Douglas-fir log prices – a comparison of recent Otago/Southland prices vs. historical US Pacific Northwest data

Harold Heath

Abstract

Douglas-fir log price information is not readily available in New Zealand. Long term price trends from the United States Pacific Northwest (PNW) have been regularly used for analysis of forest investments and valuations. Care has to be taken when assessing the PNW information because it is in a board foot measure that has a variable translation into New Zealand cubic metre prices dependent upon log diameter in particular. Falling log sizes in the PNW over the last 30 years means that the upwards trends seen in the US log price information ($US/MBF) are misleading. When translated into cubic metres, $US denominated, inflation adjusted prices (for log grades that are broadly comparable to Otago/Southland grades) have trended down over the last 30 years. When converted into NZ$/m^3, prices for PNW grades have shown a fairly flat overall trend but with considerable volatility. By comparison, Douglas-fir log prices in the Otago/Southland wood supply region have been quite constant over the last 12 years.

Introduction

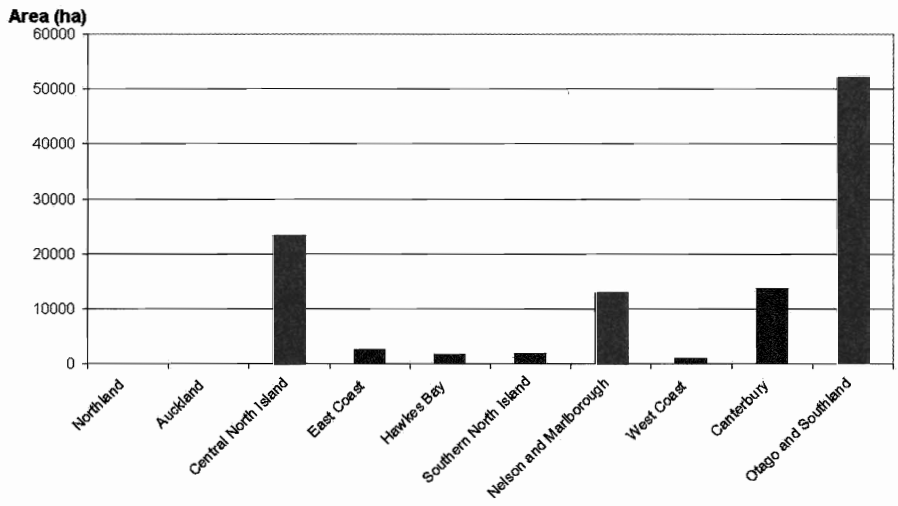
Douglas-fir is an important component of the Otago/Southland wood supply region's plantation estate. Official data for 2003 showed that the region had more than 52,000 ha of a total national estate of 109,000 ha (Fig. 1) or 48% of the national total (MAF 2004). In the last 5 years, the estate grew by 28,000 ha which was 74% of the national figure for Douglas-fir new planting. Douglas-fir represents 24% of the regional plantation estate, a proportion that is likely to increase in the future.

Because of the significance of the Douglas-fir component of the regional estate and the increasingly frequent calls for valuations of Douglas-fir forests, it is important to review the information on log prices for this species. There are no readily available surveys of Douglas-fir log prices in New Zealand, probably because it has not been an important component of the forest harvest until recently. Consequently, many valuers and forest investment promoters have used PNW data as the basis of their evaluation of the economics of Douglas-fir plantations.

I have been conducting an annual survey of Douglas-fir log prices from local forest owners since 1992. This data suggested that the New Zealand log prices were significantly different from those being used in investment prospectuses and other reports on Douglas-fir prospects. As a consequence, I undertook an analysis of readily available PNW information in an attempt to understand the differences that I was seeing.

* *NZIF Registered Forestry Consultant*
Email: hheath@xtra.co.nz

Fig. 1: Area planted in Douglas-fir by wood supply region (as at 1 April 2003). Source: MAF (2004).



Otago/Southland Log Price Data

I have log price data for Otago/Southland Douglas-fir in a mix of grades going back to 1992 (Fig. 2). The price point is for logs delivered at mill or to the port. The information comes from my own annual survey of the major local forest owners and/or sawmills. The oldest data is only for the S36 log sort which has a minimum small end diameter (sed) of 36 cm. Prices are also shown for the S20 grade (minimum sed of 20 cm). Data is from an annual survey only because the volumes being produced don't justify more frequent sampling of prices. Often the one price is fixed over the whole year. It is apparent from discussions with producers and log processors that the price levels in Otago/Southland have been stabilised

by producers controlling the level of cut.

To obtain longer term trends it has been necessary to look at data from the PNW. This has been the common approach of forest plantation developers seeking log price information to include in their prospectuses and forest valuers seeking to obtain data from a larger and more robust market than New Zealand.

PNW Log Price Information

Douglas-fir log prices are well reported and there are historical series going back more than 100 years. Fig. 3 is modified from Lutz (2002). It shows annual real ($2004) Douglas-fir log prices (all grades) since about 1890. The series is derived from data from the USFS, Washington DNR and Log Lines. Lutz ascribes the price rises and variability since 1950 to changes in government policy affecting supply.

PNW log prices are usually reported in $US/MBF. This measure is in thousands of board feet using the Scribner scaling system. Coastal Oregon and Washington use a simplified scaling system called Scribner Decimal C which essentially rounds to the nearest 10 board feet. There is also a "West Side / East Side" rule variation between coastal and inland scaling systems which differs in that logs are scaled in longer lengths on the PNW coast compared to the rest of the United States.

Fig. 2: Otago-Southland Douglas-fir at mill/wharf log prices (inflation adjusted). Units are NZ$/m³ ($2004)

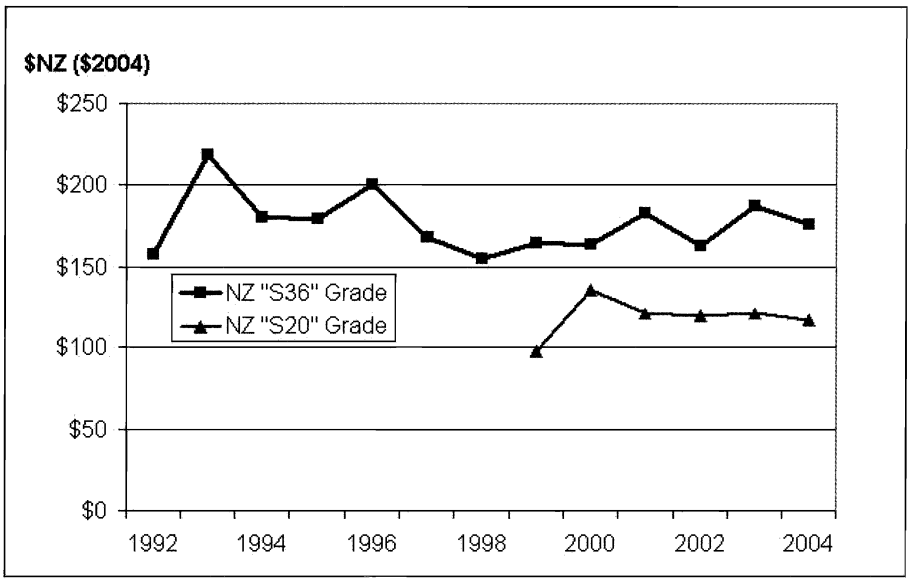
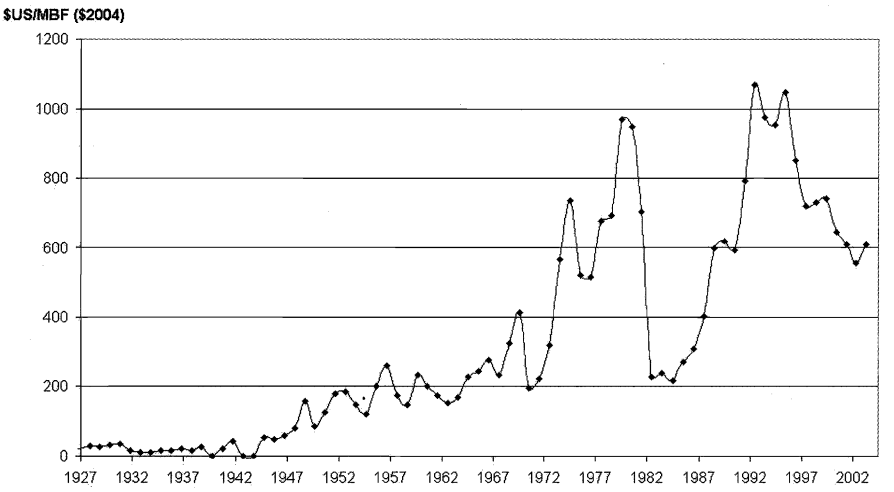


Fig. 3: PNW Douglas-fir log prices (inflation adjusted). Units are US$/MBF ($2004). Source: Lutz (2002).



The Scribner Log Scale

The Scribner log scale is described by Ellis (1994) and a table of factors is provided in the appendices to convert to cubic metres. These factors vary according to log diameter. The Scribner scale has been in use for a very long time. The best description that I have found is that provided by Bond (2004):

"J. M. Scribner developed the Scribner log rule in 1846. This rule is based on a series of diagrams outlining the sawing pattern for 1-inch lumber for each diameter and length class with a 1/4-inch allowance for saw kerf. Taper is not accounted for in the rule, so it under-estimates volumes for logs more than 16 feet in length. One disadvantage of this rule is that there is no uniform slab allowance for log diameters. A change was made to the basic Scribner rule in the early 1900s to make it easier to apply. This new rule is known as the Scribner Decimal C rule and is different from the standard Scribner rule in that all volumes are rounded to the nearest 10 board feet. For example, a log that scales 64 board feet would be rounded to 60 board feet. This rule is commonly used on the West Coast and in the South for pine saw logs. A formula which closely estimates the Scribner rule is

*Log Volume (bd. ft.) = (0.79D² - 2D - 4) *L/16*

where D is the diameter inside the bark measured in inches at the small end of the log and L is the nominal log length measured in feet."

This measuring system creates problems for people wishing to convert information from the United States into metric system measures. Spelter (2003) noted that:

"*Cubic volume scaling based on the metric system is almost universally practised in forestry. In the United States, the metric system was officially introduced in 1964, but many sectors, like logging, continue to use traditional measures. This leaves the United States, along with Liberia and Myanmar at last count, as the lone holdouts in a metric world. This leads to confusion and misunderstandings, and in an increasingly globalized economy, it saddles the United States with a self-inflicted disadvantage.*"

In actual fact the size and importance of the US timber market means that the confusion and disadvantage is shared with the rest of the world as well. The confusion is compounded by the publication and usage of fixed conversion factors to convert trade data. The most common factor in the literature is to multiply MBF (Scribner) by 4.52 or 4.53 (depending on source) to get cubic metres.

Table 1: Conversion factors (m^3/thousand board feet) reported by Spelter (2003).

	Theoretical gross	Empirical gross	Empirical net	Random lengths (1973)	Binek
Scribner					
Standard				4.53	4.53
Log diameter					
8 in.	7.34	8.30	8.44		
12 in.	6.18	6.27	6.51	5.6	
16 in.	5.07	5.24	5.51	4.7	
20 in.	4.31	4.70	4.99	4.3	
24 in.	4.15	4.39	4.70	4.1	
15 in.	4.42	4.66	4.99		3.90
International ¼ in					
Log diameter					
15 in.	3.87				3.48

Table 2: Sawlog sizes and conversion factors for Douglas-fir logs for Washington estimated by Spelter (2003).

	Diameter (inches)		Conversion factor (m^3/thousand board feet)	
Year	Coast	Interior	Coast	Interior
1970	22.1	16.2	4.81	4.84
1972	22.6	18.1	4.78	4.64
1974	21.8	18.0	4.83	4.66
1976	21.5	17.3	4.86	4.73
1978	20.2	17.8	4.97	4.67
1980	21.2	16.9	4.88	4.77
1982	18.1	15.3	5.20	4.96
1984	17.8	15.9	5.23	4.88
1986	17.9	16.0	5.22	4.86
1988	17.6	16.0	5.26	4.87
1990	15.6	12.6	5.58	5.35
1992	14.2	13.2	5.87	5.25
1996	11.8	11.1	6.60	6.64
1998	11.4	10.0	6.74	5.93

Scribner to Cubic Metre Conversion Factors

The conversion factors chosen to represent US log trade data have a major influence on the way in which the log price information is presented and used. Spelter (2003) compared theoretical and empirical board feet to cubic volume conversion factors with some published estimates (Table 1).

I have excluded superfluous detail and footnotes. The table is for illustrative purposes only. It clearly shows the range of factors in use and the potential for confusion. It also shows the inadequacy of the standard factors.

Spelter (2002) also conducted an analysis of sawmill surveys in Washington State and demonstrated that the conversion factors have changed over time. The change was due to the falling proportion of old growth logs. The surveys start in 1970 with a 56% share of old growth in the annual cut which had fallen to 4% by 1996. The average regional (coastal Washington) log diameter fell from 56.2cm to 29.8cm over the same period.

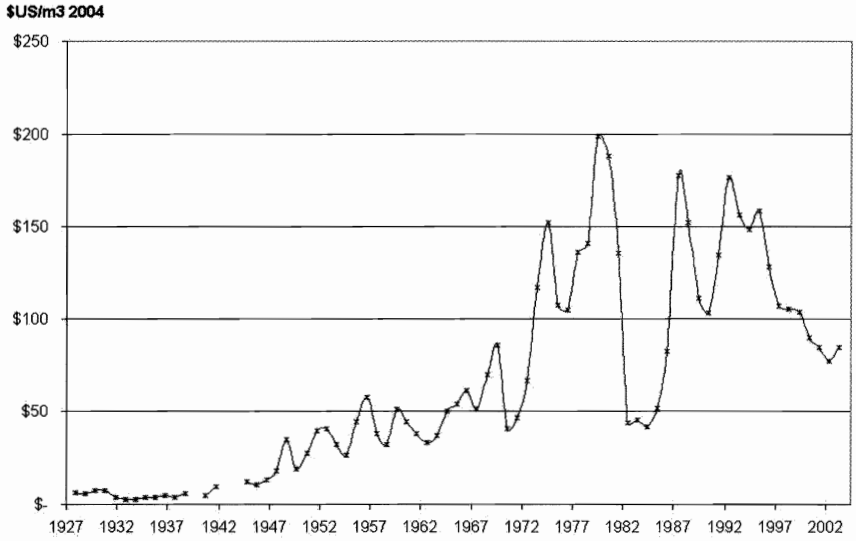
Application of Conversion Factors to Log Price information

Given the nature of the Scribner log scale and the changing nature of the Douglas-fir cut over time it is clear that an analysis is of long term log price trends needs to take this into account. The most useful information in this regard is from Spelter (2003) and is presented in Table 2. It shows estimated sawlog sizes and conversion factors for Douglas-fir logs for Washington.

Unfortunately, similar survey data does not appear to be readily available for the whole of the US.

However, the same trends, of falling old growth percentage and log size in Washington have generally occurred throughout the Douglas-fir producing states. Since the purpose of this paper

Fig. 4: PNW Douglas-fir log prices (inflation adjusted). Units are US$/m³ ($2004). Adapted from Lutz (2002).

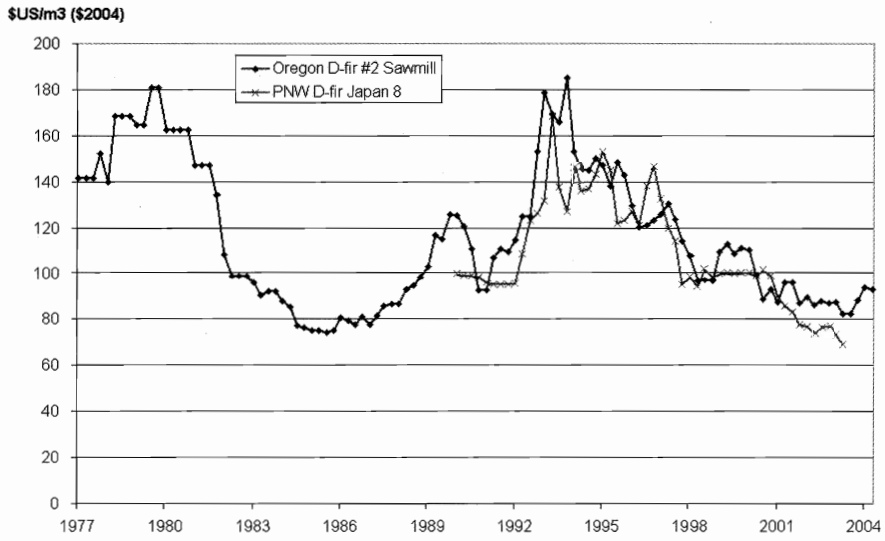


is to make general comparisons between price trends in the PNW compared to recent New Zealand information, I have made the assumption that the conversion factors derived by Spelter (2003) are relevant and can be applied to the aggregated data derived from Lutz (2002).

Fig 4. shows the price series of Lutz (2002) in US$/m3. Overall the impression is of steadily rising prices but the last 30 years has been more of a roller-coaster ride around a fairly flat trend.

Conversion factors for the export log trade are less difficult to identify as to general quantum if not specific values. This is because export logs are priced in diameter bands. The same is true for the log price information available from the Oregon Department of Forestry (ODF).

Fig. 5: PNW Douglas-fir log prices (inflation adjusted) for ODF #2 Sawmill grade and PNW Japan 8 grade. The latter is adapted from Lutz (2003). Units are US$/m³ ($2004).



Oregon Log Price Data

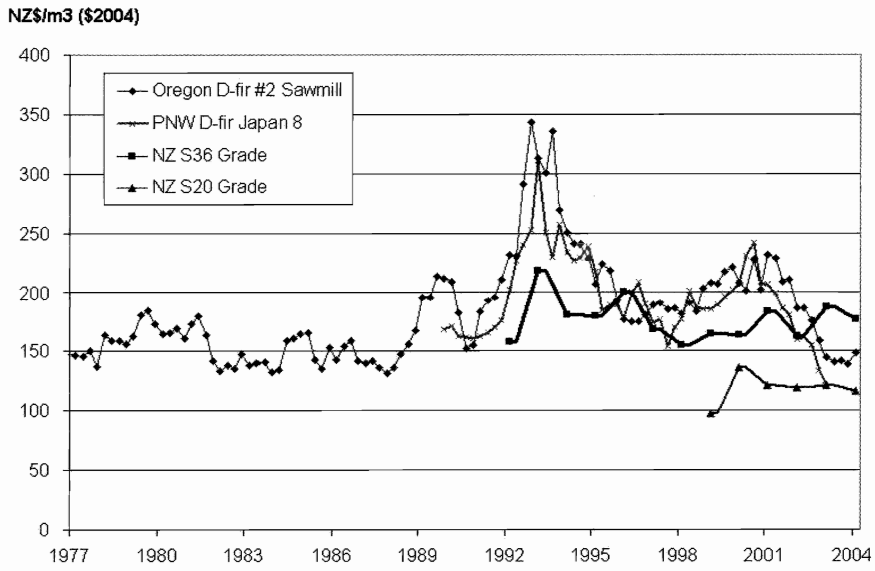
The most readily available relevant source of contemporary PNW log price information is the Oregon Department of Forestry. They have publicly available sales data going back to 1977. Coastal Oregon is also a good model for log price comparisons because log prices are regarded as most competitive there and are on average higher than those reported from either Washington State or British Colombia (Northwest Ecosystems Alliance 2001).

The Oregon log price data is very detailed as to log grades, numbers of quotes per grade and the regional log market. Log price are described as "pond" values, i.e. "what that log is worth floating in the mill's pond" (Corgan 2004). Data for the coastal regions (Regions 1, 2 & 3 in the ODF data base) were selected as relevant to PNW prices. The log grade chosen was that for which there were consistently the highest number of price quotes. This grade is #2 Sawmill Douglas-fir. The grade description supplied by Corgan (2004) is:

"Logs shall be suitable for the manufacture of (1) Construction and Better grades of lumber to an amount of not less than 65% of NET scale, or (2) B and Better or equivalent grades of lumber to an amount of not less than 25% of the NET scale. Such logs shall meet at least the following minimum exterior characteristics:
Gross Diameter - 12 inches.
Gross Length - 12 feet.
Minimum Volume - 60 board feet NET scale.
Surface - Sound, tight knots, not to exceed 2 ½" in diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery.
Slope of Grain - Not to exceed:
2" per foot on logs 12" through 20"
3" per foot on logs 21" through 35"
4" per foot on logs 36" through 50"
5" per foot on logs 51" through and over."

This grade description is similar to that of the most

Fig. 6: Log prices (inflation adjusted) for PNW log grades (ODF #2 Sawmill grade and PNW Japan 8 grade) and Otago/Southland grades (S36 and S20). Units are NZ$/m³ ($2004).



valuable local (Otago/Southland) log sort which is a mix of S1 & S2 grade sawlogs, sometimes with a minimum sed of 30cm and often with a 36cm minimum (i.e. S36 grade) which is desirable for cutting beams (30cm x 10cm and upwards).

Another source of PNW log price data is an interpolation of a graph of Japan 8 export grade logs in Lutz (2003). This shows a price series from 1990 through to 2003, although the price point is not stated it is generally given as FAS (Free Alongside Ship) in other US commentaries and in the export statistics. The grade description for Japan 8 from Corgan (pers. comm.) is:

"*Scaling diameter 8 inches and greater. Logs shall be suitable for the manufacture of Standard and Better grades of lumber to an amount of not less than 33$^{1}/_{3}$ of the gross scale. Surface - Sound, tight knots, not to exceed 3" in diameter. Any larger knots, knot clusters, and burls shall be so distributed as to permit the required recovery. Slope of Grain - May include logs having "excessive slope of grain" with proper deduction.*"

This grade is similar to a mix of New Zealand S20 and some of the better L grade logs.

Fig. 5 shows the trend in the price ($US/m³)of the ODF #2 Sawmill grade and PNW Japan 8 grade. What this graph suggests is that there has actually been a very flat long term trend in Douglas-fir log prices over the last 20 years. If the total period 1977 to 2004 is considered, the US dollar price per cubic metre has fallen. This is probably a result, in part, of falling average log sizes.

The price for the PNW Japan 8 grade is generally lower than the price of the ODF #2 Sawmill grade. This is as expected given the relative specifications of the two grades.

Comparison of PNW and Otago-Southland log prices

Fig. 6 compares log prices for the Otago/Southland S36 and S20 grades with log prices for the broadly comparable ODF #2 Sawmill grade and PNW Japan 8 grade. To make a fair comparison all of the data has been converted to New Zealand dollars and inflation adjusted to the present day.

What this graph suggests is that there has actually been a very flat long term trend in PNW Douglas-fir log prices over a period of nearly 30 years when expressed in real NZ$/m3. Although the US$/m3 price has fallen over this period (Fig. 5), fluctuations in the $US/$NZ exchange rate have kept the NZ$/m3 price up. The Otago/Southland prices have been less volatile. It is interesting to note the similarity in current prices for the PNW and Otago/Southland grades.

References

Bond, B. 2004: Understanding Log Scales and Log Rules. Report PB1650, Agricultural Extension Service, University of Tennessee.

Corgan, D. 2004: Log Term Definitions. Oregon Department of Forestry. http://www.odf.state.or.us/divisions/management/asset_management/LOGPDEF.htm

Ellis, J.C. 1994: Procedures for the Measurement of Roundwood (Second Edition), NZ Forest Research Institute.

Lutz, J. 2002: Western Timberlands - An exhausting review of recent timber prices. Timberland Report Vol.4, No.2, James W. Sewall Company.

Lutz, J. 2003: Economic Optimism: A Recent World History. Timberland Report Vol.5, No.3, James W. Sewall Company.

MAF. 2004: National Exotic Forest Description as at 1 April 2003. Ministry of Agriculture and Forestry, Wellington.

Northwest Ecosystems Alliance. 2001: Log Price Comparisons in the Vancouver Log Market.

Spelter, H. 2002: Conversion of board foot scaled logs to cubic meters in Washington State, 1970-1998. USDA Forest Service Gen. Tech. Report FPL-GTR-131.

Spelter, H. 2003: Challenges in Converting Among Log Scaling Methods. USDA Forest Service Research Paper FPL-RP-611.