

# Forest Management on Alluvial and Colluvial Fans: Extension Plan and Evaluation Survey of Workshops, Publications, and Presentations

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2006



Ministry of Forests and Range  
Forest Science Program

**Forest Management on Alluvial and Colluvial  
Fans: Extension Plan and Evaluation Survey  
of Workshops, Publications, and Presentations**

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David J. Wilford, Shawn R. Morford and  
Robin G. Pike



Ministry of Forests and Range  
Forest Science Program

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## **ABSTRACT**

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Extension of results is a key aspect of effective research. Part 1 of this report presents the extension plan developed for the Forest Management on Alluvial and Colluvial Fans research project. Components of the extension plan include descriptions of the target audiences, extension goals, learning objectives, and extension barriers. The extension plan establishes evaluation targets to help assess the success and (or) failure of extension activities conducted over the past 5 years (2001–2005). Part 2 presents a Web-based survey of individuals who attended extension events related to the project. The survey results detail the effectiveness of three types of extension methods used in the forested fan research project: publications, presentations, and workshops. The findings of the survey show that extension efforts affected the attitudes, skills, and, in some cases, forest management approaches of a large percentage of forestry practitioners and researchers who received information on forested fans or attended a workshop. The findings serve as a valuable information source for strengthening future extension delivery.

## **ACKNOWLEDGEMENTS**

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Our gratitude is extended to the B.C. Ministry of Forests and Range and to the Forest Investment Account–Forest Science Program for funding the fan research extension activities and the evaluation survey. Thank you to all 44 people who responded to this survey, especially those who offered detailed comments.

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# Part 1 Extension Plan

DAVID J. WILFORD AND ROBIN G. PIKE

## 1 INTRODUCTION

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This report provides details of the extension plan developed for the Forest Management on Alluvial and Colluvial Fans project (FIA-Forest Science Program Project #Y1051077, EP #1329). Components of the extension plan associated with this project include descriptions of the target audiences, extension goals, learning objectives, and extension barriers. The plan focuses on evaluation targets established to help assess the success and (or) failure of extension activities conducted over the past 5 years (2001–2005). While this plan is primarily a working (and living) document for the project leader, it also serves to communicate the overall project extension plan. This report provides examples of how to strategically plan for evaluation within extension activities. The most current version of this plan is for extension activities conducted in 2005–2006.

## 2 PROJECT BACKGROUND

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For decades, the forest industry in British Columbia has encountered operational, economic, and environmental challenges with valley-bottom roads and forest harvesting. Mainline forest roads and drainage structures have washed out on a regular basis, forest plantations have flooded with sediment and debris, and fish habitat has been negatively affected. People have been killed on fans due to bridge washouts (e.g., George Creek near Prince George in 1990). Few people placed these challenges in a landscape perspective, but those who did recognized that most of the problems were occurring on alluvial fans. Fans are conical-shaped landforms formed by the deposition of sediment as streams lose confinement. Sediment is delivered to fans by floods, debris floods, and debris flows. Most of the fans in British Columbia were formed during glacial ice melt, approximately 5000–10000 years ago; however, the fan-building processes continue to have a periodic influence on many fans—even though they are forested. It is this periodic, not rare, influence that is the root of the challenge facing forest managers.

In 1998, Ministry of Forests engineering staff in Houston and Terrace requested guidance for appropriate road construction on fans. An extensive literature search yielded two papers that discussed road issues on desert fans. No information was found regarding geomorphic or hydrologic hazards related to forest harvesting on fans, or hazard classification schemes at the site or landscape levels for forestry planning.

The Forest Management on Alluvial and Colluvial Fans research project was initiated in 1999 and was the first research project in British Columbia directed at forest management on fans. The overall goal of the research project is the sustainable management of forests on fans in British Columbia. The first publication from the project (Wilford et al. 2003) established that conventional forestry practices on fans were not cost-effective and were creating negative environmental effects. Subsequently, the project developed a hazard classification scheme and appropriate forestry prescriptions (see Wilford et al. 2005). In the spring of 2004, the *Forest Planning and Practices Regulations (FPPR)* for the *Forest and Range Practices Act of British Columbia (FRPA)* were released, which identified fan destabilization as an offence (Section 54<sup>1</sup>). Consequently, results from the fan research project are providing scientific support to this policy initiative, and extension is enabling forest practitioners to meet policy objectives.

### 3 EXTENSION PLAN FOR 2005–2006<sup>2</sup>

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The extension plan for the fan project is updated yearly. This plan documents extension activities to be undertaken for each of three target audiences during 2005–2006. Towards the end of 2005, an evaluation survey will be conducted to attempt to assess the effectiveness of the extension activities in order to strengthen future extension (e.g., modify workshop delivery, focus on specific target audiences, and incorporate different extension activities) (see section 3.4).

The purpose of the extension plan is to identify primary clients and their extension needs, and to design activities that provide research and science on the subject of forested fans in an applied context to address identified needs. Strategically, the plan also outlines many of the goals the research team strives to achieve as a result of their extension efforts. In some instances, stated goals may appear to be difficult to achieve as a sole result of the extension activities. For these goals, it is acknowledged that factors outside of the extension activities can and will contribute to achieving these goals. Subsequently, extension goals may need to be refined, as a result of the proposed evaluation survey (presented in Part 2 of this report), or more specific evaluation questions may need to be developed.

#### 3.1 Target Audience

The target audience is forest practitioners, managers, and researchers in British Columbia. Specifically:

Group 1. Forestry practitioners involved in forest development planning, operations, and compliance and enforcement activities (e.g., field foresters and technicians, planners, engineers, and geoscientists). The greatest amount of time for extension delivery will be focused on this group.

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<sup>1</sup> This section applies only to the coast. However, several sections indirectly address fan destabilization in the interior—Section 35 addresses impacts to forest soils and Section 57 addresses impacts to fish habitat.

<sup>2</sup> The content of Section 3 was developed during the summer of 2005, and therefore the reader may note some tense discrepancy.

Group 2. Senior forest managers and forest policy-makers within government agencies and the forest industry.

Group 3. The scientific hydrology/geomorphology community in British Columbia and internationally.

**Group 1** This is a diverse group, ranging from “technicians” with sometimes limited academic training to professional consultants with advanced degrees. It is our perception that most members of this group are familiar with the use of aerial photographs, undertaking fieldwork, and recognizing specific site features, and are observant. Members of this group generally learn by observation in the field, and aspire to practice sustainable forest management by acquiring new skills and knowledge. It’s our perception that most require skills and knowledge related to prescription development on fans (although they may not recognize fans, site evidence of hazards or hydrogeomorphic processes on fans, or specific aerial photograph features related to fan hazards). They most likely do not appreciate past forest management experience on fans (lack awareness and knowledge of past research). The group may or may not know that FRPA identifies fan destabilization on the coast directly, and indirectly in the interior, and that conventional practices on fans are not cost-effective nor always environmentally appropriate (attitude). Most members of this group do not read scientific literature, but some read professional newsletters, use the internet (listservers and Web searches), and (or) attend regional conferences. Participants of this group often have difficulty receiving permission to attend extension activities that are longer than 1 day.

For group 1 (forest practitioners), the project team considers it vital that this group realize:

1. that it is important for sustainable resources management to identify hydrogeomorphically active areas on fans and develop special prescriptions;
2. that it is important to have skills to identify active areas on fans;
3. that it is important to identify appropriate and inappropriate prescriptions for fans; and
4. that information presented in the workshops (delivered by the project team) is based on science.

**Group 2** This group prefers information presented in a concise manner. They may not realize that conventional forest practices on fans are not cost-effective, environmentally appropriate, or safe (awareness and attitude). However, they may be aware of past issues on some specific, high-profile fans. It is our perception that they require knowledge that scientific work has been completed to support new policy initiatives, and that work is being undertaken to improve field prescriptions. Members of this group should also realize that extension work is being directed at reducing and (or) solving problems (i.e., financial, environmental, and litigation). This group may not know or fully appreciate the degree to which group 1 requires support and permission to participate in extension activities.

For group 2 (senior forest managers and policy-makers), the project team considers it vital that this group realize:

1. that it is important to acknowledge that conventional practices on fans can have negative economic and environmental impacts;
2. that the identification of problems and proposed solutions are science-based;

3. that FPPR Section 54 is appropriate; and
4. that Section 54 should apply to the British Columbia interior to directly address the issue of fan destabilization.

**Group 3** This group prefers information in the form of scientific journal articles, symposium presentations (posters and oral presentations), and workshops. In British Columbia, very little research has been undertaken on forested fans, and many members of this group are likely unaware of the scientific and management issues.

For group 3 (scientific community), the project team considers it vital that this group realize:

1. that conventional forest management on fans can have negative economic and environmental impacts;
2. that hazardous areas on fans can be identified at a site level;
3. that aerial photographs of watersheds draining onto fans can be used to identify potential hazards on fans; and
4. that basic watershed morphometrics can be used to predict hydrogeomorphic processes influencing fans as well as the disturbance extent and number of events (recognizing that the Melton ratio<sup>3</sup> may not apply to watersheds in plateau terrain).

### 3.2 Extension Activities 2005–2006

The following planned activities will assist the project in achieving the outlined learning objectives:

| Activity                                 | Output   | Number of participants/people exposed to project results                        |
|--|--|---|
| 1-day workshops                          | One to three in 05/06  | Up to 30  |
| 3-day workshops                          | One in 05/06   | Up to 15  |
| Conference presentations/posters         | Two in 05/06   | Up to 100   |
| Technical articles                       | One in 05/06   |   |
| Publication of Land Management Handbooks | Two publications in 05/06 <ol style="list-style-type: none"> <li>i forest management on alluvial and colluvial fans</li> <li>ii dendroecology</li> </ol> |   |
| Consultations (one-on-one)               | Annually respond to topical requests (as requested)  | Five members of Group 1, four members of Group 2, and five members from Group 3 |
| Project archiving and database entry     | Entry/update of metadata in the Natural Resources Information Network (NRIN)   |   |
| Project communications                   | Project news posted on the FORREX Watershed Management listserv <sup>4</sup> (e.g., workshops and publications)  | 1100 subscribers in British Columbia and the Pacific Northwest                  |
|  | Targeted emails to clients   | 10  |

<sup>3</sup> Watershed relief divided by the square root of watershed area.

<sup>4</sup> This notification mailing list is operated by the FORREX Watershed Management Extension Program (WMEP) that links and targets 1100 subscribers in British Columbia and the Pacific Northwest. Subscribers receive announcements of news, courses, and events relevant to watershed management.

**3.3 Learning Objectives by Extension Activity/Target Audience**

**Group 1** A series of activities is required to address the extension needs of this diverse target group. One-day workshops with an office/field-day split will provide awareness, knowledge, and skills related to forested fan management in British Columbia. The objectives for the 1-day workshops are:

1. to increase proficiency in the use of aerial photographs to identify features related to potential hydrogeomorphic hazards and processes on fans;
2. to increase recognition of site factors to identify active and inactive fan processes in the field;
3. to develop skills in hazard recognition and fan risk assessment; and
4. to increase recognition of the importance of incorporating information presented into forest management site prescriptions and plans.

Three-day workshops provide a longer opportunity to achieve the learning objectives and will allow for the development of additional skills (e.g., dendroecology). Awareness and a degree of knowledge of the project results can be achieved through articles in professional journals, presentations at conferences/workshops, and listservers. These avenues can also lead to the establishment of one-on-one contacts that provide direct problem-solving or sharing of experiences.

**Group 2** Extension activities for this group include brief (e.g., less than 30-minute) presentations as a part of their normal work-related meetings (e.g., weekly or monthly management debriefings) and provide published material from the research project. The learning objectives for group 2 are:

1. to increase awareness of the problems associated with conventional forestry practices on fans;
2. to instill an appreciation that fans are dynamic landforms;
3. to increase participants' awareness of the utility and operational importance of using aerial photographs and fieldwork to identify hazards and develop environmentally and economically appropriate prescriptions for fans; and
4. to increase awareness that their operational staff can readily learn the new skills and knowledge required to identify hazards on fans.

One-on-one interaction (follow-up) with the project leader may occur as a result of these meetings. Field trips may be arranged; however, participation would be limited and only the most senior personnel would be targeted (e.g., Chief Forester). Field trips could "piggy-back" other planned events. Group 2 may or may not be interested in extension materials (copies of articles or handbooks) produced by the project, but may need to be assured that such information is available for their staff.

**Group 3** Extension activities for this group include journal articles and conference presentations. The learning objectives for group 3 clients are:

1. to instill an appreciation for the large gap pertaining to fan research in British Columbia and that forested fans represent an excellent opportunity for research; and
2. to increase knowledge of why the approaches used in this project (the use of basic watershed morphometrics and site features) are geomorphically and statistically valid, and appropriate for use by group 1.

One-on-one interaction with the project leader may occur as result of this exposure.

### **3.4 Evaluation of Extension Activities**

For each workshop delivered in 2005, we plan to deliver a survey to evaluate the participant's immediate response to the workshop (Appendix 1-1). We will also monitor downloads of publications and track requests for consultations. We also plan to conduct a survey of a portion of past workshop participants (2001–2005) to evaluate the effectiveness in extending project results (see results presented in Part 2 of this document). The evaluation activities will help to facilitate further modifications to the extension plan and extension activities.

### **3.5 Evaluation Targets**

Establishing targets for evaluating the changes in knowledge, skills, and attitudes is a key activity prior to initiating extension and, subsequently, evaluating the success or failure of these activities. The following evaluation targets were established to help gauge areas of success and areas needing improvement with regard to extension activities conducted under this project.

**1-day workshops** Immediately following workshops, of the responding participants:

- 90% will express that the workshop was worthwhile;
- 85% will agree that it is important for sustainable resources management to identify active areas on fans and develop special prescriptions;
- 85% will agree that, as a result of the workshop and other material generated by the fan project, they have developed the skills to identify active areas on fans;
- 85% will agree that they can identify appropriate and inappropriate prescriptions for fans;
- 85% will agree that the information presented in the workshop is based on science; and
- 85% will agree that when they encounter fans during the course of their work, they will incorporate knowledge from the workshop into their prescriptions or plans.

After 1 year, of the responding participants:

- 60% will report incorporation of the knowledge from the fan project (including workshops, publications, one-on-one discussions) into site prescriptions; and
- 60% of the geoscientists/engineers will report using the knowledge from the fan project and incorporating it into their prescriptions when they encounter fans in their work.

**3-day workshops** Immediately following workshops, of the responding participants:

- 90% will express that the workshop was worthwhile;
- 85% will agree that it is important for sustainable resources management to identify active areas on fans and develop special prescriptions;
- 85% will agree that, as a result of the workshop and other materials generated by the fan project, they have developed the skills necessary to identify active areas on fans;

- 85% will agree that they can identify appropriate and inappropriate prescriptions for fans;
- 85% will agree that the information presented in the workshop is based on science; and
- 85% will agree that when they encounter fans in their work they will incorporate knowledge from the workshop into their prescriptions or plans.

After 1 year, of the responding participants:

- 60% will report incorporation of knowledge from the fan project (including workshops, publications, one-on-one discussions) into site prescriptions; and
- 60% of the geoscientists/engineers will report using knowledge from the fan project and incorporating it into their prescriptions when they encounter fans in their work.

### **Conference presentations/posters**

- Presentations at conferences will raise awareness of the fan project and forestry/fan issues. These events do not directly increase skills and may not increase knowledge (if participants are already aware of the issues). As such, no evaluation target for these activities has been set.
- Presentations are considered to be part of the suite of extension activities and will not be evaluated this year. One reason is that many conferences, particularly in British Columbia, involve participants with a range of backgrounds and professional positions. It is likely that only those directly involved in geomorphology and hydrology would directly benefit, to the point of considering to take a 1-day workshop or to read the Land Management Handbooks.

### **Professional articles**

- Ten clients will say that they contacted the project leader because of the article.

**Land Management Handbooks** As a result of the Land Management Handbooks (LMHS):

- 75% of clients contacted will indicate that the forest management on fans LMH has provided guidance for hazard recognition; and
- 60% of clients contacted will indicate that the dendroecology LMH has provided guidance for hazard recognition.

**Presentations to senior forest managers** Following presentations, of the participants contacted:

- 75% will say that conventional practices on fans can have negative economic and environmental impacts;
- 75% will say that identification of problems and proposed solutions are science-based,
- 75% will say that FPPR Section 54 is appropriate; and
- 50% will say that Section 54 should apply to the British Columbia interior to directly address the issue of fan destabilization.

### 3.6 Extension Partners

There are many active partners and extension collaborators for this project. Regional research hydrologists and geomorphologists from the Ministry of Forests and Range, and selected consultants, will be directly involved in the delivery of workshops. FORREX staff will be involved through the Watershed Management listserver, Streamline Watershed Management Bulletin, and other FORREX publications, as custodians of NRIN, and as mentors throughout the extension planning process. Professional associations such as the Association of British Columbia Forest Professionals and the Association of Professional Engineers and Geoscientists of British Columbia, and other extension providers (e.g., University of Northern British Columbia Continuing Studies Department, Malaspina University-College Natural Resources Extension Program, and Selkirk Management Services), will partner in the advertising, registration, and venue selection for events.

### 4 LITERATURE CITED

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Wilford, D.J., M.E. Sakals, and J.L. Innes. 2003. Forestry on fans: a problem analysis. *Forestry Chronicle* 79(2).

\_\_\_\_\_. 2005. Forest management on fans: hydrogeomorphic hazards and general prescriptions. B.C. Min. For., Res. Br., Victoria, B.C. Land Manage. Handb. 57.

Facilitators:

Date:

Location:

Please complete this course evaluation to assist us in providing better service to you.

1. What were your expectations for this workshop? What did you hope to learn or discover prior to attending?
2. Were your expectations met? If not, please briefly describe why.
3. How did you learn about this workshop?
4. Can you list a few strong points of this workshop?
5. What were some weak points of this workshop or areas where you would suggest improvements or additional content?
6. For the following statements, please circle one answer.

*I think it is important for sustainable resources management to identify active areas on fans and develop special prescriptions.*

- i) strongly agree    ii) agree    iii) disagree    iv) strongly disagree

*As a result of this workshop and other materials generated by the fan project, I have the skills necessary to identify active areas on fans.*

- i) strongly agree    ii) agree    iii) disagree    iv) strongly disagree

*I can identify appropriate/inappropriate prescriptions for fans.*

- i) strongly agree    ii) agree    iii) disagree    iv) strongly disagree

*The information presented in this workshop is based on science.*

- i) strongly agree    ii) agree    iii) disagree    iv) strongly disagree

*When I encounter fans in the course of my work, I will incorporate knowledge gained from this workshop in prescriptions or plans.*

- i) strongly agree    ii) agree    iii) disagree    iv) strongly disagree

7. What will you do differently as a result of this workshop? (For example, with regards to road design, riparian reserves, preparation or review of a Forest Stewardship Plan.)
8. Have you previously seen presentations on fans by the workshop leaders?

Yes / No

9. Prior to this workshop, were you aware of the following publication: *Land Management Handbook 57, Forest Management on Fans: Hydrogeomorphic Hazards and General Prescriptions?*

*Yes / No*

10. Was this workshop worthwhile?

*Yes / No*

If no, please describe why.

11. Did this workshop increase your knowledge of the problems associated with conventional forest practices on fans?

*Yes / No*

If no, please describe why.

12. Did this workshop increase your knowledge in the recognition of site factors of active and inactive fan processes:

i) In the field      *Yes / No*

ii) In the office      *Yes / No*

If no, please describe why.

13. Did this workshop increase your skills in using aerial photographs to identify features related to potential hazards on fans?

*Yes / No*

If no, please explain why.

14. General comments:

Your Name (optional): \_\_\_\_\_

**Thank you for your comments!**

Please return completed evaluation forms to the envelope provided or fax to Dave Wilford (Fax: 250-847-6353)

## Part 2 Evaluation Survey of Fan Workshops, Publications, and Presentations

SHAWN R. MORFORD, ROBIN G. PIKE, AND DAVID J. WILFORD

### 1 INTRODUCTION

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The Extension Plan presented in Part 1 describes a range of extension activities for three audiences, and establishes a series of evaluation targets for those activities. A commitment in the extension plan was to conduct a survey to evaluate the effectiveness in extending project results. Part 2 presents the results of the survey.

During the period 2001–2005, extension activities included 1-, 2-, and 3-day workshops, presentation of oral papers and posters, office presentations, and publications. The 1-day workshops involved a half-day in the office reviewing aerial photographs, reports, and photographs, and a half-day in the field inspecting forested or logged fans. Sixteen 1-day workshops were held at nine locations around the province (Appendix 2-1) with over 200 forest practitioners participating. Two 2-day workshops were held to provide participants with the opportunity to visit more fans. A 3-day workshop was held to allow more time for inspecting fans and developing expertise in dendroecology (Wilford, Cherubini, Sakals 2005). Since 1999, oral papers and posters have been presented at 14 conferences in British Columbia (four of which had international audiences), and at four international conferences (San Francisco, Spain, Switzerland, and Australia) (see Appendix 2-2). Since 2001, five presentations have been made at educational institutions (University of British Columbia, Simon Fraser University, and Northwest Community College) and in nine offices (forest licensees and Ministry of Forests and Range). Since 1998, publications from the fan project include: an Extension Note, two Ministry of Forests Land Management Handbooks, four peer-reviewed scientific articles, two professional articles, a PhD thesis, and one paper and two abstracts in conference proceedings (see Appendix 2-3).

A key component of the extension strategy was an evaluation of the workshops, presentations, and publications to determine the effectiveness of these activities. FORREX, in partnership with the B.C. Ministry of Forests and Range (MOFR), conducted a Web-based survey in December 2005 to assess the level of success in meeting the project's objectives related to increased awareness and knowledge, and change in attitude, as well as application of information stemming from the fan project (see Part 1, section 3.1). The survey included questions about perceived utility of information, barriers to the application of information gained through workshops, as well as demographic information and professional affiliation. This report details the methods and results of the survey.

## 2 METHODS

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A Web-based survey was designed by FORREX and MOFR, and e-mail invitations were sent on December 2, 2005 to 144 potential respondents who attended a workshop and (or) presentation on fans conducted by David Wilford and his team. A reminder to respondents was sent a week later. The survey was conducted using a commercial survey tool called Zoomerang ([www.zoomerang.com](http://www.zoomerang.com)) that allowed respondents to complete and submit the questionnaire on-line and for results to be downloaded as an Excel file for input into the Statistical Package for Social Sciences software (SPSS), a standard tool for analyzing social survey data. Survey questions provided for the reporting of both quantitative and qualitative results (see Appendix 2-4).

Respondents were asked to select their professional affiliations (i.e., senior-level managers, forestry practitioners, or members of the scientific community). An additional survey question was used to indirectly identify whether or not respondents were consultants. Respondents were also asked to identify workshops they attended as well as their perceived knowledge and uses of information gained from the workshops, publications, and presentations. Information from respondents who attended a fall 2005 workshop was tabulated separately since the timeframe for incorporating any new information from the workshops was considered to be too short. Respondents were asked to provide their level of agreement with statements pertaining to fans and the effects of forest management as a direct result of the information received from the fan project. They were also asked to indicate their level of awareness and use of two recent publications on fans. Finally, respondents were invited to provide their names and contact information if they were willing to be contacted for further questions regarding their responses.

## 3 RESULTS

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### 3.1 Profile of Respondents

Of the 144 people who received invitations, 44 completed and submitted the questionnaire (31% response rate). Just over two-thirds of respondents considered themselves forestry practitioners (30 people), while nearly a third (12 people) said they were from the scientific community (Figure 1). Two respondents (5%) said that they were senior forest managers and policy-makers within government agencies or the forest industry. Based on the results of Question 7 (Appendix 2-4), it can be surmised that 17 respondents (39%) were consultants. The total number of consultants was calculated by subtracting those who selected “not a consultant,” plus those who did not answer questions specific to consultants, from the total number of respondents.

More than half of respondents attended 1-day workshops between 2001 and 2004. Of those, three people attended a 1-day field session in Squamish in 2004. Just under a third of all respondents (13 people) attended fall 2005 1-day workshops. No respondents attended a 2-day workshop, and seven people attended a 3-day workshop (16%). Twelve people have heard a presentation on fans and 19 have read at least one of the two listed publications on fans, as shown in Table 1.

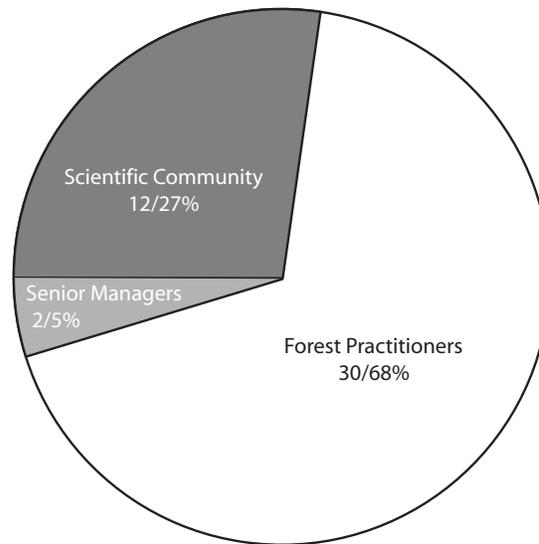


FIGURE 1 Number and percent of respondents by professional affiliation.

TABLE 1 Number and percent of participants who have attended workshops, heard presentations, or read publications on fans

|   | Number of respondents | Percent of respondents <sup>a</sup> |
|---|-----------------------|-------------------------------------|
| Attended a 1-day workshop—2001–2004       | 23                    | 52%                                 |
| Attended a 1-day workshop—fall 2005       | 13                    | 30%                                 |
| Attended Squamish workshop—October 2004   | 3                     | 7%                                  |
| Attended a 2-day workshop                 | 0                     | 0%                                  |
| Attended a 3-day workshop                 | 7                     | 16%                                 |
| Heard a presentation on forested fans     | 12                    | 27%                                 |
| Read MOFR publication(s) on forested fans | 19                    | 43%                                 |

<sup>a</sup> The percentages total more than 100 percent since respondents were able to select more than one way that they received information.

Table 2 shows the number and percent of respondents who attended workshops, heard presentations, read publications, or some combination of these.

Overall the vast majority of respondents indicated that they attended a workshop (96%). Only one person said that they only heard a presentation, while one person said that they only read a publication.

When broken down by group (i.e., forest practitioners, researchers, and senior managers), practitioners (Table 3) were more likely to select “workshop only,” than researchers (Table 4).

The two senior manager respondents did not attend workshops, but one read a publication on fans, and the other attended a presentation on fans.

TABLE 2 *Ways respondents received information (all respondent groups) (n=44)*

|  | <b>Number of respondents</b> | <b>Percent of respondents</b> |
|--|------------------------------|-------------------------------|
| Attended a workshop only   | 23                           | 52%                           |
| Heard a presentation only  | 1                            | 2%                            |
| Read a publication only  | 1                            | 2%                            |
| Attended a workshop and a presentation                               | 1                            | 2%                            |
| Attended a workshop and read a publication                           | 8                            | 18%                           |
| Attended a presentation and read a publication                       | 0                            | 0%                            |
| Attended a workshop, read a publication, and attended a presentation | 10                           | 23%                           |

TABLE 3 *Ways forest practitioners received information (n = 30)*

| <b>Forest practitioners</b>  | <b>Number of respondents</b> | <b>Percent of respondents</b> |
|--|------------------------------|-------------------------------|
| Attended a workshop only   | 19                           | 63%                           |
| Heard a presentation only  | 0                            | 0%                            |
| Read a publication only  | 0                            | 0%                            |
| Attended a workshop and a presentation                               | 0                            | 0%                            |
| Attended a workshop and read a publication                           | 6                            | 20%                           |
| Attended a presentation and read a publication                       | 0                            | 0%                            |
| Attended a workshop, read a publication, and attended a presentation | 5                            | 17%                           |

TABLE 4 *Ways researchers received information (n = 12)*

| <b>Researchers</b>   | <b>Number of respondents</b> | <b>Percent of respondents</b> |
|--|------------------------------|-------------------------------|
| Attended a workshop only   | 4                            | 33%                           |
| Heard a presentation only  | 0                            | 0%                            |
| Read a publication only  | 0                            | 0%                            |
| Attended a workshop and a presentation                               | 1                            | 8%                            |
| Attended a workshop and read a publication                           | 2                            | 17%                           |
| Attended a presentation and read a publication                       | 0                            | 0%                            |
| Attended a workshop, read a publication, and attended a presentation | 5                            | 42%                           |

Close to half of respondents who consider themselves consultants (Table 5) attended workshops only (47%) while a quarter attended a workshop and read a publication. Four consultants (24%) indicated that they received information from all three sources.

TABLE 5 *Ways consultants received information (n = 17)*

| Consultants  | Number of respondents | Percent of respondents |
|--|-----------------------|------------------------|
| Attended a workshop only   | 8                     | 47%                    |
| Heard a presentation only  | 0                     | 0%                     |
| Read a publication only  | 0                     | 0%                     |
| Attended a workshop and a presentation                               | 1                     | 5%                     |
| Attended a workshop and read a publication                           | 4                     | 24%                    |
| Attended a presentation and read a publication                       | 0                     | 0%                     |
| Attended a workshop, read a publication, and attended a presentation | 4                     | 24%                    |

### 3.2 Perceptions by Affiliation

The following summarizes findings related to attitude and skill acquisition by the three groups (forestry practitioners, senior forestry managers, scientific community), as well as those respondents identified as consultants.

**Forestry practitioners** Forestry practitioners were asked to indicate their level of agreement with several statements about attitude and skill-level changes as a direct result of information that they received on fans (Table 6). If the workshop, presentation, or publication did not change their opinion or skills, they were asked to select “not sure / no different than before.” Of the 30 people who responded to this question, a large majority “strongly agreed” or “agreed” with most statements (no less than 87%). Ninety-three percent of forest practitioners agreed that as a result of the workshops, publications, and (or) presentations, they now believe it is important for sustainable resources management to identify active areas on fans and develop special prescriptions. Eighty-seven percent say that they have acquired the necessary skills to identify active areas on fans (including 27% who strongly agreed with this statement). Ninety percent say that they can identify appropriate and inappropriate prescriptions for fans. Three percent of respondents disagreed with this statement and some were not sure or felt no different than before. Eighty-seven percent of respondents agreed that the information presented was based on science. Based on these results, it appears that the extension efforts were very effective in influencing attitudes and skills of forest practitioners.

TABLE 6 Forest practitioner opinions about the importance of fans, acquisition of skills, and scientific base of information. (The top percentage indicates total respondent ratio, the bottom number represents the actual number of respondents selecting the option.)

|   | Strongly Agree | Agree     | Disagree | Strongly Disagree | Not Sure / No Different Than Before |
|---|----------------|-----------|----------|-------------------|-------------------------------------|
| 1. It is important for sustainable resources management to identify active areas on fans and develop special prescriptions. | 70%<br>21      | 23%<br>7  | 3%<br>1  | 3%<br>1           | 0%<br>0                             |
| 2. I have acquired the necessary skills to identify active areas on fans.   | 27%<br>8       | 60%<br>18 | 0%<br>0  | 0%<br>0           | 13%<br>4                            |
| 3. I can identify appropriate and inappropriate prescriptions for fans.   | 17%<br>5       | 73%<br>22 | 3%<br>1  | 0%<br>0           | 7%<br>2                             |
| 4. The information presented in the workshops, presentations, and publications was based on science.                        | 47%<br>14      | 40%<br>12 | 3%<br>1  | 0%<br>0           | 10%<br>3                            |

**Senior forestry managers** Respondents who identified themselves as senior forestry managers were asked to indicate their level of agreement with statements about their perceptions of fans and new knowledge as a direct result of information they received. However, only one of two senior manager respondents completed the question. The individual agreed with statements about conventional forestry practices having negative impacts on fans and identification of problems and solutions being science-based and indicated that they were not sure or felt no differently than before about FRPA regulations regarding destabilization of fans, and regarding soil productivity and fish habitat. It is important to note that the survey question regarding destabilization of fans incorrectly referred to FRPA Regulation 54 rather than Section 54 of the Forest Planning and Practices Regulation. Likewise, the survey question about soil productivity and fish habitat incorrectly referred to Regulations 35 and 57. It is uncertain whether or not the respondent's selection of "not sure / no different than before" was a reflection of confusion about the question.

**Scientific community (researchers)** Seven respondents who identified themselves as researchers indicated their level of agreement with several statements about the effects of information that they received on fans (Table 7). They were asked to select "not sure/no different than before," if the information they received did not change their opinion.

A strong majority (86%) of researchers agreed that conventional forest management on fans in British Columbia has had negative impacts, and 14% (one respondent) were not sure or did not change their opinions as a result of the extension interventions. Seventy-two percent believed that they have acquired sufficient knowledge to identify hazardous areas on fans at a site level and knew how to use aerial photographs of watersheds draining onto fans to identify potential hazards on fans, and just under a third (29%) were not sure. One hundred percent of respondents now believe that basic watershed morphometrics can be used to predict hydrogeomorphic processes influencing fans as a result of the publications, presentations, and/or workshops they attended. When asked whether basic watershed morphometrics

TABLE 7 *Researcher opinions about the effects of forest management on fans and skill acquisition. (The top percentage indicates total respondent ratio, the bottom number represents the actual number of respondents selecting the option.)*

|  | Strongly Agree | Agree    | Disagree | Strongly Disagree | Not Sure / No Different Than Before |
|--|----------------|----------|----------|-------------------|-------------------------------------|
| 1. Conventional forest management on fans in British Columbia has had negative economic and environmental impacts.   | 57%<br>4       | 29%<br>2 | 0%<br>0  | 0%<br>0           | 14%<br>1                            |
| 2. I have acquired sufficient knowledge to identify hazardous areas on fans at a site level.   | 29%<br>2       | 43%<br>3 | 0%<br>0  | 0%<br>0           | 29%<br>2                            |
| 3. I know how to use aerial photographs of watersheds draining onto fans to identify potential hazards on fans.  | 29%<br>2       | 43%<br>3 | 0%<br>0  | 0%<br>0           | 29%<br>2                            |
| 4. Basic watershed morphometrics can be used to predict hydrogeomorphic processes influencing fans (recognizing that the Melton ratio may not apply to watersheds in plateau terrain).   | 29%<br>2       | 71%<br>5 | 0%<br>0  | 0%<br>0           | 0%<br>0                             |
| 5. For a varied geographic area, predictive models using basic watershed morphometrics and forest cover attributes can be used to predict the power, disturbance extent, and number of hydrogeomorphic events influencing a fan. | 0%<br>0        | 71%<br>5 | 29%<br>2 | 0%<br>0           | 0%<br>0                             |

could be used to predict characteristics of hydrogeomorphic process, no one strongly agreed with the statement, but 71% (five respondents) agreed, and just under a third (two respondents) disagreed with the statement.

These results show that skills gained by researchers as a result of the extension efforts were significant for a vast majority of researcher respondents. While the attitude of over two-thirds of researcher respondents about the predictive capability of basic watershed morphometrics and forest cover attributes on fans was affected by the extension efforts, almost a third said that they disagreed with statements about the predictive capability. The data do not indicate why a third disagreed, only that they did. Respondents could have had opinions about this beforehand that the extension intervention did not change. Some researchers could have felt more confident directly or indirectly using surrogates to predict sediment supply and streamflow.

**Consulting geoscientists/engineers/agrologists/foresters** Respondents who identified themselves as consulting geoscientists/engineers/agrologists/foresters were asked if they have used new knowledge gained from a fan workshop, presentation, and/or publication. Three-quarters of consultants (13 respondents) indicated that they have used the new knowledge, while 18% (three respondents) said that they have not. An additional 12% indicated that they had not used it because they only recently attended a workshop. These

results show that the extension efforts had an impact on consultant respondents.

### **3.3 Incorporating New Knowledge**

Of the 18 respondents who said that they write site prescriptions, well over half (61% or 11 respondents) incorporated new knowledge gained from a fan workshop into their site prescriptions. Twenty-eight percent (five respondents) indicated that they have not incorporated new information because they recently attended a workshop. Only two respondents (11%) said that they have not incorporated new knowledge into their site prescriptions.

Respondents who attended workshops were also invited to provide comments regarding barriers to using information gained from the workshops. Responses ranged from lack of institutional support and capacity, and lack of demand for information on fans, to lack of resources and time. The following list of barriers is presented in the words of the respondents.

#### **Lack of institutional support/capacity:**

- *Not working with fans anymore, but prior to this, lack of corporate direction and lack of support from geoscience community.*
- *Corporate direction and not working directly with fan issues right now.*
- *A hard sell in the interior at times as interior fans are not specifically mentioned in the legislation. This is a major shortfall in the legislation despite the fact that fans are still covered under the requirement to maintain channel stability.*
- *Not enough professionals understand fans [or] the risk of development on fans and I find sometimes the professionals who are making the decisions are not really trained, therefore not qualified to make those decisions.*

#### **Lack of demand for information on fans:**

- *General lack of recognition of importance of fans and features in the industry.*
- *Opportunities for application did not occur.*
- *Limited requests for work on fans in the district.*
- *Not working in area with active fans at this time—will be working with fans again in the future.*
- *Very few active fans in my work area. Typically work in interior “flat over steep” terrain.*
- *Haven’t had to work directly on fans recently although they are often considered.*
- *Not really any barriers, my role is not applied/field and therefore I don’t work directly with forested fans.*

#### **Not working with fans:**

- *Have switched positions and no longer do block planning involving field reconnaissance and identification of issues prior to developing an area. However, the fan workshop information will still be of interest in reviewing licensees’ plans in the field.*

**Lack of resources:**

- Lack of access to older air photos now stored off-site. They are available though.
- No inventory of existing fans on forest cover or LRDW [Land and Resource Data Warehouse—a provincial spatial information catalogue for use in GIS]. Access to air photos.

**Lack of time:**

- Lack of time to thoroughly re-review recent extensive MPB [Mountain Pine Beetle] layout.

**3.4 Awareness of Publications**

Respondents were asked to indicate their level of awareness of two Ministry of Forests and Range publications and whether or not they have applied information from the publications into their work, such as in planning, prescriptions, field work, or measurements.

For the publication titled *Forest Management on Fans: Hydrogeomorphic Hazards and General Prescriptions* by D.J. Wilford, M.E. Sakals, and J.L. Innes (2005), just over half (52%) were aware of it but had not used it, while a quarter (23%) had used it, and a quarter were not aware it existed.

For the publication titled *Dendroecology: A Guide for Using Trees to Date Geomorphic and Hydrologic Events* by D.J. Wilford, P. Cherubini, and M.E. Sakals (2005), a much larger percentage of respondents had not heard of it (42%). Forty percent were aware of it but had not used it, and only 19% had used the publication. Figures 2 and 3 show the level of awareness and use of the publications.

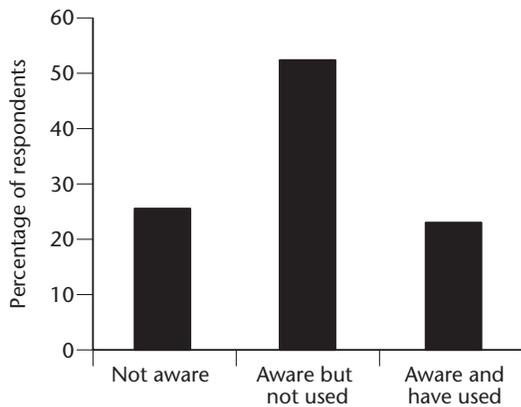


FIGURE 2 Level of awareness and use of Land Management Handbook 57. (D.J. Wilford, M.E. Sakals, and J.L. Innes. 2005. *Forest Management on Fans: Hydrogeomorphic Hazards and General Prescriptions*. B.C. Ministry of Forests. Land Management Handbook 57.)

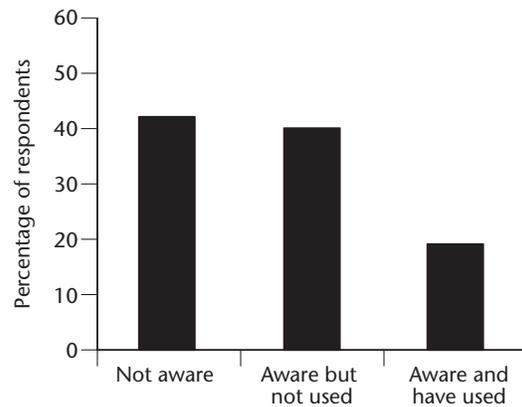


FIGURE 3 Level of awareness and use of Land Management Handbook 58. (D.J. Wilford, P. Cherubini, and M.E. Sakals. 2005. *Dendroecology: A Guide for Using Trees to Date Geomorphic and Hydrologic Events*. B.C. Ministry of Forests. Land Management Handbook 58.)

### 3.5 Other Comments

Respondents were invited to comment on the overall utility of the workshops, presentations, and publications. They provided positive comments about the practicality of the workshop and teaching methods, but there also were recommendations for changes in workshop structure, length, and approach. One respondent said that they did not apply the information directly to their field work but have informed others about the importance of fans.

Respondents' comments:

- *The workshop was very good. The practical exercises provided and the talk that was given were both useful and informative. Even though I do not address the issue on a regular basis, the information I now have gives me a foundation to recognize conditions to be aware of, possible management directions when encountering fans, and, when situations are serious, an expert to contact.*
- *The workshops have created (and continue to do so) a greater awareness of toe slope and valley floor fluvial and colluvial process among forest managers and licensees. This is very helpful when trying to present recommendations to mitigate hazards on fans.*
- *Was not aware of the two above publications, but familiar with the general concepts therein. Will use in the future. The workshop was very interesting and a good field trip.*
- *A good workshop for raising awareness.*
- *Would have liked more time on looking at the samples brought back under microscope. This was interesting, useful but rushed.*
- *Would like more on road location strategies on fans and options/considerations on drainage structure sizing and types on fans.*
- *It was a very worthwhile workshop on fans as it was quite informative and made you aware of the power of large mass-wasting events and how they affect downstream or down-channel values.*
- *Dr. Wilford et al. have done a good job of keeping this important part of forest management in the lime light over the last 5 years—an effective reminder for those working in areas where fan identification and management is required. The workshops did a very good job of practically applying research and I therefore would highly recommend.*
- *This valuable course should be taught in conjunction with the GAP [Gully Assessment Procedure of the Forest Practices Code] course. There are many new employees coming into the work force that have not had the benefit of either fan or gully assessment training. There are many people who could use a review of the work.*
- *The workshop was very well presented and I intend to use the information I recently learned (fall 2005) in all relevant future development projects. I feel the workshop was very worthwhile and have highly recommended it for other BCTS staff. I suggested to our management that Practices Foresters and Forest Technicians charged with layout and development, Engineering Techs and a least one Planner should be encouraged to attend this workshop. Follow-up discussions are occurring.*
- *Question #1 did not include an option for “Salmon Arm 2-day course fall 2005.” This course was very hands-on practical. You should approach MOF District Offices and BCTS about delivering it directly to their staff.*
- *It was very interesting—I would have liked to have had an even longer field component if possible, perhaps a 2-day course. Learning about fan manage-*

ment was good, but as someone without a strong engineering background, the 1-day course alone would not be enough to make me confident in developing appropriate prescriptions, though hopefully [it] will increase knowledge and comfort level with practice!

- It was a long time ago. I remember the principles, but not the specifics. If needed, the information is available. Suggest there are other applications of this science that should be extended to road and trail building, [and] resort development in other areas of B.C.
- Keep selling this to industry. Force government to starting auditing industries' performance on fans.
- Excellent work gentlemen! I found the information very useful and have applied the findings regularly in my work as a Forest Hydrologist. The only item that I would like to see in future presentations is more discussion around the management of fans for channel stability. We addressed the identification of debris flow and debris flood processes on the fans but we didn't get to the issue of maintaining channel stability where these events are very infrequent or not present. Some fans can be worked in and around, other cannot for channel stability reasons. Not an easy question to answer but one that comes up a lot in practice as the nicest timber grows on fans and Foresters are very reluctant to write them off completely. We have a lot of interior fans that were picked over in the 1950s and 60s and it would take a keen eye to see the subtle effects on the channel if any. Others are a train-wreck; of course the key is why. This would help to emphasize that special management is required on all fans, not just those prone to DF [debris flow] events. Lesser fans typically are the ones passed over and always the ones on which Foresters push the envelope. Looking forward to my next opportunity—sorry I missed the fall 2005 version. One of your sites was a fan that Bill and I are working on now—good choice!
- I will be retiring on Jan. 27th and moving to [Alberta] and have enjoyed working w/ Dave Wilford over the years. The course was well presented and will be a valuable tool for those working w/ forest roads.
- The information was informative and helpful but I have not yet found a way to apply it in my current job. I have been able to emphasize to clients and partners the importance of fan-related issues and the fact that terrain stability themes do not highlight this issue in the landscape but terrain maps do have inventory information about the location of fan and cone features in the landscape where these issues are relevant.

#### **4 CONCLUSIONS AND RECOMMENDATIONS**

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Based on the high percentage of respondents who replied positively to survey questions, it is clear that extension efforts significantly affected attitudes and skills regarding fans and forest management for both forest practitioners and researchers who responded to the survey. However, there were not enough senior manager respondents for us to draw conclusions about their perceptions and skill acquisition.

There was high level of consistency among forest practitioners about their perceptions regarding the effects of the extension efforts on skills and attitudes, but slightly less agreement among researchers. For example, while 71% of researchers agreed with the statement that predictive models using basic watershed morphometrics and forest cover attributes can be used to

predict the power, disturbance extent, and number of hydrogeomorphic events influencing a fan, just under a third (29%) disagreed with the statement. More investigation is required to ascertain why 29% disagreed.

The findings of this survey are consistent with other data about preferred extension delivery methods in British Columbia. To reach senior managers, this survey shows that shorter “sound-bite” approaches (such as presentations) may be more effective, whereas workshops may be more useful for reaching practitioners. The survey results indicate that a continued mixed approach would be most successful at reaching all three audiences.

Respondents offered many comments regarding barriers to incorporation of new knowledge on fans. Several pointed to a lack of recognition of the importance of fans and a lack of corporate direction relating to fans. Lack of access to resources such as aerial photographs was also noted. The workshops, publications, and presentations help to increase recognition of the importance of fans. Ensuring that the extension efforts remain targeted at decision-making levels is an important lesson of this survey. The lack of response to this survey by senior managers indicates that further extension efforts targeting this group are required.

In extension programs, the acquisition of new knowledge and skills is a desirable outcome; the *application* of knowledge is even more desirable. The survey results demonstrate that the extension efforts have made a significant difference, not only in increasing skills and knowledge, but by affecting behaviours and practices. Over three-quarters of consultants—who make up over a third of respondents—said that they have applied new knowledge gained from the extension efforts. Of respondents who write site prescriptions, sixty-one percent said that they have applied their new knowledge to their site prescriptions.

While this study was very useful in understanding whether or not attitudes, skills, and behaviours have been affected by extension efforts, the planned follow-up study to learn more details on how the knowledge is being applied in the field is an obvious next step. Characterizing the application of the knowledge will help the Ministry of Forests and Range and others plan workshops, presentations, and publications that build upon and enhance these specific field applications. Published case studies of various applications of new knowledge on fans, for example, could serve as an extension tool for teaching others. The survey data do not allow for comparisons of effects between the three types of extension methods (workshops, publications, and presentations), so follow-up interviews should attempt to identify these differences.

## 5 LITERATURE CITED

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Wilford, D.J., P. Cherubini, and M.E. Sakals. 2005. Dendroecology: a guide for using trees to date geomorphic and hydrologic events. B.C. Min. For., Res. Br., Victoria, B.C. Land Manage. Handb. 58.

Wilford, D.J., M.E. Sakals, and J.L. Innes. 2005. Forest management on fans: hydrogeomorphic hazards and general prescriptions. B.C. Min. For., Res. Br., Victoria, B.C. Land Manage. Handb. 57.

## 6 FURTHER READING

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Blackburn, D.B. (editor). 1989. Foundations and changing practices in extension. University of Guelph, Guelph, Ont.

Journal of Extension ([www.joe.org](http://www.joe.org))

Suvedi, M. and S. Morford. 2003. Conducting program and project evaluations: A primer for natural resource program managers in British Columbia. FORREX (Forest Research Extension Partnership), Kamloops, B.C. Available at <http://www.forrex.org/pubs>.

U.S. Department of Agriculture. 2001. The cooperative state research, education and extension service of the USDA home page. Available at <http://www.csrees.usda.gov/>.

Warner, P.D. and J.A. Christenson. 1984. The cooperative extension service: A national assessment. Westview Press, Boulder, Colo. and London, U.K.

**1-day Fan Workshops**

Terrace - May 1, 2001

Smithers - June 7, 2001; Sept. 18, 2001; Dec. 17, 2002

Castlegar - Oct. 8, 2002

Horsefly - Oct. 22, 2002

Prince George - Oct. 24, 2002; Oct. 7, 2003; Sept. 30, 2005

Chilliwack - Oct. 29, 2002; June 15, 2004; Oct. 18, 2005

Salmon Arm - Oct. 22, 2003; Apr. 21, 2004

Squamish - Oct. 20, 2004

Queen Charlotte City - Sept. 22, 2005

**2-day Fan Workshops**

Forest management on fans:

Hazelton - Oct. 25–26, 2001;

Salmon Arm – Oct. 26–27, 2005

**3-day Fan Workshop**

Forest management on fans:

Smithers - May 13–15, 2003

## APPENDIX 2-2 Conference presentations

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Presentations are listed in chronological order:

American Geophysical Union, AGU, San Francisco. Dec. 1999.

- presentation: “Forest management on fans”

Small Streams Workshop, Friends of Forest Hydrology, Prince George.

Oct. 3–5, 2000. (40 participants)

- presentation: “Issues with small streams on fans”

WSL Swiss Federal Research Institute, Birmensdorf, Switzerland.

Feb. 2001.

- presentation: “Forest management issues on fans in west central British Columbia and a proposed forest stand based hazard classification”

Terrain stability and forest management in the interior of British

Columbia. May 23–25, 2001. (200 participants)

- poster: “Forest Management on Fans: Identifying hydrogeomorphic hazards”

Coastal Forest Site Rehabilitation Conference, Nov. 27–29, 2001. (182 participants)

- poster: “Forest Management and Restoration on Fans”

Symposium on small stream channels and their riparian zone: their form, function and ecological importance in a watershed context.

University of British Columbia. Feb. 18–20, 2002.

- poster: “Hydrogeomorphic Role of Riparian Forests on Fans”

2002 Interior Watershed Conference. Kamloops. Mar. 12–14, 2002. (325 participants)

- poster and presentation: “Science-Based Forest Management on Fans”

Watershed Analysis Workshop: Linking Science with Results-Based Management. Nanaimo. Mar. 26, 2002. (128 participants)

- poster and presentation: “Fans in the Context of Watershed Analysis”

Mountain Forests: Conservation & Management – IUFRO conf. Vernon. July 29–Aug. 2, 2002.

- poster and presentation: “A Hazard Classification for Forestry on Fans”

MOF Provincial Engineering Meeting, Richmond. Mar. 26, 2003. (120 participants)

- presentation: “Forest Roads on Fans”

Alluvial Fans Conference, Sorbas, Spain. June 2003.

- presentation: “Fans with forests: contemporary hydrogeomorphic processes on fans with forests in west central British Columbia, Canada”

AGM of the Association of Professional Engineers and Geoscientists of B.C.,  
Penticton, Oct. 24, 2003. (60 participants)

- presentation: “Seeing the forest for the trees: identifying hydrogeomorphic hazards on fans”

Landslides and Natural Resources, International Consortium on Landslides,  
Vancouver. Oct. 30, 2003. (120 participants)

- presentation: “Differentiating hydrogeomorphic hazards using watershed morphometrics”

Integrated Resource Management Conference, Prince George. Nov. 12–14,  
2003.

- poster: “The Hydrogeomorphic Role of Riparian Forests on Fans”

Joint Conference of IUFRO 3.06 Forest Operations under Mountainous Conditions and the 12th International Mountain Logging Conf.,  
Vancouver. June 14, 2004

- presentation: “Logging on alluvial and colluvial fans: improving the bottom line”

AGM of the Association of Professional Engineers and Geoscientists of B.C.,  
Whistler, Oct. 22, 2004 (60 participants)

- presentation: “An update of fan research in west-central B.C.”

IUFRO Congress, Brisbane, Australia, Aug. 9–10, 2005

- poster: “The hydrogeomorphic role of riparian forest stands on fans”

FORREX Science Forum, Kamloops. Sept. 31, 2005

- poster: “The hydrogeomorphic role of riparian forest stands on fans”

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Thank you for participating in our survey to evaluate the outcome of the workshops, presentations, and publications regarding forest management on fans provided by Dr. Dave Wilford's team over the past 5 years.

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**1** Please select all the ways you have received information on forest management on fans in B.C.

- Attended 1-day workshop in B.C. between 2001 and 2004
  - Attended 1-day workshop in B.C. in Fall 2005
  - Attended 2-day workshop in Hazelton in Oct. 2001
  - Attended 3-day workshop in Smithers in 2003
  - Heard a presentation on fans
  - Read Ministry of Forests publication(s) on fans
- 

**2** If you selected a 1-day workshop in the question above, was it in Squamish in October 2004?

- Yes
  - No
  - Didn't select a 1-day workshop in question above
- 

**3** Please select the group that most closely describes where you spend most of your time:

- Forestry Practitioners involved in forest development planning, operations, and compliance and enforcement (e.g., field foresters and technicians, planners, engineers and geoscientists).
- Senior Forest Managers and forest policy-makers within government agencies or the forest industry.
- The scientific hydrology/geomorphology community in B.C. and internationally.

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**4** If you are a Forestry Practitioner, please indicate your level of agreement with the following statements *as a direct result* of information you received on fans. If the information you received didn't change your opinion, select "not sure/no different than before." If you are not a Forestry Practitioner, skip this question.

1 Strongly agree      2 Agree      3 Disagree      4 Strongly disagree      5 Not sure/  
no different than before

It is important for sustainable resources management to identify active areas on fans and develop special prescriptions.

1       2       3       4       5

I have acquired the necessary skills to identify active areas on fans.

1       2       3       4       5

I can identify appropriate and inappropriate prescriptions for fans.

1       2       3       4       5

The information presented in the workshops, presentations and publications was based on science.

1       2       3       4       5

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**5** If you are a Senior Manager, please indicate your level of agreement with the following statements *as a direct result* of information you received on fans. If the information you received didn't change your opinion, select "not sure/no different than before." If you are not a Senior Manager, skip this question.

1 Strongly agree      2 Agree      3 Disagree      4 Strongly disagree      5 Not sure/  
no different than before

Conventional forestry practices on fans have had negative economic and environmental impacts.

1       2       3       4       5

Identification of problems and proposed solutions related to fans in BC are science-based.

1       2       3       4       5

FRPA Regulation 54 (re: destabilization of fans) is appropriate.

1       2       3       4       5

Regulations 35 and 57 (soil productivity and fish habitat) adequately focus attention on interior fans.

1

2

3

4

5

- 
- 6** If you are a Researcher, please indicate your level of agreement with the following statements *as a direct result* of information you received on fans. If the information you received didn't change your opinion, select "not sure/no different than before." If you are not a Researcher, skip this question.

1  
Strongly  
agree

2  
Agree

3  
Disagree

4  
Strongly  
disagree

5  
Not sure/  
no different  
than before

Conventional forest management on fans in British Columbia have had negative economic and environmental impacts.

1

2

3

4

5

I have acquired sufficient knowledge to identify hazardous areas on fans at a site level.

1

2

3

4

5

I know how to use aerial photographs of watersheds draining onto fans to identify potential hazards on fans.

1

2

3

4

5

Basic watershed morphometrics can be used to predict hydrogeomorphic processes influencing fans (recognizing that the Melton ratio may not apply to watersheds in plateau terrain).

1

2

3

4

5

For a varied geographic area, that predictive models using basic watershed morphometrics and forest cover attributes can be used to predict the power, disturbance extent, and number of hydrogeomorphic events influencing a fan.

1

2

3

4

5

- 
- 7** If you are a consulting geoscientist/engineer/agrologist/forester, have you used new knowledge gained from a fan workshop, presentation, and/or publication?

- Have used
- Have not used because I just took a workshop, heard a presentation, or read a publication in Fall 2005
- Have not used for other reason(s)
- I am not a consulting geoscientist/engineer/agrologist/forester

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**8** If you write site prescriptions, have you incorporated new knowledge gained from a fan workshop you attended (including publications received at the workshop) into your site prescriptions?

- Have incorporated
- Have not incorporated because I just took a workshop in Fall 2005
- Have not incorporated for other reason(s)
- I don't write site prescriptions

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**9** Please list any barriers to using the information gained from the workshop (e.g., lack of access to air photos, corporate direction, not working with fans anymore, etc.)

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**10** Please indicate if you are aware of the following publications and if you have applied the information in your work (e.g., planning, prescriptions, field work, measurements, etc.)

|           |                    |                     |
|-----------|--------------------|---------------------|
| 1         | 2                  | 3                   |
| not aware | aware but not used | aware and have used |

i) D.J. Wilford, M.E. Sakals and J.L. Innes 2005. Forest Management on Fans: Hydrogeomorphic Hazards and General Prescriptions. Ministry of Forests and Range. Land Management Handbook 57. <http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh57.htm>

|                         |                         |                         |
|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 |
|-------------------------|-------------------------|-------------------------|

D.J. Wilford, P. Cherubini and M.E. Sakals. 2005. Dendroecology A Guide for Using Trees to Date Geomorphic and Hydrologic Events. Ministry of Forests and Range. Land Management Handbook 58 <http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh58.htm>

|                         |                         |                         |
|-------------------------|-------------------------|-------------------------|
| <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 |
|-------------------------|-------------------------|-------------------------|

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**11** Please give other comments to help us assess the utility of the workshop and information provided.

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**12** OPTIONAL: Please leave your name and contact information if you are willing to be contacted after this survey for further questions regarding your responses.

Name:

Organization:

Address 1:

:

City/Town:

Province:

Postal Code:

Telephone:

Email Address: