This forecast is an edited re-issue of the original November Forecast.
The previous forecast had errors in geoduck revenue in the main forecast tables.
These errors were in the tables only and not reflected in the text.
January 12, 2016

Department of Natural Resources

Economic & Revenue Forecast

Fiscal Year 2016, Second Quarter
November 2015

WASHINGTON STATE DEPARTMENT OF
Natural Resources

Forecast Summary

Lumber and Log Prices. Lumber and log prices have fallen markedly since peaking in mid-2014. Random Lengths' Coast Dry Random and Stud composite lumber price peaked at $393/mbf in January 2014, but fell throughout the rest of the year to average $373/mbf. The composite lumber price continued to fall precipitously through May to a low of $287/mbf before bouncing up to $333/mbf in July. As of October the price had fallen again to $295/mbf, for an average of $312/mbf for 2015 thus far.

The price of a 'typical' DNR log moved up sharply from a two-year plateau in 2013 to $591/mbf in 2014. However, prices have declined through 2015 to average $524/mbf so far. The decline in log price is primarily due to the dramatic slowdown in demand from China (noted as a significant risk in the March Forecast) and ample regional supply of both logs and lumber. A price decline was largely foreseen, though the depth of the drop was unexpected.

The outlook for stumpage prices in CY 2016 has been revised downward, held back by the same issues plaguing lumber prices, but they are still expected to be somewhat higher than in CY 2015.

Timber Sales Volume. DNR sold 18 mmbf less than expected at the end of FY 15. In the June and September forecasts, those sales were pushed out to FY 16, giving a sales volume forecast of 518 mmbf. However, the current timber sales plan suggests that a more realistic expectation is for 500 mmbf for FY 16. Through October 2015, DNR has sold 102 mmbf, leaving a remaining 398 mmbf in expected sales volume for the year. Given current timber sales plans—and absent a new sustainable harvest calculation—sales volumes are still pegged at about 500 mmbf in FY 17 and beyond.

Timber Sales Prices. Stumpage price expectations for FY 16 are reduced slightly to $340/mbf from $344/mbf. Stumpage price forecasts for further years are unchanged at $371, $369 and $367/mbf for FYs 17, 18, and 19 respectively.

Timber Removal Volume and Prices. Changes in harvester plans, largely due to continued weak timber and lumber prices, and the 18 mmbf reduction in planned sales, have reduced expectations for FY 16 removals by 40 mmbf to 524 mmbf. About 20 mmbf of this year's removals are shifted into outlying years, primarily FY 17. Removal volumes for FYs 17-19 are forecast to be 597 (+10), 511 (+2) and 515 (+8) mmbf. Timber removal prices are projected to be about $334 (-$2), $347 (-$2), $363 (-$1) and $368 (+0) per mbf for FYs 16-19. These removal prices reflect changes in the removal timing and follow from, and lag behind, the changes projected in timber sales prices.

Bottom Line for Timber Revenue. The above changes to timber sales prices, sales volumes, and harvest timing have shifted projected revenue in all forecast fiscal years. Revenue for the 2015-2017 biennium decreased by $12 million to $382 million, down three percent from September's forecast.

Uplands and Aquatic Lands Lease (Non-Timber) Revenues. In addition to revenue from timber removals on state-managed lands, DNR also generates sizable revenues from managing leases on uplands and aquatic lands.

Projected uplands revenue for FY 16 is increased by $0.5 million, due to an unexpected settlement in easement revenue and higher than expected production from mineral sales. Outlying years are unchanged.

Aquatics revenue expectations for FY 16 have been revised to $28 and $31 million due to changes in geoduck sales expectations.

Total Revenues. Forecast revenues for the 2015-2017 Biennium (FYs 16 and 17) are reduced by $16 million to $512 million. Most of the revenue change is driven by a change in expected timber harvests and timber sales volume.

Notes to the Forecast. Although the sales volume estimates in FY 16 are based on the best available internal planning data, they are subject to

downward adjustments due to on-going operational and policy issues. These issues may also affect sales volumes in outlying years, where the assumed sustainable harvest volume of 500 mmbf could prove too high.

A continuing major downside risk for the forecast is timber and lumber demand from China. While it seems that a decrease in demand has largely been accounted for in the current prices, there is growing concern that that the slowdown in Chinese construction, and economic growth more generally, will be much more dramatic than previously expected.

Another major downside risk is the mid-October expiration of the Softwood Lumber Agreement (SLA, 2006) between the U.S. and Canada. The SLA was signed in 2006 after a long running trade dispute in which U.S. producers claimed that Canada was unfairly subsidizing their lumber industry by selling government owned timber at administratively set prices, as opposed to market based prices. The agreement provided for a tariff on imports of Canadian lumber to the U.S. that was set based on the market price of lumber. From November 2013 to April 2015, lumber prices were high enough that there was no tariff. However, since lumber prices have dropped precipitously, imports were attracting the maximum tax of 15 percent. Since October 12, that tax has been removed.

The effect the SLA expiration has on U.S. lumber and timber prices will depend heavily on demand conditions both in the U.S. and internationally, particularly in China. If demand increases again, enough to push lumber prices to the levels seen prior to April, then the effect will be negligible because there would have been no tax at those prices anyway. However, until demand recovers sufficiently, U.S. producers will likely see increased competition and lower prices. This means lower demand, and therefore prices, for logs, which undermines DNR stumpage prices. This has been taken into account in our forecasts, but the size of the effect is very uncertain.

There is an unlikely upside potential for increases in timber price due to unexpectedly rapid strengthening of U.S. housing demand. This has not eventuated, despite strong employment growth and reasonable wage growth for the last two years. The lack of housing demand is likely due to a number of impediments—persistently stringent lending standards, a continued tough labor market for younger workers, and student loan debt.

Finally, although the end of the Chinese ban on geoduck imports from the Pacific Northwest has eased much of the uncertainty surrounding geoduck demand, geoduck prices are historically volatile and there is no guarantee that a blanket ban will not be reinstated. Additionally, on-going friction between purchasers and divers has further disrupted the market. PSP closures in late October have added uncertainty around harvest volumes as well. Taken all together, both the geoduck sales price and harvest volumes may become even more difficult to predict in the coming years.

DNR Office of Budget and Economics
Kristoffer Larson, Economist
David Chertudi, Lead Economist

Table 1: November 2015 Forecast by Source (millions of dollars)

Timber Sales		FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
Volume (mmbf)		497	473	500	500	500	500
	Change		-	(18)	-	-	-
	% Change		0%	-4%	0%	0%	0%
Price ($/mbf)		$ 356	$348	$ 340	$ 371	$ 369	$ 367
	Change		$ -	$ (4)	$ -	$ -	$ -
	% Change		0%	-1%	0%	0%	0%
Value of Timber Sales		**$ 177.2**	**$ 164.5**	**$ 170.0**	**$ 185.5**	**$ 184.6**	**$ 183.5**
	Change		$ -	$ (8.3)	$ -	$ -	$ -
	% Change		0%	-5%	0%	0%	0%

Timber Removals		FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
Volume (mmbf)		471	451	524	597	511	515
	Change		-	(40)	10	2	8
	% Change		0%	-7%	2%	0%	1%
Price ($/mbf)		$ 323	$ 358	$ 334	$ 346	$ 362	$ 368
	Change		$ -	$ (3)	$ (3)	$ (1)	$ (0)
	% Change		0%	-1%	-1%	0%	0%
Timber Revenue		**$ 152.1**	**$ 161.4**	**$ 174.8**	**$ 206.2**	**$ 185.1**	**$ 189.5**
	Change		$ -	$ (15.2)	$ 1.9	$ 0.0	$ 2.5
	% Change		0%	-8%	1%	0%	1%

Upland Leases		FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
Irrigated Agriculture		$ 6.7	$ 7.8	$ 6.5	$ 6.3	$ 6.3	$ 6.3
	Change		$ -	$ 0.2	$ -	$ -	$ -
	% Change		0%	3%	0%	0%	0%
Orchard/Vineyard		$ 9.4	$ 8.3	$ 5.7	$ 5.8	$ 6.0	$ 6.0
	Change		$ -	$ -	$ -	$ -	$ -
	% Change		0%	0%	0%	0%	0%
Dryland Ag/Grazing		$ 7.4	$ 5.0	$ 6.4	$ 6.5	$ 6.6	$ 6.6
	Change		$ -	$ -	$ -	$ -	$ -
	% Change		0%	0%	0%	0%	0%
Commercial		$ 9.6	$ 8.2	$ 9.0	$ 9.9	$ 9.9	$ 9.9
	Change		$ -	$ -	$ -	$ -	$ -
	% Change		0%	0%	0%	0%	0%
Other Leases		$ 8.8	$ 9.4	$ 9.6	$ 9.3	$ 9.4	$ 9.5
	Change		$ -	$ 0.5	$ -	$ -	$ -
	% Change		0%	5%	0%	0%	0%
Total Upland Leases		**$ 41.9**	**$ 38.6**	**$ 37.2**	**$ 37.8**	**$ 38.3**	**$ 38.4**
	Change		$ -	$ 0.7	$ -	$ -	$ -
	% Change		0%	2%	0%	0%	0%

Aquatic Lands		FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
Aquatic Leases		$ 10.5	$ 10.9	$ 10.6	$ 10.9	$ 11.0	$ 11.1
	Change		$ -	$ 0.2	$ -	$ -	$ -
	% Change		0%	2%	0%	0%	0%
Geoduck		$ 22.1	$ 21.0	$ 16.3	$ 18.6	$ 17.7	$ 18.1
	Change		$ -	$ (1.6)	$ (1.2)	$ (1.2)	$ (1.4)
	% Change		0%	-9%	-6%	-7%	-7%
Aquatic Lands Revenue		**$ 32.7**	**$ 31.9**	**$ 26.9**	**$ 29.5**	**$ 28.7**	**$ 29.1**
	Change		$ -	$ (1.4)	$ (1.2)	$ (1.2)	$ (1.4)
	% Change		0%	-5%	-4%	-4%	-4%

Total All Sources		**$ 226.6**	**$ 231.9**	**$ 238.8**	**$ 273.6**	**$ 252.1**	**$ 257.1**
	Change		$ -	$ (15.8)	$ 0.7	$ (1.2)	$ 1.2
	% Change		0%	-6%	0%	0%	0%

Table 2: November 2015 Forecast by Fund (millions of dollars)

Management Funds		FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
041	RMCA - Uplands	$ 33.2	$ 30.4	$ 36.3	$ 42.1	$ 36.9	$ 38.7
	Change		$ -	$ (3.0)	$ (0.3)	$ (0.3)	$ 0.4
	% Change		0%	-8%	-1%	-1%	1%
041	RMCA - Aquatic Lands	$ 14.8	$ 14.4	$ 11.8	$ 13.1	$ 12.7	$ 12.9
	Change		$ -	$ (0.7)	$ (0.6)	$ (0.6)	$ (0.7)
	% Change		0%	-6%	-4%	-5%	-5%
014	FDA	$ 19.6	$ 23.2	$ 23.8	$ 27.0	$ 24.2	$ 24.7
	Change		$ -	$ (1.1)	$ 0.8	$ 0.2	$ 0.3
	% Change		0%	-4%	3%	1%	1%
Total Management Funds		**$ 67.6**	**$ 68.0**	**$ 71.9**	**$ 82.3**	**$ 73.7**	**$ 76.3**
	Change		$ -	$ (4.8)	$ (0.1)	$ (0.7)	$ (0.0)
	% Change		0%	-6%	0%	-1%	0%

Current Funds		FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
113	Common School Construction	$ 56.6	$ 50.4	$ 57.8	$ 65.7	$ 65.9	$ 68.4
	Change		$ -	$ (5.8)	$ (1.9)	$ (1.0)	$ 0.5
	% Change		0%	-9%	-3%	-1%	1%
999	Forest Board Counties	$ 52.0	$ 64.8	$ 59.7	$ 68.8	$ 60.1	$ 60.7
	Change		$ -	$ (3.0)	$ 1.9	$ 0.7	$ 0.9
	% Change		0%	-5%	3%	1%	1%
001	General Fund	$ 2.1735	$ 1.8	$ 3.3	$ 3.3	$ 3.6	$ 3.9
	Change		$ -	$ (0.0)	$ 0.3	$ 0.0	$ 0.0
	% Change		0%	-1%	8%	0%	0%
348	University Bond Retirement	$ 1.8	$ 2.8	$ 2.4	$ 2.6	$ 2.9	$ 2.1
	Change		$ -	$ 0.3	$ 0.2	$ 0.1	$ 0.0
	% Change		0%	17%	10%	4%	2%
347	WSU Bond Retirement	$ 1.7	$ 1.8	$ 1.6	$ 1.6	$ 1.6	$ 1.6
	Change		$ -	$ (0.0)	$ (0.1)	$ (0.1)	$ (0.1)
	% Change		0%	-2%	-4%	-4%	-5%
042	CEP&RI	$ 5.5	$ 5.2	$ 4.1	$ 4.4	$ 4.4	$ 4.6
	Change		$ -	$ 0.5	$ 0.8	$ 0.2	$ 0.1
	% Change		0%	13%	23%	4%	2%
036	Capitol Building Construction	$ 6.7	$ 4.9	$ 6.7	$ 9.4	$ 9.3	$ 9.1
	Change		$ -	$ (0.1)	$ 0.8	$ 0.3	$ 0.2
	% Change		0%	-1%	9%	4%	2%
061/3/5/6	Normal (CWU, EWU, WWU, TESC) School	$ 0.2	$ 0.1	$ 0.1	$ 0.1	$ 0.2	$ 0.2
	Change		$ -	$ 0.0	$ 0.0	$ 0.0	$ 0.0
	% Change		0%	12%	10%	10%	10%
Other Funds		$ 1.5	$ 0.5	$ 0.2	$ 1.2	$ 0.4	$ 0.2
	Change		$ -	$ (0.2)	$ (0.3)	$ (0.1)	$ 0.0
	% Change		0%	-47%	-21%	-24%	7%
Total Current Funds		**$ 128.1**	**$ 132.4**	**$ 135.9**	**$ 157.0**	**$ 148.4**	**$ 150.7**
	Change		$ -	$ (8.4)	$ 1.7	$ 0.1	$ 1.7
	% Change		0%	-6%	1%	0%	1%

Table 3: November 2015 Forecast by Fund (millions of dollars), cont'd

		FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
02R	**Aquatic Lands Enhancement Account**	**$ 17.9**	**$ 17.4**	**$ 15.0**	**$ 16.4**	**$ 16.0**	**$ 16.2**
	Change		$ -	$ (0.7)	$ (0.6)	$ (0.6)	$ (0.7)
	% Change		0%	-4%	-4%	-4%	-4%

Permanent Funds		FY 14	FY 15	FY 16	FY 17	FY 18	FY 19
601	Agricultural College Permanent	$ 3.5	$ 4.1	$ 6.7	$ 6.8	$ 4.6	$ 4.3
	Change		$ -	$ (0.6)	$ 0.2	$ 0.1	$ 0.1
	% Change		0%	-8%	3%	3%	2%
604	Normal School Permanent	$ 1.8	$ 1.7	$ 2.8	$ 4.6	$ 3.5	$ 3.2
	Change		$ -	$ (0.4)	$ 0.1	$ 0.0	$ 0.1
	% Change		0%	-12%	1%	1%	3%
605	Common School Permanent	$ 0.4	$ 0.7	$ 0.3	$ 0.3	$ 0.3	$ 0.3
	Change		$ -	$ -	$ -	$ -	$ -
	% Change		0%	0%	0%	0%	0%
606	Scientific Permanent	$ 6.1	$ 7.1	$ 5.7	$ 5.7	$ 5.1	$ 5.5
	Change		$ -	$ (0.7)	$ (0.2)	$ (0.0)	$ 0.0
	% Change		0%	-11%	-4%	0%	1%
607	University Permanent	$ 1.1	$ 0.4	$ 0.3	$ 0.4	$ 0.5	$ 0.6
	Change		$ -	$ (0.3)	$ (0.4)	$ (0.2)	$ (0.0)
	% Change		0%	-43%	-50%	-28%	-2%
Total Permanent Funds		**$ 13.0**	**$ 14.0**	**$ 16.0**	**$ 17.8**	**$ 14.0**	**$ 13.9**
	Change		$ -	$ (2.0)	$ (0.4)	$ (0.1)	$ 0.2
	% Change		0%	-11%	-2%	0%	1%

		FY 14	FY 15	FY 16	FY 17	FY 17	FY 17
Total All Funds		**$ 226.6**	**$ 231.9**	**$ 238.8**	**$ 273.6**	**$ 252.1**	**$ 257.1**
	Change		$ -	$ (15.8)	$ 0.7	$ (1.2)	$ 1.2
	% Change		0%	-6%	0%	0%	0%

Contents

List of Tables

List of Figures

Acronyms and Abbreviations

bbf	Billion board feet
BLS	U.S. Bureau of Labor Statistics
CAD	Canadian dollar
CNY	Chinese yuan (renminbi)
CPI	Consumer Price Index
CY	Calendar Year
DNR	Washington Department of Natural Resources
ECB	European Central Bank
ERFC	Washington State Economic and Revenue Forecast Council
FDA	Forest Development Account
FEA	Forest Economic Advisors
Fed	U.S. Federal Reserve Board
FOMC	Federal Open Market Committee
FY	Fiscal Year
GDP	Gross Domestic Product
HMI	National Association of Home Builders/Wells Fargo Housing Market Index
IMF	International Monetary Fund
mbf	Thousand board feet
mmbf	Million board feet
PPI	Producer Price Index
Q1	First quarter of year (similarly, Q2, Q3, and Q4)
QE	Quantitative Easing
RCW	Revised Code of Washington
RISI	Resource Information Systems, Inc.
RMCA	Resource Management Cost Account
SA	Seasonally Adjusted
SAAR	Seasonally Adjusted Annual Rate
TAC	Total Allowable Catch
USD	U.S. Dollar
WDFW	Washington Department of Fish and Wildlife
WWPA	Western Wood Products Association
WTO	World Trade Organization

Preface

This *Economic and Revenue Forecast* (Forecast) projects revenues from Washington state lands managed by the Washington State Department of Natural Resources (DNR). These revenues are distributed to management funds and beneficiary accounts as directed by statute.

DNR revises its Forecast quarterly to provide updated information for trust beneficiaries and state and department budgeting purposes. Each DNR Forecast builds on the previous one, emphasizing ongoing changes. Each re-evaluates world and national macroeconomic conditions, and the demand and supply for forest products and other commodities. Finally, each assesses the impact of these economic conditions on projected revenues from DNR-managed lands.

DNR Forecasts provide information used in the *Washington Economic and Revenue Forecast* issued by the Washington State Economic and Revenue Forecast Council. The release dates for DNR Forecasts are determined by the state's forecast schedule as prescribed by RCW 82.33.020. The table below shows the anticipated schedule for future *Economic and Revenue Forecasts.*

This Forecast covers fiscal years 2016 through 2019. Fiscal years for Washington State government begin July 1 and end June 30. For example, the current fiscal year, Fiscal Year 2016, runs from July 1, 2015 through June 30, 2016.

The baseline date (the point that designates the transition from "actuals" to predictions) for DNR revenues in this Forecast is October 1st, 2015. The forecast numbers beyond that date are predicted from the most up-to-date DNR sales and revenue data available, including DNR's timber sales results through October 2015. Macroeconomic and market outlook data and trends are the most up-to-date available as the Forecast document is being written.

Unless otherwise indicated, values are expressed in nominal terms without adjustment for inflation or seasonality. Therefore, interpreting trends in the Forecast requires attention to inflationary changes in the value of money over time separate from changes attributable to other economic influences.

Economic Forecast Calendar

Forecast	Baseline Date	Draft Revenue Data Release Date	Final Data and Publication Date (approximate)
February 2016	January 1, 2016	February 18, 2016	February 31, 2016
June 2016	May 1, 2016	June 17, 2016	June 30, 2016
September 2016	August 1, 2016	September 10, 2016	September 30, 2016
November 2016	October 1, 2016	November 10, 2016	November 30, 2016

Acknowledgements

The Washington Department of Natural Resources' (DNR) *Economic and Revenue Forecast* is a collaborative effort. It is the product of information provided by private individuals and organizations, as well as by DNR staff. Their contributions greatly enhance the quality of the Forecast.

Special thanks are due to those in the wood products industry who provided information for DNR's survey of timber purchasers. These busy individuals and companies volunteered information essential to forecasting the timing of timber removal volumes, a critical component of projecting DNR's revenues on behalf of beneficiaries.

Thanks also go to DNR staff who contributed to the Forecast. Tom Shay, Andrew Hayes, Rick Roeder, Tom Heller, Duane Emmons, Kristin Swendall, and Blain Reeves provided data and counsel, including information on revenue flows in their areas of responsibility.

In the final analysis, the views expressed are our own and may not necessarily represent the views of the contributors, reviewers, or DNR.

DNR Office of Budget and Economics
Kristoffer Larson, Economist
David Chertudi, Lead Economist

Macroeconomic Conditions

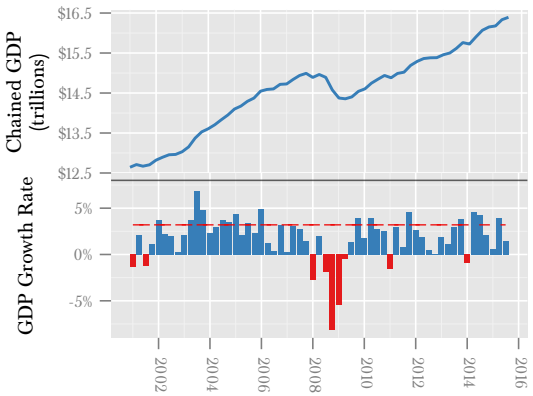
This section briefly reviews macroeconomic conditions in the United States and world economies because they influence DNR revenue—most notably through the bid prices for DNR timber sales and lease revenues from managed lands.

U.S. Economy

Gross Domestic Product

Since the end of the Great Recession during 2008 and 2009, when GDP declined in five out of six quarters, GDP growth has averaged a weak 2.2 percent on a real annualized basis (Figure 1). This is markedly less than the annualized average of 3.2 percent over the previous 50 years (1960-2009). The Great Recession set back economic growth and seriously harmed many sectors of the economy, particularly employment and wages.

Figure 1: U.S. Gross Domestic Product



2014 was widely predicted to be the year that broke the pattern of stagnation, but the annual growth was held down to 2.4 percent because a harsh winter and business inventory adjustments caused GDP to contract. 2015 was also widely predicted to be the year that broke the pattern, with a continuation of the strong employment growth from 2014 finally causing an increase in consumption and investment. However, the first quarter of 2015 was also quite poor, with a harsh winter again stifling consumption and investment and the strong dollar constraining exports. And although the second quarter 2015 GDP annualized growth was a decent 3.7 percent, the third quarter advance estimate was a mediocre 1.5 percent.

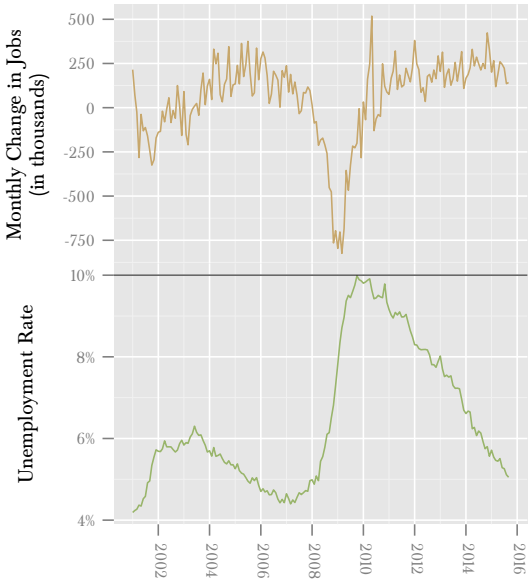
Predictions for real GDP growth in 2015 from various sources have been repeatedly reduced as the year progresses as mediocre growth and headwinds to growth mount (particularly the Chinese slowdown and the strength of the dollar). However, many forecasts have recently increased and now tend to fall in the range of 1.9-3.1 percent. The FOMC significantly lowered its 2015 forecast range in June, from 2.1-3.1 percent to 1.7-2.3 percent, but increased its range forecast in September to 1.9-2.5 percent.

Employment and Wages

The U.S. headline unemployment rate has continued to decline since the beginning of the year from 5.6 percent in January to 5.0 percent in October (Figure 2). This is down from a high of 10.0 percent in October 2009 and slightly above the average unemployment rate of 5.2 percent from 2001-2006. In October an estimated 270,000 jobs were created, well above the August and September numbers, which averaged 145,000 jobs per month. Analysts are still predicting over 250,000 jobs created per month in 2015 and 2016; however, 2015 has averaged only 206,000 jobs per month, with the year almost over.

The unemployment rate is an important indicator to track because it gives insight into slack in the labor market, that is, how many people are available to work before job growth starts driving problematic inflation. The health of the labor market is the driving force behind consumption, which constitutes about 70 percent of GDP and naturally extends to the demand for housing, which is the major driver of timber demand in the US. Data and anecdotes abound that show that one of the major effects of high unemployment rates, particularly among young adults, is lower demand for housing as more people live with their parents or take on house-mates.

Figure 2: Unemployment Rate and Monthly Change in Jobs

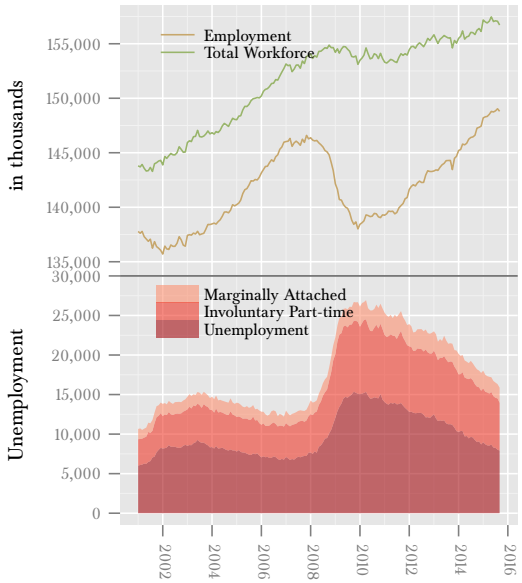


Although the unemployment rate continues to decline, it has not translated into strong wage growth, which is a prerequisite for broader improvement in the economy, nor into a strong increase in the demand for housing. One possibility for the lack of wage growth is that the headline unemployment rate may be underestimating the number of people willing to work. During the 2008-09 recession the number of people who were underemployed or marginally attached to the workforce increased dramatically. Additionally, since the recession the labor force participation rate has declined significantly, possibly because workers left the labor force after they were unable to find jobs.

The U-6 unemployment rate includes involuntarily part-time employment and marginally attached workers, who are not included in the headline unemployment rate but who, nevertheless, are likely looking for work and would benefit from better job prospects. The U-6 has declined from a high of 17.1 percent in 2010 to 11.3 percent in January and then 10.0 percent in September. It remains higher than the average of 9.1 percent from 2001-2006 (Figure 3). The decline in the year-on-year U-6 is the result of a drop in all three of its components.

Reductions in the labor force participation rate have also helped move the unemployment rate and the U-6 lower (Figure 4). The decline in the labor force participation rate is an important confounding factor when examining the unemployment rate and is a key consideration when forecasting whether an increase in employment will trigger an increase in wages and inflation. If there are many people waiting to look for employment until jobs are easier to find—such as when people are staying out of the labor force and the participation rate declines—then as employment grows more people will enter the labor force and there will be little or no pressure on wages despite a low unemployment rate. However, if people are not in the labor market for other reasons, then the labor pool is relatively fixed and wages will be pushed up as companies compete for labor.

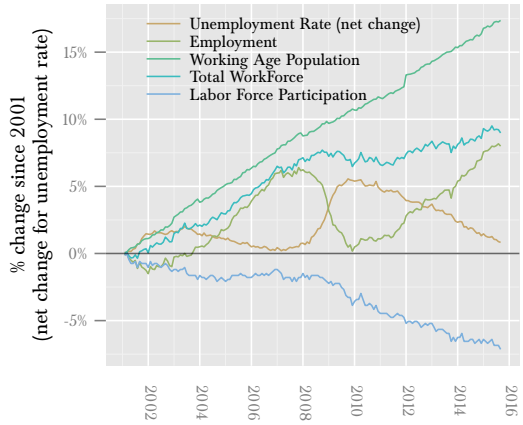
Figure 3: Employment and Unemployment



The drop in the participation rate since 2008 suggests that something about the recession itself caused people to leave the labor market, and implies that they may return when things are looking a bit better. However, Federal Reserve analysts have suggested that the recent decline in participa-

tion may be part of a longer-term trend starting in the late 1970s and pausing during the 1990s, not as a result of the recession. Indeed, according to statistics released by the Federal Reserve Bank of Atlanta, many of those dropping out of the labor force can't or don't want to work.

Figure 4: Labor Market Indicators



BLS data show that in September, out of the 95 million Americans not in the labor force, six million want a job but have not been searching for one. Almost two million of these were marginally attached and are included in the U-6, leaving around four million who may take on work when conditions are right, but who aren't included in the statistics. Given that the current number of unemployed included in the headline unemployment rate is around seven million, an additional four million potential workers is a significant additional labor population. This suggests that, while the labor force participation rate decline may indeed be structural, there may still be potentially significant slack in the labor market.

Although real wage estimates show that median weekly earnings for full time workers have been stagnant since at least the late 1970s, recent estimates show small increases—2.2 percent year-on-year in September. These increases suggest that slack in the labor market may be abating, though it is still an open question as to when, or whether, this will begin pushing up inflation or housing demand.

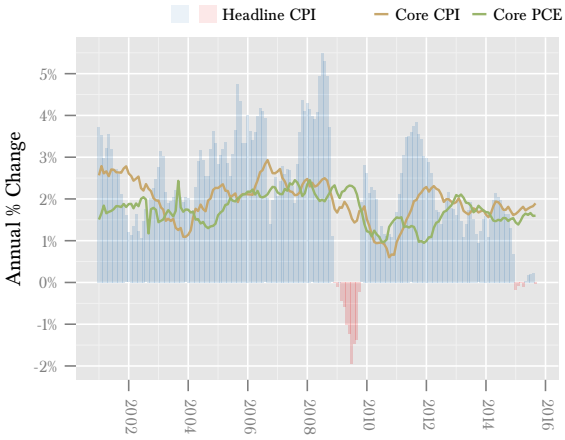
Inflation

The inflation outlook for 2015 has deteriorated significantly through 2015 with the FOMC downgrading its predicted range from 1.0-2.2 percent in its December 2014 Summary of Economic Projections, to 0.3-1.0 percent in its June Projections. However, this decline has largely been due to the fall in oil and food prices (Figure 5).

For policy purposes, the FOMC uses the core Personal Consumption Expenditures (PCE) index as the guiding measure of inflation, which removes the more volatile fuel and food prices. This measure shows long-term inflation at or below the two percent target since September 2008 (83 consecutive months). The FOMC has changed its predicted range from 1.5-1.6 in the December Economic Projections to 1.2-1.7 percent in its September 2015 projections.

The consensus among forecasters, including the FOMC, hasn't changed for the outlying years, with core inflation rates of below two percent still expected.

Figure 5: U.S. Inflation Indices



Interest Rates

Seldom in U.S. history has it been so inexpensive to borrow money. Interest rates have remained at record lows while the Federal Reserve has continued to hold the funds rate in the 0.0-0.25 percent range since December 2008. Since 2008, the Fed has pledged to keep rates near zero until it judges that there has been sufficient progress toward its dual-mandate of maximum employment and two percent inflation.

Pressure has been building to increase interest rates over the past year. Arguments for raising interest rates revolve around the steady increase in employment, the need to avoid sharp increases in inflation and the need for the Fed to maintain the confidence of markets. Arguments resisting the increase in rates are manifold, but generally note that sharp increases in inflation are not a danger from any reasonable economic model, that inflation somewhat above the target rate is not a disaster and easily addressed when it happens, that the inflation target itself is too low, and that the asymmetrical risk of raising rates too quickly could further undermine the weak recovery we have experienced.

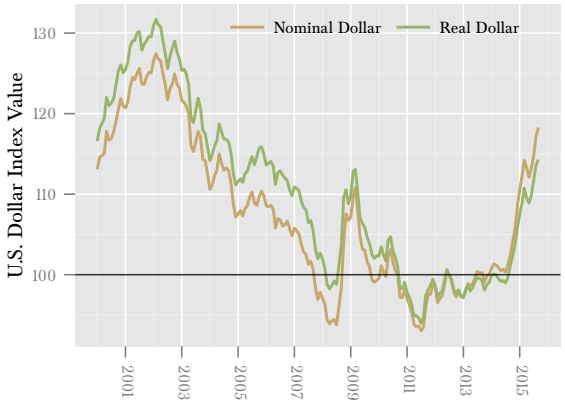
The question of whether or not to raise interest rates is important because it is the key tool of monetary policy. An increase in interest rates will slow down economic growth—business investment slows down because borrowing money becomes more expensive, so job and wage growth slow down constraining consumption. Similarly, it becomes more expensive for consumers to borrow, impeding demand in the housing and auto markets. In normal times, a decrease in interest rates will expand investment, employment, wages, and consumer credit.

Given the arguments around whether to raise rates sooner rather than later, analysts have been closely examining both current and expected inflation rates and dissecting any official FOMC statements, as well as statements of individual members, in an attempt to divine when rate rises will begin. There was strong speculation that rate rises would begin in September, but weak job growth through August, combined with poor net exports and continued weak inflation convinced the FOMC to wait. However, since the September FOMC meeting job growth has rebounded strongly, with the economy adding 271,000 jobs in October. The widely held view is that the strong job growth has made it very likely that the FOMC will increase interest rates at their December meeting, barring any catastrophic economic data, though there are still many experts who continue to counsel patience.

The U.S. Dollar and Foreign Trade

The trade-weighted U.S. dollar index has climbed dramatically, increasing by more than 20 percent since mid-2014. (Figure 6).

Figure 6: Trade-Weighted U.S. Dollar Index



The climb in the dollar has threatened the recent improvement in the U.S. economy by making imported goods relatively cheaper than those locally produced, while also making U.S. exports less competitive abroad. This has had a measurable effect on GDP growth, as net exports (exports less imports) have subtracted 3.8 percent from GDP growth over the last year and a half. It is likely that this would have been a much larger impact if not for the expansion of U.S. oil production, which has offset a significant amount of oil imports.

Importantly, a rising dollar means that timber and lumber from the Pacific Northwest become more expensive for international buyers and imported timber and lumber become less expensive.

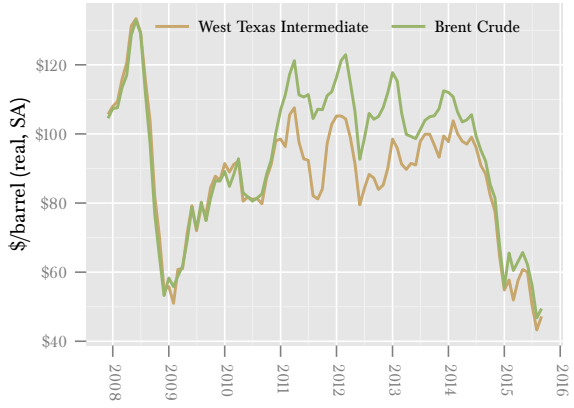
This will tend to suppress local prices and DNR's timber and agricultural revenues. Wildstock geoduck revenue will also be negatively affected because geoduck is primarily marketed abroad.

Petroleum

Crude oil and its derivatives strongly affect production, transportation, and consumption in the world and U.S. domestic economies. Prices for Brent crude oil have plummeted from $108/barrel in January 2014 to less than $50/barrel in September 2015. Broadly, a drop in oil prices acts like a tax cut for consumers and can encourage consumption; however, current data suggest that households are saving the windfall or paying down debt instead of spending it just yet.

All other things being equal, this drop in petroleum prices has lowered diesel fuel prices and will make transportation-sensitive industries—such as PNW logging and agriculture—more competitive in international markets. However, all other things are not equal: as discussed above, the U.S. dollar has risen dramatically and will make PNW timber more expensive internationally. These two forces are opposing and it is unclear which will be more influential on PNW natural resource exports.

Figure 7: Crude Oil Prices



World Economy

Europe

Forecasts for the U.S. economy often cite Europe's ongoing financial crisis and very weak economic performance as a significant downside risk. The EU (28 countries) is the fourth largest trading partner of the U.S. and, as a whole, was hammered by the Great Recession, collectively suffering a 4.5 percent contraction in 2009. This was followed by two years of slow growth, and another year of contraction. After no growth in 2013, 2014 saw real EU GDP growth of 1.3 percent—finally surpassing 2007's GDP in real terms.

After several dramatic months as the primary concern of the European economy, a deal was reached in July between Greece and its eurozone creditors that averted (at least temporarily) a Greek default or exit from the euro. Unfortunately, it appears that Greek debt will not be repaid without significant restructuring because it simply cannot grow fast enough to maintain or resolve the debt, though there seems to exist little political will within Europe to restructure.

Other issues with the European economy include persistent low inflation, though the risk of a deflationary spiral appears to have abated, and an unemployment rate that remains above 10 percent, though it varies widely between countries.

Weakness in Eurozone economies means reduced demand for U.S. exports, but it has thus far been difficult to identify significant tangible effects on the U.S. economy.

China

China is a major export market for logs and lumber from the Pacific Northwest. Since 2011, between 50 and 60 percent of the softwood log exports leaving the Seattle and Columbia River Customs District have gone to China. Changes to the Chinese economy can have a dramatic impact on the prices for logs and lumber (and geoduck) in the Pacific Northwest.

China's GDP and employment weathered the global economic and financial crises of the past seven years better than most other economies. However, that resilience is proving to be illusory, as the costs of propping up investment and maintaining significant political control over the economy mount and the likelihood of a dramatic slowdown increase. Already, Chinese GDP growth has slowed from 10.4 percent in 2010 to a 7.4 in 2014. The IMF forecasts a further decline to 6.8 percent in 2015 and 6.3 percent in 2016.

The dramatic stock market crash in the middle of the year and the botched attempt by the government to prop up the markets have undermined confidence in both the government's ability to manage the economy and their commitment to transitioning to a market-based economy. Although the crash was more a correction of the speculative bubble that had built up over the prior year—the Shanghai index increased over 150 percent from late 2014 to June 2015—and does not reflect the underlying economy, there are a still a number of concerns about the Chinese economy.

Additionally, there is growing concern that the above forecasts are overly optimistic and that Chinese GDP growth will fall much lower, possibly even into recession. This risk is mostly due to the prominence of investment as a component of GDP, the huge amount of debt in the country, and the way that debt is held. Household and corporate debt (to non-financial corporations) has ballooned from around 110 percent of GDP in 2008 to over 190 percent in 2014, and much of it is linked to real estate. Investment comprises almost 50 percent of China's GDP. At those levels of debt a slowdown in an economy can lead to a drop in income and an inability to service debt en-masse, potentially leading to a debt crisis that would undermine that investment and have a tremendous impact on China's GDP.

Analysts seem to broadly agree that in order to continue growing and to stabilize its economy China needs to pivot from its heavy reliance on investment toward a broader consumption basis. In order to do this it would need to encourage domestic spending and move away from saving, but the political measures to do this are impeded by entrenched interests.

Japan

Japan is another major export market for the Pacific Northwest—importing around 35 percent of the softwood logs exported from the Seattle and Columbia River customs districts since 2012. Unfortunately, Japan's growth has stagnated since the early 1990s after a stock market and property bubble bust trapped the economy into a deflationary spiral. After his election in late 2012, Japanese Prime Minister Shinzo Abe began a fairly bold combination of economic policy moves, dubbed 'Abenomics', in an attempt to revitalize Japan's economy.

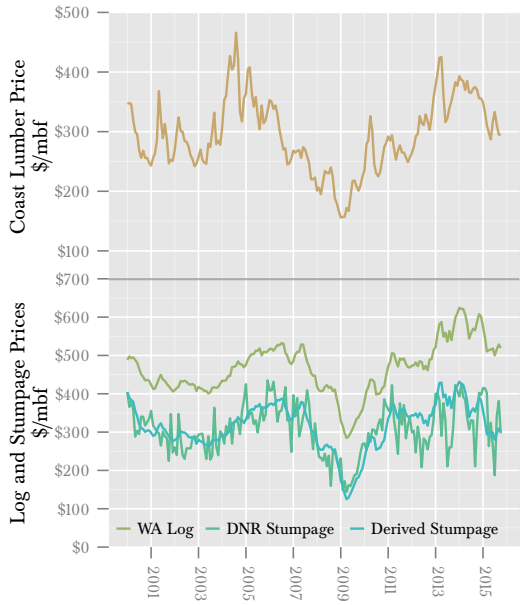
These policies were initially well received by the Japanese, judging by increasing consumer confidence and GDP growth. However, GDP in 2014 actually shrank by 0.1 percent and the IMF expects weak growth of 1.0 and 1.2 percent in 2015 and 2016, respectively.

On the other hand, it appears that Japan may be escaping from the deflationary spiral, with CPI growing by 2.7 percent in 2014 and positive inflation projected for 2015 and 2016.

Log, Lumber, and Stumpage Prices

Over the past decade, timber stumpage revenue have constituted over 75 percent of total revenues. DNR is, therefore, vitally concerned with understanding stumpage prices, log prices, lumber prices, and the related supply and demand dynamics underlying all three. This section focuses on specific market factors that affect timber stumpage prices and overall timber sales revenues generated by DNR.

Figure 8: Lumber, Log and Stumpage Prices in Washington

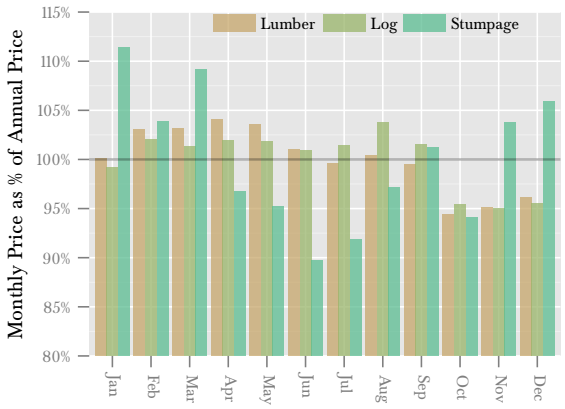


In general, timber stumpage prices reflect demand for lumber and other wood products, timber supply, and regional lumber mill capacity. There is a consistent, positive relationship between log prices and DNR's stumpage prices, despite notable volatility in stumpage prices (Figure 8). High log prices make access to logs more valuable and increase purchasers' willingness to pay for stumpage, or the right to harvest. Volatility in stumpage prices arises not only from log prices, but also from the amount of lumber and logs held in mills' inventories and from DNR-specific issues, such as the quality and type of the stumpage mix offered at auction.

The relationship between lumber prices and log prices is less consistent. Lumber prices are significantly more volatile and both the direction and size of price movements can differ from log prices. This is due to both demand and supply-side factors. On the demand side, mills will often have an inventory of logs in their yards, as well as an inventory of 'standing logs', so they do not always need to bid up log prices to take advantage of high lumber prices. From the supply side, land owners do not often need to sell their timber, so when prices fall too far, they can withhold supply and allow their trees to grow and increase in quality.

There are differences in price seasonality between lumber, logs, and stumpage, as illustrated in Figure 9. These prices are affected by a degree of seasonality that is largely the result of when each of these commodities will be used. For instance, lumber prices tend to peak in spring, when housing construction picks up, and decline through fall as the demand wanes, while stumpage prices tend to be highest when harvesters are lining up harvestable stock for the summer. DNR stumpage price volatility is also affected by the firefighting season and the quality of the stumpage mix, which varies throughout the year but tends to be lowest from August through September.

Figure 9: Lumber, Log, and DNR Stumpage Price Seasonality



U.S. Housing Market

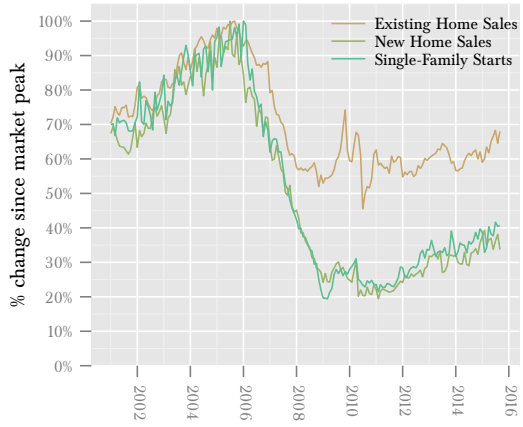
This section continues with a discussion of the U.S. housing market because it is particularly important to overall timber demand in the U.S.

New residential construction (housing starts) and residential improvements are major components of the total demand for timber in the U.S. Historically, these sectors have constituted over 70 percent of softwood consumption—45 percent going to housing starts and 25 percent to improvements—with the remainder going to industrial production and other applications.

The crash in the housing market and the following recession drastically reduced demand for new housing, which undermined the total demand for lumber (Figure 10). Since the trough from 2009-11, the lumber demand for residential construction has increased slightly, due to an increase in housing starts. Prolonged growth in starts is essential for a meaningful increase in the demand for lumber.

Housing demand has remained broadly subdued due to tight lending standards, weak labor markets, and increasing prices at the same time as stagnant or declining real wages for much of the population. However, a number of measures suggest that the modest recovery in housing demand, driven primarily by new home sales, has resumed after stalling through late 2014.

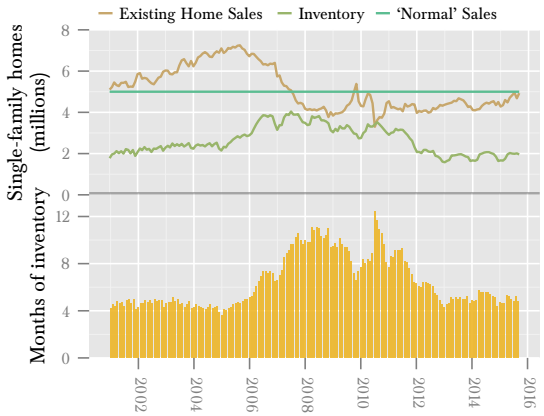
Figure 10: Home Sales and Starts as a Percentage of Pre-Recession Peak



Existing Home Sales

Existing home sales plummeted during the recession from around 6.5 million (SAAR) in 2006 to a low of around 4.1 million in 2010. They have since risen to average 4.7 million (SAAR) thus far in 2015, well above the 4.3 million average of 2014 (Figure 11).

Figure 11: Existing Home Sales



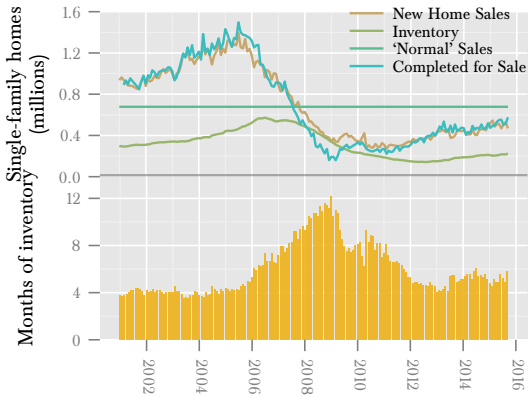
Changes in inventory can be a useful signal about the current relationship between supply and demand. A decreasing inventory suggests that demand is outstripping supply, which should put upward pressure on prices and encourage more homes to be listed or built. The current inventory has averaged around two million since 2012, suggestng that demand for existing houses is, on average, matching well with supply.

After house prices fell in the recession, private investors moved into depressed housing markets and purchased large numbers of lower-priced foreclosed residential properties. These investors have helped drive demand and may have set a floor under several key urban housing markets. There has been concern among analysts about the potential impact on house prices if investors were to begin selling en-masse and increase the housing supply while demand continues to be weak. However, without significant potential returns from other investment, there seems little chance of a mass sell-off.

New Home Sales

Unsurprisingly, new home sales also plummeted during the recession, reaching a record low of 306,000 in 2011 before beginning a slow rise (Figure 12). New home sales have increased from 440,000 (SAAR) in 2014 to an average of 505,000 to September, still well below the long-term (1963-2010) 'normal' rate of 678,000 sales per year.

Figure 12: New Single-Family Home Sales



As low as new home sales fell, new home construction fell even lower from early 2007 through mid-2011, causing the inventory of newly built homes for sale to decline over the period. After bottoming out in July 2012, the inventory of new homes has crept up as construction slightly outpaced sales. However, both sales and construction are still well below 'normal' levels.

Shadow Inventory

The inventories of existing and new homes discussed above are made up of those housing units that are currently listed for sale ('on the market'). While it exists even in normal times, there is also a 'shadow inventory' that gained attention after the recession as an important measure of the health of the housing market. The shadow inventory comprises homes not currently on the market, but expected to be listed in the next few years. The shadow inventory usually includes the number of properties currently in the process of foreclosure, properties with seriously delinquent mortgages, and properties owned by banks or real estate firms. A large shadow inventory is reflected in distressed sales (including short sales) and can put downward pressure on prices and stifle housing starts.

On the other hand, a declining shadow inventory will reduce available inventory, putting upward pressure on prices at a given demand. The shadow inventory has been declining for some time. Serious delinquencies have declined from 1.6 million in October 2014 to 1.3 million in September 2015. During the same period, the number of houses in the process of foreclosure fell from 589,000 to 470,000.

Household Formation

Household formation (or the growth in the number of households) is the key component of housing demand and a major driver of U.S. housing starts. Due to the job and income losses and to the greater financial precarity that the recession occasioned, household formation fell as people shared housing and many younger people, who were hit especially hard, moved back in with their parents. Net immigration from Mexico also approached zero following the Recession, and may have actually been negative, contributing to slowing household formation.

The drop in household formation and the consequent reduction in demand for home purchases contributed to the surge in the inventory of available housing units and significant drop in housing starts. Historically, U.S. household formation has ranged between 1.2 and 1.3 million per year; following the recession, household formations dropped dramatically to average 0.7 million per year from 2009-2014.

An important concept frequently discussed in relation to household formation is that of 'pent-up' demand—the demand for housing from those who wish to form households, but are currently unable to because of employment, earnings, or credit eligibility issues. Much of the discussion from analysts in the past several years has been around how there is a large, and growing, pent-up demand as more young adults want to move out and create

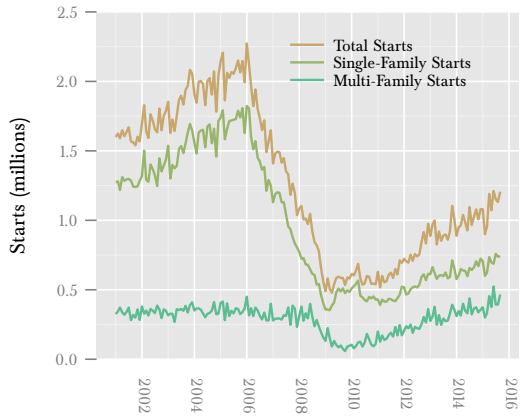
their own households. Analysts have consistently overestimated its impact on the housing market, repeatedly predicting a strong rebound in household formation and housing starts that has yet to emerge. In other words, pent-up demand has so far failed to become real demand, largely because of issues with employment, wages, credit requirements, and affordability.

Looking forward, household formation will depend on both the continued recovery in the U.S. labor market—more than just job growth, but also real wage growth—and improvements in affordability and mortgage access. Analysts are forecasting formations of around 1.1-1.2 million for the next couple of years, an average annual rate of 1.7 million from January to June 2015.

Housing Starts

U.S. housing starts picked up in 2011 and continued to rise, largely because of increases in multi-family starts. Single-family starts were more or less flat after the recession through 2012, but have been rising slowly since (Figure 13). In April 2009, U.S. housing starts fell to record lows since the Census Bureau began tracking housing starts in 1959. In 2014 there were around 1.0 million starts.

Figure 13: Housing Starts



The dependence of total housing starts on multi-family units is a new development since the recession. It is notable because multi-family structures use much less lumber than single-family houses per unit, so this increase in overall starts has had a more muted effect on timber prices than historical starts increases have had.

The outlook for housing starts is fairly positive going into 2016, which is forecast to see about 1.3 million starts. Thus far 2015 has averaged 1.1 million (SAAR) starts, overcoming low first quarter starts that were dragged down by severe weather. Continued improvements in household formations will increase demand, though it is unclear how long it will take before formations increase. Additionally, a recovery in house prices should facilitate the 'move-up' market. Combined with low market and shadow inventories constraining the supply of existing housing, prices should start increasing and provide incentives to build more houses.

Impediments to increased housing starts include the sentiment of construction companies, who report being very wary of building more houses until demand clearly picks up, and supply impediments, such as the lack of buildable lots or problems getting permits in a timely manner. Given the lead time necessary to build houses, these are likely to cause volatility in both prices and supply.

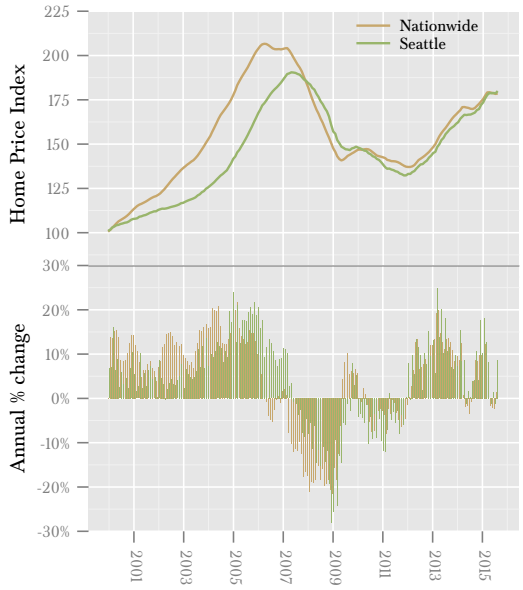
Housing Prices

U.S. housing experienced six unprecedented years of falling or flat prices following the recession. House prices started rising again only in 2012 as economic and employment indicators continued to improve. Figure 14 charts the seasonally adjusted S&P/Case-Shiller Home Price Indices for the 20-city composite, which estimates national existing home price trends. The 20-city composite index has increased most months since bottoming out in January 2012—its lowest point since October 2002, almost ten years earlier.

Seattle house prices are following a similar trajectory to national prices, having increased 7.2 percent year-on-year as of August 2015. When Seattle prices bottomed in February 2012—at their lowest point since June 2004—the average existing house in Seattle was worth only 70 percent of the May 2007 peak. As of August, the average Seattle home

was worth 94 percent of its peak price.

Figure 14: Case-Shiller Existing Home Price Index



An increase in prices would allow the return to more normal foreclosure conditions, in which homeowners are able to make rational decisions about when or whether they wish to sell—as opposed to being forced to sell or to remain 'underwater' to avoid selling at a loss or compromising their credit.

Housing Affordability

The National Association of Realtors' (NAR) U.S. Housing Affordability Index is a useful, though imperfect, measure of how affordable or attainable houses are to the average American. Index values increase as affordability increases, and decline as homes become less affordable.

Affordability peaked at a record high of 208 in February 2013 and then crashed to 156 in August of that year—its steepest decline in 30 years—on the back of increased interest rates and house prices (Figure 15). Following that decline the index rose and fell as housing market sentiment oscillated between bullish in the wake of price increases, and bearish as buyers withdrew and interest rates increased. From August 2014 the index increased on the back of declining mortgage rates and increases in the median wage, but has fallen since January due to an roughly 16 percent increase in prices, an increase in mortgage interest rates, but only a small increase in the median income.

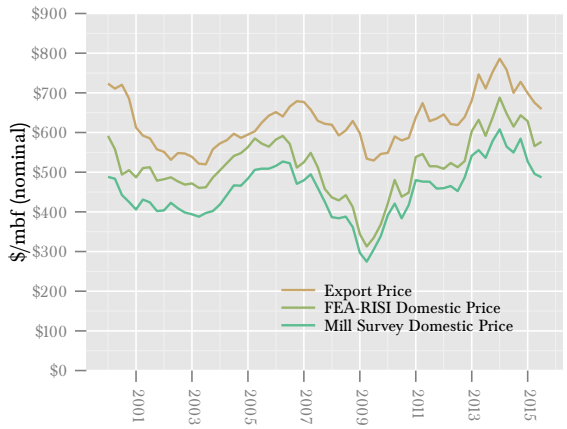
Figure 15: Housing Affordability

The income needed to purchase a house is growing much faster than are actual annual incomes. For now, low mortgage rates are muting this effect, but the trend cannot continue indefinitely—either price growth will need to slow or incomes will need to rise. The urgency for this type of adjustment increases as mortgage interest rates begin to rise.

Export Markets

Although Federal law forbids export of logs from public lands west of the 108th meridian, log exports still have a meaningful impact on DNR stumpage prices. Exports compete with domestic purchases for privately sourced logs and strong export competition pulls more of the supply from the domestic market, thereby raising all domestic prices. However, changes in export prices do not influence domestic prices in a one-to-one relationship.

Figure 16: Log Export Prices



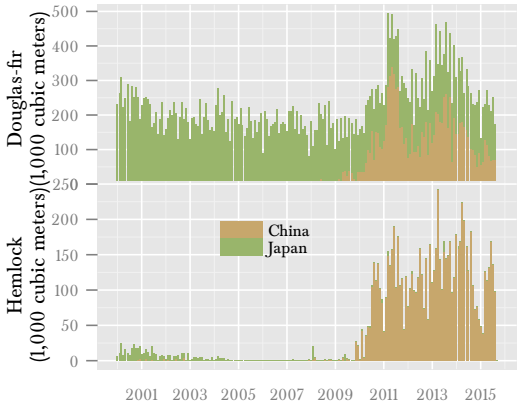
Export prices are almost always higher than domestic prices, a difference which is referred to as the 'export premium' (Figure 16). The export premium exists primarily due to the characteristics of the export markets, which can include a demand for higher quality wood, a high value placed on long-term contracts, and high transaction costs.

Note that the export prices shown in Figure 16 are weighted by DNR's typical species mix, not the species mix of actual export volumes.

Since 2010, demand from China has been a major support of log and lumber prices in Washington. That demand waned significantly in late 2014 as China's economic health wavered, the U.S. dollar appreciated while the value of the euro and ruble dropped (making U.S. timber comparatively more costly), and the Russian tariff on log exports was reduced. The downward trend in demand has continued into 2015, with Douglas-fir log exports down 46 percent through August and Hemlock (and other whitewood) exports down 39 percent (Figure 17).

In May, China re-entered the North American lumber and Hemlock log markets, but did not come back to the Douglas-fir markets with their previous gusto. Forecasters expect demand to remain elevated in the near term, but further out the export premium is expected to shrink due to strong demand from recovering domestic markets and decreased demand from importing countries, China in particular. In the long run, the export premium may shrink yet more as West Coast log exports face stronger international competition and export prices are pushed down, though much will depend on supply constraints from key international suppliers and transportation constraints from the south eastern U.S.

Figure 17: Log Export Volume



Timber Supply

Timber supply is up in the Coast region, as well as in the competing U.S. Inland and South timber regions, because timberland owners reduced harvests during the recession in response to low prices. Although timber growth has exceeded timber harvest since the beginning of the recession, thereby increasing the potential timber inventory, strong log exports in the U.S. West Coast have constrained the growth of the timber inventory in that region. Thus the deferred volume in the Coast region is not as great as elsewhere. Harvesting on the U.S. West Coast reportedly exceeded growth in 2014, which will begin to deplete the stumpage inventory.

British Columbian forests have been devastated by the mountain timber beetle, which has affected about a third of the province's timber resources. This damage has increased British Columbia's timber supply since 2007: timber killed by beetles must typically be harvested between 4 and 10 years

after being killed, so the government increased the allowable harvest to ensure that the dead timber not be wasted. Analysts expect that British Columbia's elevated timber supplies will not fall until after 2015. The supply from Canada will be further diminished by Quebec's allowable annual cut being reduced by Bill 57, which was implemented in April 2013, and may be additionally reduced by the 'North for All' plan (formerly Plan Nord).

Price Outlook

Lumber Prices

As shown in Figure 8, lumber prices have dropped precipitously since mid-2014 to April 2015. Random Lengths' Coast Dry Random and Stud composite lumber price peaked at $393/mbf in January 2014, but fell throughout the rest of the year to average $373/mbf. This was largely due to a bitterly cold winter across much of the U.S. causing weak domestic demand, ample local timber and lumber inventories, and the drop in export demand from China. Since May, when composite lumber prices reached a low of $287/mbf, prices increased to a brief peak of $333/mbf in July as China re-entered the market, but have since fallen to $295/mbf in October.

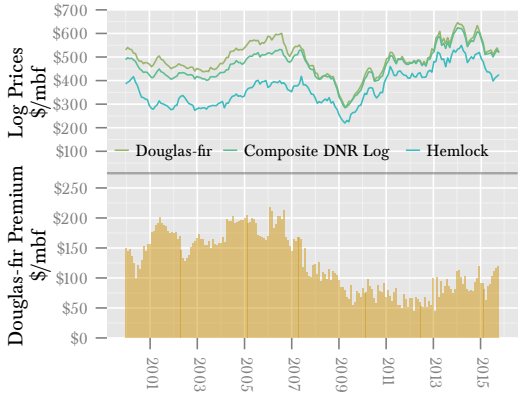
Lumber prices had a brief respite from their downward trajectory in June and July, but then resumed the downward trend. Prices may increase in the remaining months as dealers have been waiting until the expiration of the Softwood Lumber Agreement to make orders and have run down inventories, so many of them will be buying at the same time, pushing up demand, at least temporarily.

Prices are expected to be flat, or only increase slightly, in 2016 as many of the same issues that held back prices in 2015 continue to weigh down markets.

Log Prices

Figure 18 presents prices for Douglas-fir, hemlock, and DNR's composite log. The latter is calculated from prices for logs delivered to regional mills, weighted by the average geographic location, species, and grade composition of timber typically sold by DNR. In other words, it is the price a mill would pay for delivery of the typical log harvested from DNR-managed lands. The dark green line for the DNR composite log price on Figure 18 is the same as the light green line on Figure 8.

Figure 18: DNR Composite Log Prices



Readily visible on the graph is the decline in the premium for Douglas-fir—due in large part to Chinese demand fortifying hemlock prices. Also readily visible is the continued drop in prices since late 2014. The price of a 'typical' DNR log moved up sharply from a two-year plateau in 2013 to $591/mbf in 2014. However, prices have declined through 2015 to average $524/mbf so far. The decline in log price is primarily due to the dramatic slowdown in demand from China (noted as a significant risk in the March Forecast) and ample regional supply of both logs and lumber. A price decline was largely foreseen, though the depth of the drop was unexpected.

The outlook for log prices in 2016 has been revised downward, held back by the same issues plaguing lumber prices, but they are still expected to be somewhat higher than 2015 prices.

Stumpage Prices

Timber stumpage prices are the prices that successful bidders pay for the right to harvest timber from DNR-managed lands (Figure 19). At any time,

the difference between the delivered log price and DNR's stumpage price is equivalent to the sum of logging costs, hauling costs, and harvest profit (Figure 8). Subtracting the average of these costs from the log price line gives us a derived DNR stumpage price.

When actual DNR stumpage prices differ significantly from the derived stumpage prices, some sort of correction is likely to occur. For instance, in 2012 actual stumpage prices were generally lower than stumpage prices inferred from log prices, suggesting that an upward market 'correction' would be forthcoming. This correction seems to have occurred with generally higher stumpage in 2013 and 2014. However, the situation reversed in late 2014, when actual DNR stumpage prices were well above the inferred stumpage prices. As of the October timber sale, DNR stumpage prices had fallen back toward the inferred stumpage price.

DNR Stumpage Price Outlook

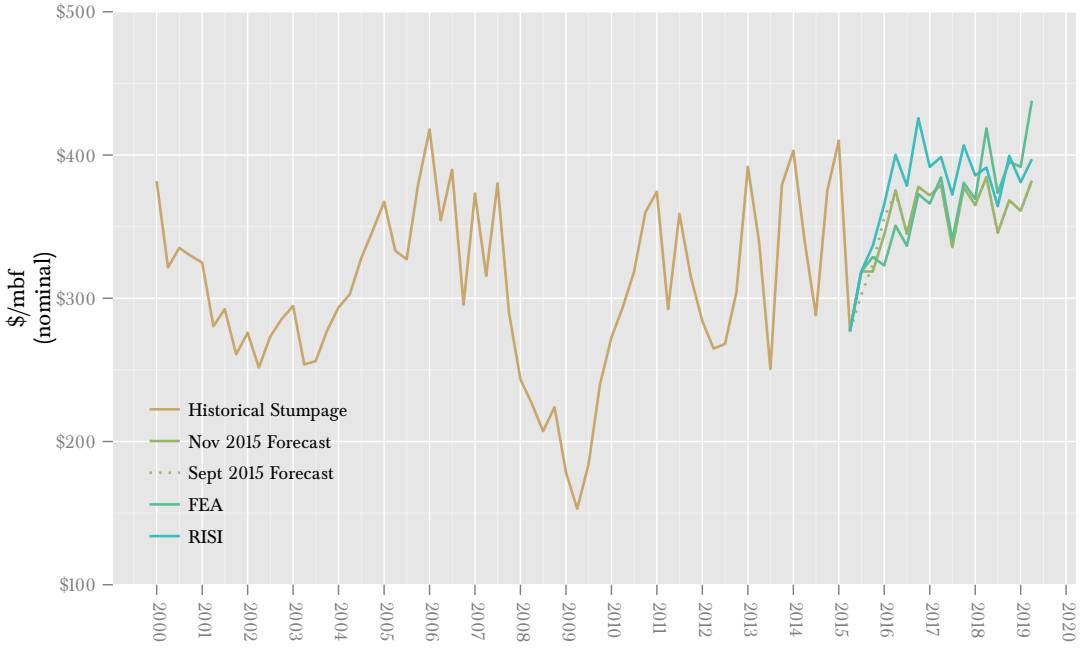
There are slight downward adjustments to the annual stumpage prices in FY 16, but the outlying years are unchanged (Figure 19). The downward adjustment in FY 16 is due to the small downward revision in expected log prices for the fiscal year.

DNR currently contracts with two forest economics consulting firms that provide log and timber stumpage price forecasts, as well as valuable insights into the housing, lumber, and timber markets. By modeling DNR's historical data on their price forecasts, we arrive at two alternative stumpage price outlooks (Figure 19, note that the RISI and FEA 'forecast' series are both adapted to reflect the species and class characteristics of typical DNR timber; the original series were West Coast averages).

Previously, the updated DNR Forecast represented a weighted middle ground between the two consultants' outlooks, however, in the September forecast we took a more pessimistic view with our spot price forecasts. These appear to have been well founded, as both consultants lowered their price forecasts. Our current forecast is only slightly more pessimistic than the median modeled stumpage prices and are still well within the range of likely stumpage prices. This decision reflects a more cautious approach to the downside risks.

It is important to note that these price expectations are for nominal prices. In real (inflation adjusted) terms, the forecast stumpage prices will be much lower than the highs achieved during the housing boom.

Figure 19: DNR Timber Stumpage Price



DNR Revenue Forecast

This Revenue Forecast includes revenue generated from timber sales on trust uplands, leases on trust uplands, and leases on aquatic lands. In the final summary table, it also forecasts revenues to individual funds, including DNR management funds, beneficiary current funds, and beneficiary permanent funds. Caveats about the uncertainty of forecasting DNR-managed revenues are summarized near the end of this section.

Timber Revenue

DNR sells timber through auctioned contracts that vary in duration. For instance, contracts for DNR timber sales sold in FY 2014 needed to be harvested between three months and four and a half years from the date of sale, with an average (weighted by volume) of about 25 months. The purchaser determines the actual timing of harvest within the terms of the contract. As a result, timber revenues to beneficiaries and DNR management funds lag behind sales, are subject to purchaser's harvest decisions, and are likely based on their perceptions of market conditions.

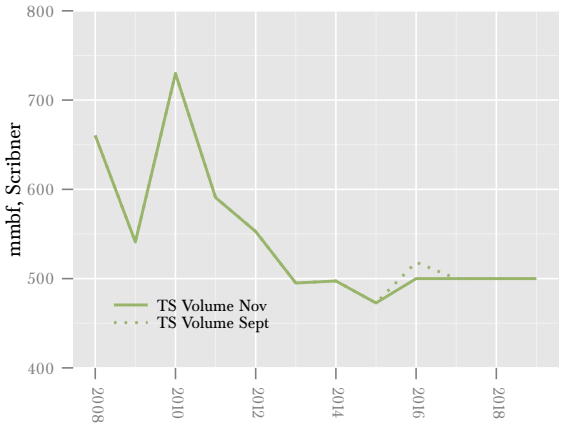
For the purposes of this chapter, timber that is sold but not yet harvested is referred to as 'inventory' or 'under contract'. Timber volume is added to the inventory when it is sold and placed under contract, and it is removed from the inventory as the timber is harvested.

Timber Sales Volume

DNR sold 18 mmbf less than expected at the end of FY 15. In the June and September forecast, those sales were pushed out to FY 16, yielding a sales volume forecast of 518 mmbf. However, the current timber sales plan incorporates a more realistic expectation of 500 mmbf for FY 16 (Figure 20). Through October 2015, DNR has sold 102 mmbf, leaving a remaining 398 mmbf in expected sales volume for the year.

FY 15 was the first year of the new sustainable harvest decade (FY 15 through FY 24) for western Washington; however, new harvest targets for the this sustainable harvest decade have not yet been determined or approved by the Board of Natural Resources. Without an updated sustainable harvest limit, annual Westside sales volumes are forecast to be 450 mmbf for future years. Together with projected Eastside timber sales of 50 mmbf for each of the next several years, we arrive at a projected annual timber sales volume of about 500 mmbf for FYs 17-19.

Figure 20: Forecast Timber Sales Volume



Timber Removal Volume

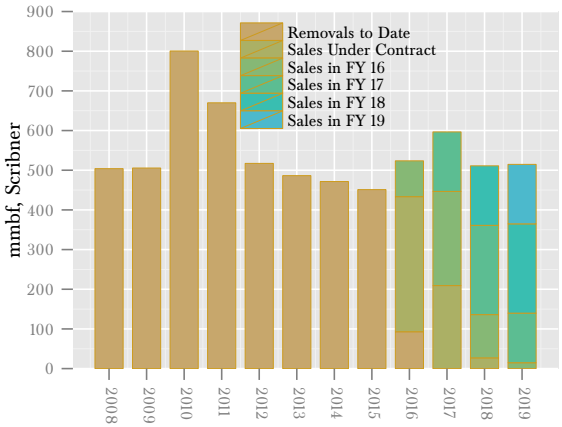
Removals in FY 15 were 451 mmbf, 19 mmbf more than expected in the June forecast.

At the end of August, the Department had 622 mmbf of timber under contract, valued at $206 million, or $331/mbf. For each Forecast, we survey timber sale purchasers to determine their planned harvest timing for the timber volume they have under contract at the time of the survey. This Forecast's survey, conducted in the first half of October, indicates that purchasers will likely harvest 340 mmbf of current inventory volume in the remainder of this fiscal year, 209 mmbf in FY 17, and the remaining 27 mmbf in FY 18 (Figure 21). This reduction in FY 16 is largely due to continued weak timber and lumber prices as purchasers push their removal plans out to FY 17 and beyond.

Including the survey responses, removals to date, and removals expected from future FY 16 sales, about 524 mmbf will be removed in FY 16,

seven percent less than the September estimate of 564 mmbf. Due to the changes in harvest plans, our harvest forecasts have increased to 597 mmbf (+10 mmbf) for FY 17 and 511 (+2 mmbf) for FY 18.

Figure 21: Forecast Timber Removal Volume



Timber Sales Prices

The price results of monthly DNR timber sales are quite volatile (Figure 8). As discussed in the stumpage price outlook, the DNR sales price (stumpage) forecast uses estimates from two forest economics consulting firms. FY 16 prices are slightly reduced to $340/mbf due to changes in the log price outlook. (Figure 22).

Figure 22: Forecast Timber Sales Price

Timber Removal Prices

Timber removal prices are determined by sales prices, volumes, and harvest timing. They can be thought of as a moving average of previous timber sales prices, weighted by the volume of sold timber removed in each time period (Figure 23).

Figure 23: Forecast Timber Removal Price

Timber Removal Revenue

Figure 24 shows projected annual timber removal revenues, broken down by the fiscal year in which the timber was sold ('sales under contract' are already sold as of October 1st, 2015). Expected removal value for FY 16 is reduced by around $15 million, to $175 million, due to the lower removal prices and volume. Removal revenue for outlying years are increased slightly due to higher harvest volume expectations.

Forecast timber removal revenues for the 2015-2017 Biennium are projected to decrease by 3.4 percent to $381 million.

Figure 24: Forecast Timber Removal Value

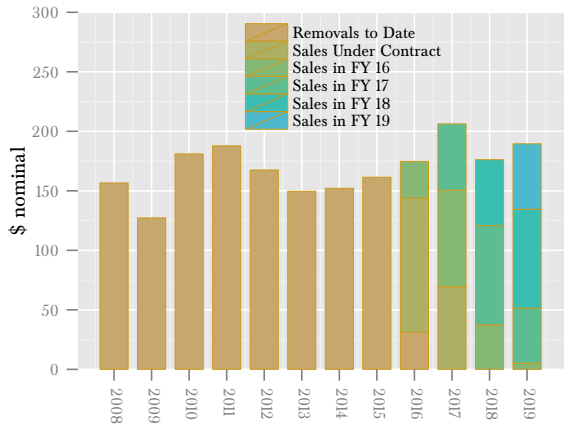
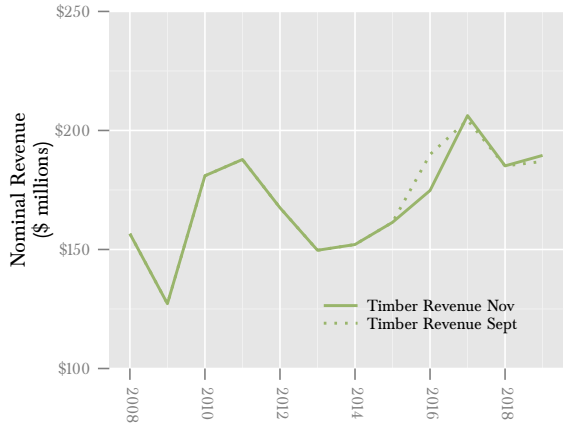


Figure 25: Forecast Timber Removal Revenue

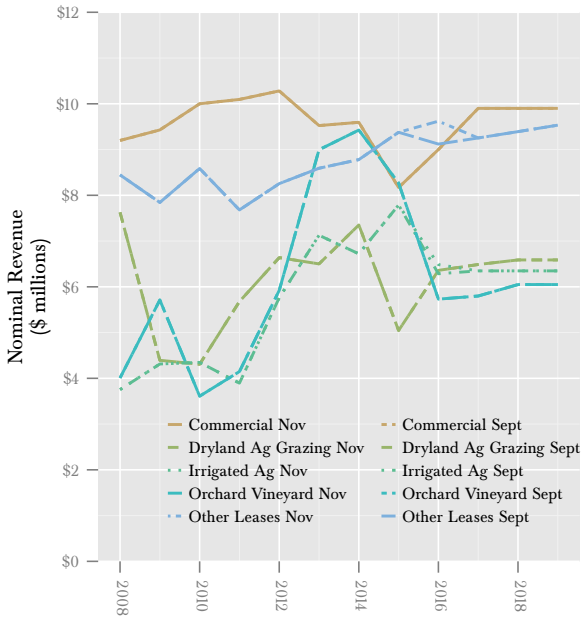


Upland Lease Revenues

Upland lease revenues are generated primarily from leases and the sale of valuable materials, other than timber, on state trust lands. There are a number of changes to Uplands revenue that, in aggregate, increase the upland revenue forecast by $0.7 million for FY 16 only (Figure 26). All other fiscal year forecasts are unchanged.

Irrigated agricultural leases are well ahead of the revenue we would expect to-date, so we are increasing the forecast by $0.2 million. The Other Leases category had a large unexpected payment so we are increasing the forecast for that category by $0.3. Finally, Minerals and Hydrocarbon revenue is well ahead of our previous expectations, so we have increased its forecast by $0.2 million.

Figure 26: Forecast Upland Lease Revenue



Aquatic Lands Revenues

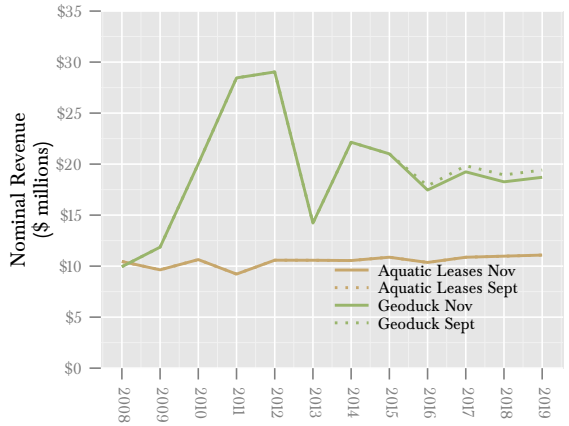
Aquatic lands revenues are generated from leases on aquatic lands and from sales of geoduck. On average leases account for one-third of the revenue while geoduck sales account for the remainder.

Aquatics lands lease revenue has been increased by $0.2 million for FY 16 due to higher than expected aquaculture and non-water-dependent leases (Figure 27). Forecast revenue for outlying years is unchanged.

The expected revenue from geoduck marketing is decreased by $1.56 million, $1.19 million, $1.25 million and $1.36 million in FY 16–FY 19 respectively (Figure 28). The drop in revenue is largely due to a downward adjustment of the price forecast. Our price forecasts have been consistently high for the past several auctions and the consistently lower prices, compared to our forecast and to prices from FY 10–FY 14, suggest that there has been some change in the equilibrium price of geoducks—that these prices aren't just part of the natural volatility of the market, but a fundamental shift.

Additionally, the volume of geoduck sales for FY 16 has been reduced—due in large part to the closure of harvest tracts due to PSP—which affects revenue forecasts for FY 16 and FY 17.

Figure 27: Aquatic Lands Revenues



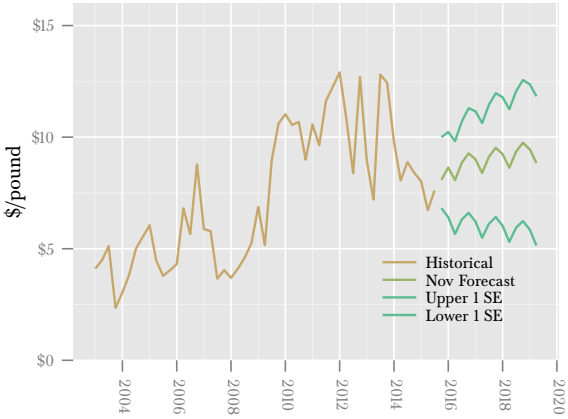
There are significant downside risks to geoduck revenues, even in the near term, that are important to consider but difficult to forecast:

1. Harvests (and therefore revenues) could be deferred or lost if geoduck beds are closed due to occurrence of PSP toxin.

2. A further slowdown in China's economic growth could lower demand for this luxury export in its largest market.

3. In light of recent WDFW surveys of closed south Puget Sound geoduck tracts showing declining recovery rates, and of evidence of active poaching, future commercial harvest levels may be further reduced.

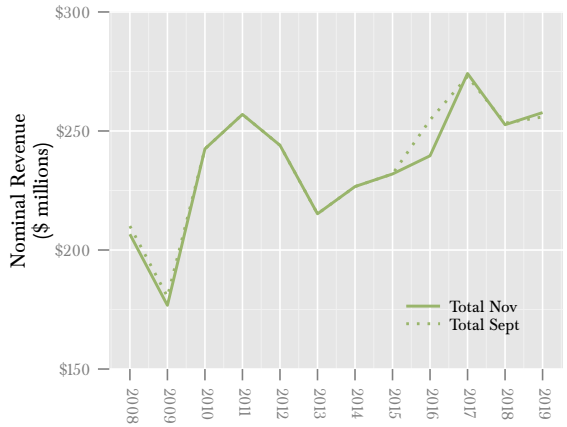
Figure 28: Geoduck Auction Prices



Total Revenues from All Sources

Forecast revenues for the 2015-2017 Biennium (FYs 16 and 17) are reduced by $16 million to $512 million (Figure 29). Most of the revenue change is driven by a change in planned timber harvests and timber sales prices.

Figure 29: Total Revenues



Some Caveats

DNR strives to produce the most accurate and objective projections possible, based on the Department's current policy directions and available information. Actual revenues will depend on future policy decisions made by the Legislature, the Board, and DNR, as well as on market and other conditions beyond DNR's control.

As events and market conditions develop, DNR will incorporate new information into future Forecasts. We judge the downside to the overall forecast to be slightly greater than the upside because of the risks to the timber sales volume (and therefore to timber removal volume and revenues) as well as the ongoing weakness and vulnerabilities of the U.S. and world economies that affect the housing market, and therefore stumpage prices.

See the Forecast Summary for more details.

Distribution of Revenues

The distribution of timber revenues by trust are based on:

- The volumes and values of timber in the inventory (sales sold but not yet harvested) by trust;
- The volumes of timber in planned sales for FY 15 by trust, and relative historical timber prices by DNR region by trust; and
- The volumes of timber by trust for FYs 15-17 based on provisional output of the sustainable harvest model and relative historical timber prices by DNR region by trust.

Since a single timber sale can be worth over $3 million, dropping, adding, or delaying even one sale can represent a significant shift in revenues to a specific trust fund.

Distributions of upland and aquatic lease revenues by trust are assumed to be proportional to historic distributions unless otherwise specified.

Management Fee Deduction. The underlying statutory management fee deductions to DNR as authorized by the legislature are 25 percent or less, as determined by the Board of Natural Resources (Board), for both the Resources Management Cost Account (RMCA) and the Forest Development Account (FDA). In budget bills, the Legislature has authorized a deduction of up to 30 percent to RMCA since July 1, 2005, now in effect through the 2013-2015 Biennium.

At its April 2011 meeting, the Board adopted a resolution to reduce the RMCA deduction from 30 to 27 percent and the FDA deduction from 25 to 23 percent. At its July 2011 meeting, the Board decided to continue the deductions at 27 percent for RMCA (so long as this rate is authorized by the legislature) and at 23 percent for FDA. At its October 2011 meeting, the Board approved a resolution to reduce the FDA deduction from 23 to 21 percent. The Board decided in July 2013 to raise the FDA deduction to 25 percent and the RMCA deduction to 29 percent. In August 2015 the Board raised the RMCA deduction up to 31 percent for the 2015-2017 biennium.

The Forecast uses the 31 percent deduction for the 2015-2017 biennium, but assumes that the deduction will be reduced back to 29 percent in the following biennium. This assumes that the Legislature will approve RMCA deductions of up to 30 percent, continuing its practice which started in FY 06.

Given this background of official actions by the legislature and the Board, the management fee deductions assumed in this Forecast are:

	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
FDA	25	25	25	25	25
RMCA	29	31	31	29	29