



17 October 2018



**SENT TO LSU AGCENTER/LOUISIANA FOREST PRODUCTS DEVELOPMENT CENTER - FOREST SECTOR / FORESTY PRODUCTS INTEREST GROUP**



Please find attached this quarter's edition of my Market Trends report. Of particular note over the past quarter, housing starts notched lower, as did building product prices. Log prices showed more resiliency, however, reducing "gross margins" in the West and the South. However, the impacts were not evenly felt; the gap between western and southern mills expanded to \$159/MBF (lumber scale) in the South's favor.

I should probably apologize for recycling a Deep Dive from last year, but the recent Wall Street Journal article lamenting the lost fortunes of private landowners in the US South who planted trees 30-40 years ago, spurred me to recycle the "Twin Peaks" analysis I shared with you a few quarters ago. In addition to the WSJ article, discussions about lofty forest productivity gains, disappointing investor returns, and uncertain future log prices at the "Who Will Own The Forest" conference in Portland last month reinforced (in my mind) the relevance of the analysis, as all members in our industry (managers, investors, landowners) consider the prospects of timberland ownership and the need for more rigor in underwriting timberland investments and developing harvest plans.

I hope you find the material interesting, and I look forward to hearing from you in the coming months.

Best Regards,

Will

William Sonnenfeld  
WillSonn Advisory, LLC

**New mailing address:**  
**P.O. Box 4706**  
**Rollingbay, WA 98061-0706**

Office: 206 201-3780

Cell: 206 445-2980

e-mail: [wes@willsonnadv.com](mailto:wes@willsonnadv.com)

*Ferry Schedule:* <http://www.wsdot.com/ferries/schedule/ScheduleDetailByRoute.aspx?route=sea-bi>

*Please support our timber industry, reduce your carbon footprint, and conserve the earth's natural resources by purchasing products made from wood: America's great renewable, recyclable and sustainable resource.*



17 October 2018



**SENT TO LSU AGCENTER/LOUISIANA FOREST PRODUCTS DEVELOPMENT CENTER - FOREST SECTOR / FORESTY PRODUCTS INTEREST GROUP**

-----

Richard P. Vlosky, Ph.D.  
 Director, Louisiana Forest Products Development Center  
 Crosby Land & Resources Endowed Professor of Forest Sector Business Development  
 Room 227, School of Renewable Natural Resources  
 Louisiana State University, Baton Rouge, LA 70803  
 Phone (office): (225) 578-4527; Fax: (225) 578-4251; Mobile Phone: (225) 223-1931  
 Web Site: [www.LFPDC.lsu.edu](http://www.LFPDC.lsu.edu)



**President, Forest Products Society; President, WoodEMA i.a.**



# Market Trends

3<sup>rd</sup> Quarter, 2018

Perspectives on the latest market trends and indices impacting the Timber and Wood Products sectors, compliments of WillSonn Advisory, LLC



# Q3 2018 Highlights

## Market Trends

- Builder sentiment flat-lines, improvement expenditures remain strong (page 4)
- Affordability continues to drift lower as interest rates move up (page 5)
- New and Existing Home inventories reverse trend, expand modestly (page 6)
- 3rd Quarter Housing Starts disappoint, pulling YTD gains down (page 7)
- Lumber and OSB prices take double digit dives, Plywood eases lower (page 8)
- PNW Log Prices take a breather, Southern log prices drift sideways (page 9-10)
- Mill margins moderate, but South advantage rockets to \$159/MBF in Q3 (page 11)
- YTD Timberland sales volume exceeds 2017, “C” properties drag values down (page 12)

## In Depth Coverage

- (Repeat) Twin Peaks of Historical Planting in the US South (page 14-19)

## In Case You Missed It

- US Home Ownership rates by age cohort (page 21)
- NCREIF Timberland Index Returns through Q2 (page 22)



# Section 1: Latest Trends



# Builder Sentiment & Private Residential Expenditures

NAHB's **Homebuilder Market Index (HMI)** and **Remodeling Market Index (RMI)** are measures of home builder and remodeling contractor sentiment.

The HMI continued to moderate through the 3<sup>rd</sup> quarter, posting a score of 67 in August, down from a revised 74 in December. The 6-month rolling average registered 69, down another point from last quarter. Hangover from high building product prices and chronic labor tightness may be taking some of the shine off of the otherwise positive outlook.

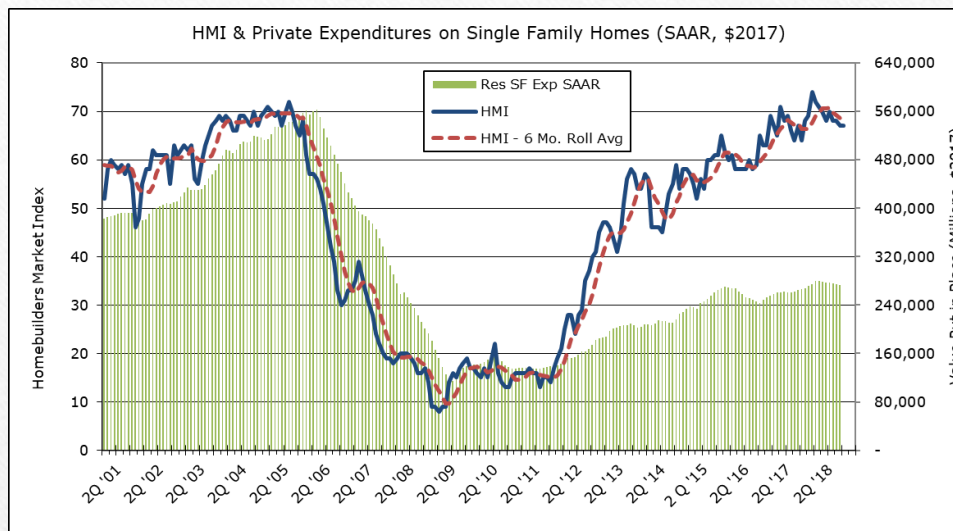
The RMI gained a point from Q2, posting a reading of 58 in Q2. As reported in the first quarter, the NAHB data suggests that average home tenure has increased from ~6 years (from 1987 through 2008) to ~10 years in three of the last four survey years.

**Private Expenditures on Single Family Housing** (in constant dollars, SAAR) has improved at a 4.8% pace YTD in 2018, a modest improvement over the 3.8% registered in 2017. The gain in **Private Residential Improvement Expenditures YTD** have fared a bit better, at 6.2% over 2017 levels, though this was well off the torrid gains of 18.0% we saw in in 2017.

*The monthly HMI and quarterly RMI are dispersion indices, measuring the proportion of respondents who have a positive versus negative view (neutral responses are ignored in the calculation). While a reading over 50 indicates a prevailing positive view of current and future conditions, it says nothing about the proportion in the neutral camp.*

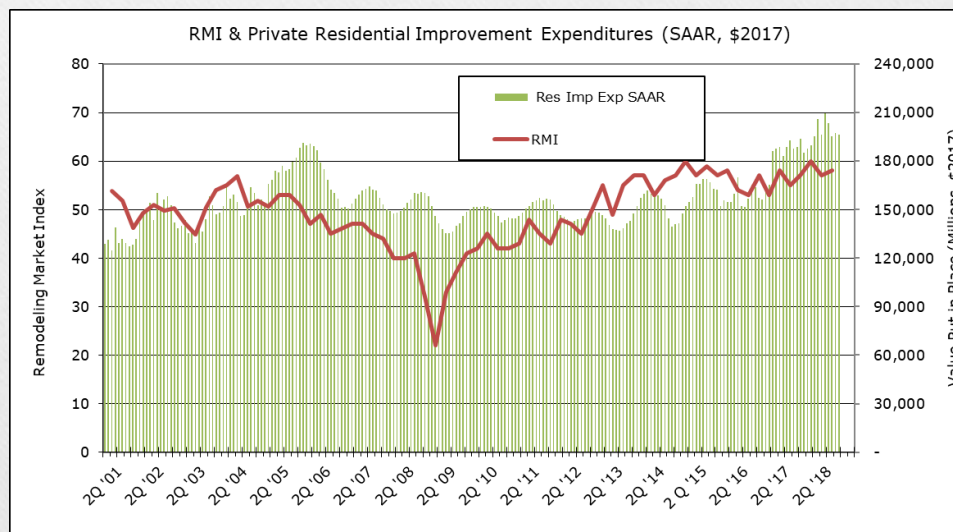
*The Seasonally Adjusted Annual Rate expenditure figures in both charts were deflated using the US Census Bureau's "Fixed" Construction Price Index which adjusts for both inflation and home size.*

WillSonn Advisory, LLC



Data Sources: Census Bureau, NAHB, Dept. of Commerce

Charts & Analysis: WillSonn Advisory



# Affordability

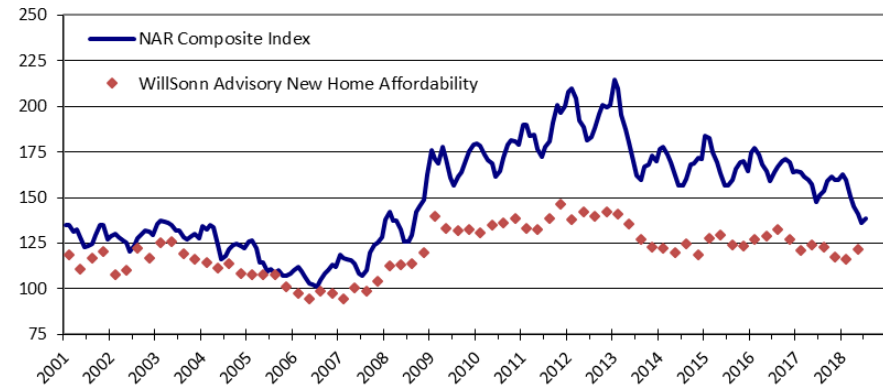
The National Association of Realtors (NAR) Affordability Index (top chart) took its typical Spring dip, registering 136 in June before ticking up to 139 in July, the lowest reading since late 2008. Also depicted in the top chart is my measure of new home affordability, one that incorporates the transaction price of new homes (rather than the listing price of existing homes, as used by NAR).

Using NAR's household income and interest rates and Census Bureau median **new** home sale prices, I calculate a more modest **New Home Affordability Index of 122 in Q2 2018**. New Home affordability has drifted lower over the past two years due to rising mortgage rates, but a 7% decline in the median new home price in Q2 2018 gave it a modest bump.

In the bottom chart, I've displayed the movement in the three components of the NAR Affordability Index – home price, mortgage rates and family income. For the first seven months of 2018, compared to the first seven months of 2017, home prices are up 5.2% and Mortgage rates are up 9.1%, but Median Family Income is up just 2.7% resulting in a lower HAI, down 6.6% from last year. Holding home price and income steady, **a 50 basis point change in mortgage rates reduces the Affordability Index about 10 points.**

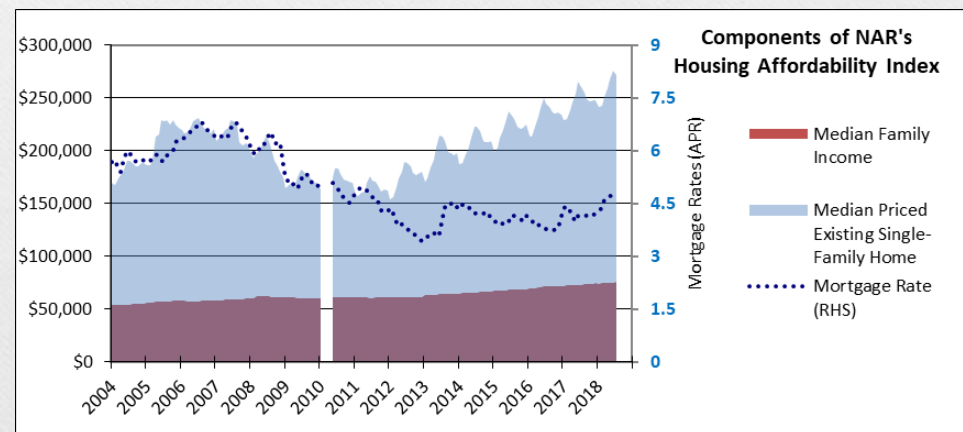
*A reading of 100 means that a family with median income would need to spend fully 25% of its monthly income on a mortgage to purchase the median priced existing home. A reading of 140 means that 25% of the median family income is 1.4 times the mortgage payment for the median priced existing home.*

## Housing Affordability Indices



Data Sources: NAR, Census Bureau,, Dept. of Commerce Advisory

Charts & Analysis: WillSonn

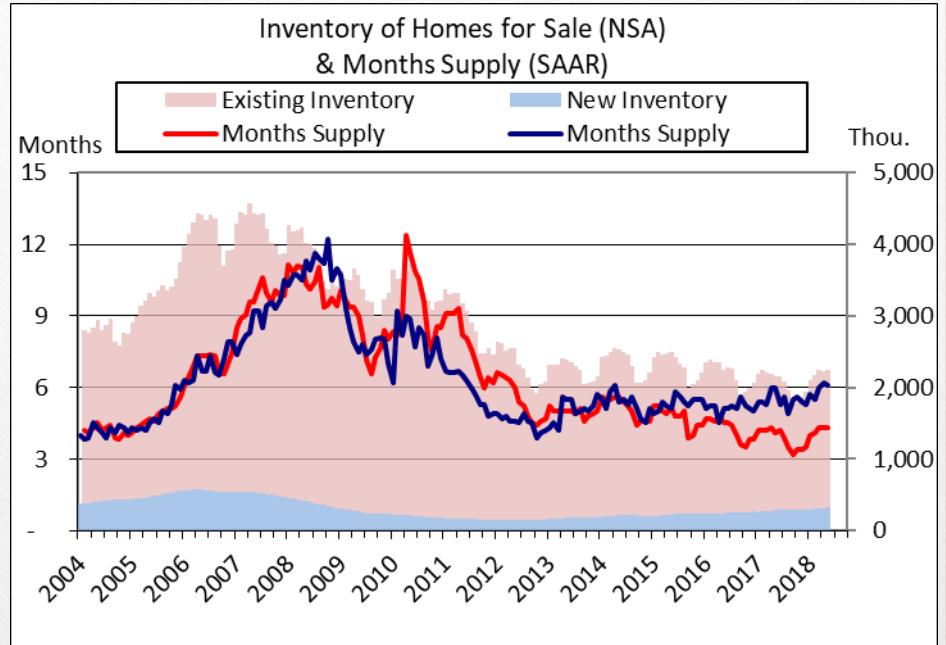


# Home Sales and Construction Trends

**The Inventory of Homes For Sale (Existing + New) totaled 2.245 million units in August**, up 491,000 units from December '17, and up 91,000 units from August, 2017. Separately, Existing Home Inventories are up 50,000 units, while New Home inventories are up 41,000 units, compared to August, 2017.

**At their respective current pace of sales, there are 4.3 months of sales in Existing Home inventories, and 6.1 months of sales in New Home inventories.** New homes for sale are at their highest level since January of 2009. Of the 325,000 units for sale at the end of August, 20% are Completed, 59% are Under Construction, and 21% have Not Yet Started.

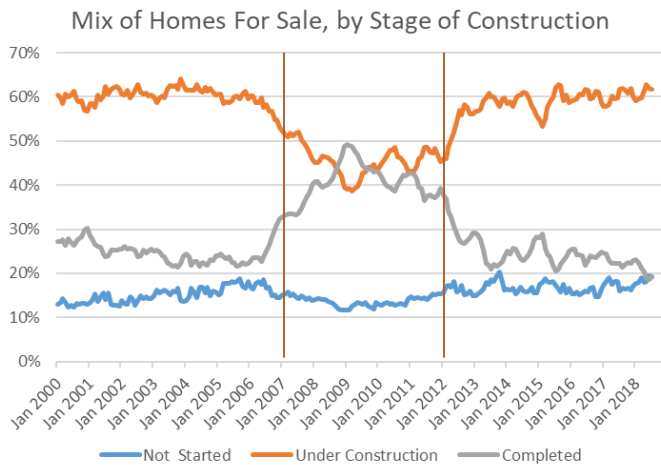
*Note: "Existing Homes" include both Single Family and Multi-Family units. "New Homes" include only Single Family Homes.*



Data Source: U.S. Census Bureau, NAR      Charts & Analysis: WillSonn Advisory

As discussed in a previous Deep Dive, "New Homes For Sale" includes not only Completed construction, but also homes Under Construction and homes Not Started if listed for sale by the builder. Each of these three components has a distinct pace of sales (Table Below), so as the mix of sales/inventory between the three shifts (Bottom Left Chart), the "Months Supply" for New Homes shifts as well.

Months Supply the past five years for each segment is well below the levels experienced in the 2007-2011 time period. Compared to 2002-2006, Completed homes have been selling at a faster clip, while Not Started and Under Construction have been selling at a slower clip..



	Months Supply For Sale		
	Last 5 Y	2007-2011	2002-2006
Not Started	3.0	5.4	2.0
Under Const.	8.9	13.6	7.6
Completed	3.8	7.4	4.2



# Housing Starts

**Total Housing Starts registered 1.28 million units in August (SAAR), 6% above the 2017 pace of 1.203 million units. In August, Single Family Starts registered 876,000 units, while Multi-Family Units came in at 406,000 Units.**

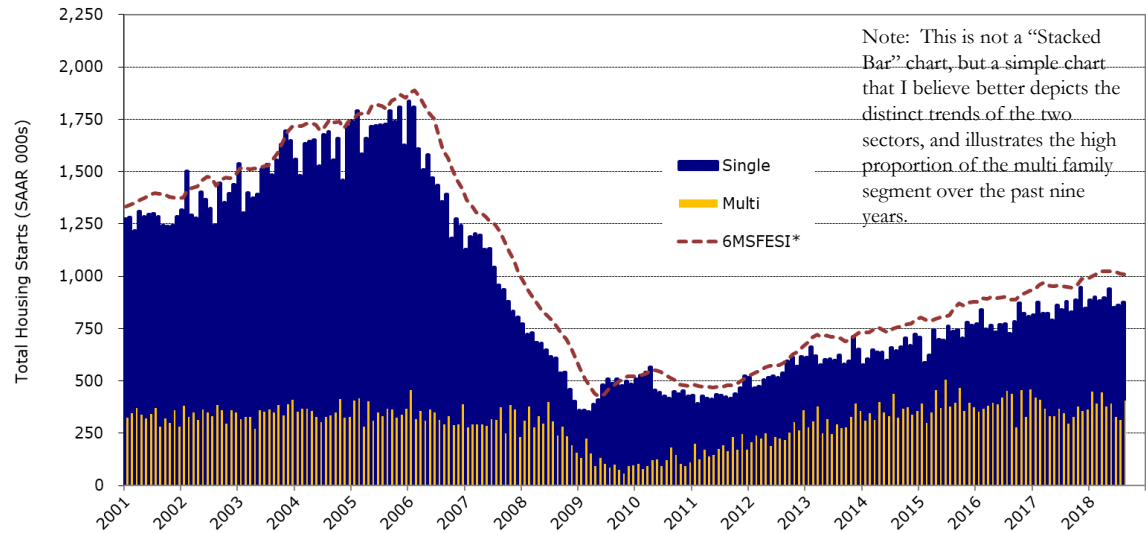
Year-to-date (SAAR), Total Housing Starts have averaged 1.274 million units, a modest increase of 5.4% over full year 2017. **Single Family Starts are up 4.1%, while Multi Family Starts are up 8.0%, compared to 2017.**

The WillSonn Advisory “6 Month Single Family Equivalent Start Index,” recasts a multi family unit into a single family unit based on relative wood use, so a better measure of Housing Start demand for wood. For the seventh month in a row above a million, it averaged **1,008,000 units over the last six months, and now sits at 53% of the 2006 peak of 1.9 million SFES’s.**

*Multi-family units use approximately 2/3 as much wood per square foot compared to a Single Family Unit, and since Multi-Family Units are about half the size of Single Family homes, I count them as a 1/3 single family equivalent.*

WillSonn Advisory, LLC

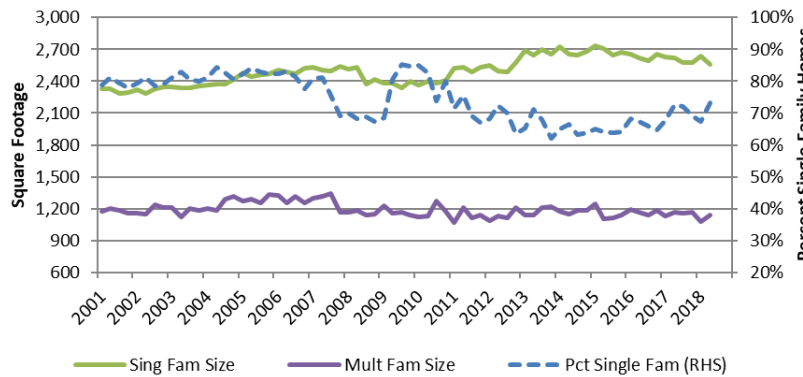
### Single and Multi Family Starts (SAAR)



\*6MSFESI = 6 Month Single Family Equivalent Start Index  
Data Source: U.S. Census Bureau

Charts & Analysis: WillSonn Advisory

### Average Home Size and Mix (Starts)



The size of the Single Family Home Starts in Q2 averaged 2,555 sq. ft., down 1.7% from 2017’s average of 2,599 sq. ft.. The size of Multi-Family Units started in Q2 averaged 1,139 sq. ft., down 1.3% from 2017 average of 1,153. **Single Family units made up 73% of Total Starts in Q2, after averaging 70% in 2017.**

10/10/2018

7

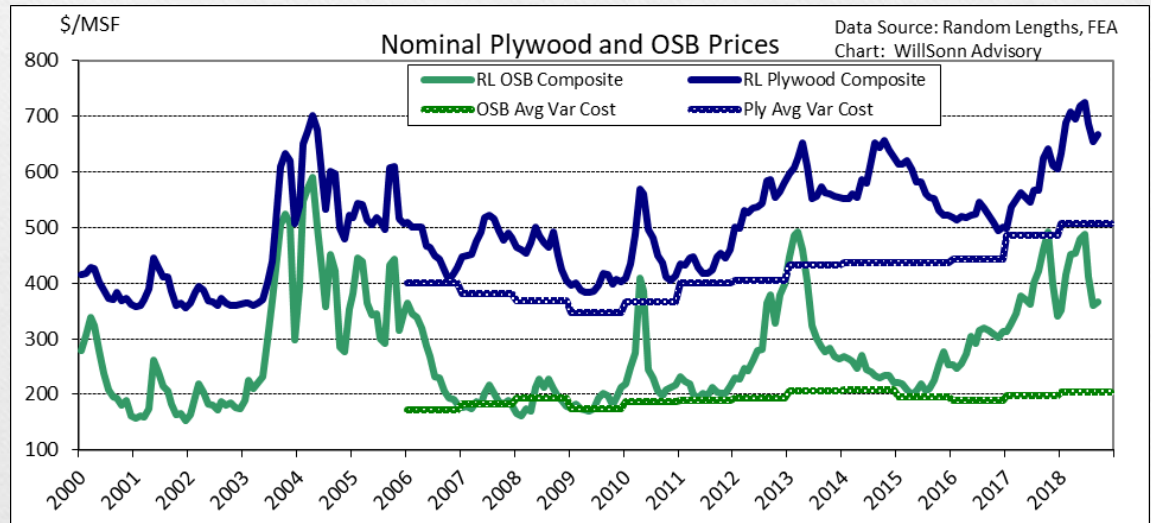
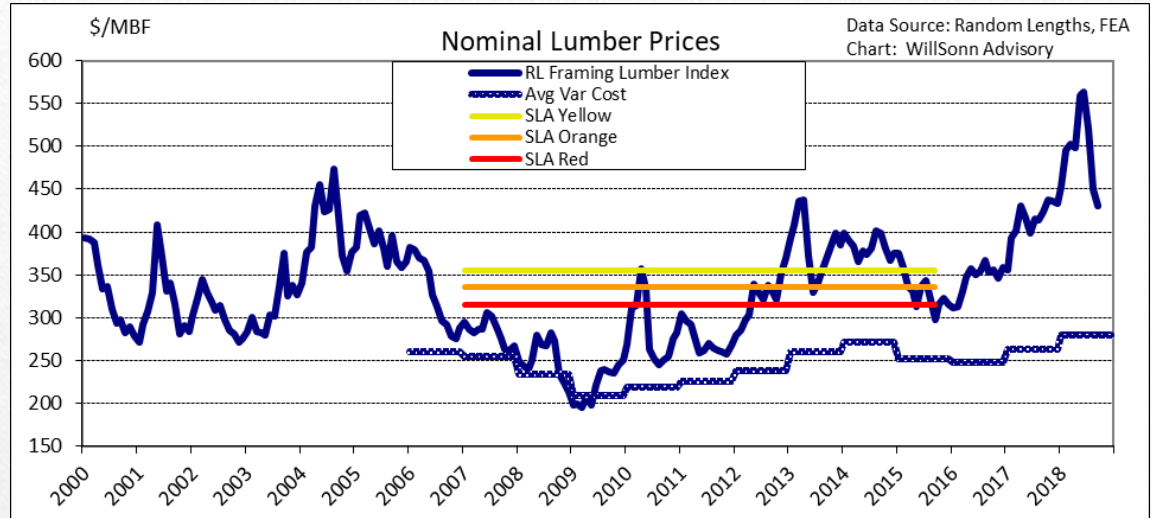
# Wood Product Prices

In 2017, while Single Family Housing Starts were up 8.6% and Residential Improvement Spending was up 18%, North American lumber production was up only 2.2%. Through the first six months of 2018, North American lumber production was up just 2%, while US Housing Starts were up 7.9%. This 18 month production lag largely caused the run up in lumber prices, which in turn put downward pressure on housing starts seen the last three months.

**Lumber prices in Q3 pulled back 14% from strong Q2 prices, but remained 13% above full year 2017 prices.** Prices have continued to slide, dipping below \$400/MBF in early October. Regionally in the third quarter relative to the previous quarter, West Coast lumber mills saw an 18% decline for Dry Dimension and 12% lower prices for Green DF, Inland mills saw prices move down 10%, while Southern sawmills saw prices contract 12%. Canadian components of the Random Lengths Framing Composite Index saw gains of 18% and 12% in the West and the East, respectively.

**Plywood pricing also retreated during the quarter, sliding 6% from Q2, but still up 17% from FY 2017 levels.** Third quarter movements favored the West again; Western Ply prices moved down 2% while Southern mills posted a 9% fall.

**OSB prices in Q3 were 20% below Q2 prices but just 1% below FY 2017 prices** (which were 32% above FY 2016, so still quite healthy), as additional capacity came on line

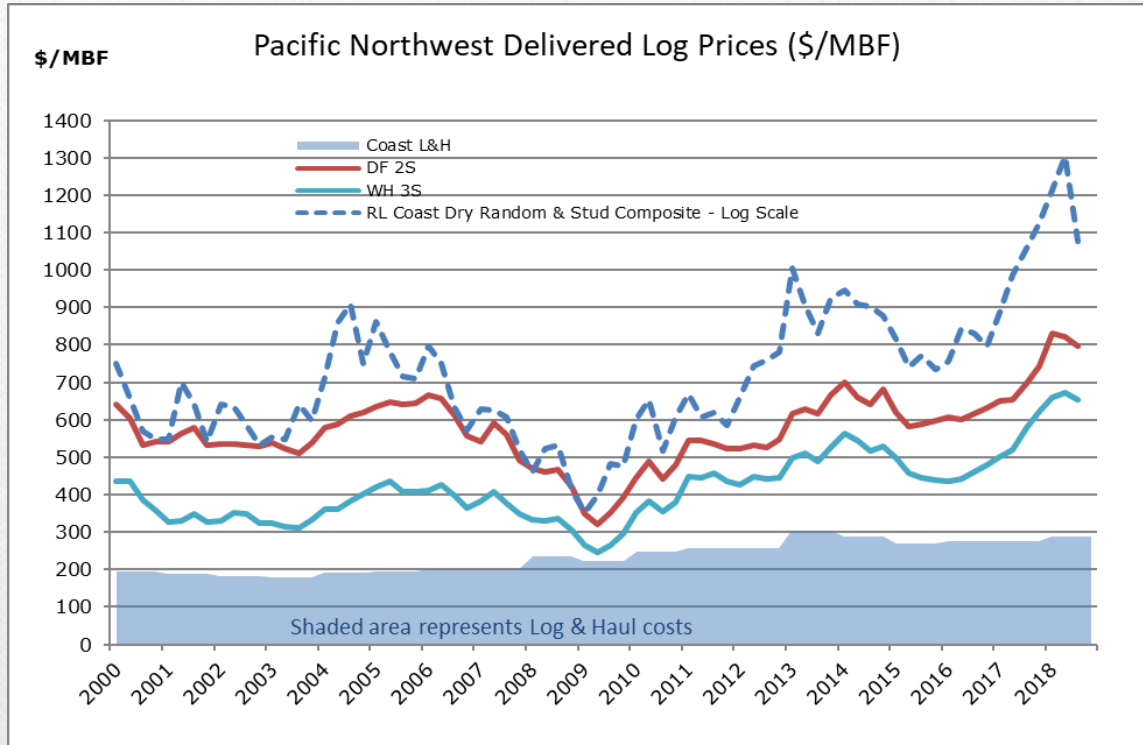


# PNW Log Prices

Though off their peak in the third quarter, strong lumber prices, along with continued decline in the supply of logs in Interior B.C., continued to support strong western log prices in Q3 '18

In the third quarter of 2018, delivered prices for **Douglas-fir 2saw** and **Whitewood 3saw** took a step back from Q2. Both grades notched average prices 3% below the second quarter, but remain 16-17% above FY 2017 levels. This comes off of full year 2017 delivered log price increases of 12% for DF 2saw and 22% for WH 3saw. Prices in 2018 for both species/grade remain in record territory in Nominal Dollars, and comparable to late 1990's prices in Real Dollar terms.

After adjustments for lumber recovery, the Random Lengths Coast Dry Random & Stud Composite price (on a log scale) retreated a whopping \$229/MBF from second quarter prices, but remain 6% above full year 2018 prices.



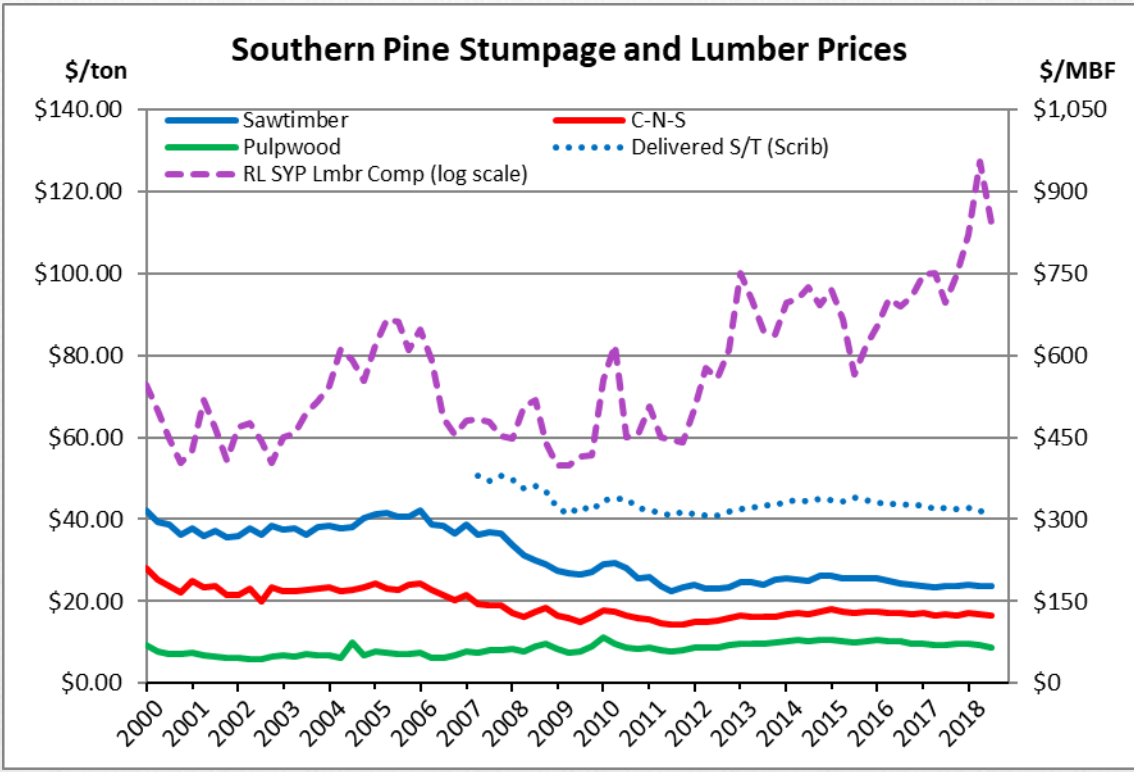
Data Source: Oregon DOF, WA DNR, Random Lengths, FEA  
Charts & Analysis: WillSonn Advisory

# Southern Pine Log Prices

**Third Quarter Southern Yellow Pine stumpage markets were mixed, with sawtimber ticking up, but the lower grades slipping.** SYP Sawtimber prices gained a meager \$0.16/ton in the third quarter, putting Q3 prices up 1% compared to FY 2017 average prices. Chip-n-saw stumpage prices were off another 2% quarter over quarter and now sit 1% below FY 2017. The modest movements in Q3 were in stark contrast to the Random Lengths SYP Lumber Composite, adjusted for lumber recovery, which was down 12% in Q3 compared to Q2 prices, trimming YOY gains in half, now 14% above FY 2017.

Pine Pulpwood prices continued to trend lower, slipping another 5% in Q3, and stayed below \$10/ton for the eighth quarter in a row. As lumber production continues to expand in the South over the next few years, mill residual chip supplies will increase. Downward pressure on roundwood pulpwood prices will likely persist.

Sawtimber to Pulpwood price ratios remain tight, at a very meager 2.5:1 in the 2012-18 period, well below the bellwether ratio of 4:1, a level not seen since mid-2008!



Data Source: Timber Mart South, Random Lengths, FEA  
 Charts & Analysis: WillSonn Advisory

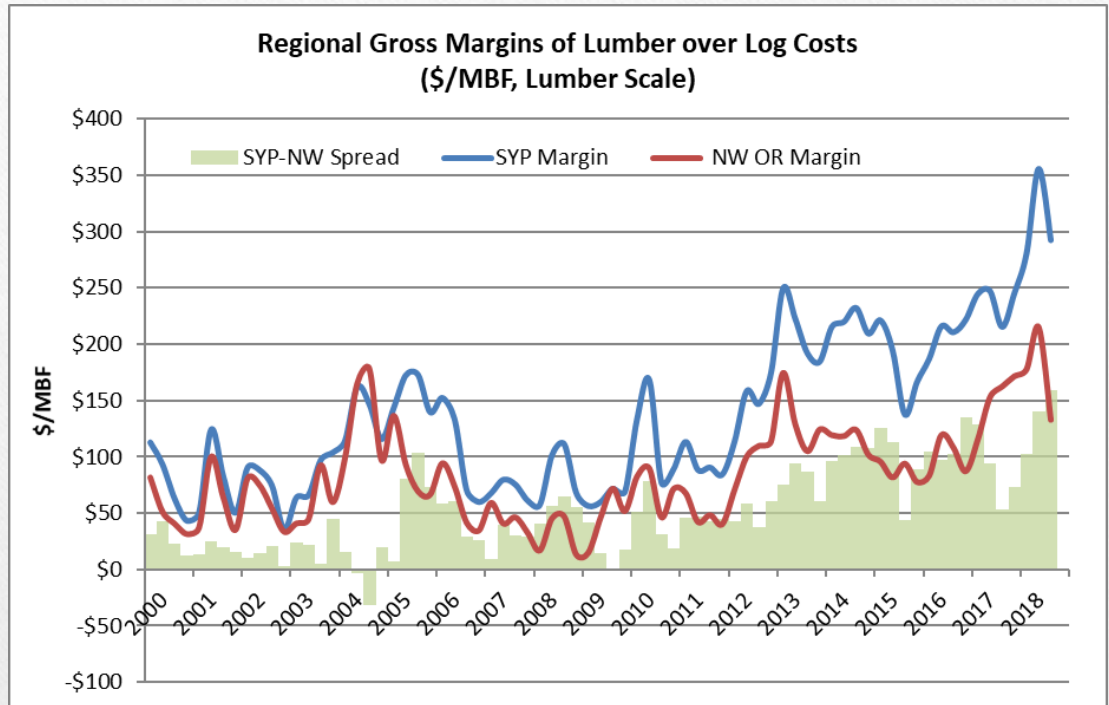
*Sawmill Gross Margins (lumber price minus delivered raw material costs) in the Northwest and South were derived from the figures on the previous two pages. The difference between the two regions is the “spread.”*

**The spread between Southern and PNW mills expanded again in Q3, to \$159/MBF**, up from an average spread in 2017 of \$87/MBF. While gross margins narrowed in both regions (\$133/MBF in the PNW, \$292/MBF in the South), PNW sawmills and landowners still have plenty of margin to work with. In the South, only the sawmills are happy.

Since the beginning of 2012, log export markets and declining Interior BC lumber production have pushed PNW log prices to historical highs. In the South, growing inventories of mature sawtimber on the stump have kept downward pressure on log prices, even as lumber prices have improved. The net result has been that the gap between the PNW’s and South’s gross margin has swelled to an average of \$111/MBF over the last eight quarters, more than 3x the 2000-2013 average of \$33/MBF.

Lumber producers will continue to focus capital investments in the US South to capture outsized margins. Absent some catastrophic event, it will likely be years before Southern mills work off excess standing sawtimber inventories, and higher stumpage prices erode margin advantages

# Regional Gross Margins



*Assumptions: 67/33 weight of DF2saw and WH3saw in the PNW, and a 75/25 weight for S/T and CNS in the South (using 7.5 tons/MBF, along with FEA’s estimates of Cut & Haul cost for S/T and CNS). All figures are lumber scale, and regional differences in lumber recovery factors are incorporated.*

Data Sources: Timber-Mart South, Random Lengths, FEA, Oregon DOF, WA DNR  
Chart & Analysis: WillSonn Advisory

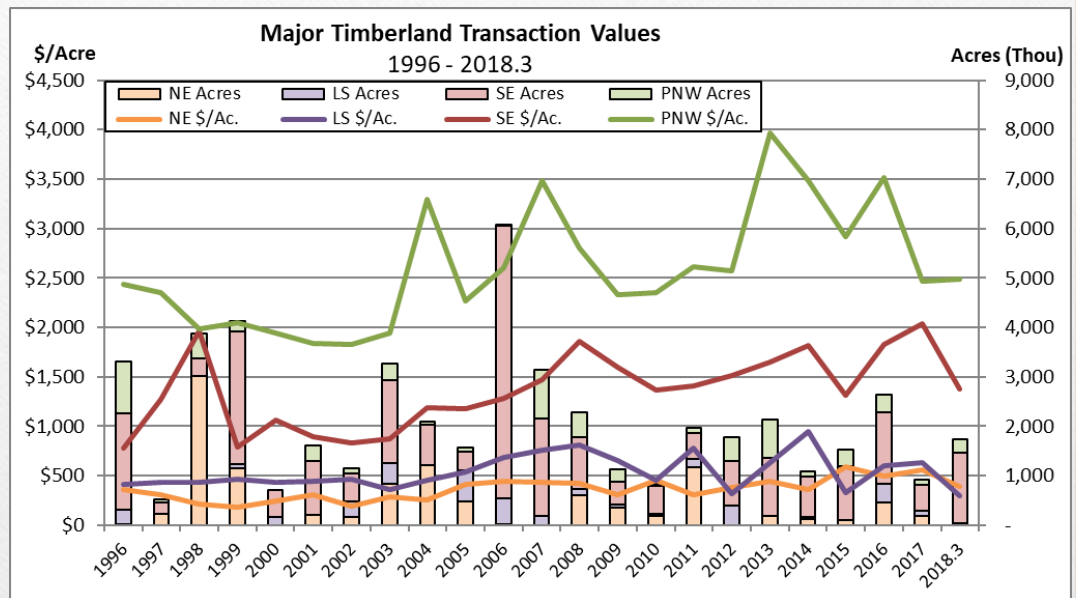
Through the third quarter of 2018, more acres and more cash has traded hands than in all of 2017. Closings year-to-date have totaled 1.8 million acres for \$2.8 billion, a slight increase from Q2.

A single transaction, CalPERS/Campbell's sale of 1.1 million acres in Texas to CatchMark and its co-investors for \$1.39 billion, made up 60% of the acres sold, and 49% of the proceeds across all regions. Absent this sale, YTD totals were more modest at 725,000 acres, \$1.4 billion in proceeds.

By investment sector, Timberland Investment Management Organizations ("TIMOs") have funded 87% of the acquisitions in 2018, well above the 41% captured over the last five years (2013-17). By comparison, TIMO buyers acquired 78% of US timberlands sold (by dollar) in the previous 13 years (2000-2012).

Regional timberland prices are all down so far this year, largely due to larger, lower quality properties ("C" properties, as some call them). PNW timberlands sold for as much as \$5,200/acre, but Roseburg's \$1,440/acre sale in northern California (63% of the region's acres) weighed down the Left Coast average. Likewise, in the South, property values reached up to the \$3,000 per acre range, but the \$1,265 paid for the beleaguered CalPERS/Campbell properties in Texas (81% of the region's acres), was a Titanic drag on the region's average.

# Regional Transaction Values



NE:Northeast LS:Lake States

SE:Southeast PNW:Pacific Northwest

Data Source: TMS, TMR, Press Releases Charts & Analysis: WillSonn Advisory



## Section 2: Deeper Dive



# The Twin Peaks in Historical Planting in the US South

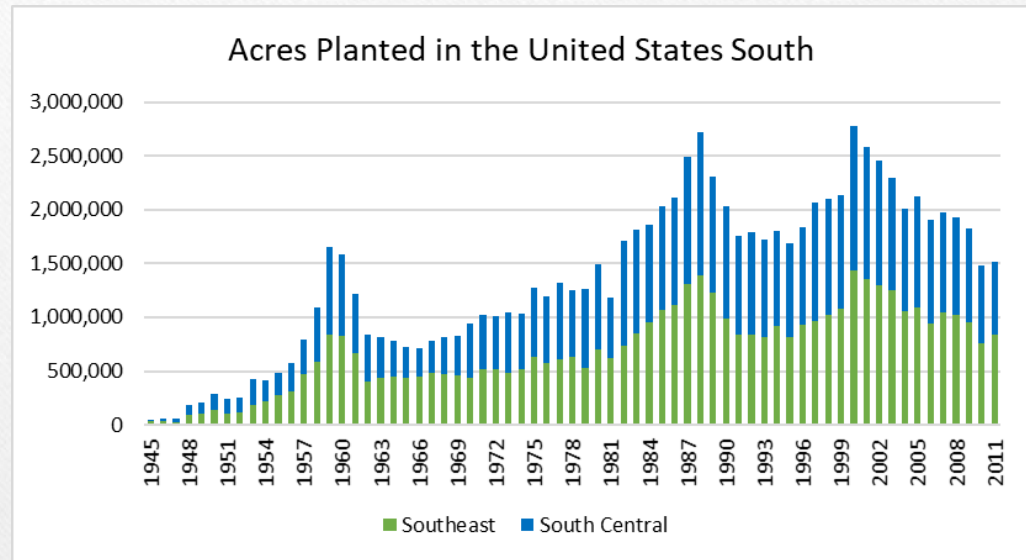
*Many of you have seen the Wall Street Journal article this week that lamented the prospects of private landowners who planted old farm land 30-40 years ago, hoping for a big payoff, now sorely disappointed by today's log prices. Last year, I presented an analysis of the pattern of historical planting in the US South and its potential impact on log prices going forward. Due to the recent WSJ article, and (to be honest) a temporary deficit of inspiration, I decided to re-publish my work again this quarter.*

Given the poor pricing that we have seen for Pine Sawtimber in the US South over the past several years, questions around **the timing and degree of recovery in Southern sawtimber log pricing** are on everyone's mind, both timberland owners and sawmill operators.

As the basis of my analysis, I relied on the USFS 2012 RPA Assessment planting data, presented to the right. You can see that through the years, planting activity has been anything but flat.

- Most notably, during the late 1980's, planting in the South rose steadily, a result of Federal subsidies aimed at soil conservation. During this time, a lot of lower productivity crop land was put (back) into timber production.
- In the early 2000's, there was a concerted push by a number of industrial and institutional land owners to convert older, natural stands to plantation.

WillSonn Advisory, LLC



Source: USFS 2012 RPA Assessment

Charts & Analysis: WillSonn Advisory, LLC

On the following pages, I am going to test a couple of scenarios around forest productivity, to see what this pattern of planting might suggest about future harvest levels, and in particular, the availability of sawtimber in the future. I will blend these scenarios to arrive at what I view as the more likely outcome. My conclusions appear on Page 18.

Overarching assumptions I used in my analysis appear on Page 19, while scenario-specific assumptions regarding yields, rotation ages and grade mix, appear on the next two pages. On the whole, I believe my assumptions are on the conservative side.



# “Flat Site Index” Scenario

In this scenario, you can see that my yield assumptions (shown in the table at the bottom) are quite conservative, in terms of both volume and grade mix. Essentially, there are no gains in forest productivity or grade mix over 1970 era levels.

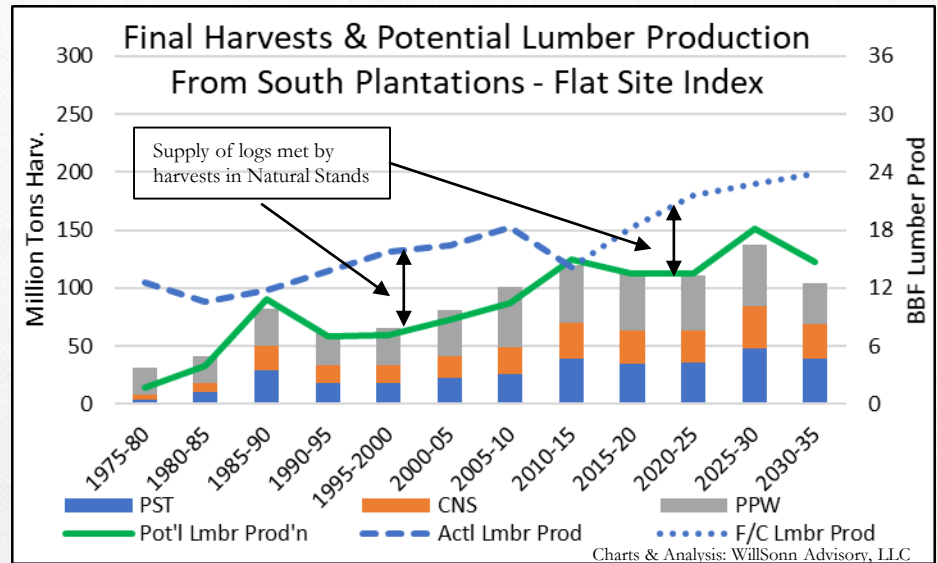
Prior to 2010, the supply of sawlogs from plantations (“Potential Lumber Production”) was unable to meet annual sawmill needs (“Actual Lumber Production”), with the shortfall being met by harvesting in Natural stands and by drawing down inventories of mature timber, which together supplied logs for ~8 BBF, by my estimation. This prolonged supply/demand tension helped push pine sawlog prices up during this period.

In 2010-2015, the decline in lumber production associated with the severe decline in US Housing Starts, coincided with the bump in maturing sawtimber related to the peak in planting that occurred in the late 1980’s – the first of the Twin Peaks. Just terrible timing. This confluence led to the current surplus of US South sawtimber on the stump.

Looking forward, despite conservative yield and grade mix assumptions, the volume of plantation sawtimber and CNS logs coming of age through 2030 would be able to satisfy all but 6 BBF of expected lumber production, versus ~8 BBF in 1990-2010. It isn’t until 2030-35 when we finally see meaningful supply constraints, as harvests from maturing plantations established in 2005 and later take a dip, and while sawmill demand continues to climb.

*“F/C Lmbr Prod” is a consensus expectation around future lumber production coming out of the US South*

WillSonn Advisory, LLC



Assumptions about stands planted in the year:		Sawtimber			Pulpwood		
Average Expressed SI in 1950:	60				60		
Average Expressed SI in 1970:	65				60		
Average Expressed SI in 1990:	65				60		
Average Expressed SI in 2010:	65				60		
Avg Rotation for 1950 Planting:	30				21		
Avg Rotation for 1970 Planting:	27				21		
Avg Rotation for 1990 Planting:	27				21		
Avg Rotation for 2010 Planting:	27				21		
Avg Yield from 1950 planting	75				80		
Avg Yield from 1970 planting	76				80		
Avg Yield from 1990 planting	76				80		
Avg Yield from 2010 planting	76				80		
		PST	CNS	PPW	PST	CNS	PPW
Grade from 1950 planting		45%	27%	28%	0%	11%	89%
Grade from 1970 planting		40%	29%	31%	0%	11%	89%
Grade from 1990 planting		40%	29%	31%	0%	11%	89%
Grade from 2010 planting		40%	29%	31%	0%	11%	89%

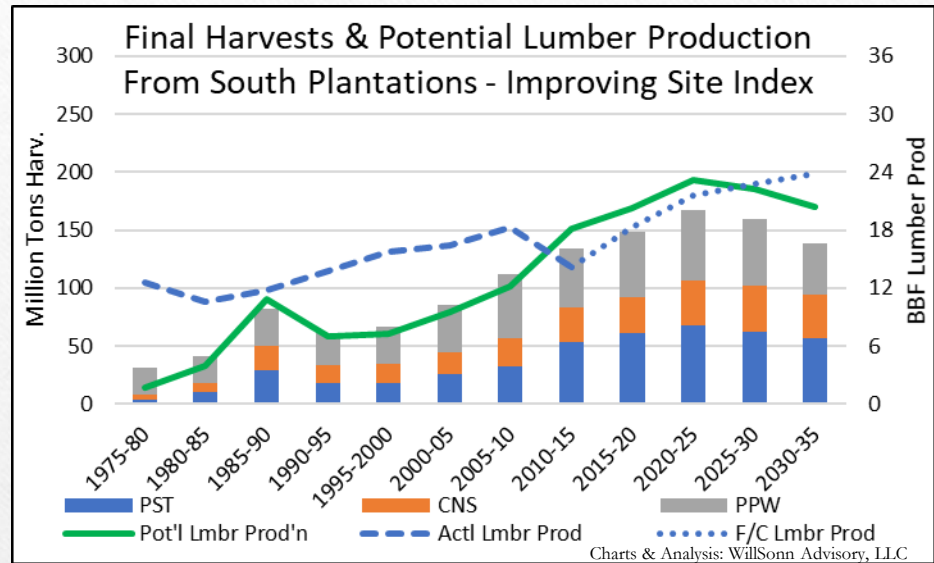
# “Improving Site Index” Scenario

In this scenario, my assumptions are more optimistic than the previous “Flat Site Index” scenario: shorter rotations, more tons, and strong grade mix.

- Nevertheless, I am convinced that a sawtimber regime, with 96 tons per acre at age 24, with 71% sawtimber and CNS, is still quite modest in comparison to what many timberland managers are modeling for future plantation harvest yields.

With the historical planting in place, under this set of plantation yield and grade mix assumptions, **the volume of sawtimber and CNS logs available to southern sawmills, just from plantations, will exceed sawmill needs.** The implication on log prices are easy to visualize – great for the mill, terrible for the landowner.

- One might take issue with any number of the assumptions I used in this scenario, not the least of which is that all landowners, both the Corporate and Private Non-Corporate subsets, manage their timberlands in the same way.
- Please turn the page...



Assumptions about stands planted in the year:		Sawtimber			Pulpwood		
Average Expressed SI in 1950:	60				60		
Average Expressed SI in 1970:	65				60		
Average Expressed SI in 1990:	70				65		
Average Expressed SI in 2010:	75				65		
Avg Rotation for 1950 Planting:	30				21		
Avg Rotation for 1970 Planting:	27				21		
Avg Rotation for 1990 Planting:	27				21		
Avg Rotation for 2010 Planting:	24				21		
Avg Yield from 1950 planting	75				80		
Avg Yield from 1970 planting	76				80		
Avg Yield from 1990 planting	86				95		
Avg Yield from 2010 planting	96				95		
		PST	CNS	PPW	PST	CNS	PPW
Grade from 1950 planting		45%	27%	28%	0%	11%	89%
Grade from 1970 planting		40%	29%	31%	0%	11%	89%
Grade from 1990 planting		52%	22%	26%	0%	15%	85%
Grade from 2010 planting		42%	29%	29%	0%	15%	85%

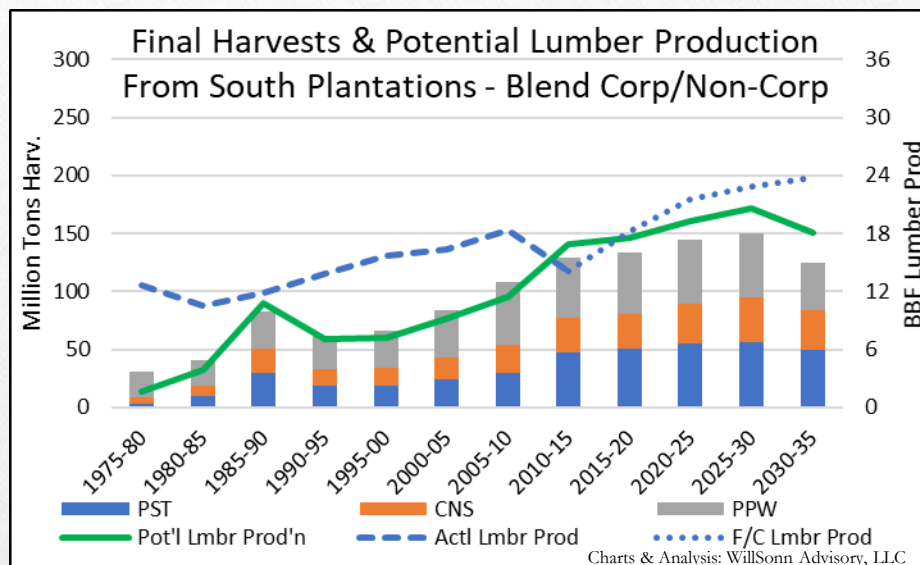
## “Blended Corporate/Non-Corporate” Scenario

My guess is that it will end up somewhere in between the “Flat” and “Improving” scenarios, because I suspect that Non-Corporate land owners do not manage their timberlands to the same degree of intensity as Corporate landowners.

The RPA data (as of 2012) indicates about 75% of Corporate pine land is in Plantation, while about 50% of Non-Corporate pine land is in Plantation. The Corporate proportion, 75%, seems low to me, but without evidence to the contrary, let’s assume it is right – it is likely conservative.

Applying those ratios to the respective pine timberlands owned by each ownership class, suggests that about 60% of Southern Pine Plantations are held by Corporate owners, 40% by Private Non-Corporate.

In this Blended Scenario, I assigned the rotation ages, yields and grade mix in the “Flat Site Index” assumptions to Private Non-Corporate landowners (weighted 40%), and rotation ages, yields and grade mix in the “Improving Site Index” assumptions to Corporate landowners (weighted 60%).



While the results don’t suggest a surplus of sawlogs and CNS logs coming from final harvest of pine plantations going forward, as we saw on the previous page, the prospects for improving log prices in the US South in this “Blended” case would likely remain elusive until after 2030. Pine sawlog harvests from Natural stands are still out there, and Corporate landowners are likely expecting better yields and grade mix than what I have used in my analysis.

# Conclusions

- In only the very conservative “Flat Site Index” scenario, could we reasonably expect to see log prices return to 1995-2005 era levels within the next 10-15 years. In reality, Southern Pine Plantations are more productive than depicted in the “Flat Site Index” scenario, current excess standing sawtimber inventories need to be worked off, Natural Stands will continue to supply sawlogs, and the second peak of plantations will certainly come of age in the next few years. All of these will combine to mitigate more intense price pressure on logs in the face of increasing lumber production in the US South.
- In balance, the risks in the assumptions underpinning my analysis are likely skewed to the downside (for log prices).
  - Some subset of Private Non-Corporate landowners are managing their timberlands more intensively than the “Flat Site Index”, e.g. more intensive silviculture, while another subset is likely managing less intensively, e.g. on longer rotations. The risks here are probably evenly balanced.
  - However, Corporate landowners, as a group, are likely pursuing management regimes and making investments, with expectations surpassing both the yield and grade mix I used in my “Improved Site Index” scenario.
- This highlights a key issue I raised recently in my presentation, “Optimization Cubed”:
  - **Widely used Linear Programming (LP) Models provide us with an “optimum solution” under static conditions, in isolation of, and immunity from, what competing landowners are doing on their land.**
- As a result of this ubiquitous and myopic optimism, harvest plans are hatched and investments are made that may lead one to pursue a harvest/management plan which in isolation appears optimal, but within the context of the entire industry, may lead everyone down a path of excess log supply and disappointing log prices.
  - This may be a no-win situation for some. If these, or even higher, productivity levels are broadly achieved across the industry (or even in a broad wood basket), prices will certainly languish, and with it, timberland values will suffer. On the other hand, if volume and grade fall short of LP model predictions, timberland investment returns will be equally disappointing.
- In the longer-term, if sawlog prices remain subdued, management regimes may change, as well as thinking around silvicultural investments. At some point, supply has to bump up against demand in order to support the higher log prices needed to incent landowners to plant trees, and to wait for them to grow into sawlogs.

# Common Assumptions:

- **Pine Plantations:** RPA data suggests only 85% of Acres Planted were planted to pine, therefore I reduced the number of Planted Acres accordingly in my analysis. This is probably a conservative assumption.
- **Final Plantation Harvest Only:** Since I am primarily concerned about sawtimber, I ignored harvests from first and second thins (which tend to yield mostly pulpwood), and just considered yields at final harvest. Chip-n-Saw logs from second thins would add further to log supply, so I also see this as a conservative assumption.
- **HBU:** I assumed 0% of plantations established before 1970 were sold as HBU prior to harvest, 5% of plantations planted in the 70's were sold prior to harvest, and 10% of plantations planted since the 80's have or will be sold prior to final harvest. I chose these levels, and their timing, because it wasn't until the late 1990's that HBU land sales became a staple in TIMO and REIT business plans. This is probably a bit conservative (too much of a reduction), in my view.
- **Site Index:** I assumed that the Site Index in the South was ~60 (what I remember being taught in forestry school back in the early 1980's), and assumed it moved up to 65 by the 1970's, due to the use of improved seed stock and moderate levels of silviculture that would have been applied to those stands over the course of their rotations. When I modeled an increase in yields and reductions in rotation ages in the "Improved Site Index" scenario, I eased into it over the preceding 20 year period.
- **Management Regime:** RPA data on Pine species breakout (Loblolly versus Slash) suggests that prior to the 1990's, ~75% of plantations were managed on a sawtimber regime and 25% on a pulpwood regime, moving to an 80/20 mix afterwards. I followed suit; I increased sawtimber regimes to 80% in the 1990's, and from 2000 forward, to 85% sawtimber regimes, trying to capture the trend away from pulpwood regimes as Paper Company timberlands were sold to TIMOs and REITs. This may also be a bit conservative.
- **Lumber Only:** "Potential Lumber Production" is the estimated volume of lumber that could be produced from sawtimber and a portion of CNS logs harvested **solely from final harvest on Pine Plantation forests**. I first assumed that 100% of the sawtimber and 75% of the CNS harvested will be available to sawmills (the rest of the CNS going to pupmills). To convert tons of logs to MBF, I assumed 7.5 tons/MBF Scribner and a Lumber Recovery Factor of 1.8 (admittedly high looking back, but arguably a bit low going forward).



# Section 3: In Case You Missed It...



<http://eyeonhousing.org/2018/07/strong-owner-household-formations-in-the-second-quarter/>

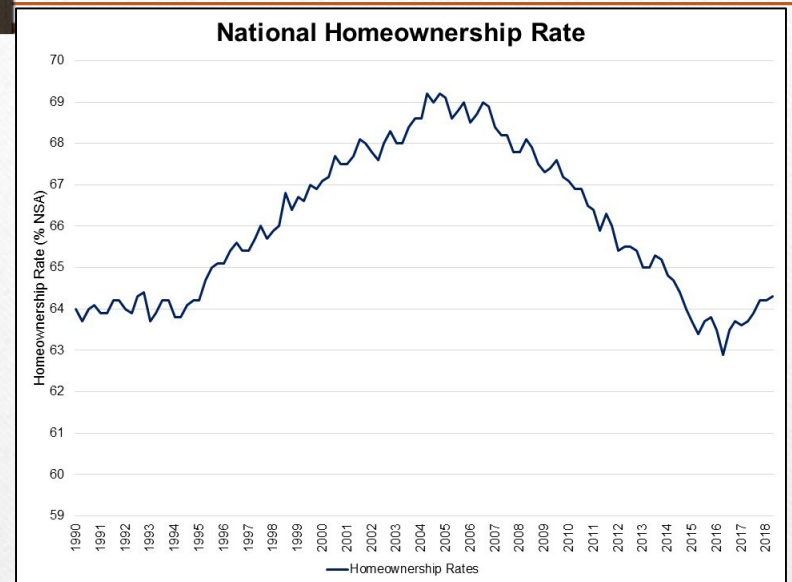
**Excerpts from an NAHB post:** According to the Census Bureau's Housing Vacancy Survey (HVS), the U.S. homeownership rate was 64.3% in the second quarter 2018. After dropping to a cycle low of 62.9% in the second quarter 2016, the national homeownership rate seems to be on a sustainable upward trend. Compared to the peak of 69.2% in 2004, the homeownership rate is lower by five percentage points.

*WillSonn Advisory note: Claiming that this appears to be a "sustainable upward trend" may be a bit premature. It could also be a "dead cat bounce" coming off its highest level in more than 30 years ("even a dead cat will bounce if it falls from a great height")*

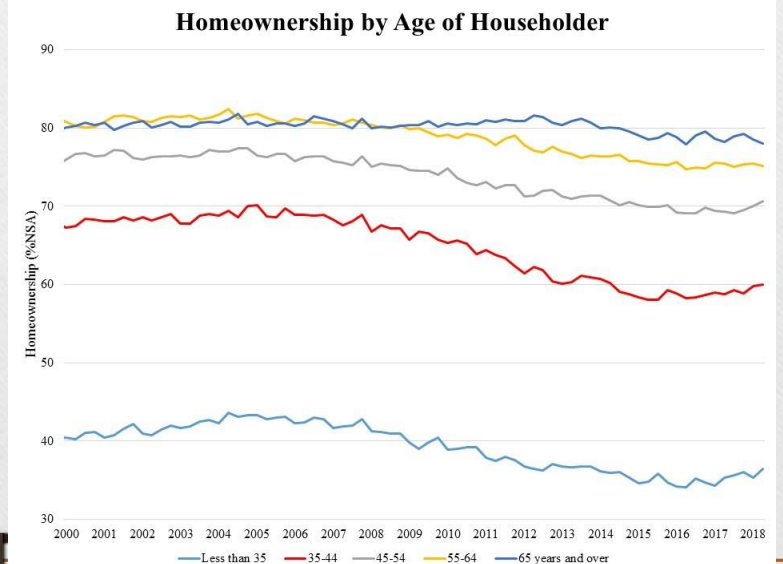
*The Homeownership rate is a key component in estimating US housing starts. As Homeownership rates decline, demand for both new and existing homes falls. Over-estimating Homeownership rates was a key miss by forecasters in the early days of the Housing recovery as most did not anticipate such a deep and prolonged decline.*

The homeownership rates among all age groups under 54 increased over the last year. Households ages 45-54 registered the largest gains among all households, a 1.3% increase from a year ago. The homeownership rates of millennials, mostly first-time homebuyers, continued the up growing trend, from 35.3% to 36.5%. It suggests that millennials are gradually returning to the for-sale housing market. However, current homeownership rates for adults ages under 35 are still 5.4 percentage points lower than before the Great Recession. Households ages 35-44 experienced a 1.2 percentage points increase on an annual basis.

WillSonn Advisory, LLC



Source: NAHB tabulation of data from the 1990, 2000 Decennial Census PUMS, 2006-2016 ACS PUMS



# NCREIF Q2 2018 Timberland Index Returns

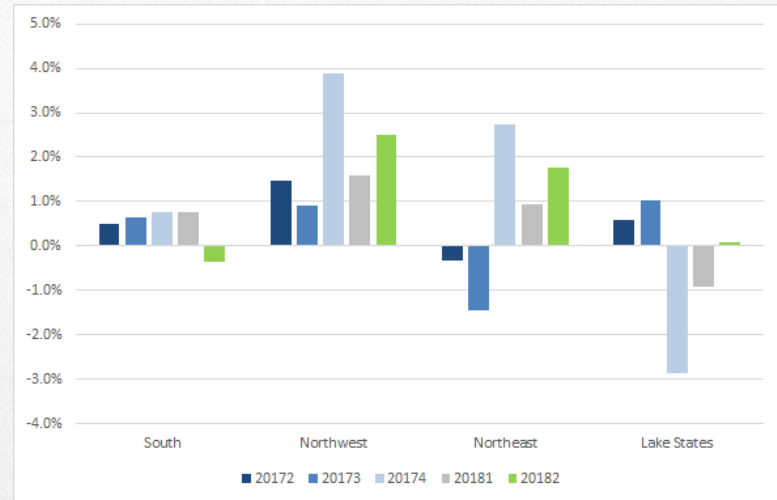
PORTLAND, Oregon, July 24, 2018 (press release) – The National Council of Real Estate Investment Fiduciaries (NCREIF) has released second quarter 2018 results of the NCREIF Timberland Index. The index returned 0.48% for the quarter, down from 0.92% last quarter and 0.70% in the second quarter 2017. The EBITDDA return, at 0.75%, was lower than 0.87% last quarter but higher than 0.62% a year ago. Appreciation in the second quarter dropped by 0.27%.

The Total Timberland Index had a 3.57% trailing year return, with 1.41% as the 2018 year-to-date total return.

The Northwest led regional returns for both the second quarter and for the trailing year. The total quarterly return for the Northwest was 2.49%, fairly evenly split between appreciation and EBITDDA return. The South dragged the index in the second quarter, with a total quarterly return of -0.35%, driven by a negative appreciation return of -0.94%.

Timberland market value per acre, at \$1,804 as of the second quarter, has slightly decreased from \$1,824 over the past year. Within the regions, the Northwest region continues to climb higher with a 5.78% increase year-over-year in the market value per acre. Market value per acre for the South region continues to follow closely with the Total Timberland Index market value per acre.

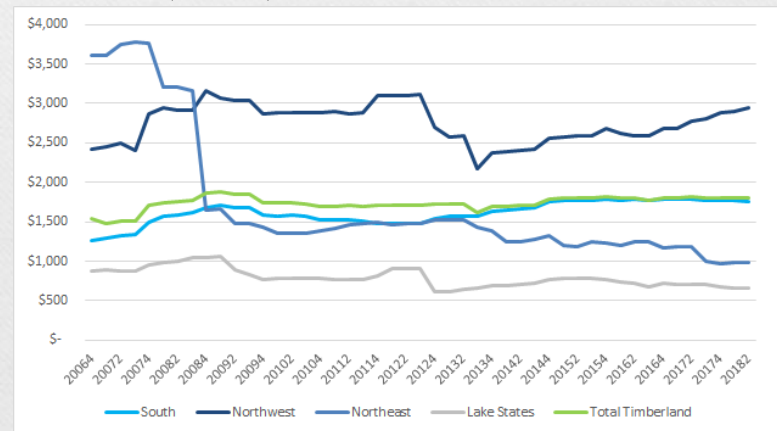
*WillSonn Advisory Note: As noted in my Q4 2017 Deep Dive, a better measure of the cash flow generated by operations is Operating Cash Flow (“OCF”). OCF encompasses not only EBITDA (as used here by NCREIF) but also incorporates maintenance Cap Ex (reforestation, Silviculture and Roads), further reducing actual cash returns.*



Above: **Timberland Quarterly Total Return Trends by Region**

Below: **Timberland Market Value per Acre in USD by Region**

Source: Jul 27, 2018 – National Council of Real Estate Investment Fiduciaries (NCREIF) Press Release







Section 4:  
About  
WillSonn  
Advisory, LLC



# WillSonn Advisory Services

- Timberland & Mill Valuations
- Acquisition “Post Mortem” Audits
- Conversion of Acquisition Pro Forma to Lender Financial Projections
- Acquisition and Operational Due Diligence
- Development of Company Enterprise Valuations
- Incorporating Economic Forecasts

## Business Assessments & Due Diligence Services



- Acquisition and Divestiture Process Management
- Conduct Regional or Global Market Studies
- Plan and Oversee Inventory & GIS Projects and/or Audits
- Independent Review of Harvest Flow Projections and Processes
- Prepare Offering Memorandums and Prospectuses

## Project Management Services



- Fiber/Log Supply Agreements
- Purchase & Sale Agreements
- Timber Deeds and Leases
- Conservation Easements & Carbon Projects
- Service and Offtake Agreements
- Joint Ventures & Partnerships
- Contract Negotiating Strategies

## Contract Structuring and Negotiation Services



- Strategic Plan Process Design, Facilitation and Documentation
- Company Specific Price, Supply and/or Demand Forecast Development
- Contingency Plan Development and Monitoring
- Financial Planning and Capital Restructuring
- Work-out Strategy Development
- Capital Investment Assessments

## Strategic Planning & Business Restructuring Services



- Validate Acquisition Valuations & Due Diligence Procedures
- Evaluate Existing or Proposed Agreements or Easements
- Interpret Annual Management Plans & Appraisals
- Examine Proposed Transfers of Ownership
- Review Divestiture Timing & Strategies
- Track Investment Performance

## Institutional Investor Services



# WillSonn Advisory

## Critical Experience for Critical Endeavors

WillSonn Advisory brings senior management experience, across multiple sectors of the wood products industry, with expertise in leading an array of strategic initiatives



<h3>Sectors</h3>	<ul style="list-style-type: none"><li>• Timber, Manufacturing, Bioenergy</li><li>• Private Industry &amp; Institutional Investment</li><li>• Corporate Lending</li><li>• Consulting</li><li>• Domestic and International</li></ul>
<h3>Experience</h3>	<ul style="list-style-type: none"><li>• Mergers, Acquisitions &amp; Divestitures</li><li>• Timberland Operations</li><li>• Finance &amp; Planning, Financial Reporting</li><li>• Loan Origination &amp; Underwriting</li><li>• Operations Support</li></ul>
<h3>Expertise</h3>	<ul style="list-style-type: none"><li>• Strategic Planning</li><li>• Asset Valuations and Due Diligence</li><li>• Project Management</li><li>• Contract Negotiations</li><li>• Budgeting &amp; Forecasting</li></ul>

I look forward to your comments and questions, and welcome the opportunity to serve your consulting needs.

**William E. Sonnenfeld, Principal**

wes@willsonnadv.com

tel 206.201.3780

cell 206.445.2980



PO Box 4706  
Rollingbay, WA  
98061-0706