

Trends in Renewable Resource Management in BC

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Abstract

This report describes trends in renewable resource management in British Columbia by tracking increases in the complexity of provincial laws governing forest and range management and by documenting changes in funding and staffing. To measure the complexity of the legal framework we reviewed all statutes and amendments to statutes, from 1912 to 2010, under the responsibility of the Minister of Forests and recorded the major responsibilities assigned to government and the forest and range sectors. To measure changes in funding and staffing within government, we reviewed the provincial budget Estimates from 1974 to 2011, focussing primarily on the budgets of the ministries responsible for management of forests, fish and wildlife, parks, and land use planning. To assess trends in the number of professional foresters and biologists working both in the provincial government and in the private sector, we analyzed records of the professional associations and data from the Ministry of Environment. Results showed that the complexity of forest management increased substantially from 1912 to 2010, especially in the last 25 years when the number of responsibilities (legal obligations) of government and industry almost tripled. Government expenditures on renewable resources trended steadily upward from 1975 to 1997, but have been reduced by approximately half since then. Budgets for the remaining “non-resource” sectors of government, on the other hand, more than doubled since 1997. The number of professional foresters employed in both government and industry has declined in recent years, more dramatically in industry than in government. Although the total number of professional biologists in the province has increased steadily since 1980, the Ministry of Environment has lost nearly 30 percent of its biologists since 2002. We conclude that decreases in funding and professional staffing are jeopardizing key functions both inside and outside of government, and are putting the province’s renewable natural resources at increasing risk. We pose several questions to stimulate further analysis and discussion about the future of renewable resource management in the province.

Introduction

British Columbia’s natural resources are its greatest assets and historically have been the mainstay of its economy. The forests, fish, and wildlife of the province, in particular, are world-renowned for their productivity and diversity—the unique mix of species, ecosystems, and landscapes that symbolizes “Beautiful BC”. But these resources face increasing stresses of many

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kinds as development spreads farther into the hinterlands, the human population grows, and the climate changes. To sustain them for the benefit of current and future generations of citizens, BC's natural resources need to be managed carefully so they remain healthy and capable of producing their many benefits—economic, ecological, cultural, recreational, and spiritual—forever.

In BC, the responsibility for management of renewable natural resources falls mostly to the provincial government. Although 94% of the province's land is in public ownership, the government delegates significant elements of this responsibility to industrial licensees, especially in forestry, so private companies and the resource managers working for them are also important participants in management. The amount of care and attention that government agencies and industrial firms devote to renewable resource management and stewardship is determined mainly by the budgets and personnel they allocate to inventories, planning, enforcement of laws and regulations, fire protection, research, reforestation, restoration, and other activities.

As pressures on natural resources have grown in recent decades, expectations placed on resource managers have grown apace. Provincial and federal laws impose more responsibilities on managers in 2011 than ever before, and non-statutory initiatives such as forest certification add to their workload. But there is growing concern, and some evidence, that government and industry are not devoting the level of funding and staffing to renewable resource management that is needed to meet those expectations and responsibilities. Many wonder if the province's magnificent natural resource legacy is receiving the attention it should.

This report describes trends in renewable resource management in BC by tracking the increasing complexity of the legislative framework, and by documenting changes in funding and staffing for management of forests, fish, wildlife, and parks. We hope it will stimulate further discussion and analyses of these important issues.

Further background on the report follows.

Why did we undertake this analysis?

- We are concerned that the diminishing investment by government in the management of renewable resources (specifically forests, fish, wildlife, and parks) is creating risks to environmental sustainability, and potential losses of social and economic opportunities.

Why do we think it is important to consider this information?

- We believe that the information in this report can help inform a discussion on the state and future of renewable resource management in BC.

Who are we?

- Retired resource management professionals, with over 120 years of resource management experience in BC.

What are our objectives?

- Compile, analyze, and present in simple format, information that describes the increases in the complexity of renewable resource management in BC.
- Compile, analyze, and present in simple format, information relevant to investment in the management of forests, fish, wildlife, and parks in BC.
- Compile, analyze, and present information on the numbers of professional foresters and biologists in BC.

- Discuss the implications of these analyses and provide examples illustrating the current situation.
- Propose questions to stimulate discussion and further investigations related to the future of renewable resource management in BC.

What were our sources?

- All information, with the exception of the number of professional biologists, was derived from publically available sources.

What are the principles that guide this work?

- Present information based on publically available data.
- Focus on the broad aspects of overall forestland management, rather than specific resources or activities.
- Analyze the data and let the results of the analysis tell the story.

Methods

Increases in the complexity of renewable resource management in BC

To produce a metric for complexity, we tracked changes to the legal framework governing forest resources over time. Our assumption is that the greater the number of responsibilities—defined as an obligation of government or of the forest and range sectors—the greater the complexity. Forest management legislation enacted since 1978 contains many provisions respecting the habitats of wildlife and fish, which we tracked in our analysis. We did not conduct separate analyses for other aspects of fisheries, wildlife, or park management, but this technique could be applied to these areas as well.

All statutes and amendments to statutes, from 1912 to 2010, under the responsibility of the Minister of Forests⁵ were reviewed and major responsibilities recorded. Two examples are:

- When the Forest Act was enacted in 1912, government had four major responsibilities; issuing tenures, setting prices for timber, protecting forests from wildfires, and creating forest reserves.
- In 1947, the Forest Act was amended to implement many of the recommendations of the Sloan Commission. Key new responsibilities included implementing a new economic means test for removing land from forest production, creating Forest Management Licenses, overseeing the development of Management and Working Plans by forest companies, and approving Management and Working Plans.

Investment in the management of forests, fish, wildlife, and parks in BC

We compiled figures on the budgets and staffing levels (expressed as Full Time Equivalents or FTEs) for the BC government from the Estimates published by the BC Ministry of Finance, for the fiscal years 1974-75 through 2011-12. Our analysis focused primarily on the budgets of the

⁵ For simplicity we have used “Minister of Forests” and “Ministry of Forests” to refer to all the variations in the ministry name over the years, including the current Ministry of Forests, Lands and Natural Resource Operations. The same is true for our use of “Ministry of Environment”.

ministries responsible for management of forests⁶, fish and wildlife, parks, and land use planning⁷. We also analyzed data on the overall provincial budget and the budgets for the so-called “big three” ministries (Health, Education, and Social Services) in order to document changes in renewable resource ministry budgets relative to the overall provincial budget and to these three ministries.

Because the names, composition, and responsibilities of the renewable resource ministries have changed many times since 1974, the annual budgets of the individual ministries cannot be compared directly year over year. We have therefore concentrated our analysis on the combined budgets and staffing levels (where available) for the renewable resource ministries, which reflect the total allocations for the resource management functions included in this analysis⁸.

Numbers of professional foresters and biologists in BC

Although a number of professions are involved in the management of renewable resources, we focused our attention on professional foresters and biologists, both in the provincial government and in the private sector. Notwithstanding the importance of these two professions, we had difficulty sourcing information on the number of these professionals practicing in BC. Additional work therefore would be required to determine more accurately the number and trends of registered professionals and technicians in both government and the private sector over the time frame of this analysis.

The number of Professional Biologists (RPBios) registered in BC from 1980 to 2010 was provided by the College of Applied Biology of BC (CABBC). The number of biologists employed in the Ministry of Environment from 2002 to 2010 was provided by the Ministry of Environment.

The total number of active Registered Professional Foresters (RPFs) in BC from 1997 to 2011 was extracted from annual reports of the Association of BC Forest Professionals (ABC FP). The number of RPFs employed by government and industry for the years 1999, 2003, 2006, and 2011 was estimated from compensation reports available on the ABCFP website.

Results and Interpretations

The complexity of renewable resource management in BC

From 1912 to 2010, the complexity of forest management has increased substantially (Figure 1). This increase in complexity occurred over five main periods:

⁶ We did not include the budget for fire fighting (the “Direct Fire” portion of the Ministry of Forests budget) in our totals, because it has fluctuated widely in some years and it does not represent funds allocated to ongoing management programs.

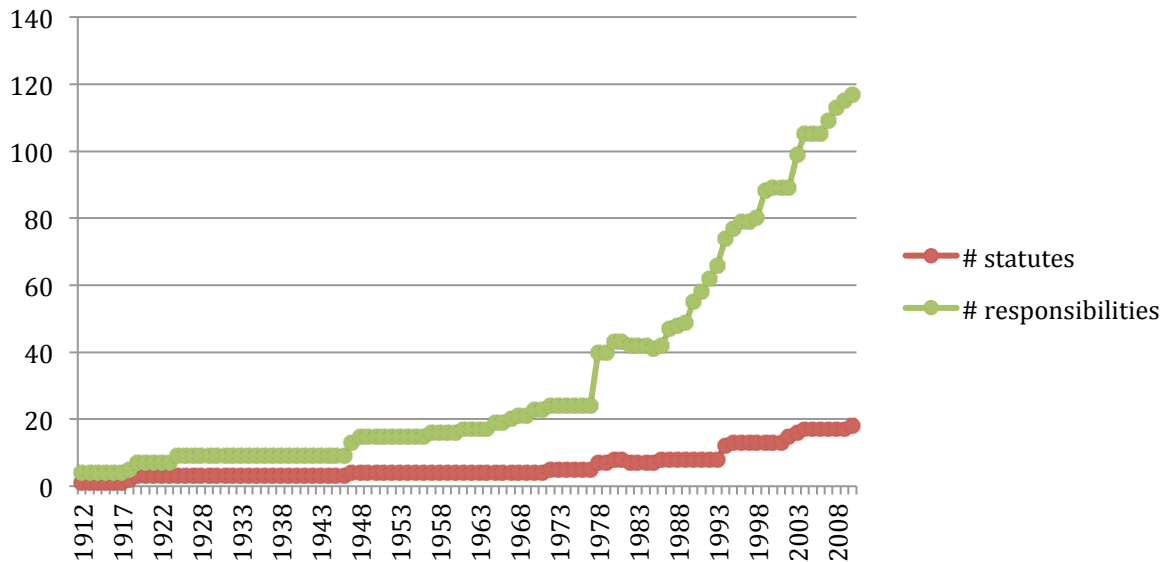
⁷ In the totals for the resource ministry budgets, we included the budget of Forest Renewal BC (1995-2002) and other large programs of dedicated funding such as the Forest Resource Development Agreements (FRDA). We did not include the budgets of agriculture, energy, mines, petroleum resources, and land administration, nor did we include miscellaneous, small, dedicated programs such as the Corporate Resource Inventory Initiative (CRII).

⁸ Because various renewable resource management programs have been transferred between ministries, sometimes repeatedly, it is impossible to track their budgets with complete accuracy. In our analysis we have attempted to standardize as much as possible the set of programs whose budgets we calculated. Although a more detailed study of the Estimates might reveal minor discrepancies, we are confident that any errors in our calculations would have little effect on the overall patterns shown in our analyses.

1. The building years from 1912 to 1946, initiated by the passage of the Forest Act;
2. Sustained yield forestry from 1947 to 1977, initiated by implementation of the recommendations from Chief Justice Sloan’s Royal Commissions on forest resources;
3. Integrated resource management from 1978 to 1994, initiated by implementation of key recommendations from Dr. Peter Pearse’s Royal Commission on Forest Resources;
4. Forest Practices Code from 1995 to 2001, initiated by implementation of the Forest Practices Code Act;
5. Results-based forestry from 2002 to the present, triggered by the passage of the Forest and Range Practices Act.

As the number of statutes increased, there was a corresponding increase in the number of responsibilities (Figure 1, and for details see Appendix 1). The pace of increasing responsibilities has been accelerating dramatically in the past three decades. For example, between 1985 and 2010 there was almost a three-fold increase in the total number of responsibilities.

Figure 1. Number of Statutes and Responsibilities Governing Forest Management

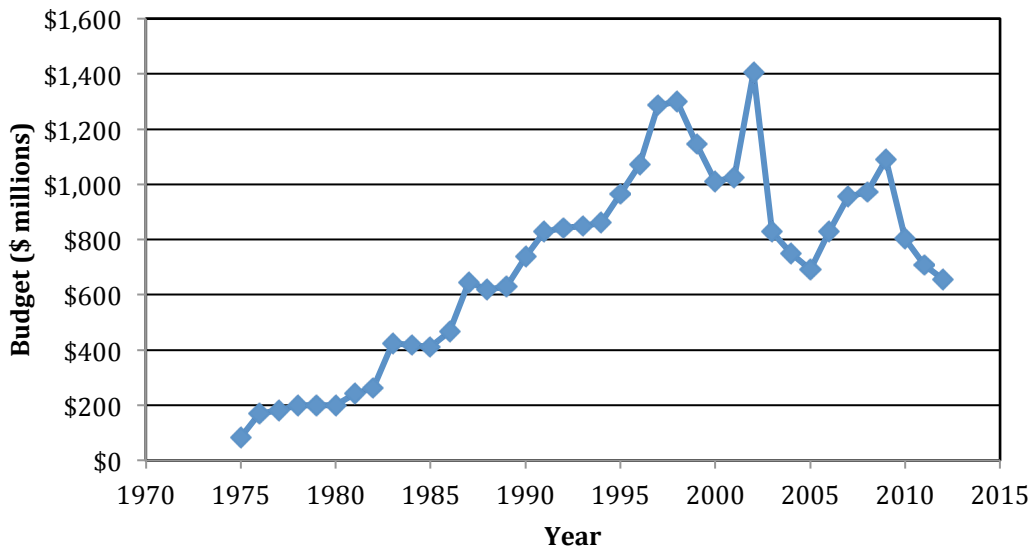


It is important to note that the statutes used for this analysis are not a complete list of legislation governing forest resources in BC. For example, there are key federal statutes (e.g., Fisheries Act, Species at Risk Act) and provincial statutes (e.g., Water Act,) that also influence forest management. We therefore believe our measure of the increase in complexity to be very conservative.

Investment in the management of forests, fish, wildlife, and parks in BC

Unlike the progressive increases in management complexity, the historical trends in funding and staffing of the renewable resource ministries show different patterns (Figures 2 and 3).

Figure 2. Total budget for resource ministries plus FRBC



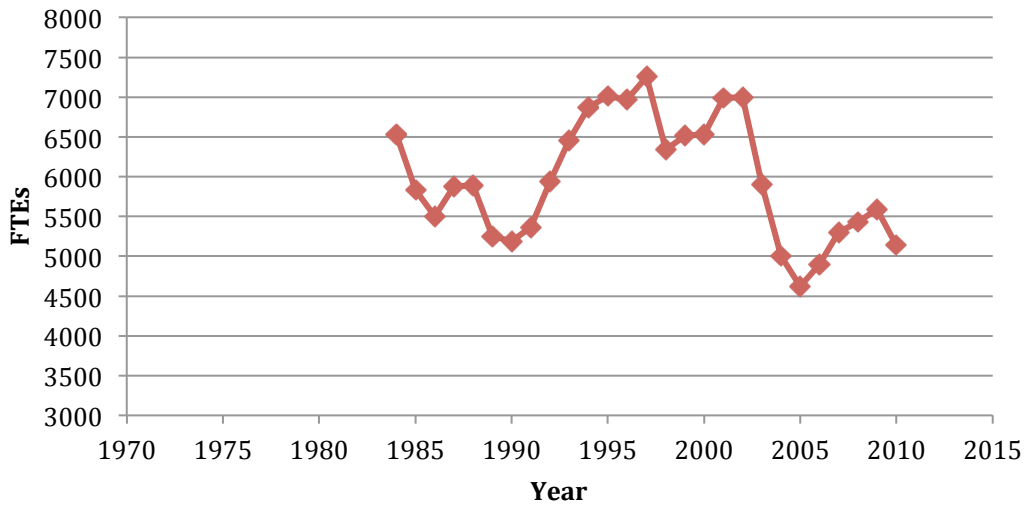
Regarding funding, the overall expenditure for the renewable resource ministries (including Forest Renewal BC during its tenure) trended steadily upward for 20 years beginning in 1975⁹ (Figure 2). After 1997, funding was cut substantially for several years; then it fluctuated dramatically until the recent reductions in 2010–12.

Figure 3 shows that overall staffing has recently fallen far below the levels seen in the mid-1980s and from 1993 through 2003. In 2010, the last year government reported FTE levels by ministry in the Estimates, there were 21% fewer staff working in the renewable resource ministries than there were in 1984, and 27% fewer than in 2002. Further reductions have occurred during the last two fiscal years, but we were not able to determine the magnitude of the reductions because the number of FTEs employed in the ministries is no longer reported by government in the Estimates¹⁰.

⁹ Budgets and FTEs are reported by fiscal year. For example “1984” for the 1983-84 fiscal year.

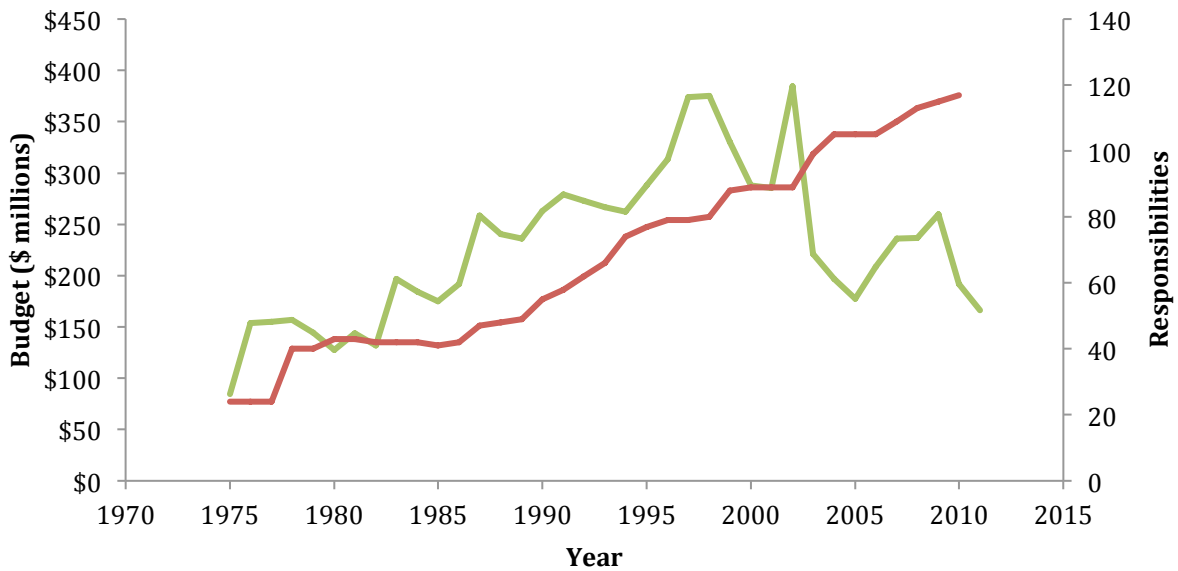
¹⁰ We wonder why government has stopped reporting this information to the public.

Figure 3. Total resource ministry FTEs (no data available before 1983-84 or after 2009-10)



When inflation is accounted for (Figure 4), the trend in funding shows a similar pattern to that seen in the absolute numbers plotted in Figure 2, but the magnitude of the budget peaks is much reduced.

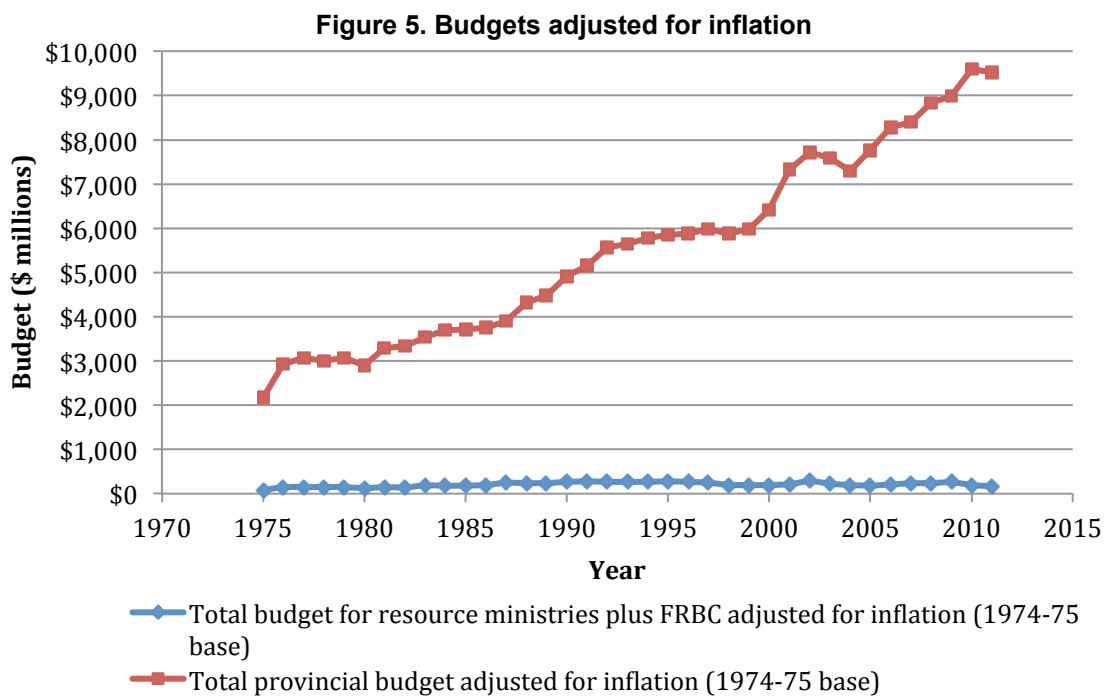
Figure 4. Total budget for resource ministries plus FRBC adjusted for inflation, and number of responsibilities



- Total budget for resource ministries plus FRBC adjusted for inflation (1974-75 base)
- # of responsibilities

Figure 4 shows that the total budget for the renewable resource ministries, in 1975 dollars, has been lower since 2003 than it was at any time in the 13 years prior to that. In 2011, it was less than half of what it had been in 2002, and only eight percent greater than it had been in 1976. Comparing the trend in budget to the trend in responsibilities (also shown in Figure 4), one can see that the lines track in parallel until 2003 (with the exception of the severe cutbacks of the late 1990s). After 2003, the lines diverge substantially as the inflation-adjusted budget falls.

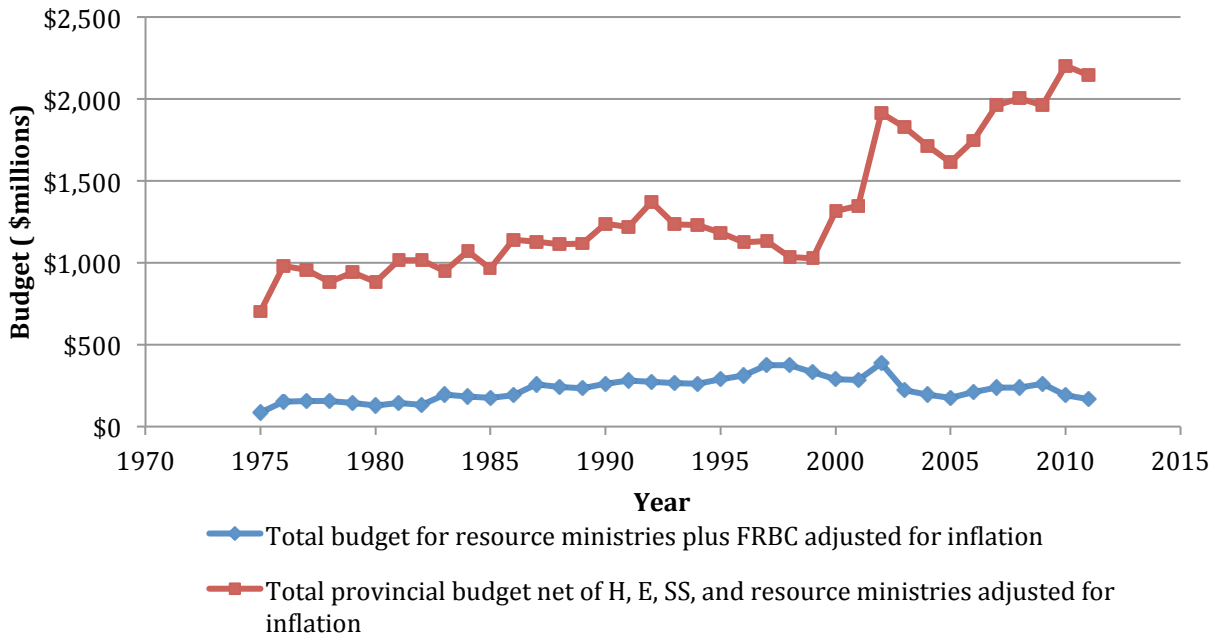
When the trend in inflation-adjusted funding for renewable resource ministries is compared to the trend of the overall provincial budget (Figure 5), two things become very clear: (1) the provincial budget steadily increases while the renewable resource ministry budgets decline in recent years; and (2) resource management funding is a very small part of the province’s budget.



This situation partly reflects the huge growth in budgets for the health, education, and social services sectors. But even when these “big three” sectors are removed from the provincial budget pool, the renewable resource ministry’s budgets have declined compared to other ministries (Figure 6).

From 1998 to 2011, the inflation-adjusted funding for the remaining “non-resource” sectors of government (all functions other than Health, Education, and Social Services) more than doubled, while funding for the renewable resource ministries fell by almost 56 percent.

Figure 6. Budgets adjusted for inflation



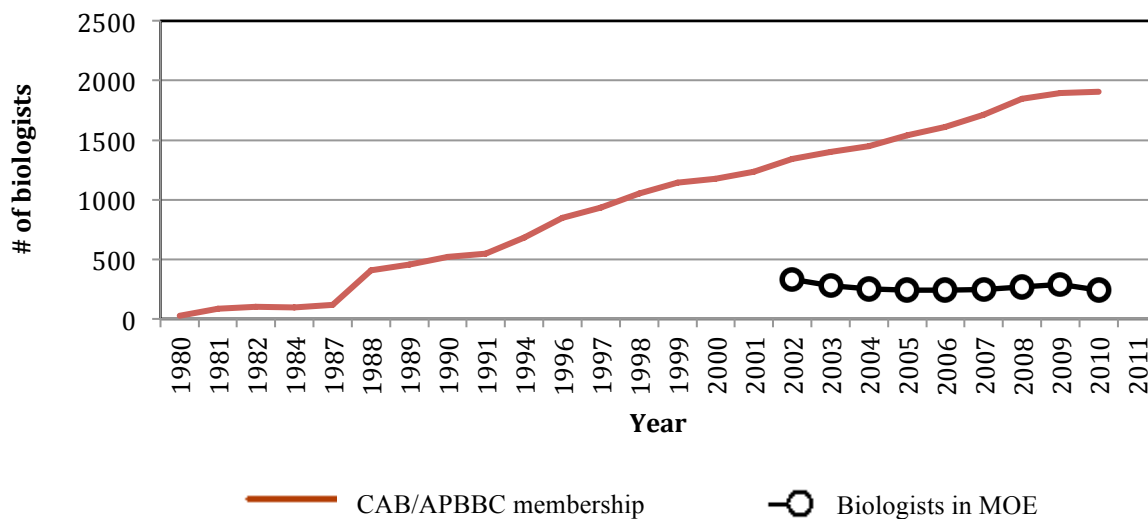
Numbers of professional foresters and biologists in BC

Figure 7 shows the numbers of biologists in the Association of Professional Biologists and the College of Applied Biology from 1980 to 2011. Figure 7 also shows the number of biologists employed by the Ministry of Environment since 2002.

During the period 1980 to 2011, trends in the numbers of biologists in the professional associations (the APBBC and the CAB) and in government were quite different. In the professional associations, membership grew steadily, while the number of biologists in the Ministry of Environment decreased. In fact, from 2002 to 2010, the number of MOE biologists declined by almost 30%¹¹.

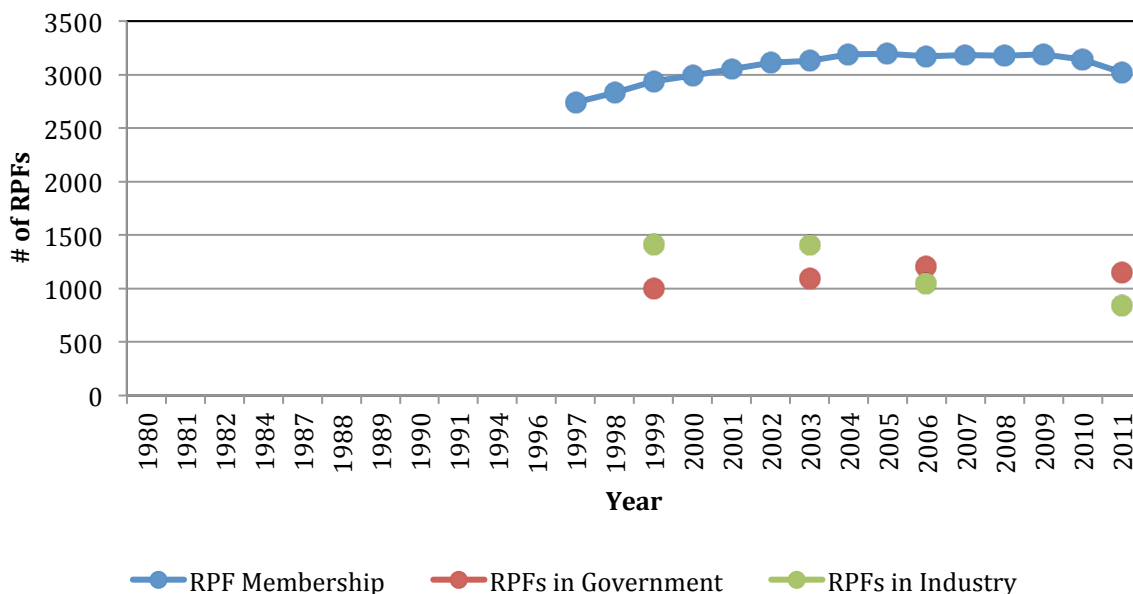
¹¹ The decrease of biologists in MOE is somewhat confounded by staff being moved from MOE to other ministries and then back to MOE over the time period.

Figure 7. APBBC/CAB membership and number of Registered Professional Biologists in Ministry of Environment



The trends in numbers of active Registered Professional Foresters (RPFs) differ from those of professional biologists (compare Figures 7 and 8). In recent years the number of active RPFs has declined while the number of RPBios increased. Similarly, the number of RPFs employed in both government and industry has declined, more dramatically in industry than in government.

Figure 8. Number of RPF members in the ABCFP, government, and industry



In summary, while the patterns of membership in the professional biologist and forester organizations differ, the number of these professionals in government is decreasing. Moreover,

fewer foresters are working in forest companies, with more of this work being contracted out to consultants. The net effect of these patterns is that fewer experts in government are on hand to support the results-based management model (see Appendix 2 for a description of this results-based management model).

Discussion

For over six decades after the first Forest Act was passed in 1912, the pace of statutory change governing forest management was slow. Following the Pearce Commission in the mid-1970's that pace greatly accelerated, and it has increased exponentially since the mid-1980s. We expect that this trend will continue and consequently will place increasing demands on resource managers in government and the private sector to meet their responsibilities. The increase in statutory responsibilities is only one simple measure, however, of the increasing complexity facing renewable resource managers. We know that other factors not considered in our analyses, such as First Nations land claims, population increase, climate change, the management of species at risk, and the cumulative effects of all land-based activities will add significantly to the complexity of renewable resource management in BC. In order to address this increasing complexity, managers need funding and trained specialists to gather and analyze information that will lead to sound, well informed, and credible decisions. They also require funding and staff expertise to address the inevitable issues that will occur in renewable resource management as complexity continues to increase.

We are concerned about the long-term downward trends in provincial investment in the management of forests, fish, wildlife, and parks in BC; especially when compared to the funding of other provincial programs. Since 1998, the “non-resource” agencies (not including the health, education and social services ministries) have more than doubled in inflation-adjusted funding, while funding for the renewable resource ministries has fallen by about 56 percent. In the last 15 years, it appears either that budgets from the renewable resource agencies have been reallocated to fund the work of these other agencies or at least that a low priority has been assigned by government to the renewable resource agencies.

Furthermore, at a time when complexity and responsibilities are increasing, there has been an apparent decline in the number of RPFs in government and industry and in the number of biologists in MOE (we were not able to determine the total number of RPBios employed by the renewable resource sector in the province). The Ministry of Environment projects that the number of biologists in that ministry will continue to decline, based on current hiring policies. These trends are troubling, as the current results-based model of forest resource management depends heavily on the judgement of these professionals.

Because funding has been reduced, the option of contracting out work to renewable resource professionals other than those employed by government and industry is also greatly reduced.

We are also concerned that reduced funding and current hiring policies will likely result not only in fewer professionals, but also in *less experienced* professionals attempting to manage BC's renewable resources in an increasingly complex environment. The lack of experience and corporate memory will worsen as older workers are laid off or retire and are replaced by new recruits, if at all.

All of these trends and concerns would not be an issue if BC's renewable resources were proven to be managed to the high level expected in the results-based management model, and if no

problems loomed in the future. We are convinced, however, there already are significant renewable resource management problems and there will likely be more in the future if nothing is done to address these trends. Two examples of the serious consequences of the province's limited investment in renewable resource management are included in Appendix 3, *Problems with fish passage at stream crossings on forest roads*; and in Appendix 4, *Conservation of ecological integrity in BC parks and protected areas*. Additional examples have been cited by others, including Bourgeois (2011) and Parfitt (2010).

We are also concerned about the diminishment or loss of key sustainability functions in government. For example, during a time when a better understanding is clearly needed of such issues as how to mitigate impacts of climate change and how to manage cumulative impacts of so many demands on the provincial land base, the research capacity within the Ministry of Forests and the Ministry of Environment has been severely reduced. These research programs were once key contributors to the credibility and public acceptance of BC's management approach to forests, fish, wildlife, and parks.

The situation outside of government is also of concern. With the end of the Forest Investment Account funding, and the absence of any other substantial "special account" funding (such as the former Forest Renewal BC and Forest Resource Development Agreement programs), little provincial funding is being provided for activities such as watershed and habitat restoration, wildlife and fish inventories, and research by universities and other non-government scientists.

Thus decreased funding is jeopardizing key functions both inside and outside of government.

Concerned citizens and interest groups are starting to discuss future visions and the funding of renewable resource management, and are voicing their concerns about the seriousness of the challenges facing resource management in BC (Bourgeois 2011). We believe that if this movement gains traction with citizens at large, it could help to shape public policy regarding the management of renewable resources. On the other hand, a divisive public debate on the sustainability of renewable resource management in BC could have negative economic impacts by turning customers away from what they perceive as products from poorly managed forests, and by discouraging investment in the renewable resource sector.

With the current lack of up-to-date inventories for forest, wildlife, and fisheries resources, management agencies face increasing uncertainty; and appear in some cases to be taking a more conservative approach to resource use. This approach will likely increase over time as managers attempt to meet their legal responsibilities and minimize risks. As a result, it is likely that economic opportunities in rural BC are being lost.

We are also concerned about the ability of government and BC's citizens to determine if government's sustainability objectives are being achieved. One impact of declining funding and professional staff is a reduction in the compliance and enforcement functions in the forest and environment ministries, and in monitoring and effectiveness evaluations. These functions are critical components of the results-based management model, and are also essential in determining if the concerns we have voiced above about trends in provincial renewable resource management are justified. If these functions are not maintained at an effective level across the province and are not credible to independent observers, it will not be possible to assess BC's success in achieving sustainability.

In conclusion, we believe that the picture created by this report is a matter of serious concern and is not generally known by government, the resource sector, the professional associations, or the public. It is our hope that this report will provide information that will contribute to discussions among these parties about the future of renewable resource management in the province.

Summary

Evidence suggests that the province is already experiencing significant impacts associated with insufficient investments in renewable resource management, and that those impacts will become much greater over time. In order to promote discussion of these issues we pose some key questions:

1. Given the decrease in capacity of the compliance and enforcement, monitoring, and effectiveness evaluation programs, how can resource professionals and the public determine the state of renewable resource management and progress towards sustainability?
2. With diminishing resources, programs, and staffing, can the results-based model of management succeed? What is required to reduce the risk of failure and increase the chance of success?
3. Where serious resource management problems are known to exist (see examples in Appendix 3 and 4), how can they be resolved?
4. Why has the funding for renewable resource management in government declined disproportionately to the other ministries?

References

Bourgeois, W.B. 2011. Who in British Columbia is committed to sustainable forest management? *Forestry Chronicle* 87(5): 579-581.

Parfitt, Ben, 2010. *Axed: A decade of cuts to BC's Forest Service*. Joint publication, Sierra Club of BC and Canadian Centre for Policy Alternatives: 1-15.

Appendix 1. The number and timing of statutes and responsibilities for forest management

Year	Act	Total number of Acts	Number of major new responsibilities	Total number of responsibilities
1912	Forest Act	1	4	4
1914	Timber Royalty Act	2	1	5
1918	Aeroplane Spruce cutting Act	3	1	6
1919	Grazing Act	4	1	7
1925	Forest Reserve Fund	5	2	9
1937	Amend FA		1	10
1947	Amend FA		4	14
	BC Foresters Act	6		
1948	Amend FA		2	16
1957	Amend FA		1	17
1961	Amend FA		1	18
1965	Amend FA		2	20
1967	Amend FA		1	21
1968	Amend FA		1	22
1970	Amend Foresters Act		1	23
	Amend FA		1	24
1972	Accelerated Reforestation Fund Act	7	1	25
1978	New Forest Act		9	34
	New Range Act		5	39
	Ministry of Forest Act	8	2	41
1980	Amend FA		1	42
	Forest and Range Resource Fund Act	9	1	43
1982	Repealed FRRFA	8	-1	42
1985	Amend FA		-1	41
1986	Forest Stand Management Fund Act	9	1	42
1987	Amend FA		5	47
1988	Amend FA		1	48
1989	Amend FA		1	49
1990	Amend FA		5	54
	Amend RA		1	55
1991	Amend FA		1	56
	Amend RA		1	57
1992	Amend FA		5	62
	Amend RA		2	64
1992	Commissioner on Resources and Envir Act		-3	61
1993	Amend FA		4	65
1994	Forest Land Reserve Act	10	1	66
	BC Forest Renewal Act	11	1	67
	Forest Practice Code of BC Act	12	6	73
1995	Amend FPC		1	74
	Amend FA		1	75
	Grazing enhan. Special Acct Act	13	1	76
1996	Amend FA		2	78

Year	Act	Total number of Acts	Number of major new responsibilities	Total number of responsibilities
1998	Amend FPC		1	79
1999	Amend FLRA		2	81
	Amend FPC		1	82
	Amend RA		5	87
2000	Amend FA		1	88
2002	Repeal Forest Renewal Act	12		
	Repeal GESAA	11	-1	87
	Amend FA		-1	86
	FN Develop. Amend. Act	12	1	87
	Forest and Range Practices Act	13	1	88
	Amend FA		-1	87
	Agric Land Comm. Act		-1	86
	College of Applied Bio Act	14	1	86
	Protected Area Forest Comp. Act	15	1	87
2003	Amend FA		4	91
	Forest Revitalization Act	16	6	97
2004	Amend RA		3	100
	Wildfire Act	17	1	101
	Amend FA		2	103
2007	Amend FRPA		4	107
2008	Amend FRPA		2	109
2008	Greenhouse Gas Reduct. Amend Act	18	2	111
2009	Amend FA		2	113
2010	Zero Net Deforestation Act	19	1	114
	Amend FA		1	115

Appendix 2. The *Forest and Range Practices Act* model

The model

There are three key components to this model:

- Objectives set by government;
- Plan and practice obligations of the operator;
- Compliance and enforcement conducted by government.

These three components are supported by the foundation of:

- professional reliance, and;
- effectiveness evaluations.

Key success factors of the model include:

- High quality plans prepared by the licensee;
- The diligence of the government decision maker approving the plan;
- The competence and integrity of the resource professionals providing advice to license holders and government decision makers;
- Government enforcing activities on the ground, and;
- Government monitoring and publically reporting on the effectiveness of the model.

If any of the key success factors fail, the model is at risk.

Our Assessment

Preparing high quality plans and diligently reviewing these plans requires skilled staff and resources to gather the required information. Resources are also required for checking compliance, enforcing the law, and monitoring and reporting on effectiveness. Thus resources are needed to gather information, analyze it, publish results, and interact with license holders and the public regarding the results. The reduction in staffing and budgets has created the likelihood that a number of the key success factors will not be met. Hence the management model is at risk of failure.

Appendix 3. Problems with fish passage at stream crossings on forest roads

The issue

In its January 2009 report *Fish Passage at Stream Crossings* (available from <http://www.fpb.gov.bc.ca/publications.aspx?id=3714>), the Forest Practices Board concluded (p. 1) that "...fish stream crossings (on roads) may be the single most important habitat impact affecting fish." It based that conclusion on the results of a special investigation of stream crossings by forest roads in 19 watersheds. This investigation showed that 58 percent of all crossings in fish-bearing habitat presented a moderate to high risk of causing fish passage problems. Even in habitats rated as important or critical, where one would expect road-builders would have taken the most care to ensure fish could pass under the road, more than a quarter (28%) of all crossings posed a moderate or high risk to fish passage. The Board concluded that impeded passage was a risk to fish of all species and age classes due to loss of access to upstream habitat for spawning, feeding, and hiding; and due to other problems.

In their response to the Board's findings (available from http://www.fpb.gov.bc.ca/SIR25_MOF_and_MOE_Response_to_Board_Recommendations.pdf), the Minister of Forests and Range and the Minister of Environment estimated that there are 134,000 to 200,000 stream crossings on resource roads in BC that present potential barriers to fish passage. The Ministers pointed out that government had funded two years of work through the Forest Investment Account (FIA), which investigated more than 5,000 stream crossings suspected or known to have "high-priority deficient crossing structures". This program, which cost about \$9 million over two fiscal years, resulted in detailed assessments of about 1500 crossings. About 25-30 percent (375-450) of those crossings were ranked as either high or medium priorities for restoration, and restoration projects were completed on about 50 crossings.

In their response letter to the Board, the Ministers noted that stream crossings on forest roads were only part of the problem, with non-forestry roads also blocking fish passage. They stated that they were committed to continuing the remediation of priority crossings and to other related initiatives, including training, and compliance and enforcement checks. Their summary paragraph, however, included an important caveat: they wrote that government's actions would result in "...ensuring fish access to the highest value habitat is maintained and restored to the greatest extent possible *within government's current financial capacity*" (italics added for emphasis).

What are the implications of government's current financial capacity? Even at the remediation rate of 25 projects per year that was achieved using FIA funding in the 2008-09 and 2009-10 fiscal years, it would take 15-18 years to restore only the crossings that were found during the two-year survey of 5,000 crossings to be high or medium priorities for restoration. But according to the Ministers, at least 134,000 crossings in the province present potential barriers to fish passage. Using the board's finding that 58 percent of crossings in fish-bearing habitat posed moderate to high risks of blocking fish passage, this implies that at least 77,000 crossings require restoration. A peer-reviewed publication (Mount et al. 2011) verifies that these estimates are reasonably accurate. At 25 per year, it would take 3,080 years to restore all these crossings.

Funding for fish passage is now part of the government's Land Based Investment Program (LBI) but funding for assessments and remediation has been severely reduced in the last two years, to

\$1.5 million annually. This means that many fewer than 25 crossings could be remediated each year.

Our Assessment

Information gathered over the past 10–15 years shows clearly that stream crossings on forest roads throughout BC have directly and significantly harmed fish habitat. This is likely to have seriously damaged fish populations and decreased the many ecological, economic, and recreational values that wild fish provide. If government and the forest industry are going to meet their legal requirements regarding fish crossings and the maintenance of fish populations, then significant resources are required to address this problem in a timely fashion. Rather than a substantial response to this proven problem, however, only a small, clearly inadequate program is being funded. Thus the reduction in management resources is creating a significant impact on the fisheries resource.

Reference

Mount, C., S. Norris, R. Thompson, and D. Tesch. 2011. GIS modeling of fish habitat and road crossings for the prioritization of culvert assessment and remediation. Streamline Watershed Management Bulletin 14:7-13.

Appendix 4. Conservation of ecological integrity in BC parks and protected areas

The issue

In 2010, the Auditor General of BC released a report titled *Conservation of Ecological Integrity in B.C. Parks and Protected Areas*. This audit was conducted to determine if BC Parks was meeting its stated goal of “proactive stewardship of ecological integrity”.

Key findings include:

- The Ministry does not have sufficient and reliable information on species, ecosystems and ecological processes ;
- The potential implications of climate change have not been contemplated ;
- Annual management planning does not exist in every region;
- When priority action plans are created, little progress is being made to address conservation objectives and ensure an effective response to threats or stressors;
- Despite the importance of public education in reducing the threats to ecological integrity, the Parks interpretation program was discontinued. BC is one of two jurisdictions in North America without such a program;
- A 2006 survey of 189 protected lands determined that 98% of the lands contained invasive plants. No evidence was found for a plan to address this threat;
- Diminishing resources has resulted in Parks turning increasingly to volunteers. There is evidence that volunteer assistance is declining;
- BC Parks relies on specialists in another division of the Ministry of Environment to provide scientific expertise. These specialists do not have the capacity to offer the assistance that is needed, and;
- No regular monitoring and evaluation taking place.

Our Assessment

All of these findings are symptomatic of an organization that does not have the resources and expertise to meet its stated goal.