This package contains examples of good answers that were submitted for sit down portion of the 2007 RPF registration exam. Although the answers were chosen as the two better answers submitted in 2007, take note of the score each answer received and be advised that answers may contain errors. Some questions in this package were not answered by enough examinees to provide examples of at least one or two good answers.

Question 1 (Short Answer)

The management paradigm of Ecosystem Based Management (EBM) is said to create "confusion by design." In British Columbia (BC), it has evolved as an approach to forest management that, as one writer describes it, "requires constructive ambiguity" in order to obtain agreement in the complex relationships common to multi stakeholder issues. One source of confusion is the notion that EBM holds the sustaining of ecological integrity as superior to all other land base demands, while others see ecological integrity as a goal equal to social and economic demands.

a) Provide a current definition of Ecosystem Based Management. Describe what is meant by the term "ecological integrity". (2 marks)

b) Explain how the current definition of EBM attempts to balance or integrate the sustainability of ecosystems, cultures, communities, and economies. The use of real examples in British Columbia to illustrate your answer is encouraged. (5 marks)

c) Describe at least two critical roles that you as a Registered Professional Forester play in the successful application and evolution of the EBM paradigm. (3 marks)

Answer 1 (scored 9.5)

a.) Ecosystem based management (EBM) is a forest management paradigm that has gathered much attention in the past several years since the government has committed to implementing it on regions of the coast by 2009. In the preparation stages of EBM, the coast information team (CIT) undertook work to research and define EMB and arrived at the following definition: "An integrated set of principles, goals, objectives and procedures that together seeks to ensure the co-existence of healthy, fully functioning ecosystems and human communities. The intent is to maintain those spatial and temporal characteristics of ecosystems such that the component species and ecological process can be sustained, and human well-being supported and improved." A shorter definition is provided in agreements in the First Nations (FNs) in the EBM implementation area: "An adaptive, systematic approach to managing human activities that seeks to ensure the co-existence of healthy fully functioning ecosystems and human communities." Several definitions exist, but each ultimately embodies the concept of maintain ecological integrity, socioeconomic stability, and cultural benefits over broad spatial and temporal scales.

In this context, ecological integrity is the ability of the natural ecosystem to function within its range of natural variability, to continue the ecological processes within it and to maintain its resilience to disturbance within it for the purposes of providing benefits that are intrinsic to the ecosystem itself and to meet the demands of society.

b.) The most notable difference in the EBM definition from the other forest management paradigms is that it takes a unique approach to including human populations. It implies that the existence of human communities and their associated demands on the ecosystem are to be considered holistically with the ecosystem and are a natural component to be managed. EBM recognizes in the definition that for the needs (cultural, social, and economic) of communities to be met, they must rely first on a strong, resilient fully-functioning ecosystem. The definition further

implies that these cultural, social and economic needs are to be considered an output of a healthy ecosystem base. This is a shift from considering the need to simply balance ecological and human values and simply focusing on extracting valuable timber as the primary resource.

The definition further adds explicitly that the framework is adaptive – adaptive management is a fundamental premise of the EBM framework and is the critical component of the management that allows its success to be evaluated and modified in an ongoing manner so that the multiple objectives of EBM may be achieved.

Seeking to reconcile these often competing ecological, economic and social objectives is complex and is facilitated by mechanisms in the EBM framework to ensure all relevant interests are represented such as land and resource forums, plan implementation monitoring committees and a network of complex agreements among the parties involved such as local communities, industry, and First Nations.

c.) The role of professionals is critical in the development and implementation of the EBM framework. Most notably, professionals are a group who may be relied upon to continually seek to reflect public values in all management decisions, to advocate for and practice good forest stewardship based on some ecological principles to provide for societal values according to Bylaw 11.3.1.

As a professional, I would also be obligated to promote, educate and raise awareness in the public of the paradigm (Bylaw 11.3.6), its technical components, intended outcomes and to advocate for a change where I felt policies and legislation were not consistent with public demands or good stewardship (Bylaw 11.3.5).

I would be further required in successfully implementing EBM by acting as a resource to ensure due diligence for my employer/client and on behalf of the public that all relevant legislation and policy was upheld (Bylaw 11.3.3) and that the design and implementation of new management systems under EBM such as adaptive and/or passive management strategies were developed and undertaken according to the professional standards to which I am held as a registered member under Bylaw 12.

Answer 2 (scored 9)

a.) Ecosystem based management (EBM) has been defined by the Coast Information Team (CIT) as “an adaptive approach to managing human activities that seeks to ensure the co-existence of healthy, fully functioning ecosystems and human communities.” Ecological integrity is the maintenance of spatial and temporal characteristics of ecosystems such that key component species and key ecological process are sustained.

b.) The implementation of EBM strives to maintain ecological integrity as its foremost objective. In the initial implementation stages of EBM the landscape is zoned to various land use designations similar to those provided under Land and Resource Management Plans. Areas designated for protection are established first and after such designation have been made than other social values are considered, such as visual landscapes, hiking trails, etc. Once environmental and

social values have been identified and managed for then economic opportunities are developed to fit and coincide with the other management values. Vancouver Island is an example where the EBM concept has been adopted. Since the acceptance of applying the EBM approach, the development of the CIT was the initial action. CIT is a multi-stakeholder group comprised of: First Nation government; the forest industry; environmental groups; and communities with support provided by both federal and provincial government. The formulation of the CIT now allows the implementation of EBM's thirty-five principles created to address ecology, socioeconomics, adaptive management, and managing ecosystem based planning processes. These principles attempt to balance the needs and interests of the CIT in regards to ecosystems, cultures, communities and economics.

c.) First and foremost, in order for myself as a Registered Professional Forester (RPF) to ensure the successful application of EBM I must ensure I have adequate knowledge of the concept complying with Bylaw 12.2.1 in order to successfully implement the required actions. Because EBM objectives vary from objectives set forth by government, compliance with "normal" legislation (government objectives) would not satisfy the successful implementation of EBM, therefore, as an RPF I must have knowledge and regard for EBM regulation and policy (i.e. compliance with Bylaw 11.3.3 and 11.3.7). Therefore as an RPF the critical roles that I undertake and must satisfy for the successful application and evolution of the EBM paradigm are:

1. To hold public interest as the priority for all management practices and decisions (Bylaw 12.3.1).

2. To be competent by being knowledgeable in my field of practice (Bylaw 12.2.1) and to abstain from practice beyond my skill level or to seek the guidance of someone who is skilled to perform the required task (Bylaw 11.3.7 and 11.5.4).

3. To work to improve practices and polices (Bylaw 11.3.5) in order to advocate and practice for good stewardship (Bylaw 11.3.1).

Question 2 (Essay)

You are participating in a post harvest field review of several standards units within a cutting permit. Most of the site plans provided for a variety of permanent dispersed and aggregate retention of overstorey trees. The site plans were largely successful in terms of meeting landscape, stand structural, and non-timber objectives. One of the participants on the review remarks: "I wonder if anyone is considering these leave trees in the allowable annual cut (AAC)." This comment gets you thinking.

Briefly describe how the AAC is determined for a timber supply area. How are non timber objectives at the landscape and stand level defined? Who defines them? How is permanently retained overstorey accounted for in a timber supply review? Are non timber objectives adequately dealt with in the determination? Explain your answer. (10 marks)

Answer 1 (scored 10)

How is the AAC determined for a Timber Supply Area (TSA)?

The process of determining the AAC in a TSA, termed the Timber Supply Review, is a nine step process over twenty months (sometimes less). The final AAC determination is made by the chief forester according to the criteria in 5.8(8) of the Forest Act. The AAC determination is supported by the AAC rationale that includes a comprehensive accounting of each relevant factor. It is not solely a calculation, but is also a matter of professional judgement on the part of the CF.

The steps of the process include:

1. Ministry of Forests (MFR) staff initiates the process with licensees and BCTS.
2. Licenses group compiles a data package that describes all relevant information, assumptions in the data, relevant issues, and management objectives. This was intended to be an initiative entitled Defined Forest Area Management DFAM, wherein licensees would collectively undertake timber supply analysis; however, this initiative has been abandoned, as per a letter from the CF of February 9, 2007. In lieu of this initiative there is Forest Investment Account (FIA) funding available for licensees to complete the timber supply analysis data package.
3. Data package is submitted to the MFR and is reviewed by the MFR, MOE and MOAL.
4. 60-day public and First Nations review and comment period.
5. Acceptance of the data package by MFR.
6. Licensee and timber supply analysis according to MFR standards include a socio-economic assessment and submitted to MFR.
7. Timber supply analysis acceptance by MFR.
8. Second public and First Nations review of the timber supply analysis (60-day period)
9. The information from the TSR up to this point that has been completed through steps 1-8 is provided to the CF for determination.

The challenge in TSA TSR is that there are several licensees operating within the TSA. The harvest rights are not exclusive. Unlike the Tree Farm License (TFC) process where tenure is area-based and one licensee is responsible for the timber supply analysis.

The important elements of AAC determinations are that the best currently available data is used and that the AACs are re-determined regularly to reflect emerging issues (5 year re-determination on TSAs and TFLs, unless extended by CF for an additional 5 years).

How are non-timber objectives at the landscape and stand level defined?

The non-timber objectives at the landscape and stand level are defined by the forest professionals operating at the stand level in the legislation that governs forest practices on crown land for stand and landscaped level (FPRR) plans developed through strategic land use planning for the landscape level.

The non-timber values and the associated objectives for these values are incorporated into licence written, government approved, forest stewardship plans, in the form of results and strategies that are written to be consistent with the tenure agreement as well as objectives in regulation, enables by regulation (GAR) and land use objectives (included those grand parented into FRPA from the FPC under 5.180 and 182 FRPA.

Objectives under 5.9 and 9.1 of the FPPR set the government objectives for landscape and stand level retention respectively. There is an additional objective under 5.8 of the FPPR for retention in riparian areas. These objectives combine to include requirements under FRPA for the values of biodiversity and wildlife in stand and landscape level redefined who defines them.

The forest profession under the professional reliance required under FRPA, has the opportunity to influence targets for stand and landscape level diversity during FSP writing by either writing a measurable and verifiable result or strategy for the objectives in the RPPR or adopting the default practice requirements consistent with 5.12.1 of the FPPR. Specifically, at the stand level a forest professional defines stand level retention that is consistent with the FSP and that considers the landscape level retention previously determined at the landscape level through various means, typically GIS mapping, ground-truthing and communication with MFR, MOE and MOAL or through strategic land use planning. A forest professional may also be involved with landscape level retention setting.

Whether involved at the stand level determining in-block retention silviculture system riparian reserves, wildlife free retentions, or measures to protect values, or site plan preparation or at the landscape level (setting aside wildlife habitat areas, determining patch size distribution, or cut block size) a forest professional is duty bound by the Code of Ethics of the ABCFP, and specifically sections 11.3.1 to practice good stewardship of forest land based on sound ecological principles and 11.3.3 to have regard for existing legislation and forest policy to be able to appropriately balance the values affected by all forest management decisions.

How is permanently retained overstorey accounted for in the TSR?

This is accounted for in steps 2 and 9 of the TSR process. In step 2, the licensee considers forest management planned for the land base in the timber supply analysis, while in step 9 the CF incorporates the considerations in 5.8(8) of the Forest Act. The CF will consider the forest composition and growth rate, expected regeneration time, silviculture treatments to be applied, timber utilization, including decay, waste, breakage, constraints related to other values, short and long term alternative rates of harvest, governments economic and social objectives as set by the Ministry of Forests and Range, and abnormal infestations or devastations due to natural or other disturbance. The CF is duty bound by the Code of Ethics in the same was as any forest professional.

In the scenario in the question, when determining constraints due to other values as per 5.8 (8)(a)(r), the CF would consider retention for the purpose of the wildlife and biodiversity value, consistent with the objectives in the FPPR developed consistent with 5.14(1) of the FRPA.

Are non-timber objectives accounted for adequately in the determination?

It is likely that retention and non-timber objectives are not adequately accounted for in the determination. This is based on the fact that we have recently entered a new policy framework under FRPA and we do not yet know the full impact this will have on timber supply, especially on the timber harvesting land base (THLB). One example of this is the 1% cap on the impact on the THLB expected from the management of wildlife in BC under the identified Wildlife Management Strategy. This impact may exceed the 1% limit. If the 1% has been incorporated in the TSA, then non-timber values may not be fully accounted for in the TSR. Also since the CF is not required to consider the effect of future forest management decisions may have, then it is likely that non-timber values are not fully accounted when only 85% of BC has a completed strategic land use plan and many more need updating. First Nations treaties and interim agreements are pending and ecosystem based management is expanding. It is reasonable that the minister cannot predict the effect of all these future events; but the regular redetermination of AACs will help keep cut levels in BC current with respect to non-timber values.

Answer 2 (scored 9.5)

The timber supply review process is essentially a scientific modelling analysis of the productive, sustainable capacity of a timber supply area given current management practices. For TSAs Ministry of Forests and Range analysts complete the data package and timber supply modelling analysis and the chief forester considers the results of this analysis combined with sensitivity analyses, public comment, socio-economic analysis and his own expertise to make the AAC determination.

The timber supply analysis uses forest cover data on species, site series, and other relevant information across the TSA and combines this with growth and yield models to predict the growth rates and sustainable yield from the TSA now and up to 250 years (or more) into the future. However, the sustainable harvest from an area is more than just the physical productive capacity – management practices and land base constraints must also be reflected in the analysis. This is done through a process called “netting down” the land base in the analysis.

Spatially defined areas at the landscape level such as parks and other protected areas are removed on aspatial basis from the area being modelled – meaning the actual characteristics of the area are modelled as being outside the timber harvesting land base. These areas are modelled as providing non-timber values (for example, old growth cover or wildlife habitat) but are not available for timber harvesting. Some stand level attributes (such as riparian reserve areas) are also modelled and netted down spatially – again, these areas are defined in GIS and removed from the THLB, but continue to contribute to non-timber objectives for forest cover. Wildlife tree retention, either single tree or patch retention, at the stand level is, for the most part modelled aspatially – that is, the productive area available for harvest in the block is reduced by appropriate percentage based on the approved result strategy from the forest stewardship plan (default is % across all cut blocks in a 12 month period, 3.5% minimum in any one block).

The net downs are defined by policy. The purpose of the timber supply review is to set the annual allowable cut based on current management practices and constraints. The removal of these areas from the timber harvesting land base is done to reflect the provision of non-timber

objectives. Therefore, in as much as forest policy reflects the will of the public, it is the public who defines the non-timber objectives at both the landscape and stand level. In practice, the timber supply and GIS analysts work to remove spatially – defined areas based on maps (parks, old growth management areas etc) – and these have been defined through different planning processes and government decisions. Aspatial removals (percent area reductions) are also done in practice by the analysts, as per the FSP and other direction.

As wildlife tree (overstorey) retention is for the most part modelled aspatially, it is an imperfect reflection of conditions on the ground. Actual growing conditions of the trees/patches removed can only be approximated at the stand average, and the impacts of the retention on regeneration of the stand are not accounted for. In addition, the fate of many single – and patch – retention areas is to blow down, which is also not well accounted for in the timber supply analysis.

That said, all of the inputs to the timber supply determination are approximations. Growth and yield estimates are one of the most important inputs and can cause the most valuation in AAC forecasts, yet uncertainty around appropriate old growth set index adjustments adds a great deal of uncertainty to the forecasts. Protected areas, OGMAs and other spatially removed areas as well as wildlife tree retention areas that are removed as a percentage of the stand continue to "grow" in the model, and contribute to non-timber requirements and constraints in the analysis. While the impact of these retention trees on the future yield of the stand and blow down events are not accurately modelled, I do not believe that this introduces significant value into the analysis. Given the uncertainty associated with more significant inputs into the analysis, and that the chief forester considers several sensitivity analyses before making his determination, I believe the method of modelling non-timber objectives, whether spatially or aspatially, is adequate.

Question 3 (Essay)

You are an RPF working for a First Nation that has signed one of the first treaties under the British Columbia Treaty Process. The First Nation has several thousand hectares in forested treaty land that they wish to manage for multiple objectives. What are your first steps in managing this land?

(10 marks)

Answer 1 (scored 10)

Working as an RPF for a First Nation (FN) under one of the first treaties in BC would be an exciting and ground-breaking challenge. My first priority in this role would be to create a management plan guiding forest activities on their treaty land base. In order to accomplish this, there are several tasks which I would undertake. For starters, I would need to review all treaty documents and relevant legislation. This treaty may specify legislation or regulations that normally apply to crown land (FRPA) or the treaty may include special provisions and legislation for treaty lands based on the negotiated government structure. For example the Nisga'a treaty includes provisions for the establishment of "rules and standards which meet or exceed provincial standards to govern forest practices." It also provides for provincial licensees continuing to harvest for a specified period so I would need to consider whether any licensees retained valid tenures over the area and what their management plans entailed for the area. Because treaties are very few in BC and associated forest management of treaty lands is new, I may choose to have a legal

representative to help consider and decipher the legal requirements when working on treaty lands. The next step would be to meet with the FN band council (or other representatives of the FN) to determine objectives of the management of their land. Depending on the level of knowledge and experience of the FN, I would work to educate them on forest stewardship and range of management regimes such as sustainable forest management. I may choose to have a repetitive of another FN with more experience in forest management of treaty lands come and talk with band representatives to help consider different objectives and management regimes.

At this point, I would also meet with other stakeholders to consider their interest to the treaty lands or resources, or to adjacent land or resources. Although public/stakeholder consultation may not be required legislatively on these particular treaty lands, I believe that it is still an important aspect of forest stewardship to consider a wide range of values.

My next step would be to gather all relevant data that exists for the area. I would consider any data collected by the FN (either formal or through historical knowledge of cultural sites etc), government inventories and I would work cooperatively with licensees to establish a relationship of information sharing (where appropriate). If I did not believe adequate information was available, I would consider performing an inventory of the land base through a variety of methods: air photo interpretation, timber cruising, sampling etc. At this stage I need to become very knowledgeable of the land base and its characteristics (timber, non-timber values, biogeoclimatic tones, timber types, wildlife habitat, special features, cultural heritage sites etc) I would also need to be aware of the resources of the band (personnel, equipment, expertise). Once I have an understanding of the land base and the objectives, I would prepare a basic structure of the management plan for review and approval by the band council. This basic outline would include timelines and a budget, an outline of the objectives discussed and a rough idea of how these objectives would be met.

Once the outline was approved, I would work on preparing a plan broken down by short and long term activities (i.e. 1-year, 5-year and 20-year). I would perform timber supply analysis to support management strategies, and incorporate objectives for non-timber values. My plan would include results and strategies to meet all objectives and would include economic forecasts. Finally, the plan would consider a safety plan.

Overall, in preparation of this management plan, I would consider my obligations as a professional forester. Under the Code of Ethics, I am responsible to perform good stewardship and according to the standards of professional practice, I must practice with completeness and correctness and with professional care. These requirements would not change simply because I am working on treaty lands and I would apply these principles to the management plan. I would ensure that the plan was free from errors, was scientifically sound and correct, attempted to balance all the objectives, provided sound rationale, provided clear direction from implementation, and provided clear and measurable objectives (as outlined in the ABCFP's Professional Reliance Implementation Guidelines).

Answer 2 (scored 10)

As a forestry professional, I am bound by all legislation and regulations that govern the practice of forestry, the ABCFP resolutions and bylaws and guidelines. My first duty is to the public (ABCFP Bylaw 11.2.1) and I hold professional principals above the demands of employment (11.3.2).

As an RPF managing the forest and its resources for the first treaty, I have significant learning to undertake compared to management for an industrial licensee.

What are the jurisdictional issues with the land? I must learn whether the several thousand hectares of forested treaty land is under the jurisdiction of the MFR, the Forest Act, and all other legislation that does or does not apply.

In fulfilling my responsibility to the public, I must define who the public is in this situation and what weight to give to different sections of the public on issues.

I must obtain a clear understanding of my employer's objectives (11.5.3) which may take time given the uniqueness of their situation.

Understanding any employer's objectives or at least getting a sense of it as it develops; I would begin to understand the public's objectives, and values. Again this would involve defining who the public is. What are the community's values, in terms of social-economic-ecological values? What do they use the forest for, and what do they want from it?

An inventory would need to be undertaken if one doesn't exist, for resources that provide the public values. This may include timber, non-timber forest products, traditional age areas etc. This would tell us what we have.

Getting back to what the public wants, this could be rather intensive as community members may not be used to having the level of input that such a treat arrangement may afford. These would be public meetings and discussions, with the general public as well as any groups/stake holders. The ultimate goal would be to set various objectives for all values and features, set in a social-economic-ecological context. This would give us goals to work towards.

How to manage the inventory for the goals and objectives that have been established would involve the drafting of a management plan. This would have input from other qualified professionals (11.5.4) where I am outside of my area of expertise (11.3.7) and would balance the health and sustainability of forests etc with the needs of those who derive benefits and have ownership rights (11.3.3).

I would research where the land fits into the provincial planning context, such as whether any higher level plans apply. If not, perhaps a similar plan should be established such that objectives are achieved on landscape levels, as well as stand level.

If the land is private forest land, perhaps the Private Forest Land Act could apply, and the Private Forest Land Association best management practices and reporting requirements would be applied.

This would be a good opportunity to extend the public knowledge about forestry (11.3.7), by community involvement, interaction, and employment.

In summary the ABCFP bylaws, guidelines and polices (i.e. Code of Ethics) would be followed as guidance in how I engage myself to the situation. I would discuss with other bands that have treaty forest land that they manage, as well as others that may have good guidance on the significant task at hand.

Question 4 (Essay)

In January, 2004 the Minister of Forests announced that, "The new Forest and Range Practices Act regulations will help restore competitiveness to the forest and range sectors by promoting industry innovation and reducing red tape while upholding environmental standards." The CEO of the Council of Forest Industries stated that, "For the first time, forest resource planning regulations provide clear directions for balancing the values British Columbians want and enjoy from their forests." The Minister of Water, Land and Air Protection, stated that, "The Forest and Range Practices Act improves the protection of ecosystems, water quality, and critical fish and wildlife species by setting clear objectives and high standards for conservation."

a) What role do each of the following agents have in "results-based" forestry:

- Ministry of Forests and Range
- Agreement Holders
- Forest Professionals
- Forest Practices Board (4 marks)

b) Given developments since inception of the new regulatory regime, evaluate the statements made by each of the proponents quoted above. Have their statements held up to the test of time? Explain your response. (6 marks)

Answer 1 (scored 9.5)

a.) Since its inception, the Forest and Range Practices Act (FRPA) has made significant changes to (1) the various role agencies play in "results-based" forestry and (2) the level of forest stewardship. Following, is an explanation of the roles played by agents in "results-based" forestry

The Ministry of Forests and Range (MFR) and personnel often provide advice and interpretation of the act and legislations, and in some cases designated decision makers will apply lists to such documents as an FSP to see if government objectives will be met. Also, the MFR provides for compliance and enforcement.

Agreement holders must retain the proper professionals that prepare a document the required practices by the agreement holder to meet government objectives. Further, an agreement holder

must retain or employ operators that have the proper experience and expertise to put what is on paper onto the ground (in a safe manner).

The role of forest professionals can be outlined by a number of sections from Bylaws 11 and 12 (Ethics and Standards of Practice, respectively). By the fact that the forest professional has an obligation to the public (11.2.1) and that the professional must advocate and practice good forest stewardship based on sound ecological principles to provide value assigned by the public (11.3.1). The forest professional must develop results (or strategies) that, while meeting government objectives for resources, also meet the public's expectations.

The role of the practices board is as such: To monitor and audit all of the above in light of the "results-based" require seeing if the regime is working. An example would be the review of early Forest Stewardship Plans (FSP).

b.) The statement made by the MFR has some truth to it, but there are some shortfalls. Indeed red tape has been removed and this may increase innovation by limiting the time spent in the office preparing documents allowing forest professionals to get out on the land to discuss the issues with the operations side of forestry (i.e. to find out what is and is not working). I would agree that environmental standards (default practices) under FRPA are similar to those of the Forest Practices Code Act (FPC). However, on the other hand it is difficult to see whether increased competitiveness will result to the FRPA regime. I say this because the competitiveness of the forest industry depends on so much more (e.g. softwood agreement, certification, higher level plans for an area and how this will affect individual agreement holders). Regarding the statement made by COFI, I don't believe the results-base regime always provides clear direction on issues. Under the FPC regulations, direction was clear, though onerous. Under FRPA, forest professionals must now define results and strategies within their FSP (or resort to defaults). It has been pointed out that early FSPs relied heavily on defaults (FPB 2006). This is likely because the defining of new results and strategies are difficult because they are hard to define, measure and verify. In regards to the statement made by the Ministry of WLAP, I believe that the objectives different from "direction" within the statement made by COFI are clear (e.g. soils to conserve the productivity and hydrological function of soils), but are also vague at times making it difficult to verify, measure and define the process of meeting these objectives. With respect to "high standard of conservation" I feel the conservation of forest resources is at least as good as under the FPC. However, it is difficult to make such statement about all conservation throughout all of BC. For example without further definition of old-growth managed areas in the wet belt forest of interior BC, we may lose important habitat for mountain caribou. The land use objectives legislation can further define areas of importance that are not being fully accounted for through the results-based regime.

In conclusion, all statement do hold weight, but forestry is so spatially specific that we can stop at the statements. We need to look within management areas, watershed units, whatever to define where things aren't working to adopt and change our practices.

Answer 2 (scored 9.5)

a.) The Ministry of Forests and Range (MFR) plays an important administrative and oversight role in the results-base model. MFR staff evaluates results and strategies in FSPs for consistency with government objectives, approve or reflect FSPs, issue cutting and road permits and undertake compliance and enforcement activities.

Licensees are responsible for creating FSPs with results and strategies for achieving government objectives for the 11 FRPA values. Licensees are obligated for delivering on these results and strategies, as well as measures and practice requirements, on the ground.

Under the results-based model, professional reliance is one of two supporting foundations. Professional reliance is "the practice of accepting and relying on the decisions and advice of professionals who accept responsibility and can be held accountable for the decisions they make and the advice they give" (ABCFP 2006). The Foresters Act gives exclusive right to practice professional forestry to registered members of the ABCFP. Therefore, FRPA rests on competent, trained members of the ABCFP operating under the Code of Ethics to use their expertise to deliver sound stewardship and uphold the public interest.

The Forest Practices Board is almost globally unique in that it evaluates on the ground forest management practices and reports publicly on both government and licensees performance on meeting their obligations. The FPB provides credible oversight and monitoring on. FRPA is indeed delivering the same environmental standards established under the old Forest Practices Code. This provides for independent scrutiny and increased public confidence.

b.) With respect to the quote from the then Minister of Forests, we must consider it in 2 parts. Firstly, he stated that FRPA would help restore competitiveness. The truth is that the competitiveness of the Canadian forest sector has never been worse; however this is owing to the drastic use in the value of the dollar (firm 65¢ to parity) and the US subprime mortgage fiasco. The question then is, would the situation faced by the industry be worse were we still operating under the Forest Practices Code? In as much as FRPA has reduce operational costs, the answer is yet – although this impact is marginal given the other challenges currently faced by the industry. The second part of the quote goes to upholding environmental values – the Forest Practices Board has indicated that, for the most part, on the ground forest practices remain strong and continue to improve. Therefore, I believe the second part of the Ministers quote has proven accurate.

With respect to the quote from COFI I believe that FRPA does provide a more accurate representation of the publics desire to achieve balance in forest management than earlier legislation. The structure of FRPA includes 11 FRPA values of which timber is one. While some argue that the inclusions of the caveat "without unduly affecting the timber supply" represents a timber bias, I accept the explanation of the MFR legislators that this caveat attempts to balance strong conversation objectives. On balance, I believe the structure of FRPA clearly articulates the values society derives from forests.

Finally, the quote from the Minster of Water, Land and Air Protection states that, through setting clear objectives and high standards, FRPA will improve protection of ecosystems, water quality and critical fish and wildlife habitat. FRPAs goal was at minimum to maintain the environmental standards from under the FPC, and hence the default requirements in FRPA represent status quo from the code. The fact is that the proposal of alternative, innovative results and strategies has been almost nil. With such a clear reliance on defaults, while it is reasonable to say that environmental standards have been maintained, I cannot agree with the statement that FRPA has improved environmental standards.

Question 5 (Essay)

Management of mountain pine beetle in British Columbia has shifted from sanitation harvest to salvage harvest of beetle-killed stands. In order to capture as much value from the wood as possible, the allowable annual cut (AAC) of several Timber Supply Areas (TSAs) has been uplifted (e.g. Williams Lake TSA, Prince George TSA). This uplift in harvest rate may have numerous ecological, economic and social impacts.

List and describe two very important and direct potential ecological impacts and two very important and direct potential social-economic impacts of the increased harvest. (4 marks)

For one of each (ecological and social-economic), outline what strategies are being used, to mitigate negative effects. (6marks)

Answer 1 (scored 10)

Two direct potential ecological impacts are effects on watershed hydrology and effects on wildlife. Due to rapid harvesting of watersheds over a short term there are concerns that watershed hydrology will be negatively affected as a result of increased peak flow and water yields. This may result in an increased risk of stream bank instability and sedimentation. In terms of wildlife there are concerns that rapid harvesting, often continuous over large areas may result in excessive fragmentation of the landscape and a detrimental reduction in wildlife habitat critical to some species.

Two direct socioeconomic impacts are the expected reduction in midterm harvest levels. As a result of the uplifts, we are basically cutting a component of our midterm harvest right now. The economic future of some communities due to their reliance on the forest industry is a serious concern. A second socioeconomic impact is safety. It is well understood that safety has economic considerations. Increased activities within areas, often involving many different operators, two ways hauling on roads not designed for this purpose, and excessive work hours in an effort to get the wood out as soon as possible has resulted in many safety related problems.

Strategies that are being employed:

Watershed hydrology – several stand level operational procedures have been recommended including:

- retaining areas with live trees in order to provide some opportunity for evapo-transpiration.
- prompt reforestation of harvested areas
- leave logging slush on site to slow snow melt, reduce wind speeds (sublimation), maintain soil moisture and aid in site regeneration
- minimize harvesting on south facing slopes (snow melt)
- plan harvesting on a watershed scale to minimize road construction and road density
- where possible, retain all green vegetation (under storey and over storey both in and outside of riparian areas, and consider widening of riparian reserves)
- develop corrosion control plans by a qualified specialist to minimize erosion and sediment delivery potential

Safety – several improvements have been made in this regard such as:

- improved communications between different operators both in terms of advising each other where and when they will be working, and by utilizing common radio frequencies for hauling
- improvements are being made to roads, including upgrading of bridges, adding turnouts, and sharing maintenance activities
- BC Forest Safety Council has implemented the Truck Safe Program in an effort to reduce the number of vehicle/hauling accidents occurring, particularly in the Interior.

Answer 2 (scored 10)

The magnitude of the MPB epidemic is enormous with more than 500 mil m^3 of pine being either grey or red according to the latest MFR update. This is no less known about 40% of the merchantable pine volume in BC and by the end of this epidemic, it might be around 80% of that volume will be dead. Among the many ecological impacts of the increase in harvest levels are: hydrology and loss of structure for wildlife and biodiversity. The hydrological impact is caused by the loss of evapo-transpiration from the dead trees, the loss of shade for snow in the spring wetting season and the loss of interpretation by the reduced free surface of dead trees or the total loss of tree surface when they are harvested. This translates to increase peak flows and will also mean lower during dry seasons. Erosion on steeper slopes and in streams (banks) is also to be mentioned.

The loss of tree cover and trees means a serious loss of structure for habitat and biodiversity as line and dead trees both create abundant habitat and associated biodiversity. Some species will benefit from it, but the majority won't.

On the socioeconomic side, two of the most prevalent impacts are the boom of the forest industry as well as the to be expected fall down in timber supply in the mid-term and the challenges to the tourism industry. Both in turn are and will challenge the existence of heavily forest resource dependent communities. While the significant increase in cut now will increase the capacity and involvements of the forest industry as well as revenue, the resultant mid-term fall down in AAC will lead to very significant lay-offs and under-utilization of capitol. Tourism mostly depends on pleasant landscapes and big clear cuts do normally not further the tourism industry.

Some of the strategies that are employed to anticipate the forest industry boom and bust are: The CF has stressed in two recent AAC determinations the importance of focusing the harvest on stands with at least 70% of dead pine. If a good "secondary stand structure" exists, then he counts that percentage to be even higher to trigger harvest of the dead pine. This strategy will prevent the damage of the non-pine dominant layer component and of the sub-canopy and under storey tree species which will likely provide for our earlier harvesting opportunity than if clear cutting took place. It will also diversify the tree species composition on the landscape now dominated with pine and thus make future timber supply more secure. Communities will equally benefit from these diversities. Another strategy is to further other uses of the dead pine that can extend the shelf life of the pine. Bio-energy initiatives and wood pellet production are such options that can utilize the pine longer and thereby constitute to smooth out the timber harvesting cruise. Less pine has to be harvested now and more can still be harvested, as the dead trees can't be cut up into saw logs anymore.

In order to mitigate the impact of wildlife and biodiversity the CF has issued a guidance document on landscape and stand level structural retention on large-scale OPB harvesting operations. The guidance letter calls for retention over and above standard stand-level retention in riparian areas and WTP and over and above regular OGMA obligations. The other strategy to mitigate the wildlife and biodiversity impact is the same as previously mentioned – to spare stands with less than 70% dead pine. The structure retained in the form of dead pine and mature non-pine species as well as under store is most valuable for wildlife and biodiversity. This strategy will even lead to high wildlife potential and use as well as biodiversity levels than is present now in rise stand become even more alive as it decays.

Question 6 (Essay)

One of the foundations of the Forest and Range Practices Act (FRPA) is the concept of professional reliance and accountability. Some critics say professional reliance is not working. Others say that it is. Argue whether professional reliance is working under FRPA. Use real life examples in your argument. (10 marks)

Answer 1 (scored 9)

Professional reliance is defined as "to rely upon the actions, judgements and advice of a professional." The practice of professional reliance within the context of BC forestry is a multidisciplinary endeavour involving forest professionals and professional technicians, as well other qualified registered professionals (QRPs).

Within the realm of operational forestry the exercise of professional reliance will involve a "team work" approach. To use a real life example of this approach, I have been involved in the preparation and execution of a cutting permit within a community watershed which serves the city of Nelson. Working in my capacity as a forest technician, I performed planning, cut block layout and road layout duties under the active oversight of a professional forester. The RPF was satisfied that I was a competent individual to interpret the management constraints of working in a community watershed. The RPF and I had a long professional relationship, so he was well aware

of my level of education, training, and experience in the duties I was responsible for. Additionally as a forestry pupil I was well aware of the professional Code of Ethics which binds me to act in the interests of the public, the profession and my employer.

Various aspects of this project required specialized knowledge of various QRPs. While not a legislated requirement of working within a community watershed, the supervising RF engaged the services of a hydrologist, to assess the sensitivity of the watershed to disturbance and advised us on an acceptable equivalent clear cut area to minimize the risk of a "material adverse impact on the quantity and flow of the water from the waterworks," and "a material adverse impact on human health that cannot be addressed by water treatment" (FPPR Sec 8.2.2).

As the proposed harvest area was situated above class IV and V terrain, a qualified geotechnical engineer was employed to determine if the road placement and cut block posed a risk to terrain stability.

Under the supervision of the RPF I was able to incorporate the recommendations of the QRPs into the final site plan, which was reviewed, signed and sealed by the supervising RPF.

At this point the cutting permit is being logged under the supervision of a qualified logging foreman, who as a non-professional, is also under the supervision of the signing RPF.

As the layout technician responsible for the permit I have also done site visits to make sure that intent of the site plan is being met, and that drainage structures are being in accordance with the recommendations of the geotechnical engineer.

This chain of responsibilities is typical of an operational forestry project under FRPA. I would argue that the plan addresses all of the 11 objectives found in FRPA section 149. The oversight of appropriate QRPs at various stages of the project ensures that due diligence is performed by the licensee, and the ethical requirements of both myself and the signing forester have been met. We have restricted ourselves to practice only in those fields where we are professionally competent (Bylaw 11.3.7), we have had regard for existing legislation, policy and common law (Bylaw 11.3.3) and we have practical good stewardship of forest land (Bylaw 11.3.1)

Answer 2 (scored 9)

The concepts of professional reliance and accountability are fundamental to the implementation to FRPA. Taking care of BC's forests, which are ~ 95% public owned, is complex and therefore requires specialized knowledge, training and experience. Therefore, the public relies on forest professionals to care for their forests with competence and integrity. This concept of professional reliance encompasses the notion of trust. BC's government, through the Forester's Act, and the ABCFP, through its Bylaws, provide forest professionals with the tools to ensure the public can trust its forests are being properly managed. Professional reliance tools include "rigorous standards of conduct, competence and accountability, as demonstrated by compliance with a strict ethical code, dedication to professional principles, and the requisite experience to carry out the work" (ABCFP – Professional Reliance in the Forest & Range Management in BC). A forest professional, according to Bylaw 11.2, has a responsibility to the public, profession, client and

other members. Such responsibility is achieved through the practice of Bylaw 12: Standards of Professional Practice, which are competence, integrity, due diligence and stewardship. It should never be assumed that the public has or will continue to have absolute trust in professional reliance. Therefore, the forest professional must continually advocate for and practice sound forest stewardship through communication, clarification, feedback and continuous improvement.

Some may have argued that the forest professional is not practicing with a regard for professional reliance. I disagree; I believe professional reliance is working under FRPA. As a FIT, I have had the opportunity to mentor under RPF's who are fully implement professional reliance in their everyday execution of their Forest Stewardship Plan. They are definitely practicing rigorous standards of conduct, competence and accountability.

In terms of rigorous standards of conduct, the RPF's have done the following. Firstly, they have created an FSP according to the guidelines of creating a professional plan. In implementing this plan, they are continually ensuring that they meet objectives and strategies within it. For example, for the value of biodiversity within the FRPA, the RPF charged with designing cut blocks ensures cut blocks are within the maximum size and that a suitable amount of wildlife, trees and patches are retained. The RPF responsible for strategic planning in the woodlands department has implemented a biodiversity program through FIA funding designed to monitor biodiversity through time within the company's area of operation. In terms of wildlife habitat features, I have witnessed the RPF's shut down logging operations upon detection of a raptor's nest. They subsequently hired a wildlife biologist to investigate the nest and further implemented a more than adequate buffer around the nest. In many ways, these professionals have gone beyond regulated and required tasks and have been innovative in terms of application of rigorous standards of conduct.

In terms of competence, these professionals have also demonstrated a superb regard for the application of professional reliance. Each RPF has an area of expertise within which they work. Whenever an aspect of their job arises in which they do not have the adequate training or expertise, they seek out qualified individuals who do. For example, during cut block layout, the overall block boundary surrounded a small tributary to a known fish-bearing stream. It was not known whether the stream was fish bearing and so subsequently a fisheries biologist was hired to conduct an assessment. Similarly, when designing a road across a relatively steep slope, there was question as to terrain stability. The slope was less than 60%. Within the regulatory framework of the FPC, a terrain assessment would not have been required necessarily. However, since there was question, a qualified resource professional was hired.

In terms of accountability, I believe the above examples attest to the RPF's incorporation of the professional principles of due diligence, competence, integrity, independence in regards to good forest stewardship. Perhaps another good example of accountability lies in these foresters adherence to their EMS and SFI standards. These systems are voluntary and auditable by external third party auditors. The foresters must prove due diligence by recording all of their professional actions and tracking those actions, including non-conformances, to completion. They must demonstrate competence through training matrices and records; they must be and must hire only those who are competent to perform tasks. When engaging the public and other professionals, the RPFs document that they have listened to concerns and have incorporated those concerns where appropriate. The RPFs have made less money for the company by training

fallers to stop work if they discover features, such as nests, that were not on the original planning document; in this way their EMS, through standard operation procedures, documents independence.

Question 7 (Short Answer)

Your company has been contacted by your mayor for advice on opportunities for the utilization of wood fibre currently not being processed locally. The mayor has been contacted by several entrepreneurs who would like to utilize the logging waste and residue and mountain pine beetle killed stands that do not produce high enough quality timber for normal milling products (e.g. lumber, pulp, OSB), but that they say offers an opportunity as biomass for biofuel, bioenergy and other uses.

The areas of interest are on your Tree Farm License (TFL). Your investigation reveals that there are large debris piles and areas of killed timber that are not currently economically feasible for your company to utilize, although they could be used as biomass for other opportunities. As the new RPF for your company, you have been asked to prepare a presentation on fibre supply considerations about which the mayor and town council should be aware. Describe briefly to them:

a) The policy framework and obligations surrounding the management, harvesting and utilization of timber resources on a TFL; (2 marks)

b) Who has the rights to Crown timber on your TFL that cannot be utilized for normal milling? What implications should the TFL holder and other proponents be aware of in pursuing alternate opportunities?; and (3 marks)

c) Key considerations for someone interested in arranging a biomass supply so that a viable facility might be developed for biofuel, bioenergy or other form of manufacturing. (5 marks)

Answer 1 (scored 9.5)

I would begin my presentation by describing:

a.) The Forest Act establishes the agreements which allow individuals/companies the rights to harvest timber on crown land. These are identified in Section 12 of the Forest Act; there are ten agreements in all. The Tree Farm Licence (TFL) is one such agreement. Licensees or individuals with operating rights in a TFL are granted almost exclusive rights to manage the lands within the TFL as per a set allowable annual cut (AAC). The TFL is an area-based tenure, which means that the owner of the TFL agreement has near sole authority to harvest within that given area; other licensees cannot operate within the bounds of the TFL. “TFL licensees confer extensive management responsibilities including collecting inventories, protection of non-timber resources, strategic and operational planning, road building, reforestation and silviculture,” (ABCFP Policy Review Guide pg 4-36 2007). TFLs are long-term tenures with a term not exceeding 25 years and they may include private land. All timber harvested from a TFL is subject to stumpage as per the

Forest Act and applicable appraisal manual. In addition, all management practices conducted on a TFL must be consistent with the Forest and Range Practices Act (objectives) and any other objectives set by government (higher level plants etc). Licensees must operate under an approved Forest Stewardship Plan (FSP) which must have results/strategies consistent with objectives set by government.

b.) All rights to harvest timber on a TFL are conferred to the agreement holder. As such, the agreement holder may choose to harvest the timber under an approved permit for a use other than normal milling. TFLs can be subdivided or transferred to another party, so that could be an option if the agreement holder was to choose to transfer rights to the use of the timber.

In terms of pursing alternate opportunities to using wood that cannot be used in normal milling procedures, there are a number of factors to consider:

1. Cost: is the opportunity viable in terms of the cost to extract the fibre compared to the subsequent return in revenue? Will it be a viable venture? What will stumpage be?
2. What, if any, are they environmental factors to consider in pursing such a venture? All obligations required under legislation, regulations and HLPs must be considered and met.
3. Is this the best use for this fibre or will it be better served if left standing and contributing to non-timber values (i.e. wildlife, biodiversity, water). If I remove it, is it going to have negative impacts on other values (i.e. in close proximity to streams)?
4. What are my obligations to the public? In removing this timber, am I balancing social values with economic gain?
5. How much volume is available for this alternate use? Is there enough to make a viable opportunity? Is there too much that removing it will compromise non-timber values?
6. What have other professionals done in similar situations?
7. What is the market for my product?

c.) Some considerations in pursuing a biofuel or other manufacturing plant include:

- Will it be profitable to harvest based on current stumpage system? What is the cost of harvest and production vs. the return on investment?
- How much volume do you have available for this venture? Is there a long-term supply to make the manufacturing plant a viable investment?
- Is there a market? If so, what is it, where is it?
- What are the costs for trucking?
- What is public consensus for such a venture?
- How long can dead fibre be used for pellets, biofuel or other products?
- How will we conserve environmental values such as wildlife, biodiversity and water?
- What have other regions/countries done?

As professionals, it is critical that we consider all values in a forest. Prior to undertaking a new initiative professionals must be certain that a new form of tenure such as that of a biofuel tenure meets the needs of the public. Professionals must uphold stewardship values in making all management decisions and so in making this presentation I would be sure to stress the importance that non-timber values be incorporated. I would also be certain to stress that professionals must be competent in the work they do. As such, it is critical to properly research

such a venture and consult appropriate professionals before making the final decision as to whether it is environmentally, socially and economically feasible.

Answer 2 (scored 9)

a.) The professional forester signing appraisal data submission should be fully aware that their work will be critically reviewed by ministry appraisal staff. The signing forester must ensure that his data used is the most current and up-to-date. The submitting forest professional must also not misrepresent facts (Bylaw 11.4.4). The professional forester should expect their work to be critical reviewed. This is important because there is the obligation to collect revenue for the crown that is due to the public of BC. The professional forester must also understand that the more faults that are discovered by ministry appraisal staff the greater the reviews will take place. If a professional is competent and he follows all legislation and guide books, and asks for professional reliance when he is uncertain of data. He will not have to be so concerned with his data appraisal submissions.

b.) The Code of Ethics clearly states that a forest professional must uphold the professional principles above the demands of employment (Bylaw 11.3.2). The forest professional must work within all current legislation, regulations, policy and common law (Bylaw 11.3.3). The forest professional must also not misrepresent facts (Bylaw 11.4.4). The Code of Ethics guides the professional when he is making decisions. The professional must follow the Code of Ethics when making decisions as a forest professional. The forest professional must complete his work to a standard that reflects good forest stewardship. If the forest professional is completing his work within the Code of Ethics and the standards of practice, the data submission should withstand peer review. This is a critical benchmark that forest professionals should use under the concept of professional reliance. There is a wide range at different inputs from a vast range of professionals in developing an appraisal. The professional forester must make sure that they have been diligent in the collection of data and that the professional has monitored this data collection. If the professional developing the appraisal can withstand a peer review or a complaint resolution process than the forest professional knows that is the balance he must attain as a forest professional.

c.) The professional care standard: Competent members exercise appropriate judgement and discretion with due care (Bylaw 12.2.3). The standards of care are outlined within the standards of professional practice. The ABCFP has developed guidelines for their interpretation. The professional standard of care is the amount of care needed to prevent an undesirable outcome. It is also the amount of care a peer would adhere to under the same conditions. The forest professional can ask themselves what another professional would do in the same situation. The professional and public or stake holder input, practice circumstances as well as the situation that the professional is dealing with. There is not one standard that can be used for a professional in a given situation. This also means the forest professional can't just follow another peer developed process, because it is being used. The professional standard of care means the professional uses his expertise and he determines the gravity of standard and care based on the seriousness of the situation and the likelihood harm will come as a result of his actions.

Question 8 (Essay)

Recently the British Columbia Provincial Government committed to take part in a program with several US states (i.e. Washington, California) to "identify, evaluate and implement ways to collectively reduce greenhouse gas emissions in the region and to achieve related co-benefits." Included was a commitment to develop a system of marketing carbon offsets and carbon credits.

a) What roles and responsibilities do British Columbia professional foresters have in this important new initiative? (6 marks)

b) Describe some examples of forest related projects in British Columbia that might present practical options to sequester carbon? (4 marks)

Answer 1 (scored 8)

Under a system of marketing carbon offsets and carbon credits, forest management may play a big role, thus BC RPFs will have an important role in their areas of practice (Bylaw 13.7). This is because only RPFs and RFTs are entitled to practice professional forestry (Foresters Act). Although in early 2007, the Canadian government elected not to include forest management in its greenhouse gas reduction measures for the Kyoto agreement (ABCFP Policy Manual 2007), I will assume forest management is identified as a tool to reduce gas emissions under this new program.

British Columbia RPFs have the responsibility to work to extend public knowledge of forestry (Bylaw 13.6), which will be required in the project opportunity identification stage. They, however, must make sure that in proposing any new activities/uses for the forest or the land base, that they adhere to Bylaw 12.1, by advocating and practicing good stewardship of forest land, based on sound ecological principles to sustain its ability to provide values which have been assigned by society. In this regard, they may need to consult the various publics to determine if possible projects are in present society's interests. Working on this project, and RPF must make sure they follow existing legislation and policy (Bylaw 13.3) but also that they work to improve practices and polices affecting the stewardship of forest land (Bylaw 13.5). In this regard, if the RPF identifies practices which he/she feels will reduce greenhouse emissions (while upholding other forest stewardship values), then he/she should advocate for this practice, as today's science tells us reduced greenhouse (GH) gas emissions will lower the rate of climate change. The RPF must also express a professional opinion on this new project, if it is founded on adequate knowledge and experience (Bylaw 13.9). It is expected that certain parts of a GH gas reduction program will be outside the RPFs area of expertise, thus he/she would need to consult the appropriate qualified registered professional, or better yet, form or become part of a team of professionals working on the project.

Projects that might present practical options to sequester carbon are numerous. Marginal farmland could be reforested. Fastening growing species could be planted. Backlog forestry land not sufficiently stocked could be fully stocked. Advocacy could by increased, to get the public planting trees in all available growing spaces (ex backyard). Forests could be fertilized to get them to grow faster.

Use of beetle killed wood could also be promoted as a use of energy, considering it is carbon neutral, and harvesting MPB killed stands would plant with fast growing seedlings.

Question 9 (Essay)

You are a forester working for a community in British Columbia. The community owns a park 300 hectares (ha) in size. The park has 70 % forest cover and large infrastructure investment. A number of businesses operate service centres in the park. The park has well established trail networks. The park has 2 million visitors per year.

During a recent wind and ice storm the park sustained damage to 52 ha of the forest, where more than 90% of trees have been damaged although only 20% have fallen down.

The Parks Board has requested that you prepare a recovery plan for the affected areas that is consistent with resource and user values. Your plan must include recommendations for safety as well as steps to mitigate potential future damage.

a) What are the key considerations of your plan and why? (8 marks)

b) Do you consider the preparation of a recovery plan the practice of professional forestry as defined by the *Foresters Act*? Why or why not. (2 marks)

Answer 1 (scored 10)

a.) The key considerations I would have to address in my recovery plan include:

1. Safety: in order to exhibit the regard for the safety of others (Bylaw 11.3.10) I would seek the services of a qualified danger tree assessor to identify and mark each tree in the 52 ha area that represented a safety risk.

2. Extending public knowledge: After the falling of all the trees that represented a safety risk I would inform the public, the companies inside the park and local interest groups what should be done with the felled timber. I would inform the public that salvage of the downed timber could facilitate funding for (1) the removal of the felled timber, and (2) measures to reduce the likelihood of repeated events, as well as the benefits of retaining some downed timber as coarse wood debris for nutrient sources (nurse logs), cover for birds and animals, etc.

3. The requirements and obligations set forth in the tenure which allows for the sale of downed timber to local processing facilities.

4. Public values: prior to development of the mitigation section of my recover plan I would consult with the public, local interest groups, the local businesses, and the parks board to identify the values and interests that need to be addressed. I would inform the public of

the need to implement practices that could mitigate the potential events from occurring again which may include feather of edges exposed to frequent, high velocity winds, a periodic assessment and removal of trees that pose safety concerns etc.

5. Timing of projects: Because the area exhibits high volumes of public the timing of projects would have to coincide with times that are less busy i.e. night time or during non-peak visiting times to address safety concerns as well as the economic well being of the local businesses.

6. Public perception/communication: Because the area is so highly visited all my actions would be up to public scrutiny, and therefore I would consult (seek their guidance), inform, and communicate regularly so that the public keeps its faith in myself and the profession.

7. Forest health and ecosystem functioning: Among all the other considerations that I am faced with I must still promote and advocate good forest stewardship (Bylaw 11.3.1).

b.) The preparation of a recovery plan would constitute the practice of professional forestry as defined under the Forester's Act because I am providing services for a fee regarding the planning of protection, and management of forest ecosystems and resources which requires the specialized education, knowledge, training and experience of a registered, enrolled or permit holder member.

Answer 2 (scored 10)

a.) In order to prepare a recovery plan for the parks board in relation to the wind and ice storm damages, there are several considerations I would make and key issues I would address.

For starters, I would initially look for an established park management plan for guidance on resource and user values for the park and objectives that may be in place for the park. While my plan will focus on the restoration and recovery of the affected area, I must consider the values and objectives for the park as a whole so that I can be duly diligent in drafting a plan that meets the needs of my client and the public (park users).

I would also obtain all relevant information regarding park ecological communities and values as well as an inventory of infrastructure such as trails and buildings. I would need to gain an understanding of what role this damaged area played in the park and how the damage impacted these values. For example, was it an area heavily used by park visitors that suffered severe infrastructure damage, or was it a more remote area that was in a relatively 'natural' state. I would also need to consider if the area contained any environmentally sensitive areas or species of concern habitat that would require special attention or concern in restoration activities.

According to the established objectives for the park in general and for the impacted area in particular, I would then prepare a restoration plan. This plan would first consider promoting a resilient ecological community. I would consider biodiversity values through snag and coarse woody debris retention, promoting a variety of habitats and planting a variety of trees and shrubs.

I would consider natural disturbance types of the area and attempt to mimic those events where possible. For example, where fire hazard has increased due to fuel build up, I may recommend thinning and pruning or prescribed fire to return the stands to their 'natural' state.

In preparing for future storm events, I would perform assessments to consider wind firmness of existing stands to provide assurance of future resiliency. All of these activities would take place while taking special considerations and cautions for special features or habitats to be protected. I would also consider the need to control brush around planted trees and control invasive plant species.

Throughout the plan, I would identify areas where safety concerns may pose a threat to restoration workers or to park visitors. The plan would include measures to limit public access and would ensure all workers were adequately trained and qualified to work in areas with hazards. I would hire a Qualified Registered Professional (QRP) specializing in hazard and danger tree assessment to supervise and provide guidance. Areas of park use by visitors would be cleared of hazard and danger trees. In plan preparation I may also choose to hire a QRP to perform slope stability assessments in areas that may be at risk due to wind thrown trees.

Park infrastructure such as trails or access routes would only be allowed to open once a final safety assessment has been performed. I would consider permanently closing or relocating infrastructure that could not be re-opened safely.

Finally, my plan would consider future events and how to mitigate impacts. Perhaps objectives for some areas need to be reconsidered based on their risk to damage or levels of use may need to be redistributed to other areas. I would also want to consider the long-term health of the ecosystem including resiliency to pests and wildfire.

b.) I absolutely would consider the preparation of this plan the practice of professional forestry under the Foresters Act. We have determined that the area impacted was a forested area for which I have been tasked with a recovery plan for a variety of values and to provide recommendations for the future resiliency of this area. The definition of professional forestry includes advising on or performing work respecting forest lands and forest ecosystems including the rehabilitation of forests. This management plan does exactly that. Although some components of the plan may not require an RPF, the plan considers forest health, forest ecosystems, forest resiliency, sensitive areas and many more applications that directly require the specialized knowledge and qualifications of an RPF.

Question 10 (Short Answer)

a) Briefly describe the legislation protecting species at risk on Crown, Federal and private land in British Columbia (flow chart with details acceptable). (3 marks)

b) What legal responsibilities do you have to protect species at risk? (1 mark)

c) What professional responsibilities do you have to protect species at risk? (1 mark)

d) As a Forest Professional, what strategies/activities should you undertake to minimize impacts on species at risk? (5 marks)

Answer 1 (scored 10)

a.) Federal land:

- Federally, Canada has the Species at Risk Act (SARA)
- Establishes the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) which classifies species as extinct, endangered, threatened or special concern and provides report to the Minister of Environment
- Minister then decides whether or not to list species
- Once listed as extirpated, endangered or threatened, becomes an offence to: (1) kill, harm, harass, capture or take an individual (2) possess, collect, buy, sell or trade in individuals of the species (3) damage or destroy its residence
- SARA includes deadlines for recovery strategy development; may include definition of critical habitat if possible
- Covers little area – only federal land, aquatic species and migrating birds
- Has "safety net" where federal government can intervene in provincial jurisdiction if province failing to protect habitat, but this has never happened, despite several petitions by environmental groups

Provincial crown land in BC:

- BC does not have a stand-alone species at risk legislation, but rather has opted to manage species at risk through existing legislative framework
- Forest and Range Practices Act: Defines "wildlife" and "species at risk" in the act so that endangered, threatened and vulnerable species can be listed as identified wildlife (see below) by the Minister of Environment
- Identified Wild Life Management Strategy:
- (1) component of FRPA
- (2) fine-fitted approach to address species whose requirements are not being met through coarse filter mechanisms such as protected areas
- (3) goal is to minimize the effects of forest and range practices on identified wildlife and maintain limiting habitats
- (4) the IWMS is limited to a 1% timber supply impact
- (5) utilizes establishment of – wildlife habitat areas, general wildlife measures, wildlife habitat features, wildlife habitat objectives to deliver on goal

Federal SARA:

- Can apply to province under safety net provisions (see above)
- Has never been implemented, despite petitions by environmental groups

Private land:

- Private Managed Forest Land Act:
- (1) contains objective for critical wildlife habitat

- (2) if habitat requirements cannot be met on crown land, Ministry of Environment can assess if it is necessary to protect critical habitat on private managed forest land (as defined by the act) and enter into agreements to protect

b.) Clearly, I must comply with the terms of all of the legislation outlined in Part A above. If operating as well on federal land, I must not harm any individuals identified under SARA or destroy their residences in operations as well as operate within the terms of any recovery strategy. On provincial crown land in BC, I must:

- follow management practices defined for wildlife habitat areas
- comply with general wildlife measures, such as timing operating to avoid sensitive periods
- not damage or render ineffective a wildlife habituate feature

On managed forest land, I must, where appropriate and necessary, work with MFR to protect critical habitat.

c.) As a registered professional forester I am bound by the Code of Ethics to:

- Advocate and practice good stewardship based on sound ecological principles (11.3.1); this would include management of species at risk, as well as provide those values desired by society, including protecting endangered species.
- Have regard for existing legislation (11.3.1)
- Operate with regard to the standards of professional practice, only in areas where competent and with integrity, independence, due diligence and a mind to stewardship

d.) - accurately identify presence of species at risk in operating area
- educate self in species requirements, consulting appropriate experts and scientific documents
- develop full understanding of legal obligations
- accurately map habitat areas and features, consulting with experts
- design harvesting activities – both spatially, and temporally – to minimize impacts on species at risk, again working with experts
- eliminate harvesting where determined will have too great an impact
- work with experts to identify means of modifying practices at a stand level (operationally) to minimize impacts
- take an adaptive management approach, including comprehensive monitoring, changing practices if they prove ineffective
- participate in recovery teams, read journals and take other steps to stay up-to-date on management practices
- communicate to and with public and First Nations to maintain social licence to operate, improve their understanding of forestry matters (Sec 3.6 of Code of Ethics) and seek their help and involvement in species protection (e.g. not snowmobiling in sensitive caribou areas)
- coordinate operations with other licensees to minimize additive impacts of multiple operations (for example, by reducing the number of roads), as well as information share

Answer 2 (scored 10)

a.) The Species at Risk Act (SARA) is the act responsible for protecting species at risk (SAR) on federal land. The purpose of the act is to "prevent Canadian indigenous species, subspecies and distinct populations from becoming extirpate or extinct." The act establishes the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) which consists of an independent body of experts responsible for assessing and identifying SAR. The COSEWIC identifies long and short-term objectives in a recover and action plan using the best available knowledge. Sections 32 and 33 of SARA are direct measures to protect SAR. Specifically, they state that it is an offence to "kill, harm, harass, capture or take an individual of a wildlife species that is listed as extirpated, endangered or threatened species" and it is an offence to "possess, collect, buy, sell or trade an individual of a wildlife listed as an extirpated, endangered or threatened species" (Species at Risk Public Registry Website). The SARA is the federal piece of legislation which requires each province to develop and implement a recovery plan for red-listed SPP as per COSEWIC.

Crown lands in BC are subject to the Wildlife Act which designated wildlife as threatened or endangered. The Wildlife Amendment Act (2004) has four legally designated species. The Ministry of Environment is responsible for this act.

The Forest and Range Practices Act also protects critical habitat for species not designated under the Wildlife Act. Under FRPA, the Ministry of Environment has the ability to designate; Species at Risk and Regionally Important Wildlife. To manage for these listed species called "identified wildlife", the act establishes special management attention to address the impacts of forest and range management on crown land. The associated identified wildlife management strategy identifies these listed species and enables the establishment of Wildlife Habitat Areas (WHA) for their protection.

All species of importance in BC are compiled through the Conservation Data Centre (CDC) and these are based on the federal COSEWIC list. CDC is a tool to provide knowledge and information on red and blue listed species in BC but bears no legal weight. The management for wildlife are enforced through the above acts.

In addition to Wildlife Act and FRPA, there are also Section 7 notices, which is under the Forest Planning and Practices Regulation which states that in the absence of WHA for SAR, or regionally identified species, a Section notice will provide interim guidance (general wildlife measures) until formal WHAs are established. Forest stewardship plans must follow these notices.

Other acts pertaining to crown land are the Land Act, Water Act and Parks and Protected Areas Act. These are coarse-filtered acts which manage for habitat at a large scale.

Some high level plans also address regionally important species and species at risk and must be considered in managing on crown lands.

Private land in BC must abide by the federal and provincial acts in managing for species at risk.

b.) As a forest professional working in BC's crown forests I have a legal obligation to abide by any designations made under the provincial Wildlife Act (for those applicable species), the FRPA (for identified wildlife and species at risk) and Section 7 Notices as per the Forest Planning and Practices Regulations. I must also be aware of designations under the Land Act, the Water Act and the Parks and Protected Areas Act. Since all species from these acts arise from the Conservation Data Centre listing, I should also be aware of this resource. If I am operating on federal lands, I must mange according to SARA and any designations made as per COSEWIC.

c.) As a professional, I am required to be competent, independent and operate with integrity. The ABCFP holds me accountable to the public through these values as stated in the Foresters Act. I am further bound by the Code of Ethics to practice good forest stewardship (bylaw 11.3.1), to have regard for existing legislation which includes managing for species at risk as per relevant acts (Bylaw 11.3.1) and to only practice in areas where I have sufficient competence (Bylaw 11.3.1). The Association of BC Forest Professionals Standards of Professional Practice further states that I must maintain sufficient knowledge in my area of practice to insure I complete work in a complete, clear and concise manner. As a resource professional I must seek to competently balance all values of the forest to meet the public's needs. I must always be aware of my obligations, especially in a results-based world, to ensure I am competent in making sound management decisions that strive to balance social, economic and environmental values.

d.) The ABCFP released a paper to guide a professional in managing for species at risk. They suggest the following to minimize impacts on SAR:

1. Keep informed of SAR in your area
- consult local experts
- consult relevant acts, COSEWIC designation and CDC lists
- consult higher level plans

2. Keep informed of new knowledge
- articles, research, new science

3. Participate in recovery teams
- being more actively involved helps increase awareness of local issues and make for more well-rounded management decisions

4. Assess practices to meet legislated direction

5. Develop low-risk options when there is no direction
- may want to have these options peer reviewed for due diligence

6. Arrive at socially acceptable decision
- As stewards of BC's forests, professionals #1 obligation is to uphold the public's interest. This includes balancing social, environmental and economic values and placing emphasis on values society places emphasis on (i.e. SAR)
7. Support monitoring and adaptive management

8. Advocate good forest stewardship
- Bylaw 11.3.1 of Code of Ethics
- incumbent on all professionals
- voice concerns and advocate for change as you feel necessary

The above will help guide me as a professional in managing for SAR. I must always remember to act in the public's interest and to practice only in areas where I am competent. I must seek advice in areas outside my knowledge and experiences. In doing so, I can be sure I am fulfilling my obligation to uphold the public's interest in making sound management decisions for SAR.

Question 11 (Essay)

There have been many revenue models for timber pricing used in British Columbia over the last few decades. The current model is a Market Pricing System which uses British Columbia Timber Sales (BCTS) auction data to set the stumpage rates for other licensees.

What are the objectives of the stumpage system in British Columbia? Is the current system working? How effective is it as compared to past systems? What changes might you suggest to improve the system and why? (10 marks)

Answer 1 (scored 8.5)

In BC, over ninety percent of the forested land base is owned by the crown, held in trust for the public. Forest tenure agreement holders harvest timber off crown for a charge referred to as stumpage. Stumpage is a government revenue system; the most recent revenue scheme used in BC for the pricing of this public resource is called the "market pricing system" or MPS. Its objective is to charge a fair and equitable amount for the crown timber harvested based on its market value. The market value is derived from a combination of timber quality, harvest site characteristics, operating costs and prices paid through competitive bid sales delivered by the governments BC Timber Sales Program (BCTS).

The MPS was phased into use in BC's coastal forest region in February of 2004 and June of 2006 for BC's two interior forest regions. Its purpose was part of the greater forest revitalization plan to increase forest sector competitiveness and profitability (among other objectives, e.g. environment) and resolve continued disputes with our largest trading partner to maintain a healthy trade relationship without undue duties.

Is this new system achieving its goal to establish a market value for our wood, demonstrating it's not subsidized by the government? Roise (2005) provided valid insight after detailed review of the coast system stating that through the MPS equations are just estimates and do contain error. These are expected to average out through the use of the average rolling bid inputs from the past five years.

In essence, about half of the time tenure holders will end up paying more than what their cutting permit would adhere on the market and about half the time they would be paying less (i.e. central limit theorem). As an aspiring professional, this expert's opinion seems appropriate given my level

of knowledge and experience with appraisals and has definitely undergone scrutiny by other experts in the field which has verified its validity. Thus I will accept this as reasonable – the MPS is working to its expectation on the coast.

For the interior, and the introduction of the log grade changes April 1, 2006 in preparation for the MPS introduction, the general impression on the new pricing scheme is that log values are being more appropriately priced, recognizing them for their value (e.g. % available for product creation; grades 2 vs. 5). Regional prices difference exist based on the wood being harvested and delivered, which is very heavily driven in some areas by the mountain pine beetle, whereas in other areas where the profiles don't include predominantly lodge pole pine (Pli). This is causing waterbeds across the interior just due to profiles and the way which the interior system is priced with an average rate applied across all cutting authorities arising from competitive bid sale information entered into regression equations.

How effective is it compared to past systems? The MPS has supported the argument in the softwood lumber dispute by being first, designed by a leading American female economist and second, more transparent and clear to apply; I say more so than the previously comparative pricing system (CVP), but still not completely clear, transparent or simple with the mountain of data collected through the log cost surveys, the arguable tenure obligations adjustments resulting and the "black box" of regressional analysis that occurs for statistically reliable data sets. It is demonstrating sales flowing to their highest demand, whether it is portion of sales sold from the Chinook Timber Supply area and trucked to Revelstoke for milling (e.g. provided by Timber Sales Manager of Chinook Business area, J Kennah, Personal Communication) or interior producers choosing to purchase BCTS wood and defer their quota wood harvest because the competitive sale is cheaper overall! I believe such two examples demonstrate aspects of developing a more competitive market are shining through.

However, there are still many challenges. A stumpage system must be equitable and fair. Factoring in market influence goes a long way to implement such a system. A truly open and competitive market would be the only way to demonstrate the perfect pricing system that would provide a fair price to the public resource and profit to industry.

Without advocating for stumpage reform and other major policy changes (e.g. remove ability to reduce AAC if at control not met in period), and not considering implement greater pricing reform if new product options come on-line for decadent balsam or hemlock or severely dry and checked Pli. I have two recommendations for the incremental change to the MPS.

First, the government should move to a system like Alberta's, where adjustments to the system occur at month's end rather than quarterly. This will increase the reality in market-influenced cutting permit prices as the value of the Canadian dollar demonstrates an undesirable amount of strength with regards to the forest sector and lumber prices are dismal. Further, monthly adjustments will reduce concern of inducing with trying to manage to that set quota amount of wood they are allowed to ship cumulatively before they get hit retroactively with huge tariffs for over shipment.

Second, I would suggest that MPS for the interior be modified so that a stumpage rate is set for each cutting authority as occurs on the coast as opposed to having an interior wide rate applied like as it stands at present. Individual rates will more accurately reflect local and regional market conditions and further benefit those operations which can operate below the industry average. Furthermore, this should aid in removing this regional waterbed. This benefits some companies to other's detriment due to a factor that's out of everyone's control.

Overall, the MPS is an improved revenue system as compared to previous CVP and others (not discussed) as it has a greater market influence in pricing, drives wood to its highest demand and a greater percentage of the time than before and is more clear and transparent. Equality is an issue yet to be resolved. Stumpage should continue to be a focus point for continued debate by government industry, the association and forest professionals as we all benefit from the public receiving a far and equitable price for its resource as well as the industry being profitable from employing measures to increase competitiveness in their business plans. A responsibility of the professional to advocate when based on sufficient knowledge and truthful data to support good forest stewardship.

Answer 2 (scored 8.5)

There have been different revenue models for timber pricing in BC. The current model, Market Pricing System (MPS), uses British Columbia Timber Sales (BCTS) auction data to set the stumpage rates for other licensees in the province.

The objectives of the stumpage system in BC have also evolved. Stumpage is the fee that is paid to the government when crown timber is harvested in BC. Guiding principle of any stumpage system in the province has been that they are determined in a systematic and equitable manner. The stumpage system must be a transparent process that will ensure the crown receives fair value for the public resource. The objectives of MPS however, differ from the previous comparative value pricing system. The objective of the MPS is to reflect a more market sensitive reality. The central concept that underlies the MPS is that auctions of standing timber establish the market value for the timber, and those market values can then be used to determine the stumpage price for the timber harvested from new auction sales or long-term tenures; it is a "transaction evidence" pricing system. The current system was implementing to extinguish the US's perceived notion that the old CVP system created a subsidy to the BC forest industry.

The current system is currently working, but has flaws that if continue to be realized will result in a failure in the stumpage system. Through the Forestry Revitalization Plan, 20% was targeted volume to be placed on the open market of representative profile timber. BCTS has not reached that goal of 20% to date and therefore, they may be issues with the statistical validity of the system. BCTS also must get volume on the open market in a timely fashion. To date, the flow of volume to the market by BCTS has not been consistent and this inconsistency (i.e. large volumes at one time vs. throughout the year) is creating issues. Potential buyers may be desperate at certain times of the year (e.g. start-up or wet season) and may pay more to access the harvesting rights which in increased stumpage; not truly reflecting the value of that timber profile. The competitive nature of these sales is consistent with stumpage objectives in many regions across

the province. One issue with the current stumpage system is in communities or areas where there is no competition for the fibre.

Industry consolidation creates issues with having a truly fair and open market as the number of competitive bidders is limited. In some parts of the province, consolidation has results in one to few potential bidders. The system fails if there is no competition. The past system (CVP) was not conducive to a healthy trade relationship with the US. The perceived forest industry subsidy caused years of international strife and therefore did not effectively address the concerns of our customers, the new MPS does, theoretically. The past administrative pricing system, created a waterbed effect in the interior. Due to the minimum stumpage paid for dead, dry logs in the MPB affected areas, other areas had to pay more for the government to reach its target revenue; this water bedding has been mitigated through MPS. CVP was also built from the licensee cost data; MPS "A" does not include this information; the winning bids are correlated with stands timber characteristics and market information to develop equations that determine the stumpage. Over time, MPS in the province will work more effectively if a few changes are made. The interior should switch from MPS 'B' to 'A'. The 'B' system uses CVP to distribute the interior MP; to reflect a true marketing pricing system, the stumpage system should price individual stands on market/auction information. BCTS also needs to get more volume on the competitive market in a timelier manner. This will work to strengthen the MPS system. Finally, a mechanism should be put in place to address areas where competition does not exist due to forestry industry consolidation.

MPS is the system that has allowed us to maintain share of lumber sales in the US, it is more defensible than the old 'administrative' pricing system, allows the average stumpage rate to reflect the value of the resource and results in the fair and equitable distribution of stumpage and log grades in the interior. In order to maintain or improve the systems function, there are a few required changes.

Question 12 (Essay)

A public interest group is concerned about the effects of climate change and has asked you to assure them that the species and provenances that you are prescribing for local reforestation are appropriate. Describe the steps you will take to investigate this issue and summarize the points you will make in your presentation to this group. (10 marks)

Answer 1 (scored 9)

As a professional forester it is my responsibility to review, sign and seal site plans. The stocking standards used in my site plan are derived from the listing of appropriate stocking standards in the forest stewardship plan that I am working within. The stocking standards within the FSP must be consistent with the FRPA Sec 149c (timber objective) and FPPR Sec 6(a).

The species and provenance prescribed in my site plan meet the said transfer guidelines set out in the "Chief Foresters Standards for Seed Use" (April 2005) and Sec 43 of FPPR (Use of Seed). When ordering seed for reforestation I will detail the elevation, latitude and longitude of my site to ensure I have seedling suitable for my site.

In order to address the public concern about the suitability of my stocking choices I will investigate several related issues.

I would investigate the current thought on climate change, especially concerning the rate and severity of climate change in my region. I would familiarize myself with climate modeling, which forecast changes in the BEC zones of BC at various intervals over the next century. I would consult with experts in the field as to the likely variation about the mean of the forecast temperature regime, and the likely effect on precipitation, snow loading, and wind events.

I would consult with experts as to the probability effect on various forest health agents given the forecast change in the environment.

I would review my list of acceptable and preferred species and determine the comparative "elasticity" of each species to a range of conditions. I would check the range of the species over western North America to determine if I am at the lower or upper limit of the species range (in terms of both latitude and elevation).

I would investigate details of the seed provenance to determine details of special breeding for drought and pest tolerance.

In my presentation to the public interest group I would present my finding concerning;

1. The forecast change in local conditions according to the current science,
2. the legislation limiting my choice of species, and the rationale behind the legislation,
3. the adaptive range for the species allowed to me by regulation,
4. the "best" choices from the list of species, based on my assessment of elasticity, and adaptation to the forecast conditions.

I would be clear with the group that the science is inexact. The change in climate could of course be more or less extreme as compared to the forecast. The inputs to the forecast may change depending on social, political and technical changes concerning carbon emission. I would uphold Bylaws 11.3.6 in extending public knowledge of forestry and promote truthful and accurate statements on forestry matters. In conclusion I would be honest that, though I am attempting to limit the risk of plantation failure through thoughtful choices based on current science, it would be impossible to guarantee the health of my plantation as for in the future 50-80 years.

Answer 2 (scored 9)

As an independent Registered Professional Forester (RPF) living and working in a community in BC (my assumption), I have been asked to make a public presentation regarding seed use, planning, re-forestry and climate change. There is a very concerned group of local individuals that have recognized me as a knowledgeable individual on the subject and they would like to engage in some dialogue – "clear the clouds" on what's going on with this issue. The interest group cites that they see media stories almost daily about the impending doom and gloom of climate change and action by the provincial government to reduce greenhouse gas emission and so forth.

However, there is no mention to what is expected to happen to our environment beyond sea level rise and more extreme weather.

As an RPF, I maintain competence in the field of silviculture having administered contracts for one cone piling, tree planting and vegetation control. I know a little about how seed is sown, where they come from and how all the information is tracked. However, to ensure I am competent to educate the public on these interrelated issues, be able to express a professional opinion, not misrepresent facts and promote truthful and accurate statements on how climate change and silviculture programs are being managed, I must investigate this issue further. These actions are my responsibilities as an RPF to the public and profession. Further, accepting such an offer to make a presentation should not just be considered a responsibility of being a professional, but a great opportunity to engage in public education, gather an understanding of their (the public's) interests so I can be assure I am advocating and practicing good forest stewardship as expected by the public to maintain my profession's exclusive rights to title and practice professional forestry!

First, I would want to gain an understanding for the relevant legislation, regulation, polices, guidelines, standards, measures and best practices utilized throughout the province for gene resource, seed and seedling management. Understanding this will help me explain legal requirements to seed use in my presentation. Examples of questions I should be prepared to answer include: What is a seed zone? Do we plan genetically-modified trees or exotic species as land managers? Why can we not plant western red cedar on this site (e.g., sub-boreal species BEC zone)?

Second, I would want to contact relevant experts in the field of seed zone management and planning breeding programs. Groups of individuals I may want to contact include: The Chief Foresters office, The MFR Forest Science Branch, The Forest Genetics Council of BC, seed orchard or seedling nursery growers and managers (e.g. Vernon Seed Orchard, Pelton Reforestation Ltd), local silviculture foresters, regional MFR silviculture specialists and researchers at educational institutions (e.g. Sally Aitken, UBC Forestry geneticist). This is not an exhaustive list of good resource opportunities, but an excellent starting point to confirm my understanding on applicable legislation, current practices, and insight as to how climate change is being approached. General discussion with my peers would also be a good option to brainstorm who to contact for information and discuss ideas about what topics are relevant for this presentation and what could be left out or referred to for more information at presentation conclusion.

Third, I would want to investigate all information available about climate change with regards to its predicted impacts to forest and practice ecosystems, planning and practices. Here I would discover the governments BC Climate Change plan "Weather, Climate and the Future: BC's Plan," the MFR specific examination of climate change and forestry in "Preparing for Climate Change: Adapting to Impacts on BC's Forest and Range Resources" and then more specifically the governments means to address the future of sustainable forest management with climate change – the "Future Forest Ecosystems Initiative".

An examination of these government publications will provide me with background knowledge to the current climate situation, potential future scenarios, steps already taken (invested in) by the government on the issue and implementation strategies and next steps.

I would no start drafting my presentation based on the concept of a professional quality plan – being scientifically and technically sound and free of errors and omissions. Further, I would want to think analytically on the situation as mentioned previously attempt to foresee the questions and concerns of the public interest group so I can be sufficiently prepared to engage dialogue beyond what my PowerPoint screen dictates! I have already gauged my client (i.e. Public groups) objectives when they asked me to speak; I want to make no assumptions of their understanding of the issue or their biases; I would want to approach this presentation with a positive and stimulate mindset with a clear understanding for my personal biases (i.e. do not include in presentation unless ask for, then specify) and high expectations for my conduct.

My drafted presentation would appear as follows:

1. Introduction
- myself (background, education, knowledge, experience)
- reasons for meeting
- what we are going to cover (basics of seed use etc)
- my limitations on knowledge, advice, speaking as an independent professional

2. Legal World of Forestry
- tree species available; relation to biogeoclimatic zone and ecology
- why government and industry plants trees
- some legislation involved – Forest Act, Foresters Act, Forest and Range Practices Act, Forest Planning and Practices Regulation, Chief Foresters Standards for Seed Use
- practicing professional forestry – who are the professionals? What's our role, why are we necessary? (definition, self-regulation profession)
- management plans containing results and strategies to meet goals and legal obligations for re-forestation
- stocking standards, ecological background, variances allowed over a license, seed registration and tracking through SPAR, establishing a free growing stand
- seed zone planning, seed collection, viability testing and storage at Surrey Tree Seed Centre; guidelines
- seedling development, research and planning
- seed orchard management and superior species selection and breeding – it's not genetic modification just picking preferential partners

3. Climate Change
- potential future scenarios (e.g. grasslands expansion, sub alpine colonization)
- modelling predictions or timeframes for a change
- government dialogue of matter
- provincial plans, MFR plans

- great uncertainty in predicting the future – this must be stressed as we're professionals trying to adapt to the predicted future matters with best, get not complete or verifiable, information
- impacts of climate change for forestry examples (e.g. MPB infestation)
- impacts of climate change specific to seed planning (e.g. orchard infestation and death; cone crop losses on landscape)

4. Future Forest Ecosystems Initiative
- purposes = adapt forest and range management framework in light of climate change to ensure stress resilience and ability to provide into future
- public consultation to date
- objectives: research, forecast, monitor, evaluate, adapt, communicate
- seed specific = looking at facilitate migration, experiment with moving seed zones (e.g. increase elevation limits), tree breeding for resilience (e.g. hard stem rusts), protecting seed stock in the future
- highlight phase in process for projects being funded through forest investment account

5. Conclusion
- great uncertainty in future
- very strict guidelines at present to ensure future forests value for society's expectations
- starting to move on what has to change in legislation and practice
- start with brainstorming and research – baby steps over next couple of years

I would want to highlight the importance of approaching such uncertainty with the precautionary approach; apply site-specific and low-risk measures and experiments will assist in forest managers gathering an understanding of how to move forward without taking any irrational steps that would open themselves or the profession/ or the government or other companies to unnecessary criticism for trying to employ adaptive management in a timely fashion.

Question 13 (Essay)

Mature overstorey trees are scattered across an opening. They are surviving but not adding much growth. Regeneration under these trees is neither dense, nor tall enough to meet free growing standards. The rest of the regeneration in the opening would meet free growing standards. The original prescription does not indicate any role for the retained overstorey trees and the original stocking standards were not adjusted to account for them.

a) Discuss the appropriateness of the free-growing concept for retention systems. (3 marks)

b) How should you account for the presence of retained overstorey trees in your stocking standards? (3 marks)

c) Under what circumstances is it an acceptable professional practice to revise stocking standards at this stage? (4 marks)

Answer 1 (scored 9)

My first duty in this circumstance would be to discuss the prescription with the RPF who developed the plan (FSP/site plan) and determine why the trees were left in the first place as a respectful measure, as not to criticize his work (11.6.2). If no management strategies were intended for the mature overstorey trees I would have to assess their value onsite. I would review land use plans, forest stewardship plans and comparative sites with site plans to determine if there is appropriateness for a free growing definition of a healthy stand of trees of a commercially valuable species, the growth of which is not impeded by competition from plants shrubs or trees.

If the trees are merchantable and community viable, now and in the future, they would meet the free growing concept. If they are not they may be viable for other uses (e.g. seed trees, wildlife trees, visuals). I would then have to calculate if the loss of growing site potential was utilized for other uses. Consultation with peers, specialist in silviculture, and public interest groups, and the government (MFR/MOE) to assure that it is acceptable practice, if not I believe I would advocate for change.

b.) I would account for the presence of overstorey in my stocking standards by using "multi-layered stocking standards" or the new "deviation from potential (DVP)" standards. Both systems are based on the concept that "big" trees take up more space than "little" trees on a site. The re-forestation density/well-spaced stems are then required to be adjusted according to available growing space. I would take my predicted loss of growing space compared to full site occupancy if clear cut and compare the volume gain/loss using the growth model TIPSY to demonstrate what the outcome may be.

The overstorey trees are not too dense so I would also prescribe that they should be retained for other purposes such as visual quality, hydrological uptake, biodiversity and future coarse woody debris. I would have to take into account potential pests and disease in the overstorey trees; potential seed genetics that may not be suitable for the site.

c.) As a professional I am able to revise stocking standards at this stage. I am able to prepare amendments to the FSP stocking standards and put them into the site plan. To do such an amendment I would need to practice (11.3.1) good stewardship based on ecological principles. Under the appropriate procedures outlined in legislation (11.3.3) (e.g. FPPR Division 1 Objectives set by government) for FPPR Sect 16/Stocking Standards. If my proposal stocking standards would meet the existing F6 date, to a standard that is appropriate (e.g. as compared to common practices such as guidebook stocking standards) the amendment would be appropriate. If my standards, based on the structure of the stand, would not meet the F6 definition and the amendment would lower the common F6 standards as amended under (FPPR Section 97) for "not practicable" may be legalized. To use "not practicable" I would need to prepare a good due diligence case that would stand up to peer review.

Amendments can be made under FRPPR 5 Section 29 under e) a change to the regeneration date, tree growing date, tree growing height or stocking standards that applies to an area in a manner that would be a significant departure from the original approved plan.

In summary, as a professional forester I must balance the needs of the public, the profession, myself, and other members in all my decisions. Any changes to stocking standards act that could put the future of the forest at risk must be done in an open, professional, and accountable way.

Answer 2 (scored 8)

a.) The appropriateness of the free growing concept for retention systems should be left up to the prescribing forester and the site in question.

Each site has different ecology, retention types and amounts, and it is the prescribing RPF that is in the best position to determine what the free growing standard should be for that site.

If only a few stems were removed per hectare, the RPF may not prescribe any free growing standards, however, if only a few stems remained after harvest, the RPF would likely place similar free growing standards to a clear cut.

The RPF is duty bound, under Bylaw 11.3.2 to uphold professional principles (i.e. good forestry) above the demands of employment.

b.) The presence of retained overstorey trees should be accounted for in my stocking standards relative to its abundance. For example, if you have 20% overstorey retention, you should have a 20% lower minimum stocking standard than if this site were clear cut. Since approximately 20% of the available growing space is still occupied post-harvest, it is reasonable to assume that you should not be expected to grow free-growing trees on that 20% that are already there.

c.) At the free-growing phase, there are very few acceptable rationales for changing stocking standards. This issue should have been dealt with long ago at the planning or regeneration delay phase. There are only two possible scenarios acceptable at this point.

One would be if a new order was in place that effectively changed the objectives of the site. The other circumstance would be if the forester could prove that he/she took all reasonable and appropriate measures to meet the standard. If, despite best planning, management efforts and intentions, this stand will not meet its stated standards, or if achieving them would be inordinately expensive, the RPF can justify revising the stocking standards.

Question 14 (Essay)

The Forest Stewardship Plan (FSP) for your forestry operation specifies a result/strategy for a landscape unit objective of managing for Elk Visual Cover Areas (EVCA). The result/strategy is described as follows:

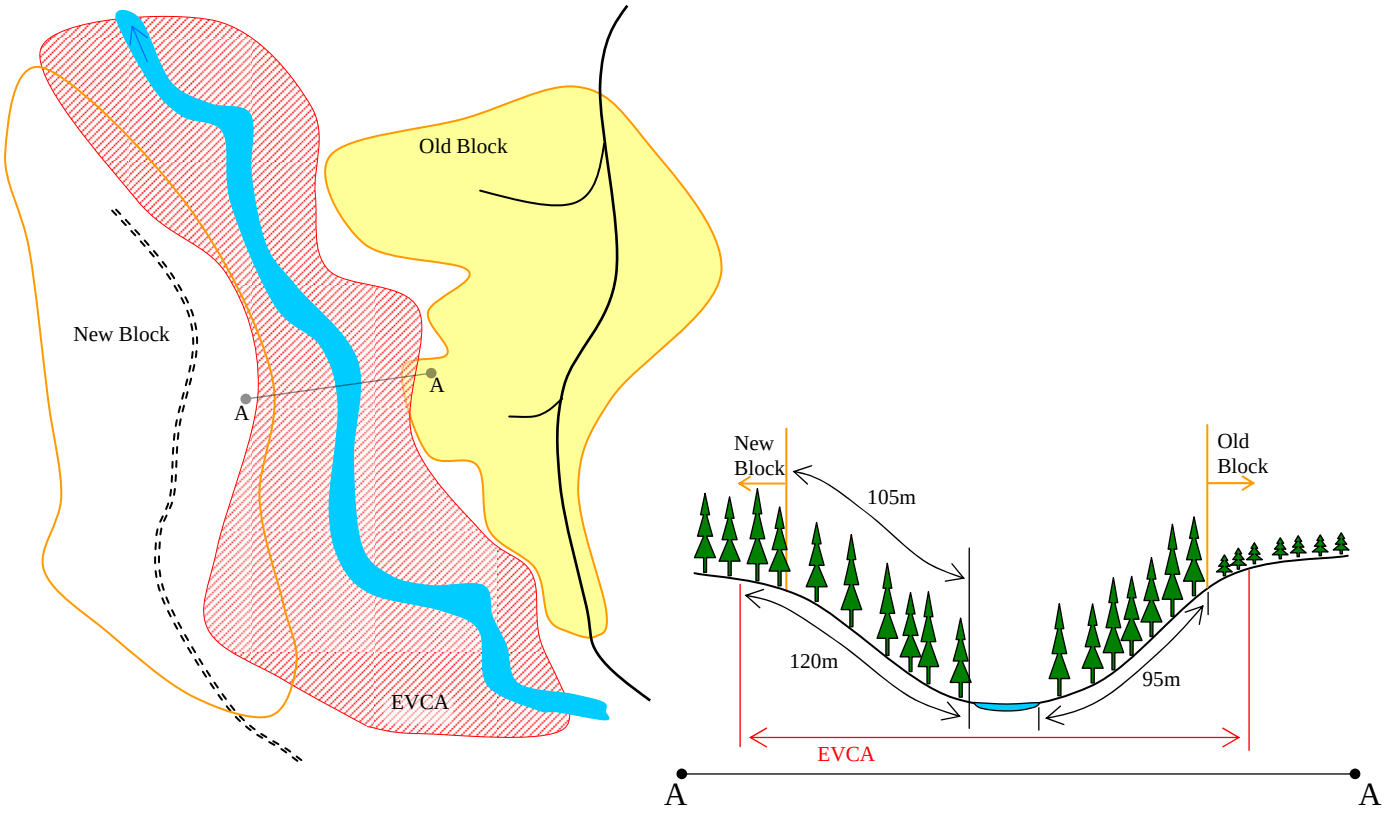
1. The holder of this FSP may harvest a cutblock within the areas identified as Elk Visual Cover Areas provided that the FSP holder leaves as standing trees at the conclusion of harvesting:
    a) at least 50% of the forested area within an Elk Visual Cover Area that exceeds 5 meters in height; and

b) forested area on the opposite side of a major riparian feature, and within 100m of the riparian feature that exceeds 5 meters in height.

As it happens, you have identified a block partially inside the EVCA. This block runs parallel to a river and its boundary ranges between 50m and 105m from the near side bank. There is a 6-year-old cutblock on the other side of the river that is also partially within the EVCA polygon and in one area, a 25m section of its boundary is 95m from the river's edge. The regeneration in the old cutblock is 1m high while the trees in the reserve are 35m high.

At first glance, this might be a situation where the new block will not achieve the result/strategy. What options would you consider and how would you proceed?

(10 marks)



Answer 1 (scored 8.5)

First and foremost I would discuss the results/strategies with the people that developed them to clearly understand the results so I have a clear mind on the direction to go with in further implementing the plans for developing this block. I would look at the old block and since only one small piece is within the EVCA I would see if I could use a cumulative average over the entire block. Since this is the closest spot there are areas over >100m. I would also consider moving my

potential new block out of the EVCA if it made sense economically. If not the prescription for the area within the EVCA would be 50% retention. The retention would ensure that the integrity of the EVCA was maintained. It is also my duty as a professional to follow the ABCFP Bylaws and the Foresters Act. From this point I would carry out a field visit to determine what was operationally and economically achievable from this I can develop a plan to meet the rest of the objectives. In this field visit I would ensure that the measurements are correct and I would re-measure the distance b/w riparian feature and the old block to ensure data was complete and correct. Once I have collected all my facts I would seek advice of an expert (biologist) in this area since, this is not within my scope of practice I must rely on the knowledge and experience of an expert (biologist) in the field. First I organize a field visit for myself and the biologist and myself to show him the issues and proposed plan for the new block. In the field we discuss the proposed plan, the results and strategies and the potential impacts to the EVCA. The biologist realizes that only one small area opposite the major riparian feature is within 100m of the riparian feature. On average for the old block we are 110m away. In discussion with the biologist he believes that this will meet the result and strategies. He states that this action will not have a detrimental impact on the integrity of the EVCA. I further explain to him the retention targets for the new block that is within the EVCA will be 50% also to protect the integrity of the EVCA. At the end of the day, the biologist comes to an agreement for the development strategy for the FSP. At the end of the day I ask the biologist to write up a report to document his/her thoughts and decisions on the proposed plan for the new block within a portion of the EVCA and that it will meet our FSP result/strategy and will not cause due harm to the EVCA. I would also document all steps that I have taken in order to come to my conclusion and ultimate decision. This will prove that I have taken logical steps to come to my conclusion if ever challenged. As a professional I have satisfied myself that I have considered all values and practiced due diligence to ensure that I have made decisions in a proper and justifiable manner. From this point I would move ahead with the development of the project.