

# 2010 Silviculture Techniques Information Needs Survey

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## Abstract

This research report summarizes findings of an electronic survey designed by FORREX to document the information needs of British Columbia natural resource management professionals in the area of silvicultural systems and stand management techniques, including their ability to use this knowledge to manage for different values on the landscape and the reasons why certain sources of information were not used. Conducted from September to October 2010, the survey was emailed to 561 key silviculture practitioners and researchers in British Columbia. A total of 107 recipients (slightly over 20%) responded to the survey.

The main knowledge gaps identified by survey respondents were related to growth and yield, economic rates of return, treatment response, and effects of treatments on values such as biodiversity, wildlife habitat, and hydrology. Other information needs identified included potential impacts of climate change on forest health, forest fire frequency and severity; and production of biofuels or carbon sequestration, and trade-offs associated with managing for these new products.

These survey results will help extension providers improve future extension programming. They will also prove useful in developing government and academic silviculture research programs and allocating funds for these programs. Survey results related to implementation barriers will also aid government policy-makers.

**KEYWORDS:** barriers; climate change; decision making; extension techniques; forest health; information needs; information sources; silvicultural systems; silviculture treatments; stand management techniques

## Introduction

Today's society is demanding a greater array of values from our forests. These include traditional goods and ecosystem services, such as timber, recreation, water, aesthetics, spirituality, non-timber forest products; and new values, such as carbon bioenergy, biofuels, and carbon storage (Morford & Hollstedt 2007; Working Roundtable on Forestry 2009).<sup>1</sup> To support these values, natural resource management professionals continue to need information on various silvicultural techniques and how these techniques will influence achievement of management objectives, particularly in light of climate change.

In March 2009, the British Columbia Ministry of Forests and Range put forward a new vision for silviculture in the province ("Growing Opportunities: A New Vision For



Silviculture in British Columbia”; B.C. Ministry of Forests and Range 2009), which was a direct response to recommendations that came from the Working Roundtable on Forestry (2009). As part of this proposed vision, intensive silviculture activities (e.g., planting improved stock, fertilizing, and spacing) could be used to bring second-growth forests into the timber harvesting rotation sooner, thus alleviating some of the expected mid-term timber supply gap caused by the mountain pine beetle infestation in the interior of the province. Other Ministry initiatives involve other aspects of silviculture practice such as short-rotation fibre plantations. Natural resource management professionals will also need information on silviculture practices and how the utility and effectiveness of these practices may be affected by climate change.

To develop a research and extension program that addresses the needs of natural resource management professionals, it is necessary to first assess their knowledge of silvicultural systems and stand management treatments and their ability to use these tools to manage for the desired values, products, and services. The information needs survey summarized in this research report is one tool used to determine this state of knowledge and to identify specific information needs and implementation barriers.

The goal of this survey was to gather the opinions of natural resource management practitioners regarding the adequacy of the information currently available to help them make silviculture decisions. The results of the survey are valuable to extension providers, such as FORREX, in improving and developing their extension programming. Information generated by this survey should also be useful in developing government and university/college silviculture research programs and allocating funds for these programs. Government policy-makers should also benefit from the results of survey questions related to implementation barriers.

## Methods

The survey was conducted during September and October 2010 using a web-based survey system called Zoomerang<sup>TM,2</sup>. Questions were developed to help determine natural resource managers’ satisfaction with their current level of knowledge on silviculture systems and pre- and post-free-growing stand management treatments, and their ability to use this knowledge to manage for different values on the landscape. Additional questions dealt with the sources of information used by natural resource managers when making silvicultural decisions and the reasons why certain sources of information were not used. Standard demographic questions were also included. Appendix 1 contains a full listing of the survey questions.

A composite contact list of silviculture practitioners was compiled from the FORREX client database using the criteria specified in Table 1.

**Table 1: Criteria for selection of names from the FORREX client database**

Criteria	Value
Region	All
Affiliations	All except Library
Main Activity Area	Management, planning, operations, research, stewardship
Interests	Bioenergy, climate change, forest entomology, forest health, forest management, forest management systems, forest planning, growth and yield, mountain pine beetle, silviculture, tenures, timber supply



This was supplemented with subscribers to the FORREX Forest Resources Dynamics electronic mailing list as well as stewardship personnel from the B.C. Ministry of Forests and Range. Also added were silviculturists from the Association of BC Forest Professionals database and other silviculturists known by the Ecosystems and Stand Management Extension Specialist. The composite list was then reviewed for accuracy.

The survey was sent out via email on September 23, 2010, to all practitioners identified through the composite contact list, with a stated deadline for completion by October 15th. Reminders were sent on October 12th and 15th. The survey was closed at the end of the workday on October 15th.

## Results

The survey was sent via email to the 561 natural resource practitioners in the compiled list. Thirty-two email addresses generated delivery error messages, reducing the sample size to 529 people. A total of 107 people responded to the survey, resulting in a response rate of 20%. Of the 107 respondents, 88 completed the entire survey while 19 only answered some of the questions.

For many of the questions, respondents were asked to provide comments on what information they felt was missing. Comments were reviewed for similarities among respondents and only these common themes are presented here. In addition, a cross-tabulation of survey responses by survey respondent affiliation was examined and is only discussed where differences were noted.

## Survey respondent profile

Profile questions at the end of the survey were intended to provide background information about the respondents. Topics included primary affiliation and fields of practice. The survey also asked respondents to provide information on their experience with various silviculture techniques and to identify their most silviculturally challenging stands.

The majority of survey respondents were involved in silviculture activities within the province of British Columbia (Table 2). One respondent indicated that they were involved in silviculture activities in all four locations within Canada. Five respondents indicated that they were involved in silviculture activities in all three regions of British Columbia, one indicated they were involved in the Coastal and Northern Interior regions, and two indicated they were involved in the Northern and Southern Interior regions.

**Table 2: Location of involvement in silviculture activities**

Location	Responses	Percent
Coastal BC	24	28
Southern Interior BC	41	47
Northern Interior BC	36	41
Another Province/Territory within Canada	1	1
Outside Canada	1	1

Of those who were involved in silviculture activities in a single provincial region, 17 were involved in the Coastal region, 33 in the Southern Interior region, and 27 in the



Northern Interior region. The respondent who was involved outside of Canada indicated participation in silviculture activities in Europe from 1987 to 2007.

Almost half of the survey respondents were affiliated with the provincial government (46%), 33% were affiliated with a major forest licensee, and 12% were affiliated with natural resource consultants (Table 3). The one minor licensee who responded to the survey was affiliated with a community forest. Groups not represented in the survey responses included landowners, regional/municipal government staff, and the general public.

**Table 3: Primary affiliation of the survey respondents**

Affiliation	Responses	Percent
Major forest licensee	28	33
Minor forest licensee	1	1
Woodlot licensee	3	3
Landowner	0	0
Natural resources consultant	10	12
Federal government	1	1
Provincial government	39	46
Regional/municipal government	0	0
Academic	1	1
First Nations/aboriginal	1	1
Non-government organization	2	2
Public	0	0
Other	0	0
Total	86	100

The majority (71%) of the survey respondents indicated that they primarily practised in the field of silviculture. This is not unexpected given the survey respondent composition. Thirty-one percent were involved in strategic/operational planning, 29% were involved in forest management planning, 15% were involved in forest health, and 13% were involved in forest operations/harvesting and road construction. All fields of practice listed in the questionnaire were selected by at least one respondent, and survey respondents could select more than one field. Of the seven who indicated “other,” two were involved in monitoring, one in auditing of forest practices, one in timber supply modelling, one in inventory, one in forest stewardship, and one in First Nations consultations.

Survey participants were asked to provide information on the types of silviculture treatments for which they had experience. All silviculture techniques listed in the questionnaire were selected at least once (Table 4). Respondents had the greatest experience with prescribing clearcut systems and conducting vegetation management, followed closely by juvenile spacing. Only four participants indicated that they had no experience with silviculture techniques. Entries under the “other” category included ecosystem restoration, site preparation, sheep grazing, planting, and broadleaf silviculture.



**Table 4: Silviculture technique experience**

Experience	Responses
Prescribing/implementing clearcut silviculture systems (e.g., clearcut, clearcut with reserves, variable retention clearcut)	69
Prescribing/implementing alternative silviculture systems (e.g., shelterwood, single-tree selection)	51
Juvenile spacing	62
Vegetation management (e.g., herbicide application, manual and mechanical brushing, etc.)	68
Pruning	32
Fertilization	41
Pre-commercial thinning	33
Commercial thinning	19
I do not have experience using silviculture techniques	4
Other, please specify	13

Participants were also asked to identify their most challenging stands. The most commonly identified problem stands included the following.

- Stands on moist to wet sites with severe levels of competing non-crop vegetation.
- Stands on dry sites.
- Stands with forest health issues (e.g., Armillaria root disease, stem rusts, frost, etc.).
- Immature lodgepole pine stands with large numbers of stems killed by the mountain pine beetle.

### Silvicultural systems responses

Silvicultural systems (e.g., clearcutting, retention, shelterwood, selection, etc.) can be used to manage for a variety of different values on the landscape (e.g., timber production, biodiversity, wildlife habitat, cultural values, water, human well-being, etc.). The majority of respondents (68%) felt they had enough silvicultural systems information to allow them to effectively manage for these values (Table 5).

**Table 5: Available information on silvicultural systems**

Question 1. Do you feel that you have the necessary information about silvicultural systems to allow you to effectively manage for these different values?	Response	Percent
	Yes	68
	No	32
	Total	100

When asked to provide their thoughts on what information they felt was missing, respondents noted a lack of:

- information on the growth and yield implications of the various alternative (non-clearcut) silvicultural systems and, in particular, growth and yield models that account for the spatial complexity associated with many of these systems;
- appropriate stocking standards for partial cuts;



- cost data (e.g., harvesting, reforestation, stand tending, etc.) for alternative silvicultural systems;
- an assessment of the adequacy of the various silvicultural systems in meeting the needs of the other values (e.g., wildlife habitat, biodiversity and coarse woody debris, visual quality, cultural heritage, etc.); and
- operational training on how to implement alternative silvicultural systems.

Continuity of tenure for multiple-entry silvicultural systems was also identified as an issue.

When asked about the potential trade-offs associated with the use of various silvicultural systems, approximately half of respondents (51%) indicated that they did not have enough information (Table 6).

**Table 6: Available information on potential tradeoffs associated with different silviculture systems**

	Response	Percent
<b>Question 2.</b> Do you feel that you have enough information about these trade-offs?	Yes	49
	No	51
	Total	100

Identified information gaps included a lack of:

- growth and yield information;
- models that would allow users to predict the impacts of different silvicultural systems on other values (e.g., wildlife habitat, non-timber forest products, hydrology, social considerations, etc.) and economics;
- data on the impact of different silvicultural systems on values as well as the interactions between the different values which makes it difficult to evaluate trade-offs; and
- a single source of information on the implications and considerations for the various silvicultural systems.

When asked if they had enough information on the effects of climate change on their choice of silvicultural system, 65% of survey respondents suggested that they did not (Table 7).

**Table 7: Available information on climate change impacts on choice of silvicultural system**

	Response	Percent
<b>Question 8.</b> Do you feel that you have enough information on how climate change may affect the choice of silviculture system?	Yes	35
	No	65
	Total	100

“Uncertain” was a commonly used word in the comments received. Survey respondents were uncertain about the accuracy of current climate change predictions and how these predictions would manifest at the stand or ecosystem level. Climate change predictions are often presented as changes to average temperatures. Some respondents felt this would have minimal impact on their choice of silvicultural system compared to changes in temperature extremes (minimums and maximums). Changes to minimum temperatures will affect the occurrence of frost events that, in turn, will affect species selection. Several respondents felt more information was required on how different species will re-



spond to changes in climate (e.g., growth, survival, regenerative ability). Other respondents suggested that climate change was a long-term issue and thus would not affect their choice of silviculture system, which was a short-term issue based on the climate during the stand regeneration period.

### Stand tending treatment responses

Respondents were asked whether they had enough information on the use of stand tending treatments to manage for a variety of values on the landscape and on how climate change might affect the utility and effectiveness of various stand tending tools. Sixty-two percent of respondents indicated that they had enough information on the use of stand tending treatments to manage for different forest values (Table 8) but just 37% indicated that they had enough information on the impact of climate change on these treatments (Table 9).

**Table 8: Available information on stand tending treatments**

Question 3. Do you feel that you have the necessary information on how to use stand tending treatments to effectively manage for these values?	Response	Percent
	Yes	62
	No	38
	Total	100

Respondents felt more information was needed on the economic rate of return on investment (ROI) for various stand management treatments in different areas of the province. Related to this was a comment from one respondent who noted that the ROI needs to be adjusted to account for risk factors such as fire and forest health agents. Several respondents suggested that a need exists for a comprehensive synthesis of available information on the effectiveness of different treatments in different areas of the province. It was noted that this synthesis should include information on the effectiveness of treatments in achieving and balancing all stand management objectives and values rather than just focussing on timber production.

**Table 9: Available information on effect of climate change on stand tending treatments**

Question 9. Do you feel that you have enough information on how climate change may affect the utility and effectiveness of various stand tending tools?	Response	Percent
	Yes	37
	No	63
	Total	100

Similar to responses received for the question on climate change and silviculture systems, respondents indicated that a strong need exists for information and models on the manifestation of climate change at the local or stand level. Other noted information needs included the following.

- How competing vegetation and forest health agents will be affected by a changing climate.
- How climate change may affect the species or stand responses to treatment.

A synthesis of stand tending treatments and their effectiveness for different areas of the province was suggested as a desirable extension product.



## Silviculture strategy responses

The proposed silviculture strategy (B.C. Ministry of Forests and Range 2009) suggests that British Columbia can increase stand volume production via certain post-free-growing stand tending treatments. Overall, 59% of respondents felt they did not have the needed information and skills to prescribe post-free-growing stand treatments to meet this goal; however, the response to this question varied between the three major survey respondent groups (Table 10). The majority (63%) of natural resource consultants answered “Yes,” while the majority (65%) of major licensee respondents answered “No.” Provincial government respondents were in the middle with only 53% answering “Yes” to this question.

**Table 10: Information and skills to meet goals in proposed silviculture strategy**

Question 4. Do you feel that you have the information and skills you need to prescribe these post-free-growing stand tending treatments to meet this goal?	Response	Percent
	Yes	41
	No	59
	Total	100

Information and skills identified as missing included the following.

- Site-specific information and data on the response of stands or trees to different stand tending treatments.
- Treatment response information, including measures of stand or tree quality in addition to volume gain information.
- Growth and yield models capable of predicting treatment responses.
- Cost/benefit analyses (which require treatment response estimates).
- Risks associated with different treatments, especially given the potential changes to forest health agents as a result of climate change.
- Skill sets relating to the application of stand management techniques.
- Methods for identifying opportunities for treatments.

## Bioenergy and carbon sequestration responses

Recently, a lot of discussion has centred around the new economy and getting different products from the forest (e.g., feedstocks for bioenergy opportunities, carbon sequestration, etc.). Over 80% of respondents suggested they did not have enough information on the silviculture techniques that can be used to manage for these new products (Table 11). Similarly, 82% of respondents felt they did not have enough information on the trade-offs associated with managing for these new products (Table 12).

**Table 11: Available information on silviculture techniques that can be used to manage for these new products**

Question 5. Do you feel that you have enough information on the silvicultural techniques that can be used to effectively manage for these new products?	Response	Percent
	Yes	19
	No	81
	Total	100

Identified information needs related to this question included the following.

- Basic knowledge on the new products, including carbon sequestration.
- Target stand characteristics (e.g., species mixes, site quality, stand density, rotation length, etc.) that would best provide for these new products.





- Economics of these new products.
- Stand-level modelling tools that incorporate carbon sequestration and storage.
- How biomass production and carbon storage will respond to different silviculture treatments.

**Table 12: Available information on trade-offs associated with these new products**

<b>Question 6.</b> Do you feel that you have enough information on the trade-offs associated with shifting to these new products (e.g., associated positive/negative impacts on forest ecosystems, etc.)?	Response	Percent
	Yes	18
	No	82
	Total	100

Information needs related to this question included the following.

- How biomass removal may impact ecosystem function, including the long-term nutrient status of the sites, biodiversity and coarse woody debris levels, wildlife trees and habitat, and hydrological values.
- How managing at different densities, species shifts, and using potentially shorter rotations may impact these values.
- Social and economic impacts of managing for these new products.
- How management for these new products may affect the ability to manage for and produce traditional forest products.

### Natural disturbance/forest health responses

The majority of survey respondents (68%) felt they had enough information on silviculture techniques that could be used to manage for the forest health factors affecting the forests in their locale (Table 13).

**Table 13: Available information on management of forest health issues in your area**

<b>Question 7.</b> Do you feel that you have enough information on the silvicultural techniques that can be used to manage for the forest health factors that are affecting the forests in your locale?	Response	Percent
	Yes	68
	No	32
	Total	100

Some respondents commented that although adequate information was available on how to manage for certain forest health factors (e.g., spruce weevil), information was lacking on management of others (e.g., elythroderma needle cast, pine stem rusts). Other identified information needs related to this question included the following.

- Forest health risk assessments.
- Training and support on the field recognition and diagnosis of forest health agents.
- Interactions between different silviculture treatments and forest health factors (e.g., fertilization and Dothistroma needle blight).
- Rust disease dynamics.
- Impact of forest health agents on young stands as well as on post-free-growing stands.

Almost 60% of the survey respondents felt they did not have enough information on how the frequency and severity of forest health disturbance events may be affected by climate change (Table 14).



**Table 14: Available information on impact of climate change on forest health issues**

Question 10. Do you feel that you have enough information on how the frequency and severity of forest health disturbance events may be affected by climate change?	Response	Percent
	Yes	41
	No	59
	Total	100

Respondents noted that information is needed on the following topics.

- How climate change will affect the population dynamics of specific insects and diseases.
- The interaction between these insects and diseases and their host(s).
- Risk analyses to help forest managers determine where and when management actions should be taken.
- How climate change may affect the number and severity of forest fires and how this may affect the regeneration of forest stands.

The majority of survey respondents (59%) felt they had enough information on the effects that different post-disturbance management options (e.g., mountain pine beetle salvage harvesting, etc.) may have on forest ecosystems (Table 15).

**Table 15: Available information on impact of post-disturbance management options on forest ecosystems**

Question 11. Do you feel that you have enough information on the effects that different post-disturbance management options (e.g., MPB salvage harvesting, etc.) may have on forest ecosystems?	Response	Percent
	Yes	59
	No	41
	Total	100

Information needs related to this question included the following.

- The effectiveness of the different post-disturbance management options, including growth and yield response, seedling ingress patterns, and brush species response.
- The economics of different management options, and the impact of management options on other forest values (e.g., coarse woody debris, hydrology).
- The interaction between different management options and the risk of the forest disturbance agents.

## Climate change

When asked whether they had any other silvicultural technique concerns relating to climate change, 31% indicated that they had other concerns. These concerns included the need for information on the following topics.

- The effects of climate change on deciduous tree species populations and growth.
- Assisted migration and conifer species selection options.
- Techniques that will help create complex and resilient stands.

Also mentioned was the need to incorporate flexibility in stocking standards to address potential climate change effects, as well as the need to incorporate the risk of increased wild fire into forest planning exercises.



## Barriers

Almost one-half of survey respondents had experienced some kind of barrier, be it policy, regulatory, or institutional, which prevented them from prescribing silviculture or stand tending treatments (Table 16).

**Table 16: Policy, regulatory, or institutional barriers**

Question 21. Have you experienced any policy, regulatory, or institutional barriers that have prevented you from prescribing silviculture systems or stand tending treatments?	Response	Percent
	Yes	45
	No	55
	Total	100

The most commonly identified barrier was the lack of available funding or other mechanisms to cover the costs of applying stand management treatments or employing non-clearcut silvicultural systems. Other identified barriers included the following.

- The lack of appropriate stocking standards and free-growing regulations for use with alternative (non-clearcut) silvicultural systems.
- A perceived lack of field experience within approval agencies and their inability to think “outside the box” when non-traditional silvicultural systems are proposed.

## Decision-making methods

In this section of the survey, respondents were asked questions related to the way they made silviculture decisions. For professional sources of information, almost all respondents (94%) indicated that they had used or currently use past personal experience or knowledge when making silviculture decisions (Table 17). Colleagues/co-workers were indicated as source of information by 90% of respondents; colleagues/peers outside of the respondent’s organization were a source of information for 77% of respondents. Least used professional sources of information included traditional ecological knowledge (20%), non-government technical specialists (20%), and extension specialists (44%). “Other” sources included observations of adjacent or similar stands.

**Table 17: Information sources for decisions made in the past (professional sources)**

Information source	Responses	Percent
Past personal experience/knowledge	81	94
Colleagues/co-workers in your organization	77	90
Colleagues/peers outside of your organization	66	77
Government researchers	65	76
Government technical specialists (other than researchers)	56	75
College or university researchers	49	57
Independent private contractors or consultants	48	56
Extension specialists	38	44
Non-government organization technical specialists	17	20
Traditional ecological knowledge (TEK)	17	20
Other, please specify	9	10



For written/participatory sources of information, the vast majority of the respondents (90%) use or had used scientific literature (Table 18). Other top information sources included extension notes (86%), guidebooks (85%), and workshops/training sessions (81%). Least used sources of information were job shadowing/mentorship (21%), Internet-based information sources (31%), and decision aids (42%). Other written/participatory sources included text books and informal trials. Although responses for professional information sources showed no variation among survey respondent groups, responses for the written/participatory sources of information did. Guidebooks were the most frequently selected source of information for respondents associated with the provincial government (97%), while this source was only selected by 71% of major licensee respondents and 88% of natural resource consultants. Scientific literature was the most frequently selected written/participatory source of information by major licensee respondents (93%). Extension notes were selected by all natural resource consultants as a source of information, followed closely by guidebooks and scientific literature.

**Table 18: Information sources for decisions made in the past (written/participatory sources)**

Information source	Responses	Percent
Scientific literature (e.g., research reports, journal articles)	77	90
Extension notes	74	86
Guidebooks (e.g., Forest Practices Code guidebooks, best practices publications)	73	85
Workshops/training sessions	70	81
Field guides	67	78
Decision aids (e.g., FORREX Stand Establishment Decision Aids, etc.)	36	42
Internet-based information sources (e.g., Wikis, discussion boards, and forums, etc.)	27	31
Job shadowing/mentorship	18	21
Other, please specify	3	3

Respondents were then asked to rank (i.e., from most likely to be used to least likely to be used) both professional and written/participatory sources of information for silviculture decisions for which they did not have any past experience. The top two professional sources of information were colleagues/co-workers from within their organization followed by colleagues/peers outside of their organization (Table 19).

Traditional ecological knowledge, non-government organization technical specialists, and extension specialists were the top three professional information sources indicated as least likely to be used (Table 20). This was consistent across the three main survey respondent groups, although one natural resource consultant indicated that traditional ecological knowledge was the most likely source of information they would use. Similarly, two major licensee respondents, two provincial government respondents, and one natural resource consultant ranked traditional ecological knowledge as their second most likely source of information.



**Table 19: Professional information sources ranked by respondents as either most likely or second most likely to be used<sup>a</sup>**

Professional information source	Respondents ranking source as most likely or second most likely to be used
Colleagues/co-workers in your organization	63
Colleagues/peers outside of your organization	38
Government researchers	14
Independent private contractors or consultants	12
Government technical specialists (other than researchers)	11
Traditional ecological knowledge (TEK)	7
College or university researchers	6
Extension specialists	2
Non-government organization technical specialists	1

<sup>a</sup> Data presented in the table is the sum of the number of respondents who selected the information source as the most likely or second most likely to be used.

**Table 20: Professional information sources ranked by respondents as either least likely or second least likely to be used<sup>a</sup>**

Professional information source	Respondents ranking source as least likely or second least likely to be used
Traditional ecological knowledge (TEK)	51
Non-government organization technical specialists	35
Extension specialists	17
College or university researchers	11
Independent private contractors or consultants	9
Colleagues/co-workers in your organization	4
Government technical specialists (other than researchers)	4
Colleagues/peers outside of your organization	3
Government researchers	2

<sup>a</sup> Data presented is the sum of the number of respondents indicating that the information source was the least likely or second least likely to be used.

For written/participatory information sources, guidebooks were the information source most likely to be used (Table 21). Extension notes, scientific literature, and field guides were very similar in their likelihood of being used; however, the responses from natural resource consultants were slightly different than those from major licensees or the provincial government. Consultants indicated that they were less likely to use guidebooks and more likely to use extension notes or scientific literature.



**Table 21: Written/participatory information sources ranked by respondents as most likely or second most likely to be used<sup>a</sup>**

Written/participatory information source	Respondents ranking source as most likely or second most likely to be used
Guidebooks	39
Extension notes	26
Scientific literature	25
Field guides	25
Workshops/training sessions	20
Job shadowing/mentorship	6
Decision aids	6
Internet-based information sources	4

<sup>a</sup> Data presented is the sum of the number of respondents indicating that the information source was the most likely or 2nd most likely to be used.

In general, job shadowing/mentorship was the least likely written/participatory information source to be used (Table 22). This was expressed very strongly by natural resource consultant respondents; however, one major licensee respondent and one provincial government respondent indicated that this information source was the most likely to be used. Internet-based information sources, such as Wikis or discussion boards, were the second, and decision aids the third written/participatory information source least likely to be used; however, one major licensee and two provincial government respondents ranked decision aids as the most likely written/participatory information source they would use.

**Table 22: Written/participatory information sources ranked by respondents as either least likely or second least likely to be used<sup>a</sup>**

Professional information source	Respondents ranking source as least likely or second least likely to be used
Job shadowing/mentorship	43
Internet-based information sources	35
Decision aids	19
Workshops/training sessions	13
Scientific literature	5
Field guides	3
Guidebooks	2
Extension notes	2

<sup>a</sup> Data presented is the sum of the number of respondents indicating that the information source was the least likely or second least likely to be used.



Participants were further asked to provide a reason for the sources of information that they ranked as least likely to be used. The main reasons given for the lack of use of traditional ecological knowledge were lack of awareness of who to talk to or where to find the information (42%), uncertainties about the trustworthiness of the information (23%), and a lack of access or an inability to access the information (19%). Several respondent comments referred to a lack of knowledge about traditional ecological knowledge. For non-government organization technical specialists, uncertainties regarding the trustworthiness of the information (32%) was the primary reason this information source was unlikely to be used; lack of awareness (24%) and lack of access (17%) were given as other reasons. Lack of awareness (38%) was the primary reason why extension specialists were unlikely to be used, followed by lack of access (24%), and issues with the application and interpretation of the information (16%).

For the written/participatory information sources unlikely to be used, lack of available time (47%) was the primary reason cited for not using job shadowing/mentoring, with lack of access (22%) the next most commonly given reason, followed by lack of awareness of who to talk to or where to find the information. Lack of trust in the information was the main reason that Internet-based sources such as Wikis and discussion boards were unlikely to be used (51%), followed by issues with the application and interpretation of the information (17%). Lack of awareness of who to talk to or where to find the information was given as the primary reason that decision aids were unlikely to be used (39%), followed by issues with the application and interpretation of the information (20%). Several respondents commented that most decision aids were too general in nature to be useful for providing information on specific silviculture treatments.

### Extension methods

In the two questions related to extension methods, respondents were asked to provide information on their current methods of accessing silviculture information and their preferred methods for receiving information. Workshops/conferences was the primary method respondents used to access information on silviculture techniques (Table 23), followed closely by online/Internet. Rarely used methods to access silviculture information were local libraries and the Association of BC Forest Professionals (ABC FP) website. "Other" methods specified included peers/colleagues/co-workers and discussions with silviculture researchers and experts.

**Table 23: Current methods of accessing information on silvicultural techniques**

Access method	Responses	Percent
Workshops/conferences	68	80
Online/Internet	63	74
FORREX website	46	54
Employer distribution networks	40	47
Subscriptions to journals	34	40
ABC FP website	18	21
Local library	7	8
Other, please specify	15	18



Respondents were then asked to indicate their preferred methods for receiving information on silviculture techniques. Extension notes were the preferred method of extension for 84% of the respondents, followed closely by workshops/technical sessions, field trips, and guidebooks/best management practices (Table 24). Least preferred extension methods included videos, multi-media products, and one-on-one assistance. Several respondents commented that all methods were useful, depending on the level of experience of the user. Two other respondents mentioned that all extension materials should be on the Internet.

**Table 24: Preferred extension methods for receiving information on silvicultural techniques**

Preferred method	Responses	Percent
Extension notes	71	84
Workshops/technical sessions	66	78
Field trips	62	73
Guidebooks/best management practices	60	71
Training courses	50	59
Literature summaries and syntheses	45	53
Journal publications	44	52
Conferences	42	49
Websites	41	48
Decision support tools	40	47
Conference proceedings	39	46
Newsletter/magazine articles	33	39
Webinar/online lecture series	31	36
Email/e-newsletters	23	27
One-on-one assistance	18	21
Multi-media products (e.g., DVDs, online flash presentations, etc.)	12	14
Videos	7	8
Other, please specify	6	7

## Discussion

To meet society's demand for a greater array of values from our forests, natural resource management professionals will need information on the various silviculture systems and stand management practices, how these systems and practices will influence these values or can be used to produce these values, and how the utility and effectiveness of these systems and practices may be affected by climate change.

To develop an extension program that addresses the information needs of natural resource management professionals, it is necessary to first assess their knowledge of silvicultural systems and stand management practices and their ability to use these tools to manage for the desired values, products, and services. The goal of this survey was to gather the opinions of natural resource management professionals regarding the adequacy of the information currently available to help them make silviculture decisions.





As several sources were used to compile the list of survey recipients, it was assumed that it contained the majority of the key silviculture practitioners and researchers in British Columbia. Nevertheless, it is probable that some were missed owing to the recent government downsizing and reorganization activities as well as staffing changes within the forest industry over the past few years. This was evident by the email delivery error messages received when the survey was launched (i.e., 5.7% of the sample). A couple of survey respondents also recommended that the survey be sent to other people within their organization or consultants that they used.

The response rate for the survey was good, with slightly over 20% of recipients completing the survey. All areas of the province were represented, with the majority of respondents being affiliated with one of three groups: (1) provincial government (46%), (2) major forest licensee (33%), or (3) consultants (12%). This grouping was attributed to the method and information sources used to compile the sample frame and is not deemed to be problematic given that the number of silviculture practitioners and researchers affiliated with other organizations is likely quite small. All fields of practice were represented and most of the respondents had experience with the application of one or more silviculture treatments.

The majority of survey respondents felt they had enough information on silvicultural systems and stand tending treatments to manage for different values on the landscape but thought information was lacking on how the utility and effectiveness of these tools might be affected by climate change. Research and extension on climate change is ongoing and should help to address this information need. Respondents identified a need for a comprehensive synthesis of current research on the effectiveness of silviculture treatments by biogeoclimatic zone. Information on the effectiveness of these tools in light of climate change could also be included in such a synthesis. Approximately half (51%) of respondents felt they did not have enough information about the trade-offs associated with different silvicultural systems; in this regard, the most frequent comment concerned a lack of information on the growth and yield implications of the various systems. Extension in this area has been minimal in the recent past primarily because of a lack of funding and the subsequent hibernation of the Southern Interior Growth and Yield Cooperative.

Most respondents thought they had enough information on silviculture techniques to manage for the forest health factors in their locale but again indicated that they lacked information on how climate change might affect the frequency and severity of forest health agents. Specific information needs were identified, including the potential impacts of climate change on forest insect population dynamics and forest fire frequency and severity, and the need for risk analysis tools to aid management decisions. Most respondents felt they had enough information on post-disturbance management of forest stands, although some needs were identified, including potential impacts of climate change on deciduous tree species populations and growth, conifer species selection options and stocking standards, and management techniques to create complex and resilient stands. Some of these needs will be addressed through the FORREX project "Reducing Vulnerabilities and Promoting Resilience of British Columbia's Natural and Human Systems Through Adaptation of Post-Disturbance Land Management Options." This project involves the design of a decision-support framework to assist natural resource managers in assessing risk and adapting post-disturbance management strategies to changes in natural disturbance regimes as a result of climate change. It provides information on the projected impacts of climate change on forest fire frequency and severity and specific forest insects, as well as information on the anticipated impacts of climate-induced changes



to natural disturbance regimes and management responses to those changes on forest succession patterns, carbon storage, biodiversity and wildlife, watersheds, and human values. These latter two project components, as well as information and tools currently under development in other similarly funded projects, will help inform and support the application of the framework. The project, which was funded by the Future Forest Ecosystem Scientific Council, was completed in March 2012. Published results are available via the project website (<http://ffesc.forrex.org>).

In addition to climate change impacts, the majority of respondents felt they did not have enough information about (or the skills to apply) post-free-growing silviculture treatments to meet the goals in the proposed provincial silviculture strategy; however, the response to this question varied considerably by survey respondent affiliation. The majority of natural resource consultants felt they had enough information, although the majority of major licensees felt they did not. Provincial government survey respondents were in the middle with only a slight majority, indicating that they had enough information. This difference may be attributed to respondent groups' varying levels of familiarity with the proposed silviculture strategy, may be a result of differences in opinion regarding how much information is "enough," or may reflect differences in levels of silviculture experience among the three groups. Nevertheless, it is only possible to speculate on the cause of the differences between groups because silviculture experience data was not collected in this survey and the level of familiarity with the proposed strategy was not assessed. As mentioned previously, respondents felt that a comprehensive synthesis on the effectiveness of the different treatments is required.

A strong majority (over 80%) of respondents felt they did not have enough information to effectively manage for the production of bioenergy feedstocks or carbon sequestration, and also lacked information on the trade-offs associated with managing for these new products. This is a critical information need given the current provincial government's planned development of this sector of the forest/energy industry; research and extension in this area should thus be assigned a high priority. Some research and extension efforts are currently under way in this area, but it appears that more needs to be done.

When making past or current silviculture decisions, respondents relied heavily on personal experience (94%) or on colleagues within their organization (90%) as professional information sources. It is surprising that the use of personal experience when making silviculture decisions was not 100%. Scientific literature, extension notes, guidebooks, and workshops/training sessions were all used by over 80% of survey respondents as written/participatory information sources.

In cases of making silviculture decisions for which respondents did not have any past experience, colleagues/coworkers within their organization were the most likely professional information source used, followed closely by colleagues/peers from outside their organization. This agrees with previous information needs survey results (Gregory & Satterfield 1999; Morford & Hollstedt 2007). Traditional ecological knowledge was the least likely professional information source to be used and respondents cited a lack of awareness of who to talk to or how to find the information as the main reason for this. This is not unexpected given the unfamiliarity of this information source within the natural resource management field. This result highlights the need to increase awareness among professionals of how to access this valuable information source. Uncertainty about the trustworthiness of the information was the main reason given for not using information from non-government organization technical specialists, which was ranked the second least likely professional information source.



The most likely sources of written/participatory information to be used by survey respondents were guidebooks followed by extension notes, scientific literature (i.e., research reports, journal articles), and field guides, which were all similar in their likelihood of use. This reflects survey results published by Gregory and Satterfield (1999), who reported that interpretive and field guides ranked first and extension notes ranked third in their likelihood of use and their ability to reach key personnel. In the 1999 survey, however, journal articles were ranked lowest in their likelihood of being used and their ability to reach key personnel. This significant change is possibly due to the increased online availability of journal articles over the past decade.

Lack of time was the primary reason given by respondents for the low likelihood of using job shadowing/mentoring as an information source. Internet-based information sources, such as Wikis or discussion boards, were the second least likely source of written/participatory information to be used by survey respondents. Uncertainties regarding the trustworthiness of the information was given as the primary reason for this ranking. This is similar to Gregory and Satterfield's survey (1999), whose results showed that Internet information sources received only "a little trust," although they also reported a much higher level of trust in university web pages. However, their survey question referred to the "Internet" in general; in the survey reported on here, the question was specific to certain Internet tools. As such, this result is not unexpected given the relative newness of the discussion board and Wiki information source in the natural resource management community. The Internet was the second most frequent method used by survey respondents to access information on silviculture techniques.

Preferred extension methods for information on silviculture tools and techniques were extension notes, workshops/technical sessions, field trips, and guidebooks. This finding is also similar to Morford and Hollstedt's survey results (2007). Least preferred extension methods included videos and multi-media products, such as DVDs and online flash presentations.

## Conclusions

The results of this survey have identified several key silviculture information gaps within the natural resource management professional community. It is critical to address these gaps so that natural resource practitioners can effectively manage both traditional goods and ecosystems services, along with the range of new products and services demanded by society from our forests, especially in light of projected climate change impacts on the environment. Some of these gaps may be filled through the extension and transfer of existing information and research; others, such as those related to climate change or new forest products (e.g., biofuels), may require investment in new research. These results will assist FORREX in their extension planning and program development, ensuring that the topics covered and the extension tools used will meet the needs of this client group. It is also imperative that government and academia develop research projects and programs with sufficient resources to address the identified gaps. Finally, the removal of the policy, regulatory, and institutional barriers to implementation identified in this survey is another key action required. Management of our natural resources in a changing climate will require the development of new and innovative approaches. Government, industry, and academia must work together to create an environment conducive to testing of non-traditional silviculture treatments and systems.



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## Notes

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2. MarketTools Inc. Zoomerang surveys. San Francisco, Calif. See: <http://www.zoomerang.com>

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## Silvicultural Techniques Information Needs Survey 2010

Wiensczyk

Today's practicing natural resource professionals are dealing with many complex natural resource management challenges and have to balance and manage for a variety of different values on the landscape such as biodiversity, wildlife habitat, cultural values, timber, water, and human well-being to ensure the long-term integrity of ecosystems is maintained and needs of communities are met. Silvicultural techniques (e.g., silviculture systems, stand tending activities, etc.) include tools and techniques that forest managers can use to help manage for these different values.

The first series of questions in this survey are designed to gather your opinion on the adequacy of the currently available information on these techniques relative to the values that you have to manage for.

**Silviculture Systems**

Silviculture systems (e.g., clearcutting, retention, shelterwood, selection, etc.) can be used to manage for a variety of different values on the landscape (e.g., timber production, stand structure, wildlife habitats, aesthetics, etc.).

1. Do you feel that you have the necessary information about silviculture systems to allow you to effectively manage for these different values?

- Yes  
 No  
 If no, what do you feel is missing?

There are potential tradeoffs when proposing various silviculture systems (e.g., growth and yield implications, vegetation management treatment options, socio-economic considerations, etc.).

2. Do you feel that you have enough information about these trade-offs?

- Yes  
 No  
 If no, what do you feel is missing?

**Stand Tending Treatments**

Stand tending treatments (e.g., thinning, pruning, fertilization, vegetation management, etc.) can also be used to manage for the variety of different values on the landscape.

3. Do you feel that you have the necessary information on how to use stand tending treatments to effectively manage for these values?

- Yes  
 No  
 If no, what do you feel is missing?

The proposed silviculture strategy suggests BC can increase stand volume production via certain post free growing stand tending treatments.

4. Do you feel that you have the information and skills you need to prescribe these post free growing stand tending treatments to meet this goal?

- Yes  
 No  
 If no, what do you feel is missing?

**Bioenergy and Carbon Sequestration**

Recently, there has been a lot of discussion about the new economy and getting different products from the forest (e.g., feed stocks for bio-energy opportunities, carbon sequestration, etc.).

5. Do you feel that you have enough information on the silvicultural techniques that can be used to effectively manage for these new products?

- Yes  
 No  
 If no, what do you feel is missing?



6. Do you feel that you have enough information on the trade-offs associated with shifting to these new products (e.g., associated positive/negative impacts on forest ecosystems, etc.)?

- Yes
- No
- If no, what do you feel is missing?

**Forest Health**

Forest health factors (e.g., mountain pine beetle, spruce budworm, Dothistroma needle blight, pine stem rusts, etc.) have had large impacts on our recent management of the forests.

7. Do you feel that you have enough information on the silvicultural techniques that can be used to manage for the forest health factors that are affecting the forests in your locale?

- Yes
- No
- If no, what do you feel is missing?

**Climate Change**

Climate change may affect the choice of silviculture system, the utility and effectiveness of stand tending treatments, and the severity and extent of forest health agents.

8. Do you feel that you have enough information on how climate change may affect the choice of silviculture system?

- Yes
- No
- If no, what you do you feel is missing?

9. Do you feel that you have enough information on how climate change may affect the utility and effectiveness of various stand tending tools?

- Yes
- No
- If no, what you feel is missing?

10. Do you feel that you have enough information on how the frequency and severity of forest health disturbance events may be affected by climate change?

- Yes
- No
- If no, what do you feel is missing?

11. Do you feel that you have enough information on the effects that different post-disturbance management options (e.g., MPB salvage harvesting, etc.) may have on forest ecosystems?

- Yes
- No
- If no, what do you feel is missing?

12. Do you have any other silvicultural technique concerns relating to climate change?

- Yes
- No
- If yes, please list and describe.

**Silviculture Experience and Decision Making Methods**

These next few questions are to gather information on your silvicultural technique experience and the information sources that you use to help you make silvicultural decisions.

13. Which silvicultural techniques have you had experience using? (*Please select all that apply*)

- Prescribing/implementing clearcut silviculture systems (e.g., clearcut, clearcut with reserves, variable retention clearcut)
- Prescribing/implementing alternative silviculture systems (e.g., shelterwood, single-tree selection)
- Juvenile spacing



- Vegetation management (e.g., herbicide application, manual and mechanical brushing, etc.)
- Pruning
- Fertilization
- Pre-commercial thinning
- Commercial thinning
- I do not have experience using silviculture techniques
- Other, please specify

14. What are your more challenging stands when it comes to prescribing silviculture treatments? When making silviculture decisions, what sources of information do you currently use or have you used in the past?

15. Professional sources? *(Please select all that apply)*

- Past personal experience/knowledge
- Colleagues/coworkers in your organization
- Colleagues/peers outside of your organization
- Independent private contractors or consultants
- College or University researchers
- Government researchers
- Government technical specialists (other than researchers)
- Non-government organization technical specialists
- Extension specialists
- Traditional Ecological Knowledge (TEK)
- Other, please specify

16. Written/participatory sources? *(Please select all that apply)*.

- Guidebooks (e.g., FPC guidebooks, best practices type publications)
- Scientific literature (e.g., Research reports, journal articles)
- Extension notes
- Decision aids (e.g., FORREX Stand Establishment Decision Aids (SEDAs))
- Field guides
- Internet-based information sources (e.g., Wiki's, discussion boards and forums, etc.)
- Workshops/training sessions
- Job Shadowing/Mentorship
- Other, please specify

If you needed to make a silviculture decision for which you did not have any past personal experience or knowledge, what sources of information are you most likely to use?

17. Professional sources? *(Please rank from most likely to be used (1) to least likely to be used (9))*

	1	2	3	4	5	6	7	8	9
Colleagues/coworkers in your organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Colleagues/peers outside of your organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Independent private contractors or consultants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
College or university researchers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Government researchers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Government technical specialists (other than researchers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-government organization (NGO) technical specialists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extension specialists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traditional Ecological Knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**APPENDIX 1: Silvicultural Techniques Information Needs Survey 2010  
(Cont'd)**

Wiensczyk

(TEK)

18. Written/participatory sources? (Please rank from most likely to be used (1) to least likely to be used (8)).

	1	2	3	4	5	6	7	8
Guidebooks (e.g., FPC guidebooks, Best practices type publications)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scientific literature (e.g., Research reports, journal articles)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extension notes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decision aids (e.g., FORREX Stand Establishment Decision Aids (SEDAs))	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Field guides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet-based information sources (e.g., Wiki's, discussion boards, and forums, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Workshops/training sessions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Job shadowing/mentorship	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. For the four (4) professional information sources that you ranked in question 17 as least likely (6-9) to be used, please indicate the primary reason that they are unlikely to be used.

Access = lack of or inability to access the information  
 Aware = lack of awareness of the information source (i.e., who to talk to, where to find information)  
 Cost = cost to access the information  
 Trust = uncertainties about the trustworthiness of the information  
 Time = limited time available  
 Interp. = Interpretation/application issues  
 Accept = acceptability of the information to superiors and/or decision makers  
 Other = any other reason - please specify in the comments box.

	Access	Aware	Costs	Trust	Time	Interp.	Accept	Other
Colleagues/coworkers in your organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Colleagues/peers outside of your organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Contractors/Consultants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
College or university researchers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Government researchers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Government technical specialists (other than researchers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
NGO technical specialists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Extension specialists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Traditional Ecological Knowledge (TEK)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								





20. For the four (4) written/participatory information sources that you ranked in question 18 as least likely (5-8) to be used, please indicate the primary reason that they are least likely to be used.  
 Access = lack of or inability to access the information  
 Aware = lack of awareness of the information source (i.e., who to talk to, where to find information)  
 Cost = cost to access the information  
 Trust = uncertainties about the trustworthiness of the information  
 Time = limited time available  
 Interp = interpretation/application issues  
 Accept = acceptability of the information to superiors and/or decision makers  
 Other = any other reason - please specify in the comments box.

	Access	Aware	Costs	Trust	Time	Interp	Accept	Other
Guidebooks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Field Guides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Scientific Literature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Extension Notes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Decision Aids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Internet-based information sources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Workshops/Training sessions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								
Job shadowing/mentorship	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional comment								

21. Have you experienced any policy, regulatory, or institutional barriers that have prevented you from prescribing silviculture systems or stand tending treatments?

- Yes
- No
- If yes, what barriers have you experienced or have knowledge of?

**Accessing Information and Extension Techniques**

22. How do you currently access information on silvicultural techniques? (Please select all that apply)

- Online/internet
- Subscriptions to journals
- Local library
- ABCFP website
- FORREX website
- Employer distribution networks
- Workshops/conferences
- Other, please specify

23. Which of the following extension methods would be helpful to you for receiving information about silvicultural techniques? (Please select all that apply)

- Extension notes
- Journal publications
- Guidebooks/Best management practices
- Literature summaries and syntheses



- Newsletter/magazine articles
- Conference proceedings
- Decision support tools
- Videos
- Multi-media products (e.g., DVD's, online flash presentations, etc.)
- Training courses
- Field trips
- Conferences
- Workshops/technical sessions
- Websites
- Email/e-newsletters
- Webinar/online lecture series
- One-on-one assistance
- Other, please specify

**Profile Questions**

24. In which geographical area are you involved in silviculture activities? (Please select all that apply)

- Coastal BC
- Southern Interior BC
- Northern Interior BC
- Another Province/Territory within Canada
- Outside Canada, please specify

25. Please select your primary affiliation.

- Major forest licensee
- Minor forest licensee
- Woodlot licensee
- Landowner
- Natural resources consultant
- Federal government
- Provincial government
- Regional/municipal government
- Academic
- First Nations/Aboriginal
- Non-government organization
- Public
- Other, please specify

26. In which field/area do you primarily practice? (Please select all that apply)

- Silviculture
- Forest Health
- Forest Research
- Forest Management Planning
- Tree Improvement
- Forest Operations/Harvesting and Road Construction
- Growth and Yield
- Ecosystem Restoration
- Planning (Strategic/Operational)
- Biology (e.g., terrestrial ecology)
- Conservation Biology
- Conservation Ecology
- Natural Resources Management Policy
- Other, please specify



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2010 SILVICULTURE  
TECHNIQUES  
INFORMATION  
NEEDS SURVEY

Wiensczyk

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# Test Your Knowledge

How well can you recall the main messages in the preceding article?  
Test your knowledge by answering the following questions.

## 2010 Silviculture Techniques Information Needs Survey

1. Survey respondents identified the following areas as missing information when asked about using silvicultural systems to manage for different values.
  - a) Stocking standards, cost data, growth and yield implications, what equipment to use
  - b) Growth and yield implications, how to use GPS to map out treatment areas, stocking standards, and cost data
  - c) Growth and yield implications, stocking standards, cost data, and continuity of tenure
  - d) Effectiveness assessment, cost data, growth and yield implications, what stock types to plant
2. Survey respondents felt that they had enough information on silvicultural techniques to manage stands for biomass and forest carbon sequestration.
  - a) True
  - b) False
3. The top three professional information sources, in likelihood of use, were:
  - a) Colleagues in their organization, colleagues outside their organization, and extension specialists
  - b) Colleagues in their organization, colleagues outside their organization, and government researchers
  - c) Government researchers, colleagues in their organization, college or university researchers
  - d) Colleagues in their organization, colleagues outside their organization, and their mom

