some families, relatives, or friends had picked students up in Port Alberni and taken them home or to relatives’ houses; there was no record of where these students were at the time. It is at this point that the University’s student care began.

### **Observations**

1. The severity of this incident became evident to University staff as students arrived back on campus.
2. A focus of Campus Security in the early stages of the callout was trying to determine who was on the trip, the location of each student, and the extent of their injuries. Making this difficult were at least three compounding factors:
  - The class list produced from University student registration software did not contain family emergency contact information for many of the students. This was not a mandatory field in the

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<sup>2</sup> *Critical Issue Response Coordination Protocol for Executive*. August 17, 2016, version.

registration software (this software is called “Banner”), and this field was not filled out for many students.

- Matching names as they were recorded in Banner with who the students were in the field was difficult because some international students used colloquial, North American names rather than the officially registered names produced by Banner.
  - Some names were spelled incorrectly in Banner, which made it difficult to match Banner information with the class list.
3. The necessary initial response was immobilized while waiting to compile class list information (which went on until at least late Saturday morning) and to receive more detailed information about the accident. The lack of good decision-making information contributed to the delay in activating initial response, but the delay was also due to being too conservative before acting and completely underestimating the significance of the event. Emergency response requires quick and definitive decision-making, often with little and incomplete information. While taking forward action, additional information is gathered, and knowledge develops to enable making accurate adjustments to the response.
  4. It is clear from institutional criteria that an SRT or EOC, or both, would have been in scope. At 9:30 p.m. on Friday, September 13, Campus Security were notified about the accident and at 10:49 p.m., they were notified that there were injuries, extent unknown. At no time did the University send anyone to Port Alberni. In this case, the University relied on other agencies to carry out the initial response and care for students.
  5. It was an oversight that an SRT was not sent to Port Alberni to gather information and assist the response. Reports at the time of the accident and immediately following it were all secondhand and poorly communicated to Campus Security. The University relied on information from the RCMP which was neither forthcoming nor clearly represented.
  6. It is approximately a two-and-a-half-hour drive from the University to Port Alberni. Had an SRT been sent to Port Alberni early on, it would have arrived in Port Alberni before the students from the accident site did. This would have been true even if the SRT had left Victoria as late as 11:20 p.m. when Campus Security found out there were injuries. Parents and friends went to Port Alberni, but University personnel did not.
  7. An EOC could have better organized and offered an appropriate and more professional response. This is widely acknowledged by different levels of University staff. Higher-level planning formalizes response protocols based on an accurate risk assessment of the incident, forecasts demands and challenge areas, puts concrete staff support systems in place, encourages interdisciplinary case management, identifies a parent management strategy, estimates resources that would be required, identifies the need for a central contact point for parents and students, and predicts the need for inter-departmental debriefings. These are all functions that a CIRT or EOC should address.
  8. Numerous parents phoned Campus Security during Friday night, September 13 and on Saturday, September 14. Comments by these parents express how unhelpful Dispatch personnel were, and that although they were told they would receive a return phone call, they did not. Students expressed the same sentiment. A designated phone line with staff for addressing parent inquiries was necessary early on, but the need for this was not recognized.

9. That the University did not immediately contact families or return inquiry phone calls is an acknowledged weakness. Although University staff thought that the RCMP's role was to contact families and emergency contact information was not readily available in the University's registration system, neither is an adequate reason for the University's neglecting to carry out compassionate communications.
  - At the scene of an accident the police officer's duty is to manage logistics such as directing traffic movement and automobile removal, being sure everyone is safe, arranging for Emergency Social Service (ESS) services, and documenting the accident. In this case the RCMP also arranged school bus transportation to Port Alberni and attended the Reception Centre during the night. After the accident, traffic investigators may analyze the accident site. If there are fatalities, they may represent the local coroner, identify the victims, and communicate with those families.
10. Higher-level planning formalizes response protocols based on an accurate risk assessment of the incident, forecasts demands and challenge areas, puts concrete staff support systems in place, encourages interdisciplinary case management, identifies a parent management strategy, estimates resources that would be required, identifies the need for a central contact point for parents and students, and predicts the need for inter-departmental debriefings. These are all functions that a CIRT or EOC should address.

### **Recommendations**

1. Reassess the management structure and decision-making process for the University's incident-response.
  - Establish a less subjective system for determining when a Critical Incident Response Team (CIRT) and EOC is formed and an SRT implemented.
  - Adopt an organized incident management system such as an adapted Incident Command System (ICS) that includes roles for the functions of Student Services. (A normal command and control ICS structure may not be well received at a collegial academic institution and will need to be adapted).
  - Provide EOC and IC training for the people who are to assume the roles, adapting the classical models to the university and field school setting. The classic ICS structure is built for seamless inter-agency response and needs to be adapted for internal university response use (for example, including Student Service units).
2. Identify who the Incident Commander (IC) should be as well as the membership of the Emergency Operations Centre (EOC). This needs to be skill- and ability-based in addition to role-based. It is not enough to structure an IC and EOC only by the institutional title someone holds, and the relatively ad hoc response of who became the IC in this accident demonstrates this.
  - Create more depth in the Incident Command function with formal acknowledgment of who should play this role in what kind of situation, and define a clear, delegated authority to go along with the role. Other peripheral Student Service units should acknowledge what their own supportive roles are and accommodate the delegated IC.

3. Develop an Emergency Operations Centre (EOC) manual for off-campus incidents.
  - Include checklists for different stages of a response, including notification, initial response, first week, first month, semester, and school year timelines.
  - Define the roles of Executive, SRT, EOC, IC, and the roles and responsibilities of Student Service Units and Academic Departments.
  - Modify documentation such as the Critical Incident Response Procedures, Critical Issue Response Coordination Protocol for Executive, and Emergency Response Plan to include pre-plans for BMSC-specific incidents, but the University might be best served by drafting amendments that would apply to all field school and off-campus incidents.
  - Develop more robust crisis response protocols that include templates for off-campus and mass incident response.
  - Develop crisis response role and responsibility definitions and job descriptions with task checklists.
4. Implement a Site Response Team (SRT) and Emergency Coordination Centre (EOC) when an incident meets the established criteria.
5. Implement a separate point-of-contact early in the response. Campus Security, while being a convenient first point-of-contact, is not the unit that should be handling parent and student inquiries for academic or service questions.

### iii. Subsequent Response

**Focus in weeks following the accident** was aimed at longer-term and ongoing intervention needs; that is, identifying forward-looking institutional processes, providing long-term trauma counselling for those students who desired it, accommodating impacted students in their academic needs, helping students work through the accident's impact and develop personal coping strategies, engaging in existential purpose- and future-oriented conversations with impacted students, linking families to external health and insurance services, connecting students with off-campus health services, encouraging students to attend followup health appointments, coordinating student transportation needs, and restoring customary institutional operating norms.

On September 14, a Response Coordination Team was created to support students. The team met regularly for several days, and then weekly. To support students, the University provided each student with \$1,000 for incidentals. The Office of Student Life gathered and supplied cell phones and other items for the students shortly after their return. University Systems also supported access to technology for students.

On September 16, a second Response Coordination Team was created to focus on Operational matters including insurance (ICBC), investigations (RCMP/Transport Canada), financial support for families, and communication.

- This group provided each family \$2,000 for travel and other costs (Sept 25th)
- There were several general communications and meetings with families

## **Observations**

1. Just as the West Coast General Hospital in Port Alberni was strained by receiving 40 students in the middle of the night, so was the University strained by trying to anticipate and respond to the needs of all 45 students and 47 families who needed care during the aftermath. In an ideal world, the University would have previously anticipated the possibility of a mass event like this occurring. The reality is that few educational institutions are ready to respond smoothly to a low-likelihood, high-consequence event of this size.
2. University staff in departments such as Campus Security, Residence Services, Student Services, Counselling, Office of Student Life, and Multifaith have extensive experience responding to smaller crisis events (there was another death and other crisis incidents on campus during the week of the September 13 bus accident), but no one at the University had dealt with an incident of this scale. This became apparent, and some elements of the response could have been handled better than they were.
3. Although not all students on the trip were noticeably traumatized, many were. **Focus during the first week** of response for these students was on crisis intervention, that is, the immediately obvious needs:
  - Advocating for and providing what the students needed in the very short term such as toiletries and the return of personal effects from the bus
  - Identifying bio-psycho-social needs
  - Developing contact and providing information
  - Providing meeting space for students (and parents) to congregate
  - Providing comfort through actions such as pet therapy
  - Providing briefing and debriefing sessions
  - Implementing trauma counselling
  - Providing access to multifaith services
  - Developing case management plans for students

All of this was done in the context of fostering awareness to recognize and appreciate the scale and scope of the incident and the corresponding resources necessary to address it. The University needed to develop an institution-wide and mass-scale incident management structure; address the demands and needs of other internal, student, parent, media, and public pressures; and simultaneously maintain regular day-to-day operations.

4. In the subsequent stages of response to the accident, one of the greatest needs of parents, later described as having fallen short in their opinion, was for the University Executive to express appropriate empathy and compassion to families by acknowledging that the event, injuries, and deaths occurred. If there is a common theme being expressed by families, this is it. Although the University did provide liaison and communication attempts, this did not always land well with parents.

## **Recommendations**

1. A University debriefing session should be held to provide the opportunity for units to share lessons learned, identify process gaps, and develop forward-looking best practices.

## **iv. Departmental Perspectives**

### **a. Student Services Department**

*“The Student Services Department provides a comprehensive range of programs and services that are intended to support conditions for student success and retention and foster a healthy environment for students to engage and thrive in their learning and development.”*

The Student Services Department is comprised of eight distinct units: Academic Advising Centre, Counselling Services, Centre for Accessible Learning, Health Services, International Student Services, Multifaith Services, Residence Service, and the Office of Student Life. In one way or another, all these units were involved in response to the BMSC Field School accident.

### **b. Office of Student Life**

*“The Office of Student Life works with units across the university to respond to critical and high-risk student incidents, develop and deliver student focused policies and create pro-active programs and services for students on key areas including student mental health and sexualized violence. The OSL also works with the university community to help resolve non-academic student conduct concerns in a consistent and fair manner.”*

On the morning of Saturday, September 14, 2019, Campus Security gave a director in Student Services the student class list and tasked her with organizing preparation for the students’ return to campus. In the absence of a more formal EOC and an Incident Commander, a director in Student Services assumed the primary coordinating function for the response from this point forward. She provided advice and guidance to senior administrators. Her assuming this role was not a function of training, experience, or job description, but an innate recognition that the response needed to be organized and that it needed to be student focused.

This role continued for close to three months, and in addition to the regular duties of the Director’s day-to-day job, it included the following:

- Gathering relevant decision-making information
- Conducting briefings with parents
- Being the point person for many external and internal stakeholder inquiries
- Seconding staff to help with purchasing toiletries and food and supporting students with their logistical needs
- Liaising with other university units
- Initiating a student case management model
- Answering an additional 200-300 emails per day
- Coordinating a wide variety of disparate and independent actions

This was done with strong resource support from the University Executive and senior management, but without formal acknowledgment of the role or designated authority to do the job. Because numerous decisions that impacted other units needed to be made quickly, functioning in this extended role also provoked some inter-unit tensions.

### **Observations**

1. The scope and scale of what the University should provide to students and families, and what an appropriate level of service should be, was difficult for staff and units to determine on their own. What service levels the individual units should provide, and what the parameters were to be, became a moving and expanding target. With no practical experience managing incidents of this scale, the size of this incident overwhelmed numerous existing institutional services. Setting the goals and timeline for shifting from crisis incident support to normal day-to-day services became difficult and uncertain. How and when to “normalize” institutional processes related to serving the group of students affected remained vague.
2. Demands and expectations of families on the University to supplement the services and processes beyond those of emergency service agencies, insurance corporations, or the public health system caused significant dissonance within various University units as they worked out what was possible and what the University’s responsibility was.
3. A critical issue for University front-line staff was how to manage the amount of parental anger that was directed at them personally. Expressions of anger, aggressive and threatening posturing, shouting, and abusive behavior was especially acute in the early stages following the accident.
4. It was also very difficult for a mid-level manager (that is, a director in Student Services) without specified authority to face angry parents in person and on the telephone day after day while trying to help with decisions. The Office of Student Life dealt with 20 to 25 families per week and all 45 students and their families for months. Much time was spent by this Director and the Office of Student Life team in a “grey area,” trying to be helpful in an antagonistic environment and in the absence of answers. Realistically, this is Executive-level work.
5. While the University Executive did not place any restrictions on the level of financial or other resources a unit had access to, lack of extensive pre-planning resulted in more time required to identify what was most needed and to increase service levels. For example, additional support workers, psychologists, and counsellors were retained, but without concrete unit-level preplans, the best way to deploy these resources needed to be determined. Many staff worked 16 to 18 hours a day, seven days a week, for weeks in a row to respond to needs, but few knew what was required, even within their own units. Staff exhaustion was real, and compassion fatigue a risk.
6. Student Affairs established key leaders who would focus on specific responsibilities related to identifying and implementing supports.
7. Because there was no designated “crisis management team,” the Office of Student Life implemented a case management model to respond to student needs in this unprecedented situation. In addition to their normal caseloads, case managers added 45 high-demand student files within one day as well as the corresponding parental demands which are not normally a part of caseload. This accounted for over 90% of their workload for the entire fall term and into the spring term while these staff continued to cover their regular caseload. There was great concern about staff burnout, and this was not a healthy work model for staff.

This case management model evolved over time to be more inclusive and interdisciplinary. It has since been acknowledged by numerous units that an inter-departmental case management model that could be implemented rapidly would be of benefit; many units and departments provided students with simultaneous advice about the same topics. These departments included, at a minimum, the Office of Student Life, Department of Biology, Counselling Services, Multifaith Services, International Student Services, Health Services, Academic Advising, Residence Services, and the Centre for Accessible Learning. Much of the information overlapped and was inconsistent, at least initially, highlighting the Student Services Department's need for an administrative protocol that defines and supports this case management model.

Building relationships between student and case manager tends to foster the student's desire to stay with that case manager long-term; this competence, familiarity, and success results in more work and centralizes the student's contact point with the University.

During this event, case managers were compensating for gaps in the institutional and organizational system, and the risk of doing something wrong was extremely high. They were often put in the position of having to represent decisions of senior leadership, thus compromising the case manager's role as a support person. Even personal time off was not replenishing enough to eliminate feelings of trepidation over returning to work, only to face the same gaps in the same volume. Without an established and preplanned structure, the impact of difficult work content is amplified, and the time-consuming need to consult others prior to making decisions adds to the workload due to lack of structure or benchmarks.

### **Recommendations**

1. Because the case management model worked well in this incident, affirmed by the different units, this model should be expanded to be more inclusive and more quickly implemented if needed.

### **c. Department of Biology**

The Department of Biology is the academic department under which this BMSC field school ran. They have offered experiential education trips to the BMSC for over 40 years.

### **Observations**

1. Students and families relayed encouraging comments about the empathy expressed and efforts made by the Department of Biology to support the students with an academic liaison, facilitate academic concessions and tutoring help, organize study groups, and provide academic advice.
2. Because the students were not "flagged" to other departments, many of these students experienced a lack of empathy and understanding from instructors in their other study subjects.
3. In some cases, the Department of Biology's attempt to accommodate students conflicted with other student service units' processes.



## **Recommendations**

1. Should the need arise in the future for the Department of Biology to support students in this manner, the Department of Biology should better coordinate its counselling, academic advice and course concessions with applicable Student Service units (see Academic Advising below).

### **d. Residence Services**

*“Residence Services provides accommodation services, programming, and education to the on-campus student community, in addition to providing a summer conference operation for off-campus customers. Their goal is to create and support conditions for student success and to foster a healthy environment for students to engage and thrive in their learning and development.”*

Close to two-thirds of the students on the BMSC Field School were living in campus residences, including Emma Machado and John Geerdes. In collaboration with the Office of Student Life, Residence Services offered drop-in space for students involved in the accident (both Residence and off-campus students), where the students would have a place to spend time together.

## **Observations**

1. Crisis events, on a smaller scale than this accident, are relatively common occurrences in University residences, and Residence Services have extensive experience working with traumatic incidents.
2. Because the Residence Services offices are staffed 24/7, they fielded many phone calls after the accident from parents about the location of student cell phones, clothing, laptops, and general logistics. They did not have the information needed to provide answers to many questions due to the following factors:
  - Student IDs and room keys were lost at the accident site.
  - Residence Services worked with the Office of Student Life to provide supplies to students who lost items such as toiletries, shoes, etc.
  - A list of field school participant names was not available which delayed and confused notices and fee payment reminders.
  - Other units and departments made decisions that impacted Residence Services mandates.
  - Student clerical staff had to deal with demanding parents without institutional direction, training, or instructions to do so.
  - Housekeeping staff were unequipped to deal with traumatic stories from parents and students.
  - Residence Services were late to the case management discussions, and a unique situation occurred where some parents moved into residence to support their child (in some cases, for weeks at a time and living in rooms with other students). Residence Services was not sure how to address this.

3. “Operational” units such as Residence Services have real working limitations, and decisions made by others can negatively impact their operations. There can also be secondary trauma to other students in residence, and following this event, Residence Services organized debriefing sessions for a number of these students.

### **Recommendations**

1. Operational units such as Residence Services are a familiar point of contact for many students and their families. Residence Services should be incorporated into incident management considerations and their operating limits accounted for when decisions are made that may impact them.

### **e. Counselling Services**

*“Counselling Services offers free professional, confidential, inclusive support to currently registered students.”*

### **Observations**

1. In a situation as traumatic as this event, Counselling Services played a key role in addressing student needs. They prioritized drop-in sessions specifically for students involved in the accident for months following.
2. Additional trauma counsellors were contracted to work with students. As of April 2020, this work was still going on. In the weeks following the accident, therapy dogs were also a large part of the healing process for many students, with over 150 student visits to six to eight therapy dogs per week.
3. Counselling Services’ mandate is to serve students, although the fact that the BMSC Field School students were first-year students, and many were minors, created a mixed student-parent dynamic. Counselling Services offered parents a place to gather and meet. They held parent debriefing meetings for two weeks after the accident, but a lack of clarity pervaded Counselling’s responsibility to parents, where parents could go, what University services they had access to, whether Counselling Services was to provide counselling services to parents, and if staff time was to be attached to that service. It soon became apparent that parents would dominate shared student and parent meetings hosted by Counselling Services, and, therefore, students preferred to meet privately with Counselling Services staff.
4. A key outcome of student contact with Counselling Services is the students’ continued expression to interact with the families of Emma Machado and John Geerdes and to hold another Celebration of Life for Emma and John. They feel that, for them, John and Emma’s deaths have not been adequately acknowledged and that this event would help them heal.

### **Recommendation**

1. In events of this nature, this unit should activate the case management system early, link families to external resources such as Insurance Corporation of British Columbia (ICBC) and Emergency Management British Columbia (EMBC), expect clarity of internal and external institutional procedures, ask for direction about what level of parental involvement and counselling is to be provided, and confirm the use of internal or external resources.

2. Counselling Services should be consulted for input into student interactions with the Machado and Geerdes families. Both students and families are interested in pursuing this interaction.

**f. Multifaith Services**

*“Multifaith Service’s aim is to foster community and provide religious and spiritual support and spiritual care for the students and staff at the University. They offer prayer and meditation groups, pastoral counselling, weekly activities, retreats and workshops on a variety of interests to support the well-being of the campus community.”*

Multifaith Services provided drop-in times for students impacted by the accident to attend the Multifaith Centre. After the accident, questions around death and dying led to a key theme of student interactions around existential conversations; that is, whether life has meaning, and if so, how? What is my purpose? What will I do with my life and career? How can I help others? Numerous students considered moving from science programs to the helping professions and some did leave school or change programs. For these students, the accident was life changing and formative and Multifaith Services played a key role.

**g. Centre for Accessible Learning**

*“The Centre for Accessible Learning provides programs and services that support students in achieving their academic goals and acts as a resource for faculty and the larger university community to help create a more accessible learning environment.”*

**Observations**

1. Many of the demands on the Centre immediately after the accident were “out of the normal process” because they tended to be last minute demands which were a reversal of how the Centre normally works.
  - Students had academic challenges when returning to classes; some needed course note taking, some tutoring, and some exam assistance. Many were concussed, impacting the extent of how well they could function cognitively.
  - Questions about how and when to “return to routine” were prevalent. The development of plans for individual students with no standard documentation was unusual, and the Centre tended to “overaccommodate” out of caution.
  - Being included in case management discussions was important and the Centre needed to determine who should be communicating with whom, and about what. Overlapping attempts to provide learning accommodations between units and with the Department of Biology was observed.
2. Fall group tutoring was held on a weekly and drop-in basis for 10 hours per week for all relevant course subjects. Confusion with the Department of Biology over who was doing what tutoring was not sorted out until February. In the Fall term, over 22 BMSC Field School students accessed 175 hours of tutoring, and in the Winter term students accessed 300 to 350 hours of tutoring.

#### **h. Academic Advising**

*“Academic Advising provides undergraduate academic advising at all stages of a degree to help students develop personal academic plans that ensure graduation requirements are met.”*

##### **Observations**

1. There is a difference between an “academic case manager” and a “student services case manager,” and in this event there was need for both. Academic Advising met with the Office of Student Life to develop a protocol for referring students to Advising and to work out appropriate processes.
2. Once Academic Advising started to meet with staff in the Office of Student Life, they played a joint coordination role: they checked which students were in Biology 184, made bookings through Academic Advising and Office of Student Life case managers, developed protocols for how to contact students, worked out the roles and work of Academic Advisors and the frontline team, and pre-determined which Advisors would be most effective with which students.
3. Because of their connection with the Department of Biology, some students, instead of going to Academic Advising, went for advice to Biology staff. This caused issues for Academic Advising and for students. Because students were being advised by faculty about changing academic programs and dropping courses, these changes had an impact on residency, visas, immigration status, and student loans, which instructional faculty may not have understood. Coordination amongst the three units of Biology, Office of Student Life, and Academic Advising are important in case management, and such coordination was lacking in the early stages. Professional courtesy may not have always been given to others.
4. From the Academic Advising perspective, communication gaps existed with the Department of Biology. Although the capacity on the Academic Advising side is limited, the roles of the Department and that of Academic Advising in a situation like this event was not clear. Should all academic questions go through an Academic Advising case manager or the Department content experts? How can an instructional faculty understand the residency, visa, immigration status, and student loan implications of course or program changes? How do concessions provided by the Department of Biology impact other non-BMSC Field School students who are asking for the same concessions from Academic Advising? How do concessions provided by the Department of Biology impact other academic departments and are those departments expected to make the same concessions? A myriad of considerations needs to be synchronized.
5. As silos may develop unintentionally between academic departments and student service units, this incident seeded the idea to designate a collaborative liaison between Academic Advising and the Office of Student Life as part of regular operations. Case managers do not have backgrounds in academic advising and are not trained as advisors, and advisors do not play the roles of other Student Service units. Incorporating the academic department in case management decision-making or determining how the academic department coordinates their actions with others is also intertwined in this collaboration.
6. The capacity to support off-campus students is challenging for Academic Advising because normally the University’s position is that the student is not a University of Victoria student once the student withdraws to leave campus or takes courses elsewhere. This makes it harder for the Academic Advising unit to support students when it is uncertain when they are, or are not, a University of Victoria student. In this situation, Academic Advising did continue to support students who withdrew due to the accident.

### **i. International Student Services**

*“International Student Services is a centralized resource providing international services, information and programs for undergraduate and graduate students from pre-arrival to degree completion. They support international degree-seeking students, visiting students and exchange students at the University.”*

Five students on the BMSC Field School, including John Geerdes, were international students. International Student Services supported the Office of Student Life in ensuring connection for the Geerdes family to the Medical Insurance for International Students and the repatriation process. They also ensured appropriate supports were made available to international students, specifically supporting students in accessing their medical insurance.

### **j. Student Health Services**

*“Health Services is the primary point of health care while students are registered at the university, especially if they do not have a family doctor in Victoria. Health Services provides a full-service primary health clinic for students with access to physicians, nurses, psychiatry and specialists, and coordinate population health programs and healthy student and campus initiatives.”*

Health Services was contacted during the early morning of Saturday, September 14, 2019, and their staff were on campus when students arrived from Duncan and Port Alberni. They immediately scheduled appointment times for students and reached out to a concussion specialist on Monday, September 16. Health Services prioritized drop-in times for field trip students in the months following the accident, until February 2020. They added additional physicians for the month following the accident and connected students to resources such as concussion specialists, off-campus chiropractors, physiotherapists and massage therapists.

#### **Observations**

1. Concussion management could have been done better over the weekend as many students did not come to Health Services later.
2. The Department of Biology held their own sessions with the BMSC Field School students that Health Services staff were not involved with but should have been. Much of the health-related services with students was uncoordinated between units. A meeting with the Department of Biology to talk about this was arranged in October and a broader debrief was held in December.

### **k. Student Services Leadership Team**

The Student Services Leadership Team is comprised of Directors from the various units of the Student Services Department. This group is key to implementing incident response actions but needs clearer communication about their roles and scope of authority in a response like this.

As identified earlier in this document, one of the members of this team, a director in Student Services, came forward and managed response to this event above and beyond her role and responsibility. This was supported by the other unit Directors. A strong sentiment held by this group and demonstrated by their collective response to this incident, is that unit directors are the key incident response management group within the University, that they have lots of experience working together in crisis situations, and that they need to be included in response coordination decisions; that is, within the Incident Command and Emergency Operations Centre structure. Effective work will get done with these front-line managers

playing an integral role in response management if they are not disconnected from decision-making and have the authority to act.

### ***Observations***

1. Student Service units feel that crisis response across the University is more ad hoc than it should be. Clearly defined institutional structure is needed to manage response and channel students toward the services they may require. The response to this accident was complex and placed an unrealistic burden on the Office of Student Life; however, it does provide the opportunity to apply lessons learned to improve institutional processes.
2. Like most organizations, the University had never experienced an incident on the scale of this accident; no one had a vision of what the response needed to be and what it would take to arrive at a desired outcome. While a director in Student Services stepped up to manage the day-to-day demands, no one specifically took time early on to focus on higher-level planning. This is an Executive and EOC function.
3. The level of resources required to respond to this event and the increased workloads on staff were underestimated, both as they evolved and in retrospect. Scenarios such as the level of care that was required for parents was enormous; extensive parental demands spread over a long period of time, and front-line staff needed procedural direction to know what actions were appropriate as they responded to parents. The University was neither structured nor in possession of operational guidelines to accommodate this.

### ***Recommendations***

There is consistent agreement across Student Service units about what would help support a more organized and professional crisis response structure on campus. These include the following:

1. Develop an on-call and ramp-up strategy for Student Services.
2. Develop an organized and interdisciplinary student case management model with defined roles and responsibilities unit by unit and implement inter-unit case management sessions during the response.
3. Plan for the ability to quickly provide staffing resources to the Office of Student Life, Counselling, and other units to enable a rapid expansion of services and the reallocation of roles to meet emergency management needs.
4. Develop protocols for what resources can be provided to non-student and family stakeholders.
5. Provide direction to Student Service units for processes and timelines to “return to standard operating procedures.”
6. Develop resource material that staff can share about the University’s crisis event family travel reimbursement and expense policy, availability of public and private health services, various insurance resources, and Province of B.C. emergency funding.
7. Create a management process that recognizes that 16-hour workdays in a crisis for weeks on end are not sustainable. Protocols are needed to provide more support to staff, certainty of time off, and recognition of potential for personal and professional burn-out.

8. Acknowledge that a mass event has much higher levels of demands that cannot be carried out indefinitely without significant additional resources provided in a timely manner.
9. Balance the level of service provided to single-person events with that provided for multi-person events. Mass events tend to get more attention, but single-person events are just as urgent to that person.

## C. Students and Family

During the research stages of this report all students and families involved in the accident were given the opportunity to provide input into the review. Ten students who were on the bus did so, either in person or by email. Personal interviews were conducted with the parents of 16 students who were on the bus, including the parents of both Emma Machado and John Geerdes.

Comments from families are extensive and it would not be possible to include all of them in this report. What follows are representative of the themes arising from those comments.

### i. Appreciation

- *We have been hugely appreciative of the efforts of the front-line staff including case workers, counsellors and a director in Student Services. Less so of the Executive.*
- *This is a tragedy and they do happen. Everyone has a history and may have had other trauma and not be resilient. This is may be their first contact with death. It is easier to blame and accept and it is easier to express anger and fear and sadness. The University needs to keep running this trip and our daughter would go if offered another one. Our experience coming out of this with the University has been positive and not negative.*

### ii. Emergency Contact and Communications

- *An emergency contact list should have been drawn up and available at the university.*
- *We were not notified of the accident until seven hours after and that was by our daughter borrowing a cell phone from a doctor to call us. Her phone went missing in the accident. It is an international call. We never were contacted by the University.*
- *When we called the University, Campus Security staff were not helpful, they were rude, and told us they would call us back. This never happened.*
- *At no time did we ever get a phone call from the University even though they had our contact details. An RCMP representative called us 24 hours later but that was the only contact we had. Everything else came to us from our daughter.*
- *Communication to students in the Port Alberni hotel was so confused that students did not know what to do. Some thought they were continuing to Bamfield. Our son had to run down the street to catch the second bus transporting students from Port Alberni to Victoria because there were no directions provided and the driver had no idea how many students were supposed to be on the bus.*

- *Our son called us from the hospital at 05:00 on Saturday. There was no attempt from the University to communicate with us until the next Wednesday and this was by email only.*
- *University Executive were there to meet students and parents on Saturday for those who could be on campus, but no one ever reached out to the parents who lived at a distance or who could not travel to Victoria.*
- *We went to Victoria the next Friday and had no idea there was counselling or that a memorial service had occurred. We received no notice from the University about these things.*
- *The RCMP called us the next day and asked us if we knew where our daughter was because they did not know.*

### **iii. Empathy and Compassion**

- *Many parents went to Port Alberni and the hospitals on Friday night. Why not any University staff?*
- *The University failed to understand the emotional impacts of the accident and to read the sentiment correctly. This accident happened in the context of the Humboldt Broncos bus crash and families are hyper-sensitive.*
- *The University sent all the wrong compassion signals and were protectionist, shortsighted, illogical, and insensitive.*
- *We called the University many times Friday night and Saturday with no answer. When we did get Campus Security, they had no information for us...no information for a parent of a student who has just been in a field trip bus crash.*
- *No compassion was expressed to us. Promised but forgotten.*
- *Our daughter has PTSD and is angry and emotional.*
- *Our daughter was put in a hotel room by herself and told to go to sleep. The hotel staff were completely emotional and needed comfort from my daughter, who was completely traumatized herself.*
- *Our daughter and another student were forced to leave the hospital with concussions when a scan showed no other injuries. Both were minors from Ontario, they were given socks and scrubs from the hospital but had no shoes. They had no money with them. A friend they just met came in a taxi and argued with the hospital to keep them. They tried to call the University to see if someone could help. They got Campus Security and said that they are being forced out of the hospital, with concussions, were minors, had no ID, and had no money. Security hung up on them.*
- *Care, empathy, and compassion were not expressed from senior leadership and that is who we needed to hear from. The University did not rise to the occasion.*
- *The University did not check up on students who were in any of the three hospitals and we have shocking stories of how students were discharged onto the street with no ID, wallet, money, or shoes and were told to figure out where to go next.*
- *The school was completely insensitive to the trauma caused; the following week they had an earthquake drill with vibrating bus in the center of campus; the Physics Department had students calculate the impacts of crashing buses; auto-emails continued to bill students and*



*tell them to come to class including up to three emails a day saying their scholarships were at risk.*

#### **iv. Road, Transportation Method, Schedule, and Safety**

- *A risk assessment would have shown that the road was too dangerous to drive, and the bus used was not appropriate.*
- *Driving on the Bamfield Main road in the dark is inappropriate. Travel should be in the daylight hours and a schedule must be adhered to.*
- *The trip lacked a working satellite telephone which is an absolute necessity.*
- *Seatbelts on the bus were not obvious and only three students wore them. They should be made mandatory. The first aid kit was apparently not properly stocked.*
- *Supervision for field trips needs to be by University staff.*
- *These students were minors and an informed consent form should have been used.*
- *It does not appear that a travel timeline or schedule was used, and if there was, it was not appropriate.*
- *Schools should realize they cannot just do the easiest instead of the safest.*

#### **v. Student Academic Accommodation**

- *Our daughter is still looking forward to going to Bamfield Marine Sciences Centre. Biology was great. The Chemistry Department had a harder time helping students and the joy of chemistry is gone. Because of a concussion she had to drop Math because it was too hard to concentrate. To keep going feels huge for her. Some flexibility from other departments and the University would be helpful.*
- *Where is the compensation for family flights, hotels, car rental, lost wages, etc.? Will academic accommodations be available to students? Why didn't the university call family emergency contacts? Why phone calls only from the RCMP and never from the University?*
- *Our daughter had to drop out of school, and we had to pay for the courses she could not take. She lost one year of school.*
- *Offering some tuition forgiveness would have been a nice gesture.*

#### **vi. Emma Machado, John Geerdes**

The responses described above were carried out in the context of the additional and especially important question of how to honour and memorialize the deaths of Emma Machado and John Geerdes and interact with their families. Much of the relationship management with the families could have been more conscientious and compassionate. The families did not resonate with the liaison services offered by the University and perceived a reluctance on the part of the Executive to engage with them.

Both families are extremely disappointed in what they see as poor communication and liaison practiced by the University. Correspondence was weak and impersonal, and telephone calls by Executive were not made to the families in a timely fashion. This has been communicated clearly to the University by the

families and lessons have been learned. During the process of preparing this report, opportunity was provided to the University Executive to reflect on their response to these families.

Amongst all the discussion above, we cannot forget the reason for this review. The deaths of Emma Machado and John Geerdes is incredibly tragic. Two exceptionally talented students with significant contribution to make to the world will not get their chance to do so.

From Winnipeg, Manitoba, Emma's dream was to be a marine biologist, which is why her decision was to go the University of Victoria. The Bamfield Marine Sciences Centre trip was to be the highlight of her first-year studies.

From Iowa Falls, Iowa, John moved to Victoria to spread his wings and for the adventure of living away from home, in a coastal city, and in a different country. An exceptionally talented athlete, John had been asked to both play soccer and row while at the University.

A memorial for Emma and John was held on the University campus on Tuesday, September 17, 2019, four days after the accident, and received mixed reviews including those of Emma Machado's parents who feel they were not adequately acknowledged. While many University staff have expressed how helpful they found the memorial, several of the students have expressed their interest in holding a separate memorial that they could plan and participate in.

There are also plans at the University for future scholarships and visible memorials in Emma's and John's names.

Both the Machado and Geerdes families have expressed that all other forms of memorialization for Emma and John should be secondary to that of having the Bamfield Main road paved, and whatever will help other students who were on the bus heal. Both families feel strongly that because the road is acting as an unofficial secondary provincial highway it should be made safe for public travel, and that with a concerted effort, the five large universities who own the BMSC have the political influence to get the road paved.

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## IV. Conclusions

### A. Decision Making

Decision making and problem solving are critically important skill areas for emergency managers. Gaining control of an incident is difficult, but essential. Lives, reputations, and efficiencies hang in the balance. Emergencies are about problem solving in typically complex environments characterized by limited time and information, along with severe consequences resulting from failure to manage well. Effective decision making, perhaps more than any other skill, is crucial to successful outcomes. Problem solving is designed to analyze a situation systematically and generate and implement an appropriate solution. Decision-making is part of problem-solving, and a critical component of any organization's response. There were gaps in the University's problem-solving processes as it pertained to the following:

- Evaluation of the seriousness of the event
- How best to gather the information needed for early incident assessment
- Whether the incident was serious enough to warrant an EOC
- The level of response and resources required to appropriately service student and family needs
- The level of empathy and compassion expressed to families of surviving student.
- Empathy and compassion driven client-relations and communications with the Machado and Geerdes families
- The forthrightness required to manage public crisis events in today's culture

### B. The Relationship Between Administration and Academic Departments in Field School Delivery

In the larger scheme of what university programming includes, the BMSC Field School accident was of low likelihood. Many higher-likelihood activities occur across a university campus and many thousands of similar trips by many organizations have driven the Bamfield Main road for the same purpose. However, the consequence of an event with fatalities is not acceptable and must be mitigated.

University Administration is responsible for overseeing the actions of what the institution carries out and for overseeing institutional risk management procedures. So are Academic Departments; but while they are subject-matter experts, they are not necessarily attuned to the public or institutional limitations. For field schools, a collaboration of administrative oversight and academic expertise needs to be developed.

Within a collegially governed institution, two concepts apply: 1) Various groups of people share in key decision-making processes (in this case, Administration and Academic Departments), and 2) certain groups exercise primary responsibility for decision making in specific areas of decision making (in this case, Administration for institutional decisions and the Academic Department for department-level decisions).

Regarding field schools, the Administration's role is to assist Academic Departments' developing appropriate planning and risk management processes, while enabling and encouraging field school program delivery. This might include:

- Developing and providing resources such as risk assessment, trip planning and contract templates, or waiver documents, while leaving the scheduling, curriculum content, delivery processes, and specific safety procedures to the Academic Department.
- Communicating to Academic Departments what level of risks (likelihood and consequence) the University can accept and how to mitigate them. For example, institutional protocols may already be in place for pandemic hazards, student billeting in international settings, appropriate procedures for program vehicle-rental insurance, 15-passenger van use, staff and student personal vehicle use on field schools, and mixed-gender accommodations.
- Requiring departments to carry out risk assessment and scenario planning for field school activities to encourage safety-oriented processes.
- Conducting institutional risk assessment against likelihood and frequency criteria to assess where high-risk activities exist and what is or is not acceptable to the institution. Institutional pandemic procedures are the most recent example of this.

An Academic Department's role within an institutional framework is to deliver high-quality field school programs. This includes:

- Determining appropriate learning environments that will facilitate and support experiential curriculum delivery.
- Managing scheduling, logistics, content, program delivery, and safety procedures.
- Determining appropriate staffing qualifications that balances both curriculum delivery and safety.
- Developing Departmental program procedures for the operation of the field school.
- Following provincial and institutional risk management procedures.

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## APPENDIX 1: SUMMARY OF RECOMMENDATIONS

1. A detailed information package should be provided to students that includes more information about activities that will be participated in while at the BMSC and a link to the BMSC informational webpage. This should be available prior to the point in which students register and pay for the trip. The in-person information session held by the senior laboratory instructor is a particularly good practice and should form the basis for a more comprehensive written information package. (p. 12)
2. The University's procedures for the administration of Waivers and Informed Consent should be reviewed and departments informed as to what is correct process, form structure, and content. (p. 12)
3. The University should ensure that all future trips to the BMSC travel and arrive during daylight hours. (p.13)
4. The University should require the collection of emergency contact information for each student. (p. 13)
5. The Department of Biology should renew the BMSC field school hazard assessment and control documentation. See Appendix 2 for a template. (p. 15)
6. University Administration should provide direction to departments regarding suitable field school supervision standards and group leader qualifications. (p.15)
7. The University should update their BMSC field school hazard assessment and control program. See Appendix 2 for a sample hazard assessment of a field school to the BMSC. (p. 17)
8. A refreshing of BMSC field school planning is necessary and should be undertaken by the Department of Biology and approved by the University's Administration. (p. 18)
9. The Department of Biology should work with the BMSC to undertake a scenario planning exercise that looks at possible events at the BMSC and ensures that appropriate prevention and response systems are in place for each hypothetical event. Scenario planning is articulated in a hazard assessment and control document, (which could also be called a risk management plan). (p. 19)
10. The University's emergency response planning documentation should be reviewed and amended to better facilitate field school and off-campus emergency response. (p. 20)
11. The University should evaluate the level of emergency response equipment carried on field schools and the level of training required of group leaders. (p. 21)
12. The Department of Biology should be more attentive to the terms included in service provider contracts, ensure the terms are appropriate and consistent, and check to see that contracted services are provided. (p. 21)

13. The University should review its communication protocols for BMSC field schools and provide telephone technology when possible. It may be necessary to carry out first-person research about where telephone technology works on the Bamfield Main road and where it does not. This could be mapped. (p. 23)
14. The University should ensure that VHF radio vehicle-to-vehicle communications are implemented on the Bamfield Main road. This will entail acquiring the proper radio equipment, a licensed radio operator, and permission from Western Forest Products (WFP) to use the posted radio frequency. (p. 24)
15. The WFP web page relies upon the occasional Twitter postings of WFP staff and a way to ensure these posts are at least daily should be found. (p. 25)
16. In many ways, the basis of this report revolves around an evaluation of whether buses are suitable transportation vehicles for groups on the Bamfield Main road. Buses clearly are and can be used safely when driven appropriately to road conditions, with driver spatial awareness, during daylight hours, with care, with enforced travel itineraries, and with applicable communication and safety technology. These factors are those that should be applied by the University for future transportation needs. (p. 28)
17. Recognizing that charter transportation companies are not in charge of schedules, trip itineraries, or group discipline and enforcement, the University should develop bus transportation protocols and be sure that appropriate staff are on the bus to implement their use. The University should not look to the driver to enforce these procedures but should contract transportation providers who can provide what the University needs to achieve them, including safety equipment and seatbelts. These protocols will include such things as pre-determined itineraries, decision-making that adheres to these itineraries, resource road radio systems, and arrival during daylight hours, among other topics. (p. 28)
18. Using the MV Frances Barkley may be useful for some University of Victoria field schools and a review of a variety of schedules using this ship should be carried out. (p. 29)
19. There is still a significant amount of trauma for some students and families around the University of Victoria's mode of transportation to the BMSC. For May 2020 field trips to the BMSC, it is worthwhile for the University to consider not compounding any negative impacts and to use an alternative mode of travel rather than a chartered bus. Additionally, be aware that September 2020 field schools to the BMSC may be associated with the anniversary of the September 2019 accident and create similar impacts. The alternative is to use very conservative bus transportation methods as described in the Conclusion of Part A of this report. University counsellors who are working with the students presently will be able to give some perspective on student reaction to bus transportation in the short term. (p. 29)
20. Transportation methods to the BMSC should make use of professional charter bus companies or the Lady Rose Marine Service and the MV Frances Barkley. (p. 31)
21. The University should encourage the BMSC to take on the responsibility of developing a central information hub for the use of groups and transportation providers travelling to the BMSC. Such a site would fulfil a broader public safety purpose as well by serving the local First Nations communities, tourists, and local commercial services. Groups travelling to the BMSC should be provided access to this site and daily updates be pushed to both the institution and field school group leaders. It should provide broader information than current road conditions, such as all of the information found on the WFP site, information on cell phone and satellite telephone blackout

- areas, standard operating procedures, best practices for satellite telephone and emergency satellite communicator use, VHF radio use and call point information, driver protocols for road use (working vehicles have the right of way at single lane points, etc.), and BMSC travel updates and recommendations. (p. 33)
22. The University should encourage the BMSC to develop a “pilot car” service from Port Alberni to and from the BMSC for groups who want this. This vehicle could provide local knowledge and expertise, advanced warning to oncoming traffic, provide vehicle-to-vehicle radio communication, advanced First Aid supplies, and be a safety net in the event of flat tires or other incidents along this section of the road. (p. 34)
  23. The level of staffing provided for the September 2019 field school was inadequate and the University needs to clarify what is the appropriate employment status, qualifications, experience, training, and preparation for leading field schools. If there is a difference identified between curricular and extra-curricular trips this also needs to be clarified. (p. 35)
  24. Reassess the management structure and decision-making process for the University’s incident-response.
    - Establish a less subjective system for determining when a Critical Incident Response Team (CIRT) and EOC is formed and an SRT implemented.
    - Adopt an organized incident management system such as an adapted Incident Command System (ICS) that includes roles for the functions of Student Services. (A normal command and control ICS structure may not be well received at a collegial academic institution and will need to be adapted).
    - Provide EOC and IC training for the people who are to assume the roles, adapting the classical models to the university setting. The ICS structure is built for seamless inter-agency response and needs to be adapted for internal university response use (for example, including Student Service units). (p. 48)
  25. Identify who the Incident Commander (IC) should be as well as the membership of the Emergency Operations Centre (EOC). This needs to be skill- and ability-based in addition to role-based. It is not enough to structure an IC and EOC only by the institutional title someone holds, and the relatively ad hoc response of who became the IC in this accident demonstrates this.
    - Create more depth in the Incident Command function with formal acknowledgment of who should play this role in what kind of situation, and define a clear, delegated authority to go along with the role. Other peripheral Student Service units should acknowledge what their own supportive roles are and accommodate the delegated IC. (p. 48)
  26. Develop an Emergency Operations Centre (EOC) manual for off-campus incidents.
    - Include checklists for different stages of a response, including notification, initial response, first week, first month, semester, and school year timelines.
    - Define the roles of Executive, SRT, EOC, IC, and the roles and responsibilities of Student Service Units and Academic Departments.
    - Modify documentation such as the Critical Incident Response Procedures, Critical Issue Response Coordination Protocol for Executive, and Emergency Response Plan to include

pre-plans for BMSC-specific incidents, but the University might be best served by drafting amendments that would apply to all field school and off-campus incidents.

- Develop more robust crisis response protocols that include templates for off-campus and mass incident response.
  - Develop crisis response role and responsibility definitions and job descriptions with task checklists. (p. 49)
27. Implement a Site Response Team (SRT) and Emergency Coordination Centre (EOC) when an incident meets the established criteria. (p. 49)
  28. Implement a separate point-of-contact early in the response. Campus Security, while being a convenient first point-of-contact, is not the unit that should be handling parent and student inquiries for academic or service questions. (p. 49)
  29. A University debriefing session should be held to provide the opportunity for units to share lessons learned, identify process gaps, and develop forward-looking best practices. (p. 51)
  30. Because the case management model worked well in this incident, affirmed by the different units, this model should be expanded to be more inclusive and more quickly implemented if needed. (p. 53)
  31. Should the need arise in the future for the Department of Biology to support students in this manner, the Department of Biology should better coordinate its counselling, academic advice and course concessions with applicable Student Service units (see Academic Advising below). (p. 54)
  32. Operational units such as Residence Services are a familiar point of contact for many students and their families. Residence Services should be incorporated into incident management considerations and their operating limits accounted for when decisions are made that may impact them. (p. 55)
  33. In events of this nature, this unit should activate the case management system early, link families to external resources such as Insurance Corporation of British Columbia (ICBC) and Emergency Management British Columbia (EMBC), expect clarity of internal and external institutional procedures, ask for direction about what level of parental involvement and counselling is to be provided, and confirm the use of internal or external resources. (p. 55)
  34. Counselling Services should be consulted for input into student interactions with the Machado and Geerdes families. Both students and families are interested in pursuing this interaction. (p. 56)
  35. Develop an on-call and ramp-up strategy for Student Services. (p. 59)
  36. Develop an organized and interdisciplinary student case management model with defined roles and responsibilities unit by unit and implement inter-unit case management sessions during the response. (p. 59)
  37. Plan for the ability to quickly provide staffing resources to the Office of Student Life, Counselling, and other units to enable a rapid expansion of services and the reallocation of roles to meet emergency management needs. (p. 59)



38. Develop protocols for what resources can be provided to non-student and family stakeholders. (p. 59)
39. Provide direction to Student Service units for processes and timelines to “return to standard operating procedures.” (p. 59)
40. Develop resource material that staff can share about the University’s crisis event family travel reimbursement and expense policy, availability of public and private health services, various insurance resources, and Province of B.C. emergency funding. (p. 59)
41. Create a management process that recognizes that 16-hour workdays in a crisis for weeks on end are not sustainable. Protocols are needed to provide more support to staff, certainty of time off, and recognition of potential for personal and professional burn-out. (p. 59)
42. Acknowledge that a mass event has much higher levels of demands that cannot be carried out indefinitely without significant additional resources provided in a timely manner. (p. 60)
43. Balance the level of service provided to single-person events with that provided for multi-person events. Mass events tend to get more attention, but single-person events are just as urgent to that person. (p. 60)

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## **APPENDIX 2: HAZARD ASSESSMENT AND CONTROL PROGRAM TEMPLATE**



**Bamfield Marine Sciences Centre**

**Hazard Assessment and Control Program for BIOL 184 Field School**

**Term, Year**

**I. General Information**

Course Name & Term	BIOL 184 Evolution and Biodiversity; Term & Year
Department	Biology
Field School Dates	Term, Year
Field School Location	Bamfield Marine Sciences Centre
Curricular / Non-curricular	Non-curricular
Faculty Lead & Position	Name, Position
Faculty Contact Information	Email: _____ Phone: _____
Date this assessment completed	Day, Month, Year

**Trip Leadership & Contact Details**

Group Leader Contact Information	Email: _____	Mobile phone no.: _____
Supporting Group Leader Contact Information	Email: _____	Mobile phone no.: _____
Supporting Group Leader Contact Information	Email: _____	Mobile phone no.: _____
On-Site Emergency Contact	Name: _____	Phone: _____

**Field School Location and Contact Information**

<p>Bamfield Marine Sciences Centre, Bamfield, BC          100 Pachena Road, Bamfield, British Columbia, V0R 1B0          Telephone: 250-728-3301          Email: <a href="mailto:info@bamfieldmsc.com">info@bamfieldmsc.com</a>  <a href="http://www.bamfieldmsc.com/">http://www.bamfieldmsc.com/</a></p> <p>Emergency Contact Name, Email and Phone Number:          Name          Email          Cell phone</p>
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## II. Academic Purpose & Program Description

### Academic Purpose and Program Description

- This is a three-day field school to the Bamfield Marine Sciences Centre.
- Students must be enrolled in BIOL 184 to participate in this trip, but the trip is extra-curricular and optional.
- Registration is on a first-come, first-paid basis, and 70-80 applications are normally received for a possible 45 positions.
- Facility bookings, course logistics and student registration is managed by the Department.
- The intent of this field school is to provide an experiential learning opportunity to study temperate rain forest ecology, oceanography, and plankton collection, and provide a tour of and become familiar with the Bamfield Marine Science Centre facility.
- Labs include invertebrate diversity of Barkley Sound Lab; a microscopic examination of plankton and discussion of data collection; an introduction to bioluminescence; seaweed identification; ecology; and human uses lab.
- Students provide personal clothing and equipment, rubber boots, raincoat & pants, and sleeping bag.

## III. Program Itinerary

### Date, Month, Year

- 11:30 Charter bus arrives at MacLaurin Parking Lot.  
 11:45 Students & staff meet at MacLaurin Parking Lot.  
 12:00 Bus departs for Port Alberni & BMSC. Students bring bag lunches.  
 15:00 Rest stop in Port Alberni.  
 15:30 Bus leaves Port Alberni for BMSC.  
 18:00 Arrival at BMSC before dark and in time for dinner, pick up welcome package from Main Building, and settle into accommodations.  
 19:00 Evening tour of the BMSC. Safety orientation. (Meet in Traffic Circle, wear boots).  
 23:00 Lights out.

### Date, Month, Year (Low tide of x.0 m @ xx:xx)

- 7:30 Breakfast  
 8:30 Welcome to the traditional territories of Huu-ay-aht First Nations and BMSC

	Group 1	Group 2	Group 3	Group 4
9:30	<u>Field trip:</u> Temperate rainforest ecology. (Meet in Traffic Circle, wear boots)		<u>Lab:</u> Invertebrate diversity of Barkley Sound (Whale lab)	
11:00	<u>Lab:</u> Invertebrate diversity of Barkley Sound (Whale lab)		<u>Boat trip:</u> Oceanography and plankton collection (2 skiffs needed)	

- 12:30 Lunch



13:30 Presentation on university learning opportunities at BMSC (Rix A, led by BMSC staff).  
(Note: Other university students will also attend if there are other groups at the BMSC).

	Group 1	Group 2	Group 3	Group 4
14:00	<u>Boat trip:</u> Oceanography and plankton collection (2 skiffs needed)		<u>Lab:</u> Seaweed identification, ecology and human uses (COTC Seaweed Lab)	
15:45	<u>Lab:</u> Microscopic examination of plankton and discussion of data collected (Rix lower level)		<u>Field trip:</u> Temperate rainforest ecology. (Meet in Traffic Circle, wear boots)	

17:30 Optional souvenirs: hoodies, t-shirts, postcards etc. available for purchase in the Whale Lab

18:00 Dinner

	Group 1	Group 2	Group 3	Group 4
19:00	<u>Lab:</u> Seaweed identification, ecology and human uses (COTC Seaweed Lab) <i>*Include intro to bioluminescence</i>		<u>Lab:</u> Microscopic examination of plankton and discussion of data collected (Rix lower level) <i>*Include intro to bioluminescence</i>	

20:30 Optional Video: Blue Planet II, episode of your choice (Rix A)

*When dark:* Field trip: Bioluminescence at BMSC docks (UVic Prof/TA led)

**Date, Month, Year (Low tide of x.x m @ xx:xx)**

7:00 Pack up and move out of accommodations. Stow bags in foyer of Rix or Main Building until bus arrives.

7:30 Breakfast, build yourself a bag lunch.

8:30 Field trip: Sandy and rocky shores of Brady's beach (Meet at docks, boat over to west Bamfield, walk ~20 min. to the beach)  
**\*\*Tide will be rising\*\***

11:15 Return to BMSC (4 shuttles across the inlet)

11:30 Load bus

11:45 Depart BMSC with bag lunches



#### IV. Field School Logistics

Transportation	Charter bus company Name Email Website Contact information
Service Providers	Charter company name Bamfield Marine Sciences Centre
Partners	n/a
Budget and Finance	Extra-curricular student funded program Revenue: \$xxx.00 fee payable by each student x # of students = \$  Expenses: Wilson's Bus Charter \$ BMSC \$ Other \$ Total Expenses \$
Emergency Response Funding	Provide a description of any funding considerations  BMSC to fund the response if the emergency occurs during a BMSC field trip.
Communications	Include a description of how 24/7 communications will be provided.  BMSC has an on-call, on-site Managing Director
Local Knowledge	Include a description of the group leadership's local knowledge. Do they have familiarity with the location, hazards, and trip content?  Instructors have a history of teaching and researching at the BMSC, which includes extensive health and safety orientation with respect to the local area.  Education programs have an information package for Instructors/Educators.



Student Selection	Include a description of how students are selected, who can participate, and their related skills and knowledge levels.
Contingency Plan	Include a description of what the contingency plan is (if any) if the program itinerary needs to be changed or the trip cancelled.
Documentation	Include a description of what documentation exists to support this field school. For example: <ul style="list-style-type: none"><li>• Proof of enrolment in BIOL 184</li><li>• Participant application forms</li><li>• Field school release forms</li><li>• Participant personal information and emergency contact information</li><li>• Proof of travel medical insurance (out-of-province &amp; international students)</li><li>• Personal medical and allergy information</li><li>• Other</li></ul>
Scenario Planning	Describe your scenario planning exercise with the BMSC and Department of Biology staff about this proposed trip.



## V. Hazard Assessment and Control Program

**Note:**

Apply the strategies of:

- 1) Eliminating Actions
- 2) Engineered Solutions
- 3) Administrative Decision-Making
- 4) Personal Protective Equipment

To address the hazards by:

- a) Not Engaging
- b) Reducing the Likelihood of Incidents (reducing frequency)
- c) Reducing the Consequence of Incidents (reducing severity)

**Definitions:**

- **Eliminating Actions:** removing the hazard from the trip or substituting the activity with less hazardous ones.
- **Engineering solutions:** implementing modifications that alter the way the trip is done, including equipment, communications, and processes that reduce the exposure and allow appropriate incident response.
- **Administrative decision-making:** controls that alter the way the trip is run, including timing, staffing, standard operating practices, and operational procedures.
- **Using Personal Protective Equipment (PPE):** equipment worn or used by individuals to reduce exposure or consequence.





### 1. HIGH LIKELIHOOD – HIGH CONSEQUENCE HAZARDS

These are predictable and non-justifiable high consequence events and we will not participate in any activity that has this high level of risk. Consequences could include death and are not limited to stress, cold, strains, sprains, and breaks.

Hazard or Activity	Description	Control Strategies
Pandemic	Any situation where a virus exists and could be transferred to participants.	<b><i>Eliminating Actions &amp; Administrative Decision-Making:</i></b> The program will not run in this circumstance.
Other	We do not know of any other potential high likelihood – high consequence hazards on this field school.	



## 2. HIGH LIKELIHOOD – LOW CONSEQUENCE HAZARDS

These are predictable and frequently occurring events that are found in normal program activities but that can be mitigated through warnings, rules, supervision, leadership, attention on the part of the student, and appropriate equipment. Consequences are generally limited to stress, cold, strains, sprains, and breaks.

Hazard or Activity	Description	Control Strategies
Water-based field-study program hazards	<p>Water-based:</p> <ul style="list-style-type: none"> <li>• Much of the program time at BMSC is on or near ocean water.</li> <li>• Water hazards exist but can be generally addressed through education and warnings, good group management, students heeding instructor directions, proper clothing and equipment, and appropriate personal protective equipment.</li> <li>• There is a high probability that participants will come in contact with frequent but low-impact water hazards.</li> <li>• High tides, tidal currents, cold weather, heavy rain, slippery docks, and inadequate clothing are program hazards that a participant could expect to come in contact with.</li> </ul>	<p><b>Eliminating Actions:</b></p> <ul style="list-style-type: none"> <li>• As much as possible the programs are run at safe sites. Dangerous locations are not used.</li> <li>• Warnings are given by instructors about water hazards in order to prepare the students and prevent accidents.</li> </ul> <p><b>Engineered Solutions:</b></p> <ul style="list-style-type: none"> <li>• A satellite telephone/communication device with voice/text capability will be taken on field trips. A detailed contact list will be carried.</li> <li>• VHF marine radios with 24/7 contact to Coast Guard are carried.</li> </ul> <p><b>Administrative Decision-Making:</b></p> <ul style="list-style-type: none"> <li>• Program activities are altered depending on the rain and weather, radio call-in procedures are used by BMSC.</li> <li>• Warnings and safety talks are given by BMSC staff.</li> </ul> <p><b>Personal Protective Equipment:</b></p> <ul style="list-style-type: none"> <li>• Personal floatation devices (PFDs) are worn at all times when in vessels on the water, appropriate clothing is required or provided.</li> </ul>
Terrestrial-based field-study program hazards	<p>Terrestrial-based:</p> <ul style="list-style-type: none"> <li>• Much of the program time at BMSC is on beaches, trails, and in the forest.</li> <li>• Terrestrial hazards exist but can generally be addressed through education and warnings, good group management, students heeding instructor directions, proper clothing and equipment, and</li> </ul>	<p><b>Eliminating Actions:</b></p> <ul style="list-style-type: none"> <li>• As much as possible the programs are run at safe sites. Dangerous locations are not used.</li> <li>• Warnings are given by instructors about terrain and wildlife hazards in order to prepare the students and prevent accidents.</li> </ul>



	<p>appropriate personal protective equipment.</p> <ul style="list-style-type: none"> <li>• There is a high probability that participants would come in contact with frequent but low-impact terrestrial hazards.</li> <li>• Cold weather, heavy rain, slippery beach rocks, inadequate clothing, and muddy and slippery trails are all program hazards that a participant could expect to come in contact with.</li> </ul>	<p><b>Engineered Solutions:</b></p> <ul style="list-style-type: none"> <li>• A satellite telephone/communication device with voice/text capability will be taken on field trips.</li> <li>• VHF marine radios with 24/7 contact to Coast Guard are carried.</li> <li>• Bear spray is carried on hikes.</li> </ul> <p><b>Administrative Decision-Making:</b></p> <ul style="list-style-type: none"> <li>• Program activities are altered depending on the rain and weather, radio call-in procedures are used by BMSC.</li> <li>• Travel is done in pairs and not as singles.</li> <li>• Warnings and safety talks are given by BMSC staff.</li> </ul> <p><b>Personal Protective Equipment:</b></p> <ul style="list-style-type: none"> <li>• Appropriate footwear is work on beaches and trails; open toed footwear is not allowed.</li> </ul>
Laboratory work	<p>Working with groups in laboratories has its own group of hazards; dissection tools are sharp, biological samples are collected and studied, chemicals used in the lab can be dangerous, and all must be done with care.</p>	<p><b>Eliminating Actions:</b> Some collection and lab activities are not done with first year biology students.</p> <p><b>Engineered Solutions:</b> Chemical labels are read with care; surfaces are bleached; labs are equipped with various safety measures including fire extinguishers and eye wash.</p> <p><b>Administrative Decision-Making:</b> Samples are handled and stored with care.</p> <p><b>Personal Protective Equipment:</b> Protective gloves are worn when handling sharp knives; biological contaminants are handled with gloves, and goggles and protective clothing are worn.</p>
First Aid		<p><b>Eliminating Actions:</b> A safety orientation is held at the beginning of the field trip by BMSC staff.</p> <p><b>Engineered Solutions:</b> BMSC has two L3 First Aid attendants during regular business hours.</p>



		<p>After hours, in the event of an accident, injury, or emergency requiring medical attention, BMSC has After Hours Emergency Protocol, including:</p> <ul style="list-style-type: none"><li>• 911 dispatch who will activate the Bamfield Volunteer Emergency First Responder team: (9) 911, or</li><li>• VIHA Bamfield Health Centre: (9) 250 728 3312 (24hr line), or</li><li>• Canadian Coast Guard: (9) 250 728 3322, or VHF Ch. 16.</li></ul> <p>A list of emergency and non-emergency procedures, for outside standard working hours, is posted at every phone, first aid kit, and fire extinguisher on campus.</p>
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### 3. LOW LIKELIHOOD – HIGH CONSEQUENCE HAZARDS

These are infrequently occurring events that are found in program activities but if they occur will have very severe consequences. Consequences could include death and are not limited to stress, cold, strains, sprains, and breaks.

Hazard or Activity	Description	Control Strategies
Bus accident	This would be a catastrophic event. In September 2019 a charter bus crashed on this same field school trip. We have implemented a number of additional control strategies to prevent this from happening again.	<p><b>Eliminating Actions:</b> If it is decided to use the MV Frances Barkley instead of bus transportation this would eliminate the bus transport risk. We do not think this is necessary at this time.</p> <p><b>Engineered Solutions:</b></p> <ul style="list-style-type: none"> <li>• A satellite telephone/communication device with voice/text capability will be taken on field trips.</li> <li>• VHF resource road communication protocols will be used.</li> <li>• A BMSC or UVic pilot car will be used for the May and September 2020 trips and this will be evaluated in November to assess its applicability,</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>• The MV Frances Barkley will be used for the May and September trips and this will be evaluated in October to assess its applicability.</li> <li>• An extensive group first aid kit will be taken, and leader first aid training will be ensured.</li> <li>• Emergency contact numbers for all participants will be collected in Banner, the Biology Office Administrator will compile this into a list prior to each trip and this will be carried by the Senior Lab Instructor on the trip. A copy will be left with the Biology Office Administrator and Department Chair.</li> <li>• The emergency contact list will include numbers for Campus Security and other UVic and other relevant external response resources.</li> </ul> <p><b>Administrative Decision-Making:</b></p> <ul style="list-style-type: none"> <li>• All field schools to the BMSC will have the Senior Lab Instructor or Faculty member on the trip. Any TA use will be in addition to this.</li> <li>• The trip will adhere to a strict transportation schedule that ensures all travel and arrival at BMSC will occur in daylight.</li> <li>• Students must be ready to depart on schedule.</li> <li>• Bus transport will not be used during the winter season.</li> </ul>



		<ul style="list-style-type: none"> <li>• When BMSC staff say alternative travel methods should be used bus charters will not be used.</li> <li>• When BMSC staff communicate that all travel is not recommended, the trip will be cancelled or rescheduled.</li> </ul> <p><b>Personal Protective Equipment:</b></p> <ul style="list-style-type: none"> <li>• All students will wear seatbelts at all times while on the bus.</li> </ul>
Ferry sinking	If the ferry option is chosen this section needs completed.	<p><b>Eliminating Actions:</b></p> <p><b>Engineered Solutions:</b></p> <p><b>Administrative Decision-Making:</b></p> <p><b>Personal Protective Equipment:</b></p>
Earthquake/Tsunami	The BMSC and much of the programming occurs in an earthquake and tsunami zone. While this is unpredictable, if this occurred it could be a high consequence event. Significant communications infrastructure would not work, BMSC and community facilities could be destroyed, and emergency response would be very complex. While the likelihood may be low, program participation at the BMSC assumes the risk of this hazard occurring is acceptable.	<p><b>Eliminating Actions:</b> Eliminating this hazard would entail not programming at BMSC and programming at the BMSC assumes the risk of this hazard occurring is acceptable.</p> <p><b>Engineered Solutions:</b></p> <ul style="list-style-type: none"> <li>• A satellite telephone/communication device with voice/text capability will be taken on field trips.</li> <li>• VHF resource road communication protocols will be used.</li> <li>• An extensive group first aid kit will be taken.</li> <li>• Emergency contact numbers for all participants will be collected in Banner, the Biology Office Administrator will compile this into a list prior to each trip and this will be carried by the Senior Lab Instructor on the trip. A copy will be left with the Biology Office Administrator and Department Chair.</li> <li>• The emergency contact list will include numbers for Campus Security and other UVic and other relevant external response resources.</li> <li>• Tsunami evacuation routes and alarm sounds have been developed and will be communicated to students.</li> </ul>



		<ul style="list-style-type: none"> <li>• BMSC and the Bamfield community have an extensive emergency response plan and there is a Tsunami alarm installed on top of the Rix Building.</li> </ul> <p><b>Administrative Decision-Making:</b></p> <ul style="list-style-type: none"> <li>• All field schools to the BMSC will have the Senior Lab Instructor on the trip. Any TA use will be in addition to this.</li> <li>• If EMBC or some other government agency posts earthquake or tsunami warnings of any kind for west Vancouver Island the trip will be cancelled, and students will be immediately removed from the site as expeditiously as possible.</li> <li>• Participants will be educated about the possibility of earthquakes and tsunamis prior to registering and paying for the trip.</li> </ul> <p><b>Personal Protective Equipment:</b></p> <ul style="list-style-type: none"> <li>• Participants will be required to bring warm clothing, sleeping bag, boots, headlamp, and other equipment that could be put to use in a tsunami event.</li> </ul>
<p>Boat capsize</p>	<p>Much of the work at the BMSC is done in boats. Weather, wind, and ocean conditions can be dangerous. Unrelated to the BMSC, in Tofino in 2015 the whale watching boat MV Leviathan II sank and six passengers drowned. There is a slight chance that a boat could capsize, with catastrophic effect.</p>	<p><b>Eliminating Actions:</b></p> <ul style="list-style-type: none"> <li>• Boats do not go on the water in high winds.</li> </ul> <p><b>Engineered Solutions:</b></p> <ul style="list-style-type: none"> <li>• Boats are owned and chosen with care by the BMSC.</li> <li>• A variety of boats are owned by the BMSC and the appropriate boat for the task at hand is used.</li> <li>• BMSC has extensive marine operation safety protocols. The Foreshore Supervisor has decades of experience operating in Barkley Sound.</li> </ul> <p><b>Administrative Decision-Making:</b></p> <ul style="list-style-type: none"> <li>• Vessel operator qualifications are set by Transport Canada and met by the BMSC.</li> <li>• Vessel operators have extensive experience and familiarity in the waters around the BMSC.</li> </ul>



		<p><b><i>Personal Protective Equipment:</i></b></p> <ul style="list-style-type: none"><li>• All vessel passengers wear Personal Floatation Devices (PFDs) at all times when in a BMSC vessel.</li></ul>
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#### 4. LOW LIKELIHOOD – LOW CONSEQUENCE HAZARDS

These are infrequently occurring events that are found in normal program activities but that can be mitigated through warnings, rules, supervision, leadership, attention on the part of the student, and appropriate equipment. Consequences are generally limited to stress, cold, strains, sprains, and breaks.

Hazard or Activity	Description	Control Strategies
Terrestrial-based field-study program hazards	These are terrestrial-based incidents that one could expect to occur infrequently. They might include encountering wildlife such as bears, wolves and cougars, and while there is real danger with these hazards the likelihood of coming in close and direct contact with them is low, and preventative measures generally keep the impact low.	<p><b>Eliminating Actions:</b></p> <ul style="list-style-type: none"><li>• Local knowledge by BMSC staff identify likely wildlife interaction areas. Dangerous locations are not used.</li><li>• Warnings are given by instructors about terrain and wildlife hazards in order to prepare the students and prevent accidents.</li></ul> <p><b>Engineered Solutions:</b></p> <ul style="list-style-type: none"><li>• Groups travel together and not as singles.</li><li>• Bear spray is carried on hikes.</li></ul> <p><b>Administrative Decision-Making:</b></p> <ul style="list-style-type: none"><li>• Program activities are altered depending on the observation of wildlife.</li></ul> <p><b>Personal Protective Equipment:</b></p> <ul style="list-style-type: none"><li>• Appropriate clothing and footwear</li></ul>



## VI. Approvals

I have performed this Field School Hazard Assessment and Control Program. I had the assistance of the following people (Sean Rogers, and anyone else....)

Name:

Position:

Signature:

Date:

As the Department Chair (could be someone different) I have reviewed and approve this Field School Hazard Assessment and Control Program.

Name:

Position:

Signature:

Date: