Appendix VI:
TREE RING DATING OF EAGLE LAKE ARCHAEOLOGICAL SAMPLES

Marion L. Parker
(Edited by R.G. Matson)

The archaeological tree-ring samples analyzed in this study were collected as part of The Eagle Lake Project conducted by the University of British Columbia. The excavation sites are in the Eagle Lake (also known as Choelquoit Lake) area and the project was directed by R.G. Matson. Two reports (Magne and Matson 1984; Matson et al. 1980) and Chapter 1 of the main text describes the archaeology of the area and included in Matson et al. (1980) is a useful description of the natural and cultural environment by Deanna Ludowicz.

Of the 40 archaeological tree-ring samples, all are lodgepole pine (Pinus contorta Dougl.) except for one hardwood sample. Although the samples generally appeared to be of poor quality for dendrochronological analysis, dates were obtained from 12 of them. This demonstrates that lodgepole pine can be used for tree-ring dating and that trees growing in the Eagle Lake area produce ring series that are sensitive enough for dendrochronological studies.

Douglas fir (Pseudotsuga menziesii (Mirb.) Franco) and lodgepole pine samples were taken to provide a “living-tree” chronology for crossdating with the archaeological tree-ring material. These samples are 5 mm increment cores from living trees and cross-sectional disks from recently cut trees and windfalls. One Douglas fir windfall provided a chronology extending back to 1380 AD. The lodgepole pine chronology derived from trees at Goosenob Lake proved to he most useful for crossdating with the archaeological samples.

Methods

Although the main method used in dating was the comparison of measured ring widths, ring density was visually observed and used to find or verify crossdating. The annual ring widths of both the living trees and the archaeological samples were measured with an eyepiece micrometer used in a low-power binocular microscope.

The methods used to remove growth trends and summarize the ring series are described by Parker et al. (1981). The tree-ring indices used in this report are of “C” type, i.e., a digital filter is used to remove all fluctuations greater than 10 years in length and accentuate the year to year variations. To verify the dating, tree-ring chronologies from other areas were compared with the Eagle Lake data. If these chronologies were not already of the “C” type, they were converted to that form by running them through the digital filter standardizing procedure.

In almost all tree-ring dating that has been done in Canada, a computer crossdating technique has been used (Parker 1967, 1970; Parker et al. 1983, 1984). This method uses correlation and computer techniques to find the best crossdating fit (or establish if there is crossdating) between a dated tree-ring series and an undated tree-ring series. If crossdating is considered to be present between two ring series, that crossdating can be objectively
measured and verified by this computer dating program, known as the Shifting Unit Dating Program (SUDP). SUDP was used to find cross-dating between the archaeological tree-ring composite chronologies and the living-tree chronologies in this study.

Analysis of the Archaeological Tree-Ring Samples
The archaeological tree-ring samples submitted for analysis in 1983 consist of charcoal and rotten wood excavated from EkSa 36 (Figure VI-1, Figure VI-2b) and EkSa 32, and a cross-sectional disk from a fairly well-preserved beam from Lingfield Creek Lodge (Figure VI-2a, c, d). Tree-ring dates ranging from cutting dates of 1851 to 1877, were obtained for 11 of the 35 samples from EkSa 36. The wood sample from Lingfield Creek Lodge dated at 1890 with a very variable outside surface. The four charcoal samples from EkSa 32 are very fragmentary and none contained enough annual rings to provide a tree-ring date. Data for the dated samples are presented (Table VI-1) to assist in the evaluation of why dates were obtained from some samples but not others.

The twelve archaeological tree-ring samples dated are generally not very well preserved and contain short ring series. However, the reliability of these dates is illustrated (Figures VI-3,-14) by computer crossdating and by comparison of broken-line plots of ring-width indices.

The procedure used to obtain the dates in this case is as follows:

1. All samples were examined under a low-power binocular microscope and those that showed any possible chance of being dated were selected for further study.

2. As each sample was examined, it was prepared by sanding (in the case of wood) or with a scalpel or razor blade (in the case of charcoal).

3. Using both ring density and ring width, crossdating was observed under the microscope, for eight samples from EkSa 36, i.e., the tree-ring patterns of width and density for any one matched all of the other seven, but calendar year dates were not known at that time.

4. Arbitrary dates were assigned and ring widths were measured.

5. Arbitrary dates were assigned also to the annual rings of the Lingfield Creek Lodge samples and its ring series was measured.

6. The ring series were standardized and ringwidth indices of the “C” type (Parker et al. 1981) were produced for all of these samples.

7. A composite chronology was built from ring series of five of the eight EkSa 36 samples.

8. Using the Shifting Unit Dating Program (SUDP), this five tree composite was crossdated with the Lingfield Creek Lodge sample.
Figure VI-1.  a. Preparing a tree-ring sample for removal from an excavation unit at EkSa 36.

b. An excavated roasting pit (Feature D) at EkSa 36.
Figure VI-2.  

a. A cross-sectional disk of a construction beam from Lingfield Creek lodge. Ring-width measurements were made of three radial blocks sawn from this disk.

b. A example of good-quality archaeological sample excavated from EkSa 36. This sample (Dendro 30) consists of both charcoal and wood.

c. A 5 mm core from a living lodgepole pine tree growing near the roasting pit shown in Figure VI-1b, is resting on the disk from Lingfield Creek lodge. The arrows mark the annual rings formed in 1840 and 1850 and the crossdating between these two samples for that decade is apparent for both width and density.

d. The arrow points to a fire scar on the Lingfield Creek lodge disk. The annual ring damaged by fire was formed in 1811.
<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Tree-Ring Date</th>
<th>Provenience and Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dendro 11</td>
<td>1822+p – 1873B</td>
<td>Unit 21, Layer B2; Mostly dirt; shell of charcoal and rotten wood; pith present; small rings; probably limb: 16 cm long, 5 cm wide.</td>
</tr>
<tr>
<td>Dendro 29</td>
<td>1817+p – 1860v inc.</td>
<td>Feature H, Unit 27, Layer B1; Rotten wood and large rings on inside of sample, charcoal and small rings on outside; small rings difficult to count; pith present; 39 cm long, 7 cm wide.</td>
</tr>
<tr>
<td>Dendro 30</td>
<td>1832p – 1877B</td>
<td>Feature H, Unit 27, Layer B1; Fairly well preserved; pith present; 29 cm long, 8 cm wide.</td>
</tr>
<tr>
<td>Dendro 31</td>
<td>1848+p – 1877r</td>
<td>Feature H, Unit 27, Layer B1; Pith present; 43 cm long, 8 cm wide.</td>
</tr>
<tr>
<td>Dendro 33</td>
<td>1822+p – 1877rB</td>
<td>Feature H, Unit 29, Layer B1; Much dirt; very fragmentary; 19 cm long, 7 cm wide.</td>
</tr>
<tr>
<td>Dendro 35</td>
<td>1832+p – 1877r</td>
<td>Feature H, Unit 29, Layer B1; Very fragile; good chronology; pith present; 19 cm long, 7 cm wide.</td>
</tr>
<tr>
<td>Dendro 54</td>
<td>1823 inc. – 1851B inc.</td>
<td>Unit 32, Layer B3; Consists of wood, rotten wood and charcoal; bark present; 7 cm long, 5 cm wide.</td>
</tr>
<tr>
<td>Dendro 72</td>
<td>1823+p – 1851vv</td>
<td>Unit 40, Layer B3; Charcoal and rotten wood; pith present; 18.5 cm long, 8 cm wide.</td>
</tr>
<tr>
<td>Dendro 77</td>
<td>1830 inc. – 1877+vv</td>
<td>Unit 45, Layer B3; Mostly dirt with thin shell of charcoal and rotten wood. Small but complacent rings; measured to 1865, ring count to 1877; 27 cm long, 11 cm wide.</td>
</tr>
<tr>
<td>Dendro 93</td>
<td>1848 inc. – 1877rB</td>
<td>Unit 57, Layer B3; Mostly dirt; flat grain; not completely charred; 29 cm long, 12 cm wide.</td>
</tr>
<tr>
<td>Dendro 96</td>
<td>1813 inc. – 1858+vv</td>
<td>Unit 59, Layer BF; Charcoal and wood; about 25 rings in charcoal and an unknown number in rotten wood; 7.5 cm long, 4 cm wide.</td>
</tr>
</tbody>
</table>

Table VI-1. Dated tree-ring samples from EkSa36, the Bear Lake site.
9. Using SUDP again, the Lingsfield Creek Lodge ring series was crossdated with a living-
tree lodgepole pine chronology derived from trees located near Goosenob Lake which is near
the EkSa 36 site.

10. The dating of the five samples from EkSa 36 and the Lingsfield Creek Lodge sample
was verified by a number of computer cross dating runs, using different combinations of
archaeological tree-ring chronologies and comparing them with various living-tree
chronologies derived from trees in the Eagle Lake area and other sites in the British Columbia
Interior. Both broken line plot comparison and computer crossdating were used at this point.

11. The ring widths were measured on all other potentially useful samples and their
ring series were compared with the various dated chronologies.

12. Some additional dates were obtained for a total of eleven from EkSa 36 plus the
Lingsfield Creek Lodge sample (Figures VI-3, -14).

Further verification of the dating of the twelve archaeological tree-ring samples was
accomplished by crossdating the EkSa 36 11 tree summary, the Lingsfield Creek Lodge sample
and the 12 tree archaeological summary with a number of living-tree master chronologies
from the British Columbia Interior. The broken-line plot comparison of this is shown in
Figure VI-15.

**Summary and Conclusions**

Forty archaeological tree-ring samples from three sites in the Eagle Lake area were examined.
Twelve tree-ring dates were obtained and this represents virtually all of the samples that are of
dateable quality. Living-tree chronologies were built for lodgepole pine and Douglas fir.

Observations and conclusions are:

1. Lodgepole pine can be used for tree-ring dating.

2. Trees growing in the Eagle Lake area are of adequate quality for dendrochronological
purposes.

3. The archaeological tree-ring samples excavated are almost exclusively lodgepole pine.

4. Charcoal is much better preserved than wood at these open sites.

5. Samples treated with paraffin and gasoline were much better preserved than the
untreated ones.

6. Both ring width and ring density are useful for cross-dating purposes.

7. Some Douglas fir trees live to be at least 600 years old in the area.
Figures VI-3,-14. Presented in these figures are: (1) the results of the Shifting Unit Dating Program (SUOP); (2) the cross correlation value \( r \) of the 1st, 2nd, and 3rd best fit in bargraph form; (3) a photograph of the archaeological tree-ring samples; and (4) a brokenline plot comparison of the individual sample compared with the composite chronology. In each of the twelve cases, an individual dated tree ring sample is compared with a summary of the twelve dated archaeological samples. The unit length used on SUDP was made equal to the length of measured ring width series of the individual sample; therefore, only one line of output is obtained. Each sample dated at the expected place with a high correlation.

The symbols used with the inside dates are:

- **year**
  - no pith ring present.
- **p**
  - pith ring present.
- **+p**
  - pith ring present, but due to the difficult nature of the ring series near the center of the specimen, an exact date cannot be assigned to it. The date is obtained by counting back from the earliest dated ring.
- **+**
  - the innermost ring is not the pith ring and an absolute date cannot be assigned to it. A ring count is involved.

The symbols used with the outside date are:

- **B**
  - bark present
- **c**
  - the outermost ring is continuous around the full circumference of the specimen. This symbol is used only if a full section is present.
- **r**
  - less than a full section is present, but the outermost ring is continuous around available circumference.
- **v**
  - a subjective judgement that, although there is no direct evidence of the true outside on the specimen, the date is within a very few years of being a cutting date.
- **vv**
  - there is no way of estimating how far the last ring is from the true outside.
- **+**
  - the nature of the dating is such that one or more rings may be missing near the end of the ring series. The presence or absence of rings cannot be determined because the specimen does not contain enough additional rings to provide an adequate check.
- **++**
  - a ring count was necessary due to the fact that beyond a certain point the specimen could not be dated.

The symbols **B**, **c** and **r** indicate cutting dates in order of decreasing confidence, unless a **+** or **++** is also present.

The abbreviations used for the tree species are:

- **DF**
  - Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco)
- **Lpp**
  - Lodgepole pine (*Pinus contorta* Dougl.)
Figure VI-3. Dendro 11.

Master Series: Eagle Lake Archaeological–12-Tree Summary
  Number of Ring Years = 79
  Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 11 EkSa 36 – Filter
  Number of values = 34
  Interval (Arbitrary) = 1840 -1872

Unit length = 34  Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master</th>
<th>Correlation of Undated Series unit with Best-fit Master unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1873</td>
<td>1873 1879 1885</td>
<td>0.775 0.350 0.305</td>
</tr>
</tbody>
</table>
Figure VI-4. Dendro 29.

Master Series: Eagle Lake Archaeological–12-Tree Summary
Number of Ring Years = 79
Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 29 EkSa 36 – Filter
Number of values = 39
Interval (Arbitrary) = 1821-1859

Unit length = 39  Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master First</th>
<th>Second</th>
<th>Third</th>
<th>Correlation of Undated Series unit with Best-fit Master unit First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1859</td>
<td>1859</td>
<td>1849</td>
<td>1886</td>
<td>0.841</td>
<td>0.324</td>
<td>0.240</td>
</tr>
</tbody>
</table>
Figure VI-5. Dendro 30.

Master Series: Eagle Lake Archaeological–12-Tree Summary
   Number of Ring Years = 79
   Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 30  EkSa 36 – Filter
   Number of values = 45
   Interval (Arbitrary) = 1833 -1877

Unit length = 45  Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master</th>
<th>Correlation of Undated Series unit with Best-fit Master unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1877</td>
<td>1877 1861 1871</td>
<td>0.810 0.310 0.282</td>
</tr>
</tbody>
</table>
Figure VI-6. Dendro 31.

Master Series: Eagle Lake Archaeological–12-Tree Summary
Number of Ring Years = 79
Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 31 EkSa 36 – Filter
Number of values = 29
Interval (Arbitrary) = 1849 -1877

Unit length = 29  Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master First</th>
<th>Second</th>
<th>Third</th>
<th>Correlation of Undated Series unit with Best-fit Master unit First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1877</td>
<td>1877</td>
<td>1850</td>
<td>1845</td>
<td>0.852</td>
<td>0.460</td>
<td>0.396</td>
</tr>
</tbody>
</table>
Figure VI-7. Dendro 33.

Master Series: Eagle Lake Archaeological–12-Tree Summary
Number of Ring Years = 79
Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 33  EkSa 36 – Filtered Summary
Number of values = 30
Interval (Arbitrary) = 1848 -1877

Unit length = 30   Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated Series unit</th>
<th>Last Ring-Year of Best-Fit on Master Series unit</th>
<th>Correlation of Undated Series unit with Best-fit Master unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1877</td>
<td>1877</td>
<td>0.695 0.405 0.294</td>
</tr>
<tr>
<td></td>
<td>1845</td>
<td>1855</td>
<td></td>
</tr>
</tbody>
</table>
Figure VI-8. Dendro 35.

Master Series: Eagle Lake Archaeological–12-Tree Summary
Number of Ring Years = 79
Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 35 EkSa 36 – Filtered Summary
Number of values = 43
Interval (Arbitrary) = 1835 -1877

Unit length = 43   Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated Series unit</th>
<th>Last Ring-Year of Best-Fit on Master First</th>
<th>Last Ring-Year of Best-Fit on Master Second</th>
<th>Last Ring-Year of Best-Fit on Master Third</th>
<th>Correlation of Undated Series unit with Best-fit Master unit First</th>
<th>Correlation of Undated Series unit with Best-fit Master unit Second</th>
<th>Correlation of Undated Series unit with Best-fit Master unit Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1877</td>
<td>1877</td>
<td>1861</td>
<td>1871</td>
<td>0.832</td>
<td>0.406</td>
<td>0.346</td>
</tr>
</tbody>
</table>
Figure VI-9. Dendro 54.

Master Series: Eagle Lake Archaeological–12-Tree Summary
Number of Ring Years = 79
Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 54 EkSa 36 – Filtered Summary
Number of values = 27
Interval (Arbitrary) = 1824 -1850

Unit length = 27  Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master First</th>
<th>Last Ring-Year of Best-Fit on Master Second</th>
<th>Last Ring-Year of Best-Fit on Master Third</th>
<th>Correlation of Undated Series unit with Best-fit Master unit First</th>
<th>Correlation of Undated Series unit with Best-fit Master unit Second</th>
<th>Correlation of Undated Series unit with Best-fit Master unit Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1850</td>
<td>1850</td>
<td>1882</td>
<td>1877</td>
<td>0.821</td>
<td>0.499</td>
<td>0.441</td>
</tr>
</tbody>
</table>
Figure VI-10. Dendro 72.

Master Series: Eagle Lake Archaeological-12-Tree Summary
Number of Ring Years = 79
Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 72 EkSa 36 – Filtered Summary
Number of values = 25
Interval (Arbitrary) = 1825 -1849

Unit length = 25  Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master First</th>
<th>Second</th>
<th>Third</th>
<th>Correlation of Undated Series unit with Best-fit Master unit First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1849</td>
<td>1849</td>
<td>1859</td>
<td>1842</td>
<td>0.779</td>
<td>0.333</td>
<td>0.322</td>
</tr>
</tbody>
</table>
Figure VI-11. Dendro 77.

Master Series: Eagle Lake Archaeological–12-Tree Summary
   Number of Ring Years = 79
   Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 77 EkSa 36 – Filtered Summary
   Number of values = 35
   Interval (Arbitrary) = 1831 -1865

Unit length = 35 Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master First</th>
<th>Second</th>
<th>Third</th>
<th>Correlation of Undated Series unit with Best-fit Master unit First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1865</td>
<td>1865</td>
<td>1874</td>
<td>1847</td>
<td>0.479</td>
<td>0.272</td>
<td>0.240</td>
</tr>
</tbody>
</table>

The ring series of Dendro 77 is of poorer quality (more complacent) than the others but the match is good enough to accept.
Figure VI-12. Dendro 93.

Master Series: Eagle Lake Archaeological–12-Tree Summary
   Number of Ring Years = 79
   Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 93  EkSa 36 – Filtered Summary
   Number of values = 29
   Interval (Arbitrary) = 1849 -1877

Unit length = 29  Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master First</th>
<th>Second</th>
<th>Third</th>
<th>Correlation of Undated Series unit with Best-fit Master unit First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1877</td>
<td>1877</td>
<td>1845</td>
<td>1855</td>
<td>0.809</td>
<td>0.355</td>
<td>0.350</td>
</tr>
</tbody>
</table>
Figure VI-13. Dendro 96.

Master Series: Eagle Lake Archaeological–12-Tree Summary
Number of Ring Years = 79
Dated Interval = 1809 - 1887

Undated Series: Eagle Lake Archaeological – Dendro 96  EkSa 36 – Filtered Summary
Number of values = 43
Interval (Arbitrary) = 1814 -1856

Unit length = 43    Increment = 1

| Un dated | Last Ring | Last Ring-Year of Best-Fit on Master Correlation of Undated Series unit with Best-fit Master unit |
|----------|-----------|-----------------------------------------------|--------------------------------------------------------------------------------------------------|
| Series unit | on Undated series unit | First | Second | Third | First | Second | Third |
| 1 | 1856 | 1856 | 1866 | 1872 | 0.776 | 0.422 | 0.376 |
Master Series: Eagle Lake Archaeological-12-Tree Summary
Number of Ring Years = 79
Dated Interval = 1809 - 1887

Undated Series: Lingfield Creek Lodge - Shortened Interval - Filtered Summary
Number of values = 64
Interval (Arbitrary) = 1814 -1877

Unit length = 64  Increment = 1

<table>
<thead>
<tr>
<th>Undated Series unit</th>
<th>Last Ring on Undated series unit</th>
<th>Last Ring-Year of Best-Fit on Master</th>
<th>Correlation of Undated Series unit with Best-fit Master unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1877</td>
<td>1877 1887 1875</td>
<td>0.701 0.151 0.142</td>
</tr>
</tbody>
</table>

The ring series of the Lingfield Creek Lodge sample was compared with the composite chronology for the years 1814-1877, although the sample was actually measured to 1887. This was done so that the correlation comparison would be more comparable to those of the other samples. A ring count was made on this disk from 1887 to 1890 for a date of 1890 vv inc.
9. Using SUDP again, the Lingfield Creek Lodge ring series was crossdated with a living-
tree lodgepole pine chronology derived from trees located near Goosenob Lake which is near
the EkSa 36 site.

10. The dating of the five samples from EkSa 36 and the Lingfield Creek Lodge sample
was verified by a number of computer cross dating runs, using different combinations of
archaeological tree-ring chronologies and comparing them with various living-tree
chronologies derived from trees in the Eagle Lake area and other sites in the British Columbia
Interior. Both broken line plot comparison and computer crossdating were used at this point.

11. The ring widths were measured on all other potentially useful samples and their
ring series were compared with the various dated chronologies.

12. Some additional dates were obtained for a total of eleven from EkSa 36 plus the
Lingfield Creek Lodge sample (Figures VI-3, -14).

Further verification of the dating of the twelve archaeological tree-ring samples was
accomplished by crossdating the EkSa 36 11 tree summary, the Lingfield Creek Lodge sample
and the 12 tree archaeological summary with a number of living-tree master chronologies
from the British Columbia Interior. The broken-line plot comparison of this is shown in
Figure VI-15.

Summary and Conclusions
Forty archaeological tree-ring samples from three sites in the Eagle Lake area were examined.
Twelve tree-ring dates were obtained and this represents virtually all of the samples that are of
dateable quality. Living-tree chronologies were built for lodgepole pine and Douglas fir.

Observations and conclusions are:

1. Lodgepole pine can be used for tree-ring dating.

2. Trees growing in the Eagle Lake area are of adequate quality for dendrochronological
purposes.

3. The archaeological tree-ring samples excavated are almost exclusively lodgepole pine.

4. Charcoal is much better preserved than wood at these open sites.

5. Samples treated with paraffin and gasoline were much better preserved than the
untreated ones.

6. Both ring width and ring density are useful for cross-dating purposes.
Figure VI-15. Broken-line plots of two archaeological tree-ring chronologies (EkSa 36 and Lingsfield Creek lodge) with four living tree chronologies. (Details of living tree chronologies are reported elsewhere.)
7. Some Douglas fir trees live to be at least 600 years old in the area.

8. Douglas fir trees generally live to be much older than lodgepole pine trees.

9. Dates were obtained from about one third of the samples examined.

10. Almost all of the undated samples were not of dateable quality because they contained too few rings.

11. Although many of the samples collected are of poor dendrochronological quality, the quality of the samples cannot be assessed easily in the field without damaging them. For this reason, almost all samples excavated should be submitted for dendrochronological analysis and saved or discarded by the dendrochronologist in the laboratory.

12. Tree-ring dates range from cutting dates of 1851 to 1877 for samples from EkSa 36.

13. The most common cutting date for EkSa 36 samples is 1877.

14. The Lingfield Creek Lodge beam dated at 1890 is incomplete.

15. None of the four samples from EkSa 32 was of dateable quality.

16. Dating techniques used were visual comparison, broken-line plot comparison of ring-width indices, and computer cross-dating.

17. The Lingfield Creek lodge sample matched well with samples from living lodgepole pine trees.

18. The annual ring formed in 1811 on the Lingfield Creek lodge beam was damaged by a fire.

19. The summary chronologies of the Eagle Lake archaeological samples cross-date well with the living-tree chronologies in that area and crossdating with other more distant areas can be realized if computer crossdating is used.

20. Cross correlation comparisons were made for many combinations of archaeological and living-tree chronologies. This provides a basis for evaluating crossdating between species, areas, and other variables.

21. Six new living-tree chronologies were built for the Eagle Lake area. This furnishes a foundation for future tree-ring dating in the area and adjacent regions.
ACKNOWLEDGEMENTS
I would like to thank R.G. Matson for organizing this study and assisting in the
dendrochronological field work and laboratory analysis. Marty Magne and other members of
Matson’s crew gave me assistance in collecting tree-ring samples and providing facilities for
the laboratory work. Benjamin Parker helped with the field work and Harold Sininons
assisted in sample preparation. Randy Bruce provided the required computer programming.
Tree species identification of the archaeological samples was done by Stan Rowe. Kim Lucas
and Diane Schram are the two people who assisted most in the processing of the tree-ring
samples and in manuscript preparation.
REFERENCES CITED

Matson, R.G., M. Magne, D. Ludowicz, and D.L. Pokotylo.
1980 The Eagle Lake Project; Report on the 1979 Season. Final Report to
S.S.H.R.C., Laboratory of Archaeology, University of British Columbia, Vancouver.

Parker, Marion L.
1967 *Dendrochronology of Point of Pines.* Unpublished Master’s thesis,
Department of Anthropology, University of Arizona, Tucson

1970 Dendrochronological techniques used by the Geological Survey of Canada.
In *Tree Ring Analysis with Special Reference to Northwest America;*
edited by J.H.G. Smith and John Worrall. University of British Columbia Faculty
of Forestry Bull. 7. pp. 56-66. (Also published in 1971 as Geological Survey of
Canada Paper 71-25; 30 pp.)

1984 Tree-Ring Dating of the Cabin behind Hat Creek House.
Contract report to: British Columbia Heritage Trust. 19 pp. plus Appendices.

1983 Tree-Ring Dating of Driftwood from Raised Beaches on the Hudson Bay Coast.
*Climatic Change in Canada* 3, edited by C.R. Harington, pp. 220-272
*Syllogeus,* No. 49. National Museum of Natural Sciences, National Museums of
Canada, Ottawa

Parker, M.L., R.D. Bruce, and L.A. Jezas
18 pp.

Parker, M.L., L.A. Jozsa, Sandra C. Johnston, and Paul A. Bramball
1981 Dendrochronological studies on the coasts of James Hay and Hudson Bay.
No. 33. National Museum of Natural Sciences, National Museums of Canada,
Ottawa.

In press. Tree-ring dating in Canada and the Northwestern United States. Paper
Departmen. of Geography, York University, Toronto, Ontario, Canada. 11 pp.

Schulman, Edmund
1956 *Dendroclimatic Changes in Semiarid America.*
University of Arizona Press, Tucson.
Stokes, M.A., Linda Drew, and C.W. Stockton
1973 *Tree-Ring Chronologies of Western America. 1. Selected Tree-Ring Stations.*
  *Chronology Series. 1.* Laboratory of Tree-Ring Research, University of Arizona, Tucson.