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2007 Southern Interior Information Needs Assessment for Watershed Management

FORREX
Supporting Sustainable Natural Resource Management Decisions

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Todd Redding, Stephanie Lepsoe,
and Michelle Laurie

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EXECUTIVE SUMMARY

This report summarizes the results of a qualitative study designed to document important issues, research gaps, and extension needs related to the management of forested watersheds in the Southern Interior of British Columbia. The purpose of the assessment was to gather respondent input to:

- assist in strategic planning for the FORREX Watershed Management Extension Program (WMEP), and
- inform FORREX clients of the extension needs and knowledge gaps identified by respondents.

Respondents were asked to describe their most important research and (or) extension needs around stated topics, including: water quantity and quality; groundwater; watershed restoration; small streams and riparian zones; fish and aquatic habitat; climate change; monitoring and data collection; communication and data availability; water resource governance; and social and future issues.

The survey results indicated an interrelationship between many of the survey topics; that is, most respondents identified issues, research gaps, and extension needs that were common to more than one survey topic. The survey results also showed that no single watershed management research or extension need prevails above all others; rather, a wide range of needs exists.

Five important themes requiring research and extension emerged from this survey:

1. Reducing uncertainty around potential climate change impacts on water resources in the province's water-limited Southern Interior.
2. Quantifying the effects of forest disturbance (especially the mountain pine beetle infestation and harvesting) on water quantity and quality.
3. Increasing hydrologic knowledge and education for professionals, the public, and First Nations.
4. Evaluating operational tools for predicting the effects of forest disturbance on water resources.
5. Increasing understanding of groundwater resources (inventory) and protection (legislation).

In the Southern Interior, numerous interested parties are involved in activities related to watershed management. A major challenge is to integrate the wide range of perspectives into coherent management that addresses the primary concerns of all parties.

This report presents respondent perceptions collected during the survey; it does not attempt to relate the authors' interpretations of this input. As such, it complements a concurrent project for the Northern Interior of British Columbia (Redding and Nickurak 2008), as well as a previously completed study on coastal information needs (Pike 2004).

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1 INTRODUCTION

The FORREX Watershed Management Extension Program (WMEP) provides extension services on topics that directly or indirectly affect water resources in terrestrial and aquatic ecosystems. The goal of the program is to increase communication, understanding, and application of innovative knowledge and research results. Identifying issues, knowledge gaps, and resulting extension needs are critical elements of the program's extension delivery.

This report documents important issues and information needs related to watershed management in the Southern Interior of British Columbia. This project builds on a number of other studies that address watershed management information needs (see: Pike 2003; Redding 2007a; Redding 2007b). The survey results also highlight some conclusions that are similar to those reached in a provincial survey of natural resource practitioners (Morford and Hollstedt 2007).

The survey assessment was undertaken to gather input that would further guide WMEP development in meeting clients' needs and to assist in the strategic planning of the Southern Interior WMEP.

2 METHODS

2.1 Study Design

The WMEP's Southern Interior Needs Assessment had two primary objectives:

1. to identify issues, research gaps, and extension needs specific to the Southern Interior; and
2. to determine the most critical issues and (or) needs.

FORREX selected key informants to respond to the survey; these respondents were either interviewed over the telephone or in person. This approach was deemed most suitable given the objectives of the assessment and resource constraints.

A list of potential respondents was compiled and prioritized. Selection was based on the respondents' profession, and their experience and (or) employment position within their organizations. All respondents were known to be familiar with watershed management issues in the Southern Interior. Confidentiality and anonymity were assured to encourage respondents to speak freely about the issues. In total, 32 interviews were conducted between August and October 2007.

2.2 Study Delivery

A letter of introduction and copy of the survey questions was sent by email to respondents in advance (see Appendices A and B). A consultant (S. Lepsoe) and a FORREX Watershed Management Extension Specialist (T. Redding) conducted in-person and telephone interviews. During each interview, the interviewer entered notes either directly into a table or onto the questionnaire (Appendix B). Due to time constraints, two respondents preferred to send their comments via email. When all interviews were completed, the consultant sorted the responses by theme and topic into a draft report. FORREX reviewed these findings and generated the final report.

2.3 Study Limitations

This needs assessment is part of a process that is identifying relevant watershed management needs for British Columbia and was designed to provide FORREX with input to plan its WMEP. As it was intended to be a qualitative, non-random study, many respondents can be placed into more than one client group.

It is also important to note that all respondents may not have had the same level of understanding and (or) insight when providing input on current issues and research and extension needs. The timing of the interviews (August–October) prevented the interviewers from making contact with a number of people, especially forest industry representatives. In addition, no interviews were conducted with members of the range management sector because the interviewers were unable to contact key informants or schedule interviews.

This summary report also does not offer any interpretation of the respondents' input—it merely presents what was collected in the survey.

3 RESULTS

3.1 Profile of Respondents

Respondents were asked to select from a list of nine categories that described field or area of practice (see Appendix B). They were asked to select their primary area of practice and, if applicable, a secondary category (Table 1).

Respondents were asked to select an affiliation that best applied to them. Seven categories were listed in the survey and, if necessary, respondents could select more than one (Table 2).

TABLE 1 Respondents' area or field of practice

Field or area of practice	Primary	Secondary
1 Forestry	14	1
2 Agriculture	0	0
3 Mining	0	1
4 Biology (e.g., wildlife conservation)	1	3
5 Fisheries	5	1
6 Geosciences and Engineering	4	5
7 Water Supply and Licensing	0	5
8 Power Supply (e.g., micro-hydro, wind)	0	0
9 Other[a]	8	2

[a] Responses falling within the "Other" category included: policy; community ground (2 respondents); watershed management; water quality; public health (2 respondents); and source water protection.

TABLE 2 Respondent affiliation

Affiliation	Primary	Secondary
1 Forest Industry	2	1
2 Provincial Government	7	0
3 Other Government Agencies	4	0
4 First Nations	3	0
5 Consultants/Academics	11	0
6 Community/Stewardship Group/NGO	5	2
7 Other[a]	0	1

[a] One respondent specified "community support" as a secondary affiliation in the "Other" category.

3.2 Survey Responses

Respondents were asked to identify their research and extension needs in the following areas:

- water quantity
- water quality
- groundwater
- watershed restoration
- small streams and riparian zones
- fish/aquatic habitat
- climate change
- monitoring and data collection
- communication and data availability
- water resource governance
- social issues
- future issues
- other issues

"Research need" was defined as an area where respondents felt information is lacking or non-existent. "Extension need" was defined as an area where information exists, but is not reaching the people who need it. However, many of the needs or gaps noted may be considered as related to both research and extension.

3.2.1 Water Quantity

Water quantity generated the greatest amount of interest among respondents most likely because the flow regime exercises a strong control over many other water-related values (e.g., water quality, habitat, etc.). A major information need for the respondents was the effect of the current mountain pine beetle infestation on flows. Respondents' specific research and extension information needs related to water quantity included the following.

RESEARCH NEEDS

- The effects of forest management and natural disturbance (mountain pine beetle, wildfire) on timing, duration, and magnitude of peak flows, low flows, and water yield.
- Improved ability to predict effects of disturbance on hydrological response at large scales.
- The differences in hydrologic function between standing dead trees killed by mountain pine beetle and harvested stands.
- The effects of different retention strategies (live and dead trees) on water flows and hydrologic recovery (from stand to watershed scales).
- The effect of large areas of dead pine on flows and hydrologic recovery.
- The effects of low flows on aquatic organisms and habitat.
- A better understanding of snow interception processes/snow interception values related to equivalent clearcut areas (ECAs) for various stages of pine mortality.
- The extrapolation of hydrologic understanding to ungauged basins and between scales (e.g., most research has been done on small watersheds, but many critical issues occur at the large watershed [Fraser Basin] scale).
- Water as a key resource from a historical and traditional use perspective.
- The hydrologic recovery in areas of dead pine 5 or more years after defoliation.
- The effects of roads on diversion of flows within and out of a watershed.

EXTENSION NEEDS

- The synthesis of available hydrologic models for application to forest management uses, the scales at which they are applied, and their data requirements; the models most appropriate for specific circumstances.
- The amount of water available and already allocated for licenses in the Southern Interior; the amount available for non-traditional uses (e.g., First Nations, in-stream flow for aquatic habitat).

3.2.2 Water Quality

Information needs about water quality were fairly general, with a number of respondents relating potential water-quality issues back to water quantity. Respondents' specific research and extension information needs related to water quality included the following.

RESEARCH NEEDS

- The prediction of the cumulative effects of land use change and disturbance on water quality (especially sediment and turbidity) at large scales.
- The prediction of sediment and turbidity effects of forest management activities and wildfire disturbance.
- The effects of mountain pine beetle and salvage harvesting retention strategies on water quality.
- The value of riparian retention for physical and chemical water quality.
- A determination of whether lower and more prolonged low flows cause a decrease in water quality due to concentration effects.
- The quantification of linkages between groundwater extraction and stream temperature.

EXTENSION NEEDS

- General extension on sediment, turbidity, and stream temperature.

3.2.3 Groundwater

Most responses about groundwater tended to relate to the need for more information and an understanding of the extent of the resource. This will become a more urgent issue as groundwater extraction for human use increases in the Southern Interior as surface water supplies are allocated or diminish. Respondents' specific research and extension information needs related to groundwater included the following.

RESEARCH NEEDS

- A comprehensive inventory of groundwater resources (aquifer locations, volumes, yield) to allow informed management of the resource, especially in the Okanagan and Columbia basins where groundwater extraction is increasing.
- The role of upland forested watersheds on regional groundwater recharge and the effect of large-scale disturbance (e.g., mountain pine beetle) on valley-bottom groundwater resources (e.g., Okanagan valley).
- The effect of increased groundwater recharge after disturbance (harvesting, mountain pine beetle) on slope stability.

EXTENSION NEEDS

- Information on surface water–groundwater interactions in upland forested watersheds.
- Publicly available information on groundwater resources and protection.
- Extension on groundwater–stream interactions for people who extract alluvial groundwater for household and agricultural use.

- Rules-of-thumb to explain lag times between wet/dry years and their effects on groundwater and streamflow.

3.2.4 Watershed Restoration

Respondents identified a lack of evaluation of previous restoration efforts as an area of primary information need. Their specific research and extension information needs related to watershed restoration included the following.

RESEARCH NEEDS

- The types of restoration that worked in the past; no formal effectiveness evaluations of past watershed restoration projects (e.g., FRBC Watershed Restoration Program) have taken place so it is not known whether past projects/programs met objectives or how future work could be done differently.
- Feasible and effective wildfire restoration methods for different situations (physiography, vegetation, soils).
- Reference conditions that should be used as the target for restoration; how to determine the target and the objective criteria for evaluating success.
- The determination of the success of small-scale restoration efforts when factors contributing to problems are large-scale and effects are cumulative.

EXTENSION NEEDS

- Case studies of successful and unsuccessful restoration projects/programs to help guide future work.
- The determination of whether source protection is a better option than downstream remediation (i.e., deal with the problem, not the symptoms).

3.2.5 Small Streams and Riparian Zones

The primary information needs around small streams and riparian zones related to understanding biophysical interactions between streams and terrestrial ecosystems. Respondents' specific research and extension information needs related to small streams and riparian zones included the following.

RESEARCH NEEDS

- A better understanding of biophysical interactions (hydrologic, geomorphic, and biological) and feedback mechanisms in streams and aquatic ecosystems (e.g., wetlands, lakes).
- The differences between the stand dynamics of the riparian zone and the surrounding upland forest, and links with riparian and aquatic function.
- The effects of forest management on erosion and deposition at tributary mouths.
- A determination of whether riparian buffer zones really work to protect hydrological and ecological values.

EXTENSION NEEDS

- Communication to resource managers of the importance of riparian zones.
- Extension about development on [alluvial and colluvial] fans in the Southern Interior.
- Extension about the importance of large woody debris in streams and sources of future large woody debris contributions from the riparian zone.
- Synthesis related to the differences in ecology (growth and stand dynamics) between riparian forests and adjacent upland forests, and how these differences affect hydrological recovery of the riparian zones.

- Extension on riparian planning for First Nations groups involved in resource management.
- Extension about riparian benefits targeted to recreational and agricultural users.

3.2.6 Fish and Aquatic Habitat

Many of the information needs identified under this category also relate to the previous category on small streams and riparian zones. Respondents' specific research and extension information needs related to fish and aquatic habitat included the following.

RESEARCH NEEDS

- The impact of changes related to the mountain pine beetle infestation and climate change in the timing, magnitude, and duration of low flows on fish and fish habitat.
- The potential effects of increased access to the land base (because of large-scale salvage harvesting related to the mountain pine beetle infestation) on fish stocks and habitat (e.g., increased recreational and cattle access).
- The relative impacts of habitat, ocean survival, and commercial fishing on declining salmonid returns.
- The effects of mountain pine beetle salvage and various retention strategies on fish habitat and aquatic productivity.
- The methods of determining and evaluating fish flows for small streams.
- The interactions between groundwater, low flows, and fish habitat.

EXTENSION NEEDS

- Information about the range of fish species expected to be present in different streams and environmental conditions.

3.2.7 Climate Change

Respondents identified the uncertainty around the potential effects of climate change on water resources in the Southern Interior as a primary barrier to long-term watershed management planning. Their specific research and extension information needs related to climate change included the following.

RESEARCH NEEDS

- The effects of climate change on the timing, duration, and magnitude of flows (peak flows, low flows, water yield).
- The effects of climate change on terrain stability.
- The potential hydrologic implications of increased incidence of rain-on-snow events in the Southern Interior.
- A determination of how the dynamics of the snow-sensitive zone will change.
- The translation of regional-scale climate change predictions to a stand management perspective.
- The interaction between climate change and land use change and its effect on hydrology; the thresholds at which these effects will be magnified.
- The influence of climate change on terrestrial restoration efforts (e.g., restoration of beetle-killed landscapes); the influence on hydrological recovery in the near- and mid-term future.

EXTENSION NEEDS

- Better communication (to a range of clients) about the uncertainty around climate change and water resources.
- Better efforts to simplify and communicate climate change predictions and research results to a wider audience.

- Conversion of International Panel on Climate Change findings into locally/regionally useful risk-analysis products.

3.2.8 Monitoring and Data Collection

Respondents noted a lack of hydrometric monitoring stations to monitor the long-term effects of disturbance and climate change. Their specific extension information needs related to monitoring and data collection included the following.

EXTENSION NEEDS

- An inventory of current hydrological (water quantity and quality) monitoring activities in the public and private sectors.
- Climate data for high-elevation areas in the Southern Interior, which are currently underrepresented.
- An increased recognition of the need for long-term monitoring stations, which are important to analyze and understand the impacts of land-use change, disturbance, and climate change.
- Inventories of First Nations' traditional uses and historical land uses to inform integrated watershed planning.

OTHER ISSUES

- Maintenance and expansion of the provincial hydrometric network to support research and watershed management decision making, especially in light of potential effects of climate change.

3.2.9 Communication and Data Availability

Respondents noted that, for ease of use, data sources should be accessible and employ consistent formats. Their specific extension information needs related to communication and data availability included the following.

EXTENSION NEEDS

- An inventory (clearinghouse) of data sources and data availability (e.g., hydrometric, climate, geology, soils, vegetation).
- A mechanism to simplify data use/access agreements with governments and industry.
- An anticipation of future needs to ensure the necessary data and information are available in a timely manner.
- The formatting of available data in a useful and consistent manner for managers and decision makers.
- A mechanism to provide improved access to "grey literature" (e.g., consulting reports).
- Improved access to digital soil maps.
- The presentation of data and information directly to small communities rather than the use of Web sources.

3.2.10 Water Resource Governance

Respondents identified the need to build capacity in communities to gain more control of resources; improved groundwater legislation and evaluation of whether the legislation is effective were also recognized needs. Respondents' specific extension information needs related to water resource governance included the following.

EXTENSION NEEDS

- The determination of the type of governance model necessary to bring together the co-ordinating, permitting, and licensing bodies involved in provincial water management.

- A clarification of the levels of government and departments responsible for various aspects of water management.
- Extension related to provincial groundwater regulations.
- Extension related to the watershed protection legislation pertinent to recreation activities (e.g., ATV use and mud-boggers).
- Simple public information around groundwater and surface water licensing and permitting.
- Extension programming with First Nations to help build capacity in water policy analysis to assist in securing water rights.
- The determination of whether *Forest and Range Practices Act* objectives actually improved management practices and outcomes for watershed function.

OTHER ISSUES

- Incorporate hydrogeomorphic concerns about management of fans [alluvial and colluvial] in the interior into the *Forest and Range Practices Act* (as has been done for fans on the Coast).
- Eroded confidence in *Forest and Range Practices Act* water quality objectives because of minimal monitoring and evaluation, and little enforcement.

3.2.11 Social Issues

Most social issues identified by respondents revolved around education of interested parties in the basics of hydrology and watersheds to improve management. Respondents' specific extension information needs related to social issues included the following.

EXTENSION NEEDS

- Extension on the basic hydrological knowledge necessary to understand the effects of disturbance on hydrological processes.
- Determine ways to integrate First Nations' views of water with science-based management.
- Clarify agency responsibilities and regulatory frameworks (i.e., to alleviate frustration around tangled regulations and overlapping jurisdictions).
- Increase awareness of the Riparian Area Regulation.
- Increase awareness about developing groundwater regulations.
- Provide support for First Nations to develop their capacity to deal with water resource governance issues.
- Develop local management models that support local water resource governance.
- Determine whether *Forest and Range Practices Act* objectives have resulted in better practices.
- Determine how field practitioners evaluate the success of treatments and management practices in light of climate change.
- Convey scientific information to policy-makers to guide science-based policy.
- Develop a water source protection handbook.
- Develop short bulletins or fact sheets targeted to the general public about disturbances and the effects of climate change on water.
- Increase community awareness and buy-in before extreme events occur.
- Determine how to encourage students (K through 12) to explore careers in natural resources and provide them with background on the requirements necessary to follow this career path.
- Increase community awareness about where water comes from (e.g., people live in the valleys, but their water primarily comes from the surrounding forested mountains and plateau areas).

OTHER ISSUES

- Incorporate concerns about the management of fans [alluvial and colluvial] in the Interior into the *Forest and Range Practices Act* (as has been done for fans on the Coast).

3.2.12 Future Issues

Respondents identified some other issues related to future developments that did not fit within the topical areas presented previously. Their specific information needs related to future issues included the following.

- Greater data integration.
- Changes in management in the post–mountain pine beetle era.
- Interactions of the legacy of mountain pine beetle infestation and future climate change.
- Effect of increased access (especially recreational and livestock) to the forest land base on watershed function.
- Effect on a regeneration lag of leaving standing dead pine stands and its implication for future cut levels.

3.2.13 Other Issues

Respondents identified some other issues that did not fit within the topical areas presented previously. Their specific research and extension information needs related to other issues included the following.

RESEARCH NEEDS

- The determination of whether relationships between leaf area index and hydrologic recovery following mountain pine beetle attack are sufficient for operational planning purposes.
- Consistent approaches to determining the appropriate level of development in watersheds.

EXTENSION NEEDS

- Determine why different watersheds respond in different ways to the same inputs (climate) or disturbance. A systematic approach would allow practitioners to assess the sensitivity of watersheds to varying types and levels of harvesting and salvage options.
- Extrapolate results from plot scale to watershed and regional scales.
- Influence of increased mining on watershed management given the different environmental requirements.

3.3 Information Tools

3.3.1 Where do you receive research or extension support?

Respondents identified (in order of use): professional colleagues, government Web sites, FORREX, research institutions, Google, networks, and own organization.

3.3.2 What tools do you currently use to obtain research and extension support?

Respondents identified (in order of use): personal contacts, publications in general, conferences and workshops, newsletters, telephone, online networks, and journals. Although only two respondents identified listservs as a current tool, it appears that this observation may be more a result of the options listed as possible answers for this question, rather than of actual use. Listservs were not specifically listed as an option, but responses to other questions suggested that listservs were very useful and used regularly.

3.3.3 What are your current constraints in obtaining research information or extension support?

Respondents identified time and budgets as the main constraints in obtaining research information and extension support. Of the respondents who identified budgets as a constraint, about half specifically mentioned lack of funding to attend conferences. Access to journals was another constraint; several

respondents suggested they, or their organizations, would be willing to pay a fee (between $150 and $300) for access to an online journal database such as that provided by the University of British Columbia. Respondents also identified knowing where to look and (or) lack of awareness of what is available as another limitation.

Another major constraint that surfaced throughout the survey is a lack of data. Where data does exist, the time lag between data collection and gaining access to it was noted. This is especially the case with climate change and hydrological data.

Limited Web access or slow connection speed were constraints for a number of respondents in rural communities.

3.3.4 What is your preferred way of receiving information?

Respondents identified events as the preferred way of receiving information, with conferences and workshops ranking above courses. Publications were second with the majority of respondents preferring electronic copies to print copies. However, many respondents also mentioned that they liked the option of accessing print copies should particular articles be of interest to them. Literature summaries and syntheses ranked third, followed by Web sites and fact sheets. Several respondents commented that their preferred way of receiving information depended on the type of information, noting that *LINK* is effective in providing up-to-date information on recent publications and upcoming events. Most of the respondents already receive *Streamline*.

3.3.5 Knowledge of FORREX services?

With the exception of two respondents, all others were aware of FORREX. The overwhelming majority currently use FORREX's services and products. Some respondents mentioned that they did not use FORREX services regularly, as they felt the topics covered were not broad enough. However, it appears that some respondents were not aware of the breadth of topics, services, and products provided by FORREX. Thus, it was not clear whether lack of awareness or limited focus was the reason for the lack of use of FORREX products by some respondents. Of the respondents who used FORREX services and products, the most frequently used included *Streamline*, *JEM*, *LINK*, listservs, and conferences and workshops.

3.3.6 What FORREX services have you used?

Streamline and the WatershedEXT listserv topped the list of FORREX services used, followed by *LINK*, *JEM*, workshops, conferences, and the FORREX Web site. However, some respondents were aware they were using FORREX products, but could not identify which one, or identify the difference between *Streamline*, *JEM*, and *LINK*. In addition, several respondents mentioned that they make use of their contacts with FORREX personnel.

3.3.7 What do you like and dislike about the services provided by FORREX?

Overall, respondents seemed very satisfied with the services and products provided by FORREX. They were especially supportive of *Streamline* and *JEM*, regular listserv postings and notifications of events and publications, and relevant workshops and conferences. Many respondents liked the combination of *Streamline* summaries and detailed reports. In addition, respondents liked the clear format, good organization, and easy navigability of the FORREX Web site.

Respondents often mentioned their appreciation for delivery of informative and timely information in a concise manner, as well as a focus on local issues. Respondents were keen to see FORREX continue their services. It was suggested that delivery modes should be changed only if the current methods were not

working, but not to "change for the sake of change." Respondents also found the email notification of new publications and articles useful. Suggestions for improvement included:

- Expand scope of clientele outside the traditional forestry-oriented client group.
- Workshops should present new information, not just re-hash information that is already widely known.
- To help reduce potential for overlap and build collaboration, FORREX could provide more information on what research is currently being conducted.
- Some respondents working in rural areas outside the Okanagan felt isolated and would benefit from more informal networking opportunities for consultants and industry/academia to connect across sectors and professions.
- Increase the rate of feedback between research and practice.
- *Streamline* could be more frequent.
- Natural Resources Information Network (NRIN) needs to be more user-friendly.
- FORREX could provide more short products written in easy-to-understand terms.
- Better anticipate information needs of industry.

4 SUMMARY AND CONCLUSIONS

The survey was designed to identify watershed management research and extension needs in the Southern Interior of British Columbia from the perspective of a range of FORREX clients, partners, and contacts. Five important themes requiring research and extension emerged from this survey:

1. Reducing uncertainty around potential climate change impacts on water resources in the province's water-limited Southern Interior.
2. Quantifying the effects of forest disturbance (especially the mountain pine beetle infestation and harvesting) on water quantity and quality.
3. Increasing hydrologic knowledge and education for professionals, the public, and First Nations.
4. Evaluating operational tools that predict the effects of forest disturbance on water resources.
5. Increasing understanding of groundwater resources (inventory) and protection (legislation).

The results of interviews with key informants were similar to those presented by Morford and Hollstedt (2007) in a recent survey of natural resources practitioners in British Columbia. Morford and Hollstedt (2007) found that the highest-priority watershed management topics were forest management impacts on quantity and quality, riparian management, hydrologic recovery, and silviculture, pest, and wildfire effects on water quantity and quality. Climate change and mountain pine beetle were also considered high-priority topics. A previous watershed management information needs assessment for coastal British Columbia (Pike 2004) resulted in similar themes, but with a stronger emphasis on riparian areas and fish habitat.

The results of these surveys will be used to develop extension programming and inform research funding on the priority themes and topics. The findings on information tools will be used to improve extension delivery by the WMEP.

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APPENDIX A Introductory Letter

Dear FORREX Respondent,

As you know, watershed management issues are among the many challenges facing natural resource managers in the Southern Interior of British Columbia. FORREX's Watershed Management Extension Program is currently conducting a needs assessment to identify specific Southern Interior watershed information needs that are critical to sustainable management of forested watersheds. We are requesting your help in this process.

The focus of the Watershed Management Extension Program (WMEP) is to provide extension services on topics that directly or indirectly affect water resources in terrestrial and aquatic ecosystems. Our goal is to increase communication, understanding, and application of innovative knowledge and research results. We provide a number of products and services:

- Web site with information on WMEP, products, services and links to external sources of information;
- Publications such as *Streamline Watershed Management Bulletin* (***http://www.forrex.org/publications/streamline/streamline.asp***);
- Workshops such as "Mountain Pine Beetle and Watershed Hydrology" (***http://www.forrex.org/program/water/mpb_hydrology.asp***).

The program has a broad client base that includes:

- Operations (industry, government, First Nations, consulting, and interested public).
- Policy/decision-makers (government, First Nations, industry, stewardship/community groups).
- Researchers (industry, government, consulting, First Nations, and academic researchers).
- Professional associations, environmental organizations, and interested public.

You are among a few key respondents we are asking to participate in this survey. Your input will be added to other extension needs identified over the last 2 years, helping to further guide our program development to meet our clients' needs. The survey will be conducted by telephone interview with Stephanie Lepsoe (contractor) or Todd Redding (FORREX Watershed Management Extension Specialist), on behalf of FORREX, following a questionnaire format. We ask you to respond not only based on your own perspective, but also from the perspectives of others you know in your field. Survey results will be made publicly available on the FORREX Web site by the end of March 2008.

For questions or more information about the Watershed Management Extension Program, please contact Todd Redding (250-807-9516, todd.redding@forrex.org).

Thank you for your participation.

Sincerely,

Todd Redding and Stephanie Lepsoe

APPENDIX B Key Informant Survey

Southern/Northern Interior WM Needs Assessment

The FORREX Watershed Management Extension Program is conducting an information needs assessment around watershed management issues focussed on forested watersheds in the Southern Interior of British Columbia. The information gained from this survey will be used to guide the development of extension programming to best address the needs and issues in the Southern Interior. Results will be shared with other organizations to help guide their research and extension investments (e.g., FIA–Forest Science Research Program Advisory Committees, etc.).

Name:

Organization:

Position:

Geographical working region:

Contact information:

1. In which field/area do you primarily practice: Select primary and secondary (more than one if necessary)
   - ❑ Forestry
   - ❑ Agriculture
   - ❑ Mining
   - ❑ Biology (e.g., wildlife, conservation)
   - ❑ Fisheries
   - ❑ Geosciences and Engineering (e.g., terrain stability, road design)
   - ❑ Water Supply and Licensing
   - ❑ Power Supply
   - ❑ Other, please specify

2. Which sector best applies to you: Select primary and secondary (more than one if necessary)
   - ❑ Forest Industry
   - ❑ Provincial Government
   - ❑ Other Government agencies
   - ❑ First Nations
   - ❑ Consultant/Academic
   - ❑ Community/Stewardship Group/NGO
   - ❑ Other, please specify

3. Please list your key needs (research or extension) around the stated topics.
   Note: A research need is where you believe that information is lacking or does not exist. An extension need is where information exists, but for some reason is not getting to the people who need it. If possible, please provide examples of specific questions related to this issue from the region. If you feel that this is an extension need, please suggest to whom the extension effort should be targeted towards.
   - ❑ Water quantity (e.g., water yield, peak flows, low flows)
   - ❑ Water quality (e.g., sediment, turbidity, temperature)
   - ❑ Groundwater (e.g., quantity, quality)
   - ❑ Watershed restoration (e.g., channel structures, road deactivation)
   - ❑ Small streams and riparian zones (e.g., riparian buffers, headwater streams)

- ❑ Fish/aquatic habitat (e.g., habitat quality, low flows, temperature)
- ❑ Climate change (e.g., changes in precipitation type and timing, increased temperatures, changes in flow regimes)
- ❑ Monitoring and data collection (e.g., loss of hydrometric stations, lack of high elevation climate data)
- ❑ Communication and data availability (e.g., data and reports available on the Web)
- ❑ Water resource governance (e.g., *FRPA*, water rights, policy, groundwater legislation)
- ❑ Social issues (e.g., lack of basic hydrological understanding)
- ❑ Future issues? (e.g., what do you see becoming critical in the next 5–10 years)
- ❑ Other issues?

4. Where do you currently obtain research or extension support? (i.e., professional colleagues, own organization, FORREX, networks, research institutions, government Web sites, Google?)
5. What tools do you currently use to access information?
   - ❑ Online networks? (e.g., professional association Web site)
   - ❑ Publications, newsletters, journals (please provide examples)
   - ❑ Personal contacts
   - ❑ Telephone
   - ❑ Conferences
   - ❑ Other? Please specify.
6. What are your current constraints in obtaining research information or extension support? (e.g., budgets, time, Web access)
7. What is your preferred way of receiving information?
   - ❑ events (workshop, conference, course, field tour)
   - ❑ publications (*Streamline*, *LINK*, *JEM*)
   - ❑ print copies
   - ❑ electronic access
   - ❑ literature summaries/synthesis
   - ❑ fact sheets
   - ❑ multimedia (Web sites, streaming video)
   - ❑ other
8. Are you aware of FORREX and do you currently use their services and products?
9. Which FORREX services have you used previously? (select more than one)
   - ❑ None
   - ❑ Listserv
   - ❑ *Streamline Watershed Management Bulletin*
   - ❑ *LINK*
   - ❑ *JEM*
   - ❑ Web site
   - ❑ Other (please specify)
10. What do you like and dislike about the services provided by FORREX? Do you have suggestions for improvement?
11. Additional comments and suggestions?