Hydroriparian Planning Guide: response to reviewers' comments

Members of the Hydroriparian Work Team

13 April, 2004

The following remarks are organized by review. So far as possible, individual points are individually discussed. However, some reviewers wrote general texts or made very general points, which have required interpretation by members of the Work Team. Hence, not all specifics may be dealt with in the manner intended by the reviewer. Detailed editing of the text is not discussed below. Several reviewers provided text edits. In general, all appropriate edits that pertained to grammar, clarity and style were adopted.

External reviewer 1

The reviewer provided a comprehensive review, including 496 comments in the text. These interlinear comments were examined and appropriate responses made. In many cases, this consisted of adopting grammatical corrections or stylistic suggestions, or providing more formal prose. The reviewer's summary critical points are addressed in the following paragraphs, using the reviewer's titles and brief quotation of the main points.

Form:
"The document is too long, very poorly written . . ."

In significant degree, this remark addresses the text critique (see above). It is also clear, however, that the reviewer is reading the document with the view that it is intended for lay readers. The Work Team debated the audience at length and concluded that the Guide is a technical document intended for forest planners and field managers, and for persons engaged in LRMP deliberations. It is not intended for a general readership. A paragraph was inserted into the introduction explicitly identifying the intended audience.

"There are [sic] a morass of terms".

A concerted attempt was made in revision to adopt a consistent set of terms. Each technical term is highlighted in the text at its first appearance and a definition is given in the glossary. Important terms are given brief definitions in the text. Particularly important revisions were to define 'hydroriparian', 'hydroriparian ecosystem' and 'hydroriparian zone' in the introduction to the Guide. The definitions in the glossary were all reviewed; most are drawn from other BC forest management documents.

"Stage 3.0 (Watershed planning) appears to have been written by someone else and dropped into this document with little integration. . ."

The main editors of the text have completely rewritten the sections describing stage 3 of the process.

"Risk is discussed about three times, including in Stage 3.0."

Since the strategy of the proposed hydroriparian planning procedure depends upon the risk analysis procedure, a subsection describing it has been written into the Introduction. The information related to implementation of the risk procedure remains with the Stage 3 description. The actual risk curves have been removed to an appendix (#6).

"Appendix 9 [is] a background document to the process of creating the guide, so it should be deleted."

Appendix 9 describes adaptive management. The Work Team regards that as an essential element of the Guide. The appendix remains, but the Guide has been revised to give greater emphasis to using the principles of adaptive management in hydroriparian management.

"The introduction is especially very poorly written."

The introduction was completely rewritten, incorporating ideas presented by the reviewer (but including much else, as well).

"Send the document to a professional editor . . ."

The entire Guide was given a final revision by one editor from the Work Team. It was then given a high-level review by the CIT editor for internal consistency and references to CIT reports.

"[Compile] a table for the maps with the headings: stage; map; scale; content; purpose."

Other reviewers were concerned with the question 'where does the information come from that goes into the maps?' Accordingly, an appendix has been constructed that describes systematically the compilation of the maps, describing the main data sources, and giving a critique of the information sources. This appendix in effect accomplishes the purpose intended by the reviewer.

". . . suggest testing the guide out on a group from the intended audience".

We have received an industrial assessment of the Guide and have been able to incorporate some helpful advice from that experience. However, releasing the Guide for a general test was beyond the authority of the Work Team.

Content

"There are many, many mistakes with respect to content."

The reviewer emphasizes the lack of adequate definitions of 'hydroriparian' (see above), and considers that the text is inadequate in its explanation of the relation between geomorphologically driven disturbance and the condition of hydroriparian ecosystems. An attempt has been made in revision to repair this shortcoming.

The reviewer also indicates that the Guide is remiss in not pointing out that the key to maintaining ecosystem function is to maintain the range of natural variability. This is a prominent concept in conservation biology that was extensively debated by the Work Team. Our conclusion is that a landscape managed for extractive forestry cannot be maintained entirely within the range of natural variability. The Guide was constructed on the basis that it is of paramount importance to minimize excursions beyond that range, and their net effect in the regional landscape.

Physiographic regions or subregions

The reviewer commends the use of subregions over Natural Disturbance Types because the former are defined on physiographic criteria that are important drivers of disturbance, hence are more fundamental. However, it is claimed that the criteria used to define the regions are not clear. An appendix table defines the regions and describes their

most important features (in relation to hydroriparian activity), including glacial activity, which the reviewer appears to consider was ignored.

The reviewer quotes an American authority on physiographic processes in the Coast Mountains. The experience of that authority is based in the American Coast and Cascade ranges, beyond the main glacial boundary, where terrain conditions are quite different than those in British Columbia. The Work Team relied on British Columbia experience wherever possible, including the experience of forest field managers.

The map of the regions clearly states that they are constructed as a conflation of the physiographic regions of Holland and ecoregions of Pojar. The Work Team regarded it as a counterproductive exercise to construct entirely new regions, nor did it have the resources to do so in a scientifically sound way. The Work Team would agree, however, that the construction of a new regionalization of the Coast Range for purposes of forest management would be an important undertaking.

Risk assessment

"At the very least, they [risk assessment curves] need to be more solidly substantiated . ."

The Work Team agrees with this point, but emphasizes that data simply do not exist to substantiate them. The complete set of documents associated with the Guide, including the Workshop reports, shows how the risk curves were constructed. In order to meet the criticism implied here, the Guide was revised to emphasize that the risk curves are presented as 'hypotheses' for critical test in an adaptive management regime, and that it is expected that evidence-based revisions will occur.

The reviewer points out that the location of historic development within a watershed is an important factor in deciding future management. The Work Team agrees. It is for this reason that certain of the risk factors are specifically related to development within the designated hydroriparian zone.

Disturbance regimes

It is pointed out that the material presented in Appendix 5 relates, not to disturbance regimes but, to disturbance return interval and extent. The data have been relabeled. Use of these data have been specified in the revised Guide.

Technical reports

The reviewer deplores the lack of review. This matter was outside the authority of the Work Team. However, it is believed that some review has subsequently been obtained of these reports. The reviewer complains that the authors of the reports are not authorities, or have not worked in the region. The authors were selected on the basis of their regional experience, not all of which is necessarily visible.

The validity of one report (#4) is specifically questioned. However, the reviewer does not indicate whether the fact that this report consists of a meta-analysis (a formal procedure) of prior work was understood. In any case, that report chiefly emphasized the inadequacy of regional knowledge, rather than providing well-founded guidelines for management, which the Guide recognizes.

External reviewer 2

Reviewer #2 suggested that the Guide require the development of 'dynamic landscape planning models' as well as maps. These are software simulation models that portray the predicted outcomes of various decisions that might be made. They are attractive because they provide planners and public respondents with a graphic display of possible outcomes. We have suggested that such models would be useful but we have not required them. Their implementation introduces an additional level of technical complexity in land management planning and requires, to be reliable, a large regional data base. It is not clear to us that resources are currently available to guarantee either of these. On the other hand, such models can be introduced as soon as is feasible without any need to change anything in the Guide.

The reviewer made a series of suggestions to clarify the discussion of adaptive management given in the Guide. We have adopted all of these suggestions, specifically noting the requirement to develop a set of alternative strategic options, describing the importance of replicated and/or paired treatment/control designs, modifying the conceptual figures, and including a section on cost effectiveness that incorporates the approaches suggested by the reviewer. Overall, we have revised the Guide to give increased priority to adaptive management. We note, however, that the Work Team persistently detected a dichotomy between the highly formal construction of adaptive management favoured by research scientists, and the less formal approach favoured by industry. This dichotomy is represented in our discussion by the distinction of 'active' and 'passive' adaptive management. The reviewer distinctly favours the active approach. The Work Team concluded that both approaches have their place, depending on context, resources, and the information to be discovered.

The reviewer indicated that the problems of monitoring should be faced more squarely. The reviewer's comments are helpful, but do not fall specifically within the purposes of a planning guide. They should be an integral part of the larger land management strategy, since data are necessary before any rational planning, or performance or outcomes testing can be conducted.

Finally, the reviewer recommended the removal of Figure 1 as "meaningless". We elected to retain the figure. Less technically oriented readers have found it to be useful.

Dr. Bob Willington (via H. Grenander)

Dr. Willington's comments relate to the industry trial of the HPG, but have been passed to the Work Group as being relevant to the Guide itself. The relevant comments are discussed below.

All area in a drainage basin upstream of the point of interest influences the hydrology at the point of interest.

Agreed.

ECA is not a hydrological risk factor. It may be a risk factor for peak flow, say, but peak flow should then be used as the risk factor for hydroriparian integrity.

The reviewer has failed to grasp that the Guide is specifically constructed to use planning indicators available before development as the input information for the risk

assessments. Since post-development peak flows would be difficult to predict in many situations, the correlated management indicator is preferred.

Why are roads and harvest in Classes IV and V terrain included as risk factors?

They are included because development has occurred in such terrain in the past, and still occurs in Class IV terrain in some circumstances. Experience indicates that this significantly raises risk of sediment delivery into the hydroriparian system.

Reviewer points out the desirability of additional details for risk planning (for example, hypsometry, alpine area, existence of point sources of sediment, additional classification of roads, etc.)

All such details will be considered by an experienced forest manager, but there is some limit to what can be encompassed within a base procedure such as the Hydroriparian Planning Guide. The Work Team endeavoured to identify a minimum set of accessible criteria that cover most risks. Other critics have given the opinion that the procedure already is too complex, hence it seems inadvisable (pending further experience) to build additional conditions, constraints and requirements into the procedure.

Dr. Robert Bilby (via H. Grenander)

Dr. Bilby is a prominent American forest ecologist.

Risk is never very well defined in the document.

Risk is now introduced and defined in the Introduction, and technical details of assessment are given in stage 3 instructions. See response to reviewer 1 above.

[paraphrasing] the landscape is too complex to permit the risk functions – for which there are inadequate bases anyway – to be applied successfully.

The risk functions are explicitly presented as hypotheses for test, and the planning/management process is presented in the framework of adaptive management for reasons similar to those given.

Natural disturbance is not a viable basis for forest management.

Dr. Bilby notes that recent studies have identified a very broad range, in the long term, within which natural disturbance in a landscape may fall. The range becomes wider as spatial scale becomes smaller. The reason for this is the eventual occurrence of rare, but very intense disturbance events such as wildfires or severe storms. Hence, natural disturbance is not a useful guide for long-term forest management. The Work Team has considered the problem of rare events and recognizes that regions subject to such events require special management regimes across the entire landscape. The Hydroriparian Planning Guide is not designed to provide planning procedures for such contingencies. To the extent that we can base disturbance on British Columbia Coast Range on data, however, it appears that we find a range of conditions within which the proposals made in the Guide are viable.

Review from the British Columbia Ministry of Forests, Coast Regional Office

This is a detailed document divided into two parts, general points and detailed critique. Much of the critique represents criticisms made from a viewpoint (the necessity to realize some level of economic value from the forest, and the necessity for planning to work toward expedient realization of this value) that is contrary to the philosophy of the Hydroriparian Planning Guide. The Hydroriparian Work Team was instructed to develop the Guide within a framework that gives primary consideration to long term sustainability of the forest and forest resources. Hence, it necessarily assigns primacy to the maintenance of viable forest ecosystems and, in absence of comprehensive knowledge of forest ecology, it necessarily is precautionary in character. The risk strategy incorporated into the Guide is a deliberate attempt to introduce some managerial discretion in light of this primary concern. Consequently, although the following discussion takes cognizance of the criticisms made by the MoF group, relatively few can be accommodated within the framework of the Guide. The points are taken up in the same order as the critique. They are identified by paraphrasing what we have interpreted as the main issue underlying each point.

General Review

The current trend in British Columbia forest legislation is toward results based management, whereas the document favours a process-based procedural approach.

The Work Team was fully aware of the legislative trend and it is for this reason that the novel, risk-based management procedure was introduced. This procedure is designed to give managers freedom to compare levels of results against levels of risk in a way that informs them what are the long-term possible outcomes in the landscape. A results basis for forest management is interpreted to mean that results will be adaptively incorporated into ongoing modification of forest management practices, and provision is explicitly made for this in the document.

The document is very difficult to read.

It has been completely revised in the attempt to make it more transparent.

Implementation of this procedure would be difficult, if not impossible. It is unlikely to result in optimal decisions from an operational perspective.

We have test data that indicate that the procedure is perfectly possible to implement. Whether or not it is apt to deliver optimal decisions is something that only experience will reveal.

The concept of risk advocated in the Guide is different than more commonly used risk concepts and may not be appropriate.

The introduction of the risk concept in the revised document addresses this issue, explaining why the particular definition was adopted and how it is to be interpreted.

The HPG duplicates much that is contained in the EBM Handbook. The two documents, together, are much too complex.

The Hydroriparian Work Team understands that the HPG is a technical document from which results will be drawn for incorporation into the EBM Handbook. It is not intended that both should be used operationally on an equivalent basis. The final

decisions on presentation of the results are beyond the authority of the Hydroriparian Work Team.

Planning Process

The procedure is academic.

No comment.

Local planning requires a large superstructure of subregional and landscape assessment. Is this realistic?

It is difficult to respond to such a criticism. Plainly, the Work Team believes it is necessary if the forest landscape is to be maintained as a viable ecosystem and a productive working forest in the long term. The implication of the critique, that forest development planning is a local issue, is specifically rejected by the entire EBM approach.

It is unlikely that the forester will have gained much new information in steps 1 and 2.

Gaining new information is not the point of the procedure: the point is to array the available information in order to use it effectively.

Steps 3 and 4 are daunting; step 5 is impossible.

But there is no specific critique. The reviewer admits that much of the required work is routine. The reviewer is possibly thinking that the complete procedure has to be initiated from the beginning for every cutblock in the landscape. Plainly, several cutblocks in one drainage basin will take advantage of the same compilation of higher level information.

Define subregion.

Done, in revision.

Reviewer is confused about stand disturbing return intervals. He points out that return intervals of only 50 years are responsible for floodplain evolution.

But 50 years creates neither a floodplain nor (what is more pertinent) a floodplain forest (to which the disturbance return interval refers). In revision, the discussion of stand-replacing disturbances has been more clearly specified by giving attention to definitions and to the presentation of the table.

Reviewer questions the basis for the disturbance return intervals.

The revised text incorporates recent analyses of disturbance frequency, based on existing databases, that closely match the ground-based estimates provided initially by J. Pojar and colleagues.

Define landscape. Purpose of investigating landscapes is not clear.

Defined in revision. Its purpose is to ensure that the context in which drainage-basin and site-level disturbances associated with development occur is acceptable for overall ecosystem viability.

Problems mapping the hydroriparian zone.

The method of mapping is based on available (or should-be available) data of terrain mapping. The reviewer really seems to be unhappy with the specificity of this procedure. Nevertheless, it is operationally feasible, and that is what is required. Reviewer notes that the hydroriparian buffer will have consequences on the timber

supply. Yes it will; the timber supply should be an outcome of a rational planning process, not an input to it.

High value fish habitat: definitions are vague and unrealistic.

It is probable that a professional biologist will have to carry out the tasks defined here. We have revised the section in the attempt to introduce greater clarity.

Terrestrial ecosystems can be defined only with information already available to planners.

That is the intention.

Develop site plan: claimed to be impractical because, in part, insufficient instructions are given and they are not consistent with operational realities.

We do not understand this criticism. An overall critique was that the document is too procedural. The entire EBM process is intended to change operational realities.

Risks cannot be quantified; at best they can be categorized.

The revised document recognizes this. See prior remarks on risk.

The proposed process will likely require an exorbitant amount of resources. Much of the required background information does not exist (e.g., terrain maps. . .).

The procedure is designed to be implemented with information that is supposed to be available under the Forest Practices Code. It does take full advantage of that information.

The requirement to take on adaptive management monitoring, as described in this document, will be very complex, costly and time consuming with likely very little return on investment. The net effect is planners are funneled into using precautionary principles that are very restrictive in terms of rate of cut and reserve requirements.

Given direction to design ecologically sound practices, the Work Team designed the approach first, to be precautionary and second, to benefit from learning as managers explore higher-risk options. This approach differs from the status quo.

Most of the guide's contents is extraneous to the needs of planners working on LRMPs . . The cost of the comprehensive planning processes for developing watershed and site plans may cause some timber to become 'administratively' unavailable . . .

The guide is not intended solely for LRMP planners. The audience has been clearly specified in revision. Test applications have demonstrated that the planning processes are achievable with reasonable effort and cost.

Document should be reduced to Table 1 + Appendix 6 (interpreted qualitatively), leaving room for professional accountability.

No comment.

Incorporate this document into the EBM framework

It is a component of the EBM framework.

The level of ecosystem inventory is beyond what has been possible given available resources.

No comment. This remark is typical of several that claim the procedure is impractical for lack of information. The Work Team has determined that this is not the case. In any case, that would be no reason for not recommending improved management

practices that require new information. Certainly, improved information would benefit the proposed procedures. However, these issues are beyond the authority of the Work Team.

This report is badly in need of a real example.

An example map analysis has been added as an appendix. Several planning trials have been conducted.

Dispense with the HEN: fold into "EBM network".

Critic admits in the same paragraph that riparian forests are, generally, more productive than the "matrix or average forests". This is the reason why the procedure and the concept of a HEN were invented.

Risk assessment

Approach seems to be based on a risk assessment approach that seems to be specific to this document and ignores generally accepted concept risk = hazard x consequence. It directs planners to very precautionary principles.

The criticism is correct in both points, and both points were specifically adopted as bases for the procedure. The concept of risk, as adapted for the Guide, is now explained in the introduction. The reason for the precautionary approach is also discussed.

Need to explain framework for evaluating expert judgement (Bayesian belief suggested).

The basis for the expert judgements are discussed in Workshop reports. No formal framework for calibrating belief was adopted. Many practitioners are unfamiliar with such frameworks and, certainly, it would have further complicated the document.

How can risks at finer levels be made consistent with risks at higher levels if all units are not considered simultaneously?

It can't. That is why the intermediate level 'landscape' is introduced. (See remarks above). In addition, the order of planning gives precedence to higher levels (as per the EBM Handbook).

The definition of risk effectively eliminates the possibility of "no risk". Document fails to note that disturbance can be a good thing for forest productivity and growth and, therefore, likely, ecosystem function as well.

The inference is not one that the Work Team would care to make. Low risk is a perfectly possible outcome; the Work Team probably would agree that there is no such thing as 'no risk', given the state of knowledge of forest ecosystems.

Proposed approach ignores economic and operational factors.

The purpose of the Guide is to assure ecologically sound practice, not economically expedient practice. The EBM Handbook, with its additional emphasis on the well-being of communities, covers human factors.

Objection to recommendation to avoid Class IV terrain.

The procedure is precautionary. This recommendation is based on the advice of experienced terrain analysts. While the quality of Class IV terrain does vary widely (as remarked), experience indicates that poor decisions are often made about it. Hence, this Guide recommends avoiding it.

Method of assessing risk identifies potential risk only; it does not account for licensees' actions.

The Guide is a planning document. Licensees' actions are not available for assessment at the stage when the Guide is applied. The Guide does encourage good judgement. A manager dealing with a licensee who has habitually proven to be a careful and successful operator has latitude, within the document, to permit the licensee to assume a higher level of 'potential risk'.

Riparian reserves

There is already a process in place that provides protection to riparian areas.

The present practices are considered to be too arbitrary and too restrictive of the range of streams afforded protection to guarantee long-term ecological viability.

There is no reference to Chatwin et al. (2001). Assessment of the condition of small fish-bearing streams. . .

A member of the authorship of that report was a member of the Hydroriparian Work Team.

The document does not adequately consider very small streams. In particular, there is no basis to reserve areas around them because they cannot transport large debris and do not have the power to erode their banks.

The Guide is cognizant of factors beyond those quoted, which focus only on physical erosion. Water quality maintenance and animal habitat are significant functions of these streams. Therefore the Guide seeks to retain a representative set of them in the forest landscape. Careful reading of the Guide reveals that this action does not necessarily represent a permanent reserve process.

Most small streams are seasonal and would require reserves, which is impractical.

The revised Guide recognizes the problem of distinguishing ephemeral and seasonal streams on the coast and makes recommendations accordingly.

The process is too expensive.

This criticism raises the philosophical question whether value can continue to be extracted from forests without reasonable levels of reinvestment. That is not a matter for the Hydroriparian Working Group to settle.

Biodiversity

This section consists of a series of questions about specific statements in Appendices 1, 6, and 9. They have been dealt with in revision so far as knowledge permits.

The David Suzuki Foundation

General Comments

Guide is overly complex and cumbersome

In revision an attempt was made to define a straightforward path through the material. In particular, technical detail related to risk assessment was removed to an appendix. An example of application was also added as an appendix.

Scientific rationales are not given

Scientific bases are given in the Background Technical Reports. (It is difficult t to see how both of the foregoing comments could be dealt with within the report..)

Recommend that site-level planning be more prescriptive.

The relative lack of highly prescriptive instructions is deliberately intended to leave room for professional judgement in light of the freedom of the operator to assume a chosen level of risk. It is, furthermore, difficult to see how one can realistically be highly prescriptive at site level, consistent with leaving open the possibility to obtain optimum management decisions, given the distinctive character and problems presented by every site.

The Guide fails to acknowledge that the remaining riparian forests may be globally significant.

This matter is more appropriately addressed in the EBM Handbook.

The Guide does not recognize the provisions of the federal Fisheries Act.

The Guide is consistent with the federal Fisheries Act; furthermore the Fisheries Act takes regulatory precedence. There seems no need to specify it.

The Guide does not address road design and layout.

The Guide is a land management planning document, not an engineering document. To meet the spirit of the Guide, road design and layout must be accomplished so that the recommendations in the Guide are fully followed. Specific provisions for road development, which are not restricted to riparian zones, must come from elsewhere.

The Guide will be legally unenforceable . . . due to the significant degree of discretion afforded forest managers and lack of clarity in the prescriptions.

An attempt was made to make the Guide consistent with the overarching provincial policy to move toward "results based management", which requires that discretion be left to forest managers. In its critique, the BC MoF complains that the document is much too prescriptive. There is no common ground between these positions.

The Guide fails to advocate any precautionary minimum buffer widths.

The Work Team is persuaded that there is little merit in universally prescribed buffer widths of any width. What constitutes an effective buffer depends on site conditions. It is possible that some sites may merit no buffer at all. Therefore, the Guide is written to secure effective buffers.

The Guide is predicated upon the presumed effectiveness of voluntary adherence . . . despite a poor history of voluntary measures for riparian forest management.

The Work Team is persuaded that the matter of adherence to best management practices (the underlying theme of the entire CIT exercise) is best exercised through permitting and re-permitting activities, not through writing prescriptions that will condemn conscientious operators, along with everyone else, to suboptimal management solutions.

The Guide cannot condone "high risk" management . . . that may directly or indirectly affect fish habitat . . . as such activity, and the counseling of it, may be an offence.

See above on the precedence of the Fisheries Act.

There are no examples of well-designed adaptive management programs with secure long-term funding . . .

This matter lies beyond the authority of the Hydroriparian Work Team.

There is no specific system prescribed for adaptive management.

Some further details of data management have been incorporated into Appendix 9. Adaptive management consists, within its formal framework, of designing treatments that are adapted to site conditions and to the area of practice that it is desired to advance. It seems unwise to attempt to prescribe in detail how adaptive management must work. For guidance, there are several textbooks on the method.

Specific comments

p.23: precautionary guideline for maintaining channel bank stability overlooks the importance of maintaining channel bank stability in the small, often steep headwater streams and gullies found in the source zone, which are common sites of debris flow and landslide initiation.

It is the opinion of the Work Team that landslide initiation in headwater areas is not a matter of streambank stability, but of the stability of the entire slope above the channel. Extensive geotechnical experience bears out this opinion. This is, therefore, not strictly a riparian matter, but one for EBM regarding terrain classification and working rules. See the EBM Handbook. (But see also Hydroriparian guidelines re. Class IV and V terrain, designed to eliminate sediment delivery from such sources.)

p.23: precautionary guideline for maintaining high-value fish habitat does not acknowledge the legal obligation to avoid "indirect" impacts on fish habitat . . . and recommends [rates of forest removal that exceed currently accepted guidelines]

See remarks above on the precedence of the Fisheries Act. The Work Team considers that the wording is consistent with the Act, even though it is not invoked. Forest removal rates in the Hydroriparian Planning Guide are adjusted according to the area involved. In an individual "small drainage", a prescription for 5% forest removal in 3 years, for example, would make the harvest uneconomical to undertake at all. It is not the purpose of the HPG to discourage forest harvest.

p.29: riparian corridors. . . need to consider the species involved and take into consideration slope and elevation. To qualify as EBM the prescription for corridors must qualify as low risk.

This is an example of a "fine filter" ecological criterion that must be varied regionally, according to terrain and animal species involved. It is not practical to write a general prescription for the Coast without unduly constraining management possibilities in most areas. Hence the Guide has been written for characteristic conditions and cautions that adjustments must be expected locally. In the case quoted, additional reserves for wildlife would be identified and established. The more general question of the relation between level of risk and EBM is not one that the Hydroriparian Work Team can resolve. The implication of the claim made here is that the entire risk strategy should be abandoned in favour of the precautionary (low risk) guidelines given in the Guide.

A buffer of 1 ½ tree heights to define the hydroriparian zone is not explained; nor is any system for incorporating the information of field checks given.

The buffer is purely a conservative planning expedient to overcome the possible inaccuracy of boundary placements on the maps that are used initially to establish the extent of hydroriparian areas. It is expected that field adjustments will be made by competent field managers using the techniques they normally apply to demarcate areas identified on the ground. Restricting their activities to specified procedures appears, to the Work Team, to be counterproductive.

The report states that "all components of the food chain that have been impacted must be considered in addressing the needs of species at the community level", but does not state how the information will be incorporated.

The Work Team considers this to be a matter for the investigating ecologist in each instance.

Rainforest Solutions Project (Carver Report)

This review is cast as a report, with commentary on various aspects of the Draft HPG. It does not present a consolidated list of critical points. The following comments represent remarks on points of interest extracted from a reading of the report.

p.1: modeling would be expected to play a key role in the adaptive management exercise.

The Work Team agrees, but has remained silent on the topic since there are no current 'standard methods'. It seems, therefore, unreasonable to constrain the capabilities of those engaged in such exercises. (This remark is chiefly to amplify a previous commentary: the Carver Report appears not to be critical on this point.)

p.1. Some further work could improve effectiveness of the [reserve] design. (An example is provided.)

Agreed. The Work Team expects that experience will rapidly identify such possibilities, but could not anticipate all of them.

The Hydroriparian Planning Guide uses the Range of Natural Variability principle, but does not make allowance for natural variability on top of induced disturbance.

It appears, by definition, not feasible to remain strictly within the range of natural variability when introducing additional human disturbance. See, also, comments by Bilby.

Risk indicators need revisiting, and some procedure needs to be established to reassess them regularly, on an independent scientific basis.

Revisions were made to increase consistency. The idea to revisit the risk criteria regularly is a good one, but how that is done will depend on the further development of the EBM approach to forest management, hence it is not practical for the Hydroriparian Work Team to make a substantive recommendation. The Guide does emphasize that the risk criteria should be regarded as hypotheses for test and revision.

Indicators chosen for hydrological risk are not the optimal ones and are not appropriately applied

The indicators and levels of applications derived from an "expert" workshop. The Work Team has written in provision to modify them in light of field experience (such as that quoted in the report). For the present, they remain since they are what has been recommended to the Work Group.

Stream morphology indicator: report includes some suggested technical adjustments.

See last point.

Channel bank stability indicator: report argues that the ecological functions of the riparian zone should be included here, which would change both the prescription and the definition of adequate buffer width (from channel widths to site-specific tree heights).

The Work Team has treated this criterion as a physical stability criterion only. The question of broadening it to include riparian ecological functions (shade; microclimate; downed wood provision) can be considered in revision after some experience is gained. At the present time, however, it seems that wholesale revision risks undermining the criteria that have been established.

Downed wood: recommend revisiting criteria.

The response is as for hydrology. However, the points of criticism are well taken.

Precautionary guidelines: more specificity recommended.

Points are well taken.

The Carver Report contains a thoughtful critique. Many aspects of it have not been incorporated at this stage because the risk criteria have been derived from a workshop process. With test experience, it is likely that the criteria will change. This will be an appropriate time to introduce Carver's recommendations.