Ric Report 008
Discussion Document

INVENTORY NEEDS FOR INCLUDING THE MAINTENANCE OF BIODIVERSITY IN PLANNING: The results of Province-wide interviews

FOR

THE BIODIVERSITY INVENTORY TASK FORCE
OF THE RESOURCES INVENTORY COMMITTEE

BY

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19 MAY 1992

Canadian Cataloguing in Publication Data
Stevens, Victoria.
Inventory needs for including the maintenance of biodiversity in planning [computer file]

(RIC report ; 008)

Available through the Internet.
Issued also in printed format on demand.
ISBN 0-7726-3784-9

1. Biological diversity conservation - British Columbia - Planning. 2. Natural resources - British Columbia - Management. 3. Natural resources surveys - British Columbia. I. Resources Inventory Committee (Canada). Biodiversity Inventory Task Force. II. Title. III. Series: RIC report (Resources Inventory Committee (Canada)) ; 008.

QH77.C3S78 1999 333.95'16'09711 C99-960060-5

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PREAMBLE

This report is submitted to the Resources Inventory Committee (RIC) by the Biodiversity Inventory Task Force.

The Resources Inventory Committee consists of representatives from various ministries and agencies of the Canadian and the British Columbia governments. First Nations peoples are represented in the Committee. RIC objectives are to develop a common set of standards and procedures for the provincial resources inventories, as recommended by the Forest Resources Commission in its report *The Future of Our Forests*.

To achieve its objectives, the Resources Inventory Committee has set up several task forces, including the Biodiversity Inventory Task Force.

Funding of the Resources Inventory Committee work, including the preparation of this report, is provided by the Canada-British Columbia Partnership Agreement on Forest Resources Development: FRDA II - a four year (1991-1995) $200 million program cost shared equally by the federal and provincial governments.

For additional copies and/or further information about the Resources Inventory Committee and its various Task Forces, please contact:

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1. Background

Biodiversity is defined by the Biodiversity Inventory Group (BIG) as the full variety of life including genes, species and ecosystems plus ecological; and evolutionary processes. Recently, the planners and managers of British Columbia have been asked to consider all of the biodiversity of the province in their planning documents. In other words, in addition to managing for big game, furbearer and fisheries species, and recognized endangered species, they have been asked to manage for thousands of species, subspecies and populations, both visible and invisible and to keep ecosystem processes intact.

One of the tools that is commonly used by managers is inventories. Inventories can be maps, lists, point source information, or numbers describing or monitoring some aspect of animals, plants or ecosystems through space or time. An enormous array of inventories over components of biodiversity is possible. Limited resources make it imperative that inventories are carefully designed to support biodiversity needs. Biodiversity inventory is a new concept, and so broadly based, that ideas and debate about what to measure, map and use in land use planning decisions are evolving. To design a workable system of inventories, BIG consulted people with a broad range of experience in biodiversity management.

2. Methods

A proposal outlining a system of inventories to cover all the needs of those entrusted with the maintenance of biodiversity was sent to 74 people across the province who represent different geographic areas and different planning levels (Appendix A). This was designed to stimulate discussion about an appropriate system of inventories that can assist managers and planners in the task of maintaining biodiversity. The biodiversity inventories were meant to address information needs at four levels. The planning levels were set by the Resources Inventory Committee (RIC). They are local (municipal, stand), subregional (watershed, ISA), regional (MOF and MOE regions) and provincial.

The recipients of the proposal were asked to rank the proposed inventories and to suggest further information that would be beneficial to decision making. Telephone interviews were conducted over a two week period to speed up the response time. Close to 200 phone calls resulted in 47 interviews. In addition, 2 people sent written responses and 2 spoke from 2 different perspectives (i.e. mayor of a municipality and ecologist with provincial experience). This represents a 66% response rate from the mailing and 51 total responses (Appendix B). Table 1 shows the correlation of the geographic distribution and the planning level for those individuals who were interviewed. The sample bias to local-regional planning indicates that most planning is carried out at this level. A few individuals who were in a research capacity declined to state a planning level.

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Table 1. The correlation between the geographic distribution and the planning levels of the respondents.

	LOCAL	LOCAL - REGIONAL	REGIONAL	REGIONAL - PROVINCIAL	PROVINCIAL	LOCAL - PROVINCIAL
Victoria	5	5		3	2	2
Vancouver Island (x Victoria)		4				
Greater Vancouver	1	3	2		1	2
Mainland Coast (x Vancouver)		1				
Interior Plateau		7		1		
Southern Interior		3				
Kootenays (including Trench)		5				
North			1			
Totals	6	28	3	4	3	4

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3. Results

There was 100% cooperation. The subject of managing for biodiversity is compelling both because of its obvious necessity (to most people) and the conceptual difficulties relating to its vastness and our own connectedness with the natural world. The proposed inventories (see Appendix A - p. 13) were ranked at least partially by 27 respondents and a preference for ecosystem vs. species management, or general information vs. detailed information was often apparent from the interview. Table 2 indicates the preferences of the respondents. An arbitrary scoring system produced the numbers: a clear first choice got 2 points, a clear second choice received 1 point. An indication of preference for ecosystem over species management scored 1 point for all of column II, or vice versa. Likewise, an indication of preference for information on rare elements gave row C points all across, etc.
The highest individual scores are for general ecosystem inventories (I1A) followed by inventories of critical populations, subspecies and species (IC). A commonly requested combination was good ecosystem maps at a level appropriate to the planning goals and detailed inventories of critical species.

This combination of ecosystem management and management of critical elements has been described as a coarse filter/fine filter approach to management. The ecosystem approach takes care of the bulk of the species and is described as the coarse filter. For those species or critical habitats that would not be captured by the
ecosystem approach, (i.e., would fall through the coarse filter), the fine filter with more detailed information on critical species or habitats is in place. Many people felt that the species information was good enough to get on with decision making, but that good ecosystem information was lacking.

Table 2. Scores showing the correlation of inventory preferences between the levels of inventory detail and the species or ecosystem approach. A is general, C) concentrates on rare elements, I is species, II is ecosystems.

	I	II	Total
A	25	41	66
B	8	16	24
C	30	21	51
Total	63	78	

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Other responses included advocating ecosystem management with no species management at all; single species such as game species management is good enough to encompass all biodiversity; advocating indicators; reviling indicators; and even the suggestion that humans are having no negative effect on biodiversity and in the long run (geologic time?) nature will take care of herself as she always has.

Some suspected trends were confirmed - people working in industry, who need information on which to base immediate decisions had critical species inventories as top priority; people working in areas where there was little inventory information were not particular about what they got, they just wanted something, while those from areas such as the Southern Interior who have good species information available often thought that species information was not high priority, but preferred ecosystem inventories.

Same of the best insights came from discussions outside the proposed inventories. The following is a compilation of other suggested inventories and related comments which could assist in managing for the maintenance of biodiversity. They are grouped by planning level, but are not exclusively the province of that level. The following lists are not ranked in any way.

3.1 Local planning level needs and comments

1. Maps indicating sensitive ecosystems. Sensitive refers to those which are most easily damaged by "uninformed use such as wetlands, steep forest land, etc.

2. Maps of remaining natural ecosystems.

3. Map of significant geological features. These areas of often harbor rare species as well as being of interest from a geological point of view.

4. An overlay of a detailed ecosystem map showing land use, land status, ownership, condition, how land is protected (i.e. in a par3r, reserve, development trust)

5. Detailed inventories of habitats at risk including the anirnal and plant components as well as attributes to maintain relevant processes where possible. Processes could include such things as genetics and ecological history while the attributes might include island biogeographic features, linkages and/or buffers.

6. Local level maps of soil types, moisture, climatic zones, forest cover.

7. Inventories for areas impacted by sewage discharge/ urban storm water.

8. Maps showing historical information such as fire and cutting history, social and cultural use, seral stage, grazing history.

9. Color air photos at 1:20 000 or 1:16 000 for areas with specific local planning needs.

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10. Any local inventories need to have a regional or even provincial context (i.e. something that is locally common may be the only example of its kind in the region or province).

11. Any inventory that flags something as critical, whether plant, animal or habitat, can be used immediately in decision making around development or preservation (land acquisition).

12. A local politician pointed out that any inventories which could conceivably be used by laypersons (politicians and citizens) should be accompanied by very basic source material What is ecological classification? What is the biological/ecological context of the inventory? What are the limitations of the inventory?

3.2 Regional and subregional planning level needs and comments

These two planning levels were combined as they were so close in terms of inventory needs.

1. Freshwater aquatic ecosystems need inventories based on different variables than terrestrial systems. Almost nothing has been done to date. Hydro/physiographic mapping is currently underway at UBC by Mike Church from the Geography Department, but also need an ecological component - invertebrates, paraphytons, etc.

2. Inventories (maps) of particular critical habitats such as old-growth showing sur rounding vegetation and seral stage, linkages, buffers.

3. Inventories of landscape attributes within habitats or groups of habitats for use in planning for a combination reserves and silvicultural techniques to preserve biodiversity by maintaining the structural diversity of the landscape.

4. A GIS system which provides links to information from all ministries.

5. Inventories of invertebrates - Do insect communities really differ between 2 crowns of the same tree species? Do they differ between watersheds? How much difference is there?

6. Maps of major ecosystems which may not be captured by the current ecosystem classifications such as riparian areas, midslope forests, seral stage. To use this kind of map in planning it is necessary to know ecosystem functional relationships - How much can be logged? In what proportion? What kinds and sizes of linkages are necessary?

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7. Forest cover maps need better definition. More information on understory plant communities, forest structure. The current inventory underrepresents the deciduous component and is of little use for wildlife habitat or diversity questions.

8. Inventory of stand age, species composition and productivity together with species-habitat models to predict wildlife present.

9. Overlays for ecosystem maps showing boundaries of all stakeholders such as resort operators, ranchers, guide outfitters, trapping areas.

10. More insect, disease and fire susceptibility maps.

11. Joint inventories with USA to determine cross-boundary corrdors for movement of their endangered species such as wolves and grizzly bears.

12. Generally 1:250 000 ecosystem mapping is a rough documentation of what we already know is there. New information comes from a larger scale, nothing less than 1:50 000 for most of the province. Critical areas should be done first.

13. Inventories of species which give information of presence or absence of species in particular habitats are not reliable without accompanying information on the species use of the habitat - Is it seasonal? Is it a source habitat? A sink?

14. To move away from big game management there is a need for habitat relation ship understanding for other species.

3.3 Provincial planning level needs and comments

1. Historical and present social and cultural uses of land. Are they compatible with maintaining ecosystem integrity?

2. Broad scale mapping to help predict what human needs will be in 50 - 100 years
   a. Trends in societal demands for land use.
   b. Expected climatic changes
   e. Trends in forest harvesting.
   d. Trends in water use.

4. Discussion

Several general topics kept resurfacing dunng the interviews and these require some elaboration.

4.1 Other management tools

It is difficult to separate research needs from inventory. In order to use inventories effectively, an understanding of species-habitat models and ecosystem functional relationships is necessary. For example, an inventory of habitat attributes is relatively meaningless as a planning tool without the accompanying information about how wildlife uses these attributes and their most effective justaposition; a species inventory mean nothing without knowledge of the natural stochastic variation in population levels over time, preferred habitat, seasons of use, etc. In short, inventories as an isolated tool will not be very helpfuI.

4.2 Change in management orientation

For so long environmental planning has been crisis driven that it is now necessary to provide information to politicians or industry on an imminent crisis to deter development plans, change silvicultural practices, halt 1ogging in pristine watersheds, etc. Several respondents referred to their need for information on endangered species so that they could get gentler logging, old-growth reserves or move developments. This is not managing for biodiversity. In order to maintain biodiversity it will be necessary to change our management orientation away from recurring crises. One possible way to accomplish this would be to define the insidious loss of biodiversity as a crisis and to point out the economic benefits of sound planning which avoids lurching from one crisis to the next. This brings us to the next point.

4.3 Education

Any educational effort which is directed at the public will help the cause of maintaining biodiversity. Local politicians and planners, although they may want to use inventories to incorporate biological data in planning, cannot do so without public support. In addition, an educational effort aimed at MOE and MOF administrators and managers can galvanize support throughout their ranks for including information gleened from inventories in their planning.
Wise use of inventories requires education. As an example, some respondents told me that fringe populations were an expendable portion of a local biodiversity while others extolled the virtues of their genetic variability. Putting some energy behind a thorough educational effort could help clear up some of these differences.

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A demonstration of the relationship between the environment and the economy is a vital part of any educational program.

Field training to implement the use of any new kinds of inventories was requested from MOF district personnel.

5. Inventory proposal from BIG for maintaining provincial biodiversity

Managing for biodiversity involves two major strategies which are both critical to success. Each of these strategies allows a range of management intensity--from preservation to integrated use to single-use. The first strategy can be referred to as the coarse filter method. This method ensures the long-term conservation of the majority of elements of biological diversity (i.e., species, subspecies, populations, communities, etc.) by ensuring that the commoner ecosystems (e.g., plant communities or habitats) are managed wisely and all successional stages are available as viable entities. Coarse filter management can be accomplished by a system of reserves for such elements as old-growth forests and wilderness habitats and species; by integrated management for other ecosystems and specific stand attributes such as snags and coarse woody debris, and by intensive, single-use management for selected commoner habitats. This ecosystem approach requires the use of some kind of management indicator element(s) to track the health and integrity of the ecosystems. Choosing these elements is outside the scope of this report, but it is clear from interviews that it will be a difficult task. The element(s) must be a good reflection of the ecosystem; common enough to monitor with accuracy; and free of large variations unrelated to the ecosystem(s) in question.

The second strategy, the fine filter method, can be invoked for those elements that will not remain viable under the coarse filter approach (i.e., will fall through this filter) These are the rarer elements - either rare communities that will be ignored at most planning scales or those taxa that do not occupy all suitable habitat or are severely restricted in distribution and therefore must be managed on a very geographical-specific basis. Again, the appropriate level of intensity of management must be selected to ensure the long-term viability of the rarer elements. In most cases, this will mean preservation or very careful integrated management.

Superimposed on this two-fold approach are several levels of planning, which are appropriate for selected coarse or fine filter activities. For the purposes of RIC, we are considering 4 planning levels with the 2 middle levels combined. For example, the rare elements may only be statused at a provincial level and then included in management plans at a regional/subregional level for wide-ranging species (e.g. Grizziy Bear, Fisher, Spotted Owl) and at the local level for rare habitats (e.g., Garry oak forest, Douglas-fir old-growth forest), rare plants (e.g., golden paintbrush, large-flowered rhododendron), and rare vertebrates with small home ranges (e.g., Cascade Mantled Groundsquirrel, Sage Thrasher, Sharp-tailed Snake). Table 3 illustrates the relationship between planning scale and coarse/fine filter activity as well as indicating the appropriate inventories at each scale to carry out this double strategy for the maintenance of biodiversity.

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Table 3. A system of inventories to aid in the planned maintenance of biodiversity in British Columbia

BIODIVERSITY MANAGEMENT

PLANNING LEVEL	COARSE FILTER Ecosystem Management	FINE FILTER Critical Element Management
provincial	-ecoprovince -biogeoclimatic zone	-statusing of provincial level units
regional/ subregional	-ecoregion/ecosection -biogeoclimatic subzones -important landscape elements -management indicator elements	-statusing of regional level units -wide-ranging rare elements
local	-site association -habitat class -important habitat (stand) elements	-rare habitat elements -rare animal elements with small home ranges

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6. Recommendations

1. The most widespread need expressed was for good ecosystem maps at a detailed enough sealed 1:50 000 - 1:10 000 depending on planning level and needs) Many of the other mapping requests could be part of a comprehensive GIS system which could be accessed from all over the province.

2. Ecosystem classification should include animal species as well as plant species in their definitions. After all, it is a network which is being described and the animals are an integral part of that network.

3. Freshwater aquatic ecosystems have been neglected in comparison with terrestrial systems, in spite of the fact that riparian areas are one of the areas of highest diversity. We could use an aquatic ecosystem classification system together with an examination of the relationship between the aquatic ecosystem and the adjacent riparian ecosystem.

4. The timeliness of this topic, the eagerness of many individuals to discuss it and the variety of responses received indicate that a lively and fruitful workshop could be organized around the following questions.
   - What is the point of species inventories? How can they be meaningfully interpreted? How many species can be tracked effectively at the same time?
   - Is it possible to use an management indicator elements to track the health of an ecosystem? Is it necessary? Is there any other way?
   - Can biodiversity needs be met by managing ecosystems alone?
   - How should the province be divided at different planning scales?

Appendix A

To: Planners/Managers in British Columbia From: Victoria Stevens, consultant for the Biodiversity Inventory Group (BIG) of the Resources Inventory Committee (RIC) 598-7004

Re: The incorporation of biological data into planning documents

BACKGROUND

As an outcome of the Forest Resources Commission report "The Future of our Forests", the Resources Inventory Committee (RIC) was set up to complete and standardize the resource inventories of all land in the province. It is proceeding with 7 task forces or groups one of which is the Biodiversity Inventory Group (BIG).

Biodiversity is defined by BIG as the full variety of life including genes, species and ecosystems plus ecological and evolutionary processes. Populations and subspecies are an expression of the diversity of genes within a species, and are therefore important elements of biodiversity.

One of the goals of BIG is to propose a system of inventories to provide information needed to conserve biodiversity and to identify the current gaps in that system. A biodiversity inventory is a way to document the richness of life and its processes. It is important to note that while a system of inventories is only one of several planning tools needed to maintain biodiversity, it is the only tool being considered in this proposal.

Four planning levels are being used by RIC - provincial, regional, subregional and local.

YOUR CURRENT AND PAST PLANNING EXPERIENCE

What levels of planning are you involved with?

How do you use inventories about ecosystems, plants or animals in your planning?

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DRAFT PROPOSAL FOR BIODIVERSITY INVENTORIES

A draft proposal is presented here to stimulate your comments on inventory needs for biodiversity. Please reflect on the thoroughness and usefulness of this proposal for your purposes. I will telephone during the next 2 weeks to get your feedback. Any additional ideas are welcome. The Biodiversity Inventory Group greatly appreciates your cooperation!

BIG proposes having two complementary, parallel sets of inventories for any defined area, those for populations, subspecies and species and those for ecosystems.

I	II
INVENTORIES OF POPULATIONS, SUBSPECIES AND SPECIES	**INVENTORIES OF ECOSYSTEMS**
IA. A list of the kinds of animals and plants in an area (e.g., amphibians, reptiles, birds, mammals, fish, flowering plants).	**IIA.** A list of all ecosystems present (scale changing depending on which of the four levels of planning is taking place - i.e. biogeoclimatic zones or ecoregions on the provincial level (1:2,000,000) down to site associations or biophysical habitats at the local level (1:20,000)).
IB. A list of the kinds of animals and plants in an area that are indicator forms or that are at risk (endangered, threatened, rare, or scarce).	**IIB.** A list of the ecosystems in an area which are endangered, threatened, rare or scarce. This list is being compiled by the Centre for Data Conservation in Victoria.
IC. The location, habitat characteristics, and seasonal occurence/abundance of animals and plants in an area that are indicator forms or are at risk (range maps).	**IIC.** The location of ecosystems of concern (appropriate maps).

As we improve our knowledge of ecosystem (community) functions and specoes relationships we can modify our choices of indicator forms.

REACTION TO PROPOSAL

Can you rank the importance of the proposed inventories to your work?

What other information would you find useful?

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Definitions

Endangered - A descriptor for any native species, population or ecosystem ~ danger of imminent extinction or extirpation throughout all or a significant portion of its range in B. C.

Indicator form - Any population, subspecies, species or ecosystem which has been selected as an indicator.
Inventory - The process of collection (v.) or the resulting collection (n.) of materials, data or information.

Monitoring - A periodic inventory to assess the status of a population, subspecies, species, community and/or ecosystem.

Population - The community of potentially interbreeding individuals at a given locality (from Mayr, E. 1970. Populations, species, and evolution. The Belknap Press, Cambridge, Mass.)

Rare - A descriptor for any species, subspecies, population or ecosystem for which viability is a concern because it exists at extremely low numbers throughout B. C.

Scarce - A descriptor for any species, subspecies, population or ecosystem that was once common, but has become rare as a result of human activities.

Species - A reproductively isolated aggregate of interbreeding populations (bom Mayr, 1970).

Subspecies - An aggregate of local populations of a species inhabiting a geographic subdivision of the range of the species and differing taxonomically from other populations of the species (from Mayr, 1970).

Threatened - A descriptor for any native species, subspecies, population or ecosystem that is likely to become endangered throughout all or a significant portion of its range unless factors affecting its vulnerability are reversed.

Appendix B: Name, affiliation and location of each person interviewed.

Ralph Archibald	MOF	Victoria
Harold Armleder	MOF	Williams Lake
Tyhson Banighen	Turtle Island Earth Stewards	Vancouver
Anke Bergner	City of Victoria	Victoria
Russ Black	GVRD	Burnaby
Bill Bourgeois[1]	CORE	Victoria
Fred Bunnell	UBC- Dept. of Forest Sciences	Vancouver
John Cartwright	MOE	Kamloops
Chris Clement (ecologist)	Clearwater Mapping	Victoria
Chris Clement (mayor)	Esquimalt Municipality	Esquimalt
Alistair Craighead	City of Victoria	Victoria
Jim Crover	MOF	Victoria
Rick Dawson	MOF	Williams Lake
John Deal	CanFor	Woss
Ray Demarchi	MOE	Cranbrook
Orville Dyer	MOE	Penticton
Don Eastman (citizen)	GRD - environment roundtable	Victoria
Don Eastman (ecologist	MOE	Victoria
Sherry Eland	MOF	McBride
Katherine Enns	Larkspur Biological	Consulting Victoria
Jay Harnmond	MOE	Nelson
Russ Hendry	MOF	Invermere
Debbi Hlady	MOE	Victoria
Robin Hoffos	MOF	Victoria
Dave Jones	MOE	Penticton
Dave King	MOE	Prince George
Walt Klenner	MOF	Kamloops
Ron Kott	MOE	Victoria
Herb Langin	MOE	Williams, Lake
Dave Linsay	Fletcher Challenge	Crofton
Dave Low	MOE	Kamloops
Ron McLaughlin	MacBlo - Woodlands Services	Nanaimo
Brock McArthur	Environment Subcommittee	Saanich
Brian McCloy	COFI	Vancouver
Inn McDougall[2]	MOE	Nanaimo
Bruce McLellan	MOF	Prince George
Dave Morris	Provincial Capital Commission	Victoria
A1 Niezen	MOF	Victoria
George Reid	MOE	Nanaimo
Hal Reveley	MOF	Burnaby
Gary Richardson	Islands Trust	Victoria
Marvin Rosenall	MOE	Surrey
Tin Ryan	Cariboo Lumber Manuf. Assoc.	Williams Lake
Dale Seip	MOF	Burnaby
Al Soobotin	MOE	Nelson
Doug Steventon	MOF	Smithers
Gary Sutherland	MOF	Vancouver
Jim Sutherland	MOF	Williams Lake
Rob Thompson	MOE	Fort St. John2
Dave Tredger	MOE	Victoria

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Glen Watts	MOE	Prince George
Guy Woods	MOE	Nelson

1 received written comments
2 recently moved to Williams Lake but gave the Fort St. John perspective