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Newly Released SIBEC Estimates Offer Forest Managers Improved Accuracy and Precision

British Columbia's Biogeoclimatic Ecosystem Classification (BEC) system organizes our knowledge of ecosystems and provides a framework within which to manage forest resources. This classification system has served as a foundation for forest management decisions for more than 20 years. Since the 1990s, foresters and scientists recognized that correlating BEC site factor information with measures of site productivity, or site index (SI), would greatly enhance our ability to manage certain forest stands. Now, with the release of the updated site index by site unit SIBEC model estimates, forest managers have a valuable tool to improve silvicultural and timber supply decision making.

Why Is Site Index Important In Forest Management?

Site index is the most common measure of forest site productivity and forest growth used in British Columbia. These estimates of site productivity serve as an important baseline for forest-level planning and help to formulate silviculture strategies. They enable forest managers to predict forest stand growth and the yield of timber at harvest.

Site index allows the comparison of productive potential between sites across a broad range of existing stand conditions. As measures of site productivity, these estimates influence timber supply analyses and the Chief Forester's decisions on allowable annual cut. By enabling forest managers to predict the outcome of a particular forest practice, site index estimates are also important inputs to land-use decisions and analyses of silviculture investments.

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What Is The History Of The SIBEC Project?
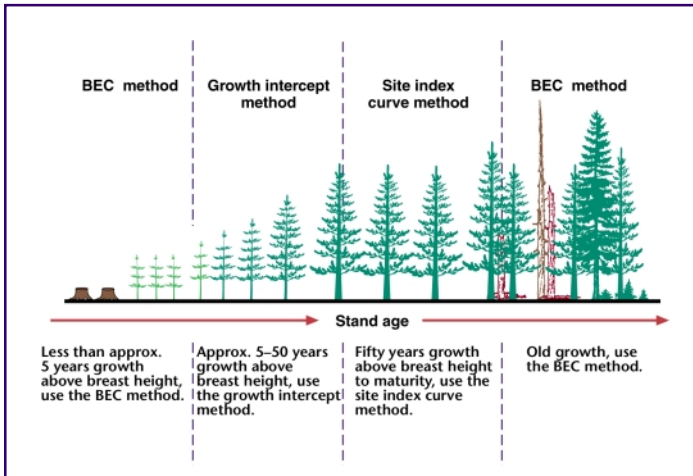
The use of the BEC method is appropriate for very young stands, very old stands, and uneven-aged stands, provided that a correct site identification of the area can be obtained. This method is also preferred for stands with significant forest health problems.

The SIBEC project was initiated to develop a comprehensive, indirect method of estimating site index in stands where direct determination of potential productivity was not possible.

The provincial SIBEC database was initially compiled in 1994–5, and the first approximation estimates of site index for BEC site series and species combinations were completed and published in 1997. At that time, the model developers realized that the accuracy and precision of these estimates would improve over time through a process of continued data acquisition and refinements to the analysis tools.

The newly released second approximation of the SIBEC model (2002) represents a complete revision of the data collection standards and a redesign of the analysis tools, providing improved estimates for more BEC site series/species combinations.

What Is The Relationship Between Site Index And Site Factors?

Tree growth is influenced by various site factors which, taken together, determine the site's quality. These growth, or site, factors include climate (light and temperature) and soil moisture, nutrients, and aeration. In general, site index, is greatest on moist sites and increases with soil fertility.

Each cell on an edatopic grid represents a group of sites with a very narrow range in soil moisture and nutrient conditions. Under any soil nutrient conditions, the site index of most species generally increases from very dry to moist sites and then decreases from moist to wet sites. Under any soil moisture conditions, site index generally increases from very poor through very rich sites. This general trend is demonstrated here for western hemlock (Hw).

Site Series

01 HwBa–Blueberry
02 HwPl–Cladina
03 HwCw–Salal
04 CwHw–Swordfern
05 BaCw–Foamflower
06 HwBa–Deer fern
07 BaCw–Salmonberry
08 BaSs–Devil's club
13 Pl–Sphagnum
14 CwSs–Skunk cabbage

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SITE INDEX ESTIMATES BY SITE SERIES:
Second Approximation Estimates For Tree Species In British Columbia

The second approximation estimates of site index by site series are presented in tabular form in two reports, with an accompanying Web guide [*www.for.gov.bc.ca/research/SIBEC*].

This guide:

- explains the basics of site index and the general relationships between site index and site factors;
- provides a summary of the methods used to generate the site index estimates presented in the two reports;
- outlines the content and format of the report tables; and
- describes how to use the tabular information presented in each report to estimate site index in the field.

The Web guide also contains a site index species conversion table for mixed species stands, and provides a listing of additional references, resources, and important contacts.

The first "Site Index-Site Unit Report by Region" compiles site index estimates by biogeoclimatic unit for each forest region. The second "Site Index-Site Unit Report by Biogeoclimatic Unit" displays site index estimates by site series for each biogeoclimatic subzone/variant. The site series data summary provided in each report includes tree species abbreviations, sample size, mean site index, and associated standard error. Both reports are available in PDF format and as a downloadable Microsoft Excel file.

BGC Unit	Site Series	Site Association	Site Series Summary			
			Species	Sample Size	Mean Site Index	Standard Error
ESSFwc1	01	Bl - Rhododendron - Oak fern	Bl	15	19.8	0.8
ESSFwc1	01	Bl - Rhododendron - Oak fern	Cw		15.0	
ESSFwc1	01	Bl - Rhododendron - Oak fern	Hw		15.0	
ESSFwc1	01	Bl - Rhododendron - Oak fern	Pl	14	20.5	0.4
ESSFwc1	01	Bl - Rhododendron - Oak fern	Se	19	20.2	1.2
ESSFwc1	02	Bl - Falsebox - Grouseberry	Bl	28	17.3	0.7
ESSFwc1	02	Bl - Falsebox - Grouseberry	Pl	27	17.8	0.6
ESSFwc1	02	Bl - Falsebox - Grouseberry	Se		15.0	
ESSFwc1	03	Bl - Devil's club - Lady fern	Bl	15	19.7	0.5
ESSFwc1	03	Bl - Devil's club - Lady fern	Cw		15.0	

Tabular format of the Site Index–Site Unit Report by Biogeoclimatic Unit

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What Are The Main Differences Between The First And The Second Approximation Estimates?

- **IMPROVED ACCURACY:** The second approximation site index estimates are obtained through the addition of new data collected following the revised SIBEC data and sampling standards. Approximately 2200 new records have been added to the data warehouse in the last 5 years. Previously collected data were also reviewed, and those data not adequately meeting the current collection and sampling standards were removed from the database.

- **INCREASED PRECISION:** Where a given tree species is present within the site series, a site index point estimate is given along with its associated standard error and the number of sample plots on which the site index data are based. For some site series, the estimates did not achieve the desired level of precision and these are reported as site index class midpoints. Therefore, the estimates provided are a mix of second approximation point estimates and first approximation site index class estimates.

- **EXPANDED COVERAGE:** Site index estimates for some hardwood tree species are also included.

As new data are added to the provincial data warehouse, these second approximation estimates will be revised. To contribute data to the provincial SIBEC data warehouse, please contact the SIBEC Administrator (Shirley.Mah@gems8.gov.bc.ca), B.C. Ministry of Forests.

For SIBEC data collection standards, see the Site Productivity Working Group's SIBEC Sampling and Data Standards (Version 5.1).

To view or download the updated site index by site unit estimates and accompanying Web guide, please visit the SIBEC Web site:

http://www.for.gov.bc.ca/research/SIBEC

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