

Department of Natural Resources
Economic & Revenue Forecast

Fiscal Year 2020, Second Quarter
November 2019



Forecast Summary

Lumber and Log Prices. Lumber prices in 2017 increased through the year from \$351/mbf to \$490/mbf, averaging \$425/mbf for the year—significantly higher than previous years and the highest prices in real terms since the height of the previous housing boom in 2005. Prices continued to increase through the first half of 2018, averaging \$569/mbf through July, peaking at \$635 before dropping markedly to an apparent nadir of \$324/mbf in November. Since then prices increased to \$395/mbf in February 2019, before falling back and vacillating between \$360/mbf and \$380/mbf since April.

Prices for the ‘typical’ DNR log were also markedly higher in 2017 than previous years, climbing from \$578/mbf in January to \$719/mbf in December, averaging \$611/mbf for the year. Prices for DNR logs increased in the first quarter of 2018, averaging \$722/mbf, but declined through the rest of the year to a low of \$519/mbf in December. Prices have recovered from that low to \$560/mbf in February 2019, but fell back again to \$535/mbf in October. Prices have averaged \$551/mbf year-to-date through October.

Log and lumber prices were expected to weaken in the final two quarters of 2018, but they were still expected to stay above recent years’ averages, before climbing back to near early-2018 levels in early 2019. That, obviously, did not happen. The steepness of the price decline was surprising and appears to be due to a confluence of a number of factors. As discussed in the main forecast, throughout the latter half of 2018 housing starts stalled, house price growth flattened (and declined in some areas, like Seattle) and lumber mills built significant inventories of both logs and lumber. Log prices are expected to continue recovering through the rest of 2019, and will average something close to 2016 prices for the calendar year. Prices are expected to continue increasing through early 2020, though they are not expected to approach the highs seen in 2018.

Timber Sales Volume. Sales plans in the current and outlying years have not changed, so absent a

new sustainable harvest calculation, sales volume forecasts remain at 500 mmbf. The volume sold in FY 19 was 488 mmbf, 12 mmbf lower than the June forecast. Unfortunately, with the continued low price and weak demand, we continue to see a number of contracts being passed-in at auction with no bidders. To date, DNR has sold 115 mmbf in stumpage, with 31 mmbf of contracts left with no bids. That leaves 407 mmbf to auction in the remainder of the year to reach our forecast sales volume. It is DNR’s intention to bring more than this to auction, however, given the number of contracts with no bidders and the potential issues with the planned volume, 500 mmbf remains a reasonable estimate of what will actually sell.

Timber Sales Prices. As of the June 2019 Forecast, sales prices for the outlying years were left unchanged because log and lumber prices are expected to recover from the weakness that dominated prices in FY 19. However, the average prices for sales through August were extremely low at \$164/mbf. While the composition of the timber in the first two auctions will not necessarily be representative of what will be brought forward in the remainder of the year and prices are expected to recover, the forecast average sales price for FY 20 was reduced to \$330 in September. Although sales prices in the last two months have recovered, averaging \$340/mbf, the average sales price forecast is unchanged.

Timber Removal Volume and Prices. The harvest volume forecast for FY 19 was reduced by 20 mmbf in June to 500 mmbf, and ended the year slightly above the forecast at 502 mmbf.

The harvest volume forecast model revision, that was started in the previous forecast, is ongoing. As a result, the forecast timber removal volumes are again decreased for all forecast years.

In September the forecast average removal price was increased based on the high average price of timber removed through August—which had an average price of \$384/mbf—and the value of remaining inventory and expiring contracts. In September there were 152 mmbf worth of contracts expiring in FY 20, with an average value of \$372/mbf, and 304 mmbf worth of contracts expiring in FY 21,

with an average value of \$388/mbf. However, the value of harvested timber has dropped precipitously from an average price of \$385/mbf for harvests in July through September to an average value of \$269/mbf in October. Additionally, the value of volume expiring in FY 20 has also dropped meaningfully, from an average of \$372/mbf to an average of \$332/mbf.

These developments have driven a reduction in the timber removal prices for all fiscal years.

Timber Revenue. Forecast timber revenue are decreased in FY 20 and all outlying years. Revenue in FY 20 and FY 21 are reduced by \$13 million and \$10 million respectively.

Revenues for the 2019-2021 biennium are forecast to total \$345 million, a decrease of 6.2 percent (\$23 million) from the September Forecast, while revenues for the 2021-2023 biennium are decreased by 1.2 percent (\$4 million) to \$357 million.

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.

The non-timber uplands revenue forecasts are unchanged for all years. The decrease in agricultural prices and the likely impacts of the trade war has already been built in.

The aquatic lease revenue forecast is unchanged for all forecast years.

However, the forecast geoduck revenue has been revised downward for all forecast years due to continued very low prices in the first and second geoduck auctions of the fiscal year, down from an average of \$9.43/lb in FY 19 to \$5.98/lb, a 37% drop from, in the first two auctions of FY 20. Price weakness in geoduck auctions are expected to continue as long as the 25 percent tariff to China continues, which are assumed to remain until at least the beginning of FY 21. After that, prices are expected to increase, but they are not expected to reach their current levels ever again due to an increase in competition from other geoduck production and other luxury seafood products.

Total Revenues. Forecast revenues for the 2019-

2021 Biennium (FYs 20 and 21) are decreased by 6.1 percent (\$31 million) to \$478 million. Revenues for the 2021-2023 Biennium are decreased by 2.0 percent (\$10 million) to \$494 million.

Notes to the Forecast. While we strive to produce an accurate forecast, there are a number of sources of uncertainty that may affect DNR revenue specifically, and the overall economic activity more broadly. These include: the as-yet undetermined sustainable harvest volume; uncertainty about the type and quality of stumpage DNR is able to bring to market more than three months out; the trade-war and slow-down in the Chinese economy directly affecting timber and agricultural exports and prices, as well as affecting overall economic growth; uncertainty about future housing starts; and a potentially weaker economic climate, if not an outright recession, among other things.

While the sales volume estimates are based on the best available internal planning data, they are subject to adjustments due to ongoing operational and policy issues. In particular, these issues are likely to affect sales volumes in outlying years, where the assumed sustainable harvest volume of 500 mmbf might be too high.

The most concerning factor in this forecast, and likely for forecasts in the near future, is the combined problem of the slowdown in housing construction and the decreasing exports to China.

Chinese imports of U.S. logs and lumber started meaningfully in 2010 and provided support to prices in the worst years following the Recession in 2008-09, when housing construction was very low. However, Chinese imports have dropped dramatically since 2014, year-to-date exports of untreated Douglas-fir and Hemlock logs from Washington and Oregon to China decreased by 46 percent between 2014 and 2018. While Chinese demand has been dropping, domestic housing demand had been picking up and more than offset the decrease in China-bound exports—it appears that the strong log and lumber price growth from 2017 and the beginning of 2018 was due largely to housing construction. But that housing construction growth has stalled.

Since the beginning of 2018 the U.S. and China have been engaged in an escalating trade dispute. Directly relevant to DNR revenues are a 25 percent tariff on geoduck and wheat, and a five percent tariff on softwood logs. The tariff on geoduck is likely the main driver of the drop in geoduck prices. The log tariffs and the slowdown in housing starts are major contributors to the lower domestic price of logs.

Although decreasing exports are built into the forecast, China is still a meaningful market for Washington timber and lumber. A faster than expected drop in demand represents a continuing downside risk for the forecast. Aside from the trade tensions discussed above, there are other things that could undermine Chinese demand, such as the current apparent slowdown in Chinese economic growth or continued loss of PNW market share to international and Southeastern US competitors.

Growth in domestic housing demand was expected to offset the decline in China-bound exports. If housing construction does not recover from its recent weakness, as optimistic analysts have forecast, and Chinese exports continue to decline, then log and lumber prices will remain weak and continue to fall, in which case even our conservative current stumpage forecast may be optimistic.

The strong housing starts for August 2019 appears to have been a blip, with the starts estimate falling back to its moving average in September. Unfortunately, there are still a number of significant impediments, on both the supply and demand sides, to a strong recovery in prices and starts. Constraints on demand include persistently stringent lending standards, a continued tough labor market for younger workers, enormous student loan debt, and poor wage growth. It has been surprising how high prices have risen given these constraints. Additional, supply side impediments constraining construction growth include a concentration of market power, and a lack of skilled labor or readily buildable land.

Another concern for the overall U.S. economy, which would affect DNR revenue, is the recurrent political uncertainty surrounding the U.S. Federal Government. The government was shutdown from

December 22, 2018 to January 25, 2019 and was the second federal government shutdown of the current U.S. administration. If a budget agreement isn't reached by the end of November 2019, then the government will shut down again. The risk of another shutdown appears to have grown with the beginning of an impeachment inquiry and continued disagreement about funding of a border wall with Mexico. In the end, the effects of the Federal Government shutdown in 2018-19 were likely minimal and insignificant compared to the size of the economy. However, shutdowns cause instability in an economy and could have significant unforeseen impacts if they happen too often. Another shutdown, particularly around the holiday spending period, could have an outsized impact on economic growth.

Any direct impact of the 2018-2019 shutdown on DNR was likely from the effect on the housing market, potentially delaying what was expected to be a recovery in the first quarter of 2019. Single-family home loans through the FHA and all types of VA loans were still funded through the shutdown, though with delays, while some other types of FHA loans were not processed. Most conventional mortgages are not backed by the federal government and were processed as usual, though tax transcript processing at the IRS was disturbed and caused delays in application processing.

Since the expiration of the Softwood Lumber Agreement (SLA) in late 2015, the U.S. and Canada have been without a trade agreement that covers lumber. As of late 2017 a U.S. ITC finding cleared the Department of Commerce to impose duties, which have been set at 20.23 percent. Although Canada has appealed the finding to a NAFTA panel and has filed a complaint with the WTO, much of the short-term uncertainty about trade costs is gone. Without a breakthrough on the new SLA negotiations or a finding from the WTO or NAFTA panel, the markets are unlikely to see the price volatility that the previous duty uncertainty caused. Additionally, at current lumber prices, the duties shouldn't be significant enough to reduce Canadian production.

More important than the lumber duties is likely the

drop in available timber due to exhaustion of the beetle killed timber that had been boosting the log supply in BC, Canada. This drop in timber supply has reportedly caused a number of lumber mills to close.

Aside from the tariffs pushing down geoduck prices, which they appear to have done, China has twice instituted bans on Pacific Northwest shellfish on food safety grounds—paralytic shellfish poison (PSP) and arsenic contamination. It's not clear that either of these bans significantly affected prices or harvest activity. However, it is entirely possible that China could re-enact a more forceful ban on geoduck that would have a dramatic effect on geoduck prices, and therefore revenue.

As always in the geoduck fisheries, PSP closures create uncertainty around harvest volumes as well.

Table 1: November 2019 Forecast by Source (millions of dollars)

Timber Sales		FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23
Volume (mmbf)		545	520	496	488	500	500	500	500
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Price (\$/mbf)		285	346	458	325	330	340	340	340
	Change				\$ -	\$ -	\$ -	\$ -	\$ -
	% Change				0%	0%	0%	0%	0%
Value of Timber Sales		155.3	179.8	227.1	158.8	165.0	170.0	170.0	170.0
	Change				\$ -	\$ -	\$ -	\$ -	\$ -
	% Change				0%	0%	0%	0%	0%
Timber Removals									
Volume (mmbf)		490	493	528	502	512	526	513	528
	Change				-	(22)	(26)	(11)	(1)
	% Change				0%	-4%	-5%	-2%	0%
Price (\$/mbf)		338	313	338	385	331	335	339	339
	Change				-	(10.2)	(2.2)	(0.2)	(0.1)
	% Change				0%	-3%	-1%	0%	0%
Timber Revenue		165.7	154.2	178.6	193.3	169.3	176.1	173.8	179.4
	Change				-	(12.8)	(10.0)	(3.7)	(0.5)
	% Change				0%	-7%	-5%	-2%	0%
Upland Leases									
Irrigated Agriculture		8.7	9.1	10.4	8.9	8.7	8.7	9.0	9.0
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Orchard/Vineyard		8.2	8.1	8.5	9.0	8.2	8.2	8.2	8.2
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Dryland Ag/Grazing		5.2	5.6	6.6	6.6	6.0	6.0	6.0	6.0
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Commercial		9.0	9.7	10.9	10.2	10.4	10.4	10.4	10.4
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Other Leases		10.5	10.7	9.8	10.0	10.2	10.3	10.3	10.3
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Total Upland Leases		41.6	43.1	46.1	44.6	43.5	43.6	43.9	43.9
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Aquatic Lands									
Aquatic Leases		11.1	10.8	12.0	13.5	11.3	11.2	11.2	11.2
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Geoduck		14.5	27.9	26.4	23.6	10.9	12.6	15.0	15.3
	Change				(0.0)	(3.2)	(4.9)	(2.7)	(3.4)
	% Change				0%	-23%	-28%	-15%	-18%
Aquatic Lands Revenue		25.6	38.7	38.4	37.1	22.2	23.8	26.2	26.5
	Change				(0.0)	(3.2)	(4.9)	(2.7)	(3.4)
	% Change				0%	-13%	-17%	-9%	-11%
Total All Sources									
		232.9	236.1	263.1	275.0	234.9	243.5	243.9	249.7
	Change				(0.0)	(16.0)	(14.9)	(6.4)	(3.9)
	% Change				0%	-6%	-6%	-3%	-2%

Table 2: November 2019 Forecast by Fund (millions of dollars)

Key DNR Operating Funds		FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23
041	RMCA - Uplands	36.0	33.7	40.6	39.9	34.2	38.3	38.6	39.4
	Change				-	(1.7)	(1.0)	(0.5)	(0.2)
	% Change				0%	-5%	-3%	-1%	0%
041	RMCA - Aquatic Lands	11.3	17.9	17.6	16.7	9.4	10.2	11.4	11.6
	Change				-	(1.6)	(2.5)	(1.4)	(1.7)
	% Change				0%	-15%	-19%	-11%	-13%
014	FDA	22.8	22.0	22.1	25.6	23.0	22.5	21.6	22.1
	Change				-	(2.2)	(1.4)	(0.6)	(0.3)
	% Change				0%	-9%	-6%	-3%	-1%
21Q	Forest Health Revolving			4.4	6.5	8.8	9.1	10.1	11.1
	Change				-	0.6	(0.8)	0.3	1.2
	% Change				0%	7%	-8%	3%	12%
Total DNR Key Operating Funds		70.2	73.6	84.7	88.7	75.5	80.1	81.7	84.2
	Change				-	(4.9)	(5.6)	(2.1)	(0.9)
	% Change				0%	-6%	-7%	-3%	-1%
Current Funds									
113	Common School Construction	59.7	51.8	62.6	64.2	59.3	63.7	63.8	64.9
	Change				-	(2.6)	(1.9)	(0.8)	(0.3)
	% Change				0%	-4%	-3%	-1%	0%
999	Forest Board Counties	55.3	58.5	59.6	69.5	57.1	55.5	53.0	54.3
	Change				-	(5.1)	(3.3)	(1.5)	(0.6)
	% Change				0%	-8%	-6%	-3%	-1%
001	General Fund	4.1	2.6	2.1	1.9	4.0	3.7	3.5	3.5
	Change				-	(0.5)	(0.3)	(0.1)	(0.1)
	% Change				0%	-11%	-7%	-3%	-2%
348	University Bond Retirement	1.8	1.8	3.2	1.3	2.1	2.0	1.9	1.9
	Change				-	0.6	0.1	0.0	0.0
	% Change				0%	38%	8%	1%	1%
347	WSU Bond Retirement	1.4	1.7	1.6	1.4	1.7	1.7	1.7	1.7
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
042	CEP&RI	3.1	4.1	5.3	2.7	2.5	3.8	4.0	4.1
	Change				-	(0.1)	(0.0)	(0.0)	(0.0)
	% Change				0%	-5%	-1%	-1%	0%
036	Capitol Building Construction	6.7	8.2	6.2	9.8	5.2	6.9	7.4	7.7
	Change				-	(0.5)	(0.3)	(0.1)	(0.0)
	% Change				0%	-9%	-4%	-1%	0%
061/3/5/6	Normal (CWU, EWU, WWU, TESC) School	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Other Funds		0.1	0.0	1.1	1.2	1.1	0.2	0.1	0.1
	Change				-	0.1	(0.1)	(0.0)	(0.0)
	% Change				0%	10%	-36%	-17%	-11%
Total Current Funds		132.2	129.0	141.7	152.1	133.2	137.7	135.6	138.4
	Change				-	(8.1)	(5.8)	(2.6)	(1.1)
	% Change				0%	-6%	-4%	-2%	-1%

(Continued)

Table 3: November 2019 Forecast by Fund (millions of dollars), cont'd

Aquatic Lands Enhancement Account		FY 16	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23
02R		14.2	20.8	20.8	20.4	12.8	13.6	14.8	14.9
	Change				-	(1.6)	(2.5)	(1.4)	(1.7)
	% Change				0%	-11%	-15%	-8%	-10%
Permanent Funds									
	601 Agricultural College Permanent	7.6	4.6	4.2	4.1	6.9	4.0	3.7	3.8
	Change				-	(0.2)	(0.8)	(0.2)	(0.1)
	% Change				0%	-3%	-16%	-6%	-3%
	604 Normal School Permanent	2.4	3.1	4.1	2.9	2.4	2.7	2.6	2.7
	Change				-	(0.4)	(0.2)	(0.1)	(0.0)
	% Change				0%	-13%	-6%	-3%	-1%
	605 Common School Permanent	1.0	0.6	0.8	0.2	0.3	0.3	0.3	0.3
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
	606 Scientific Permanent	5.0	4.1	7.0	5.4	3.6	4.6	4.6	4.8
	Change				-	(0.8)	(0.1)	(0.1)	(0.0)
	% Change				0%	-19%	-2%	-2%	0%
	607 University Permanent	0.2	0.3	0.3	0.7	0.2	0.4	0.5	0.5
	Change				-	(0.0)	0.0	0.0	0.0
	% Change				0%	-15%	3%	1%	1%
Total Permanent Funds		16.2	12.6	16.5	13.3	13.4	12.1	11.8	12.1
	Change				-	(1.4)	(1.0)	(0.4)	(0.2)
	% Change				0%	-10%	-8%	-3%	-1%
Total All Funds		232.9	236.1	263.7	274.4	234.9	243.5	243.9	249.7
	Change				-	(16.0)	(14.9)	(6.4)	(3.9)
	% Change				0%	-6%	-6%	-3%	-2%

Figure 1: Timber Forecast Charts

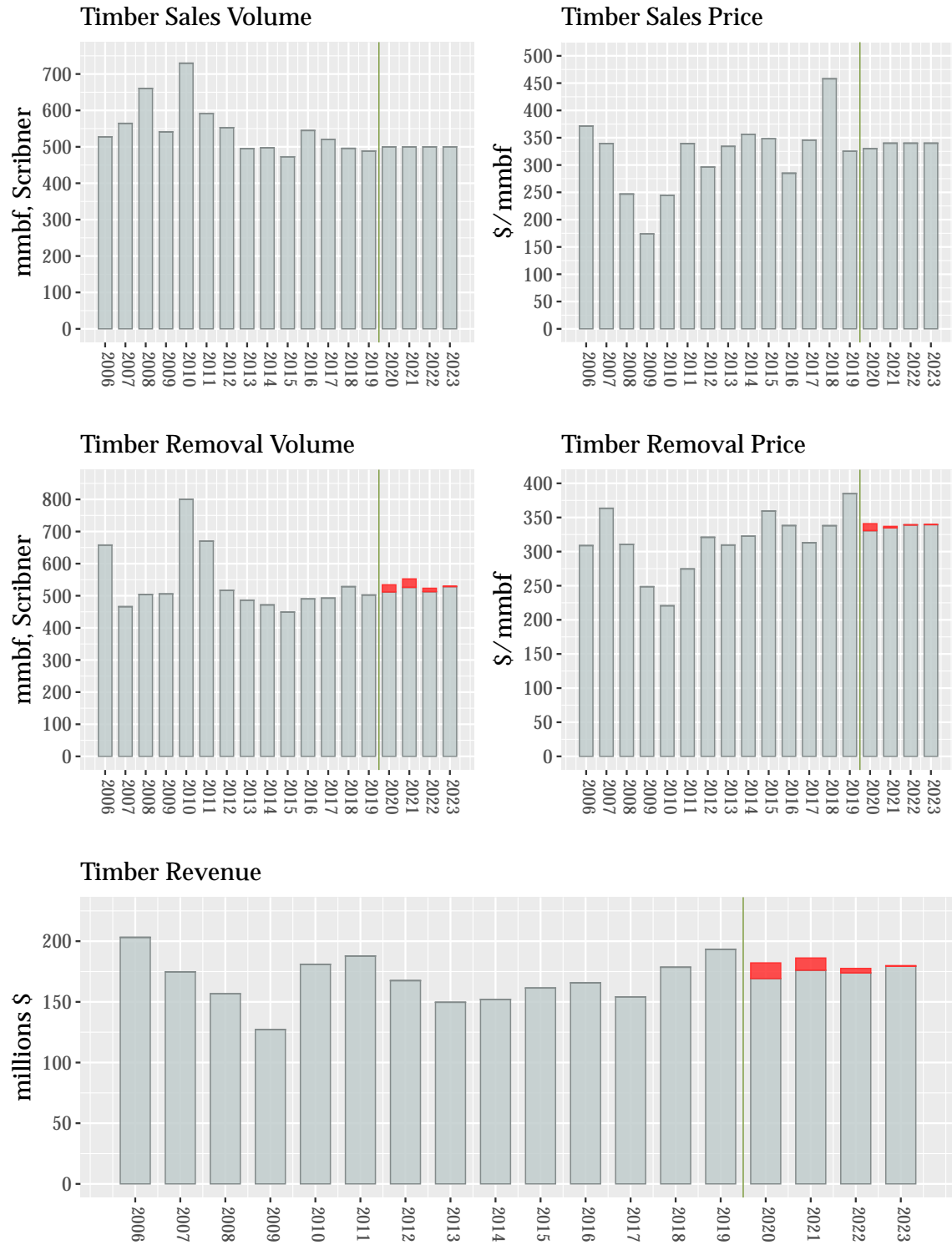


Figure 2: Other Uplands Forecast Charts

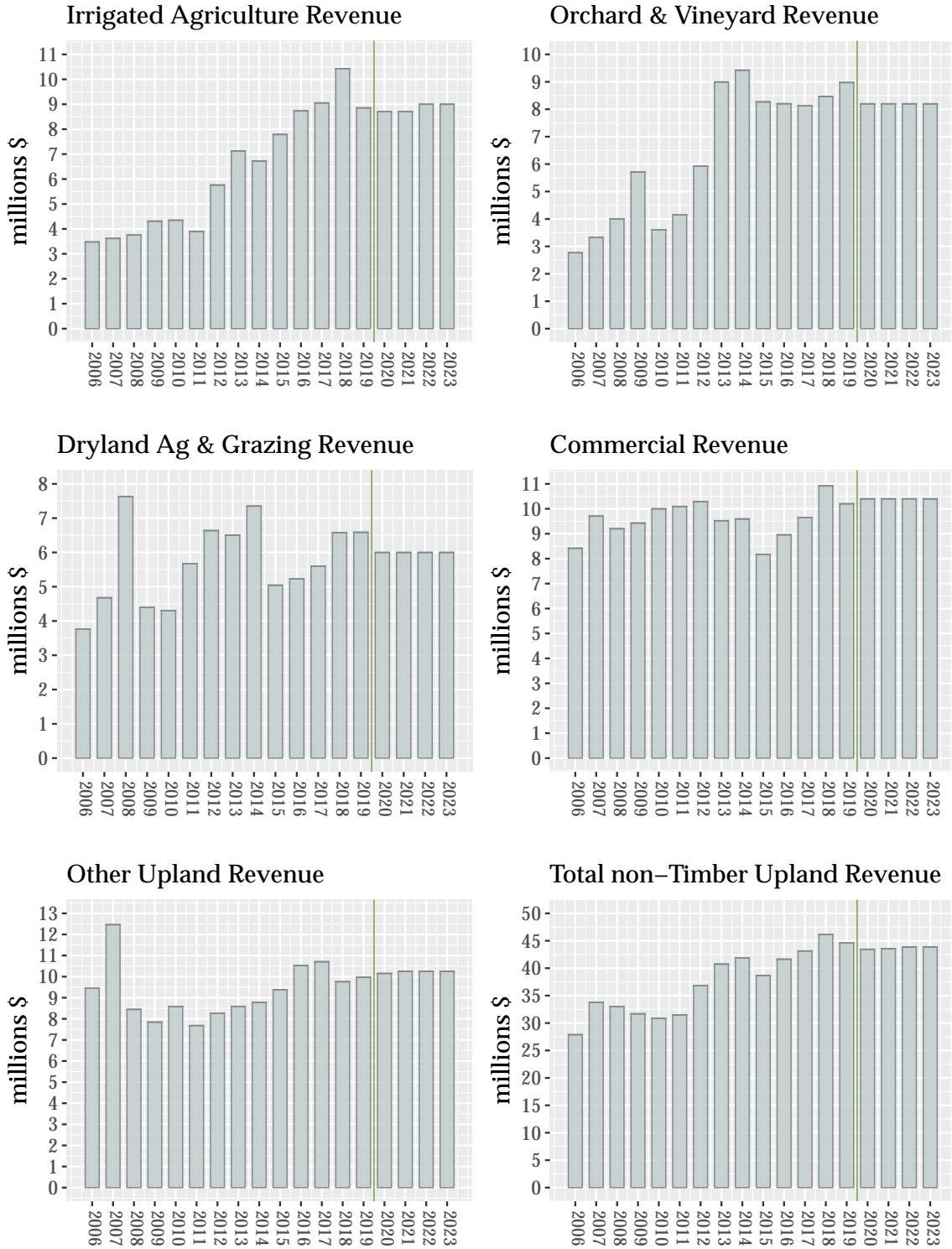
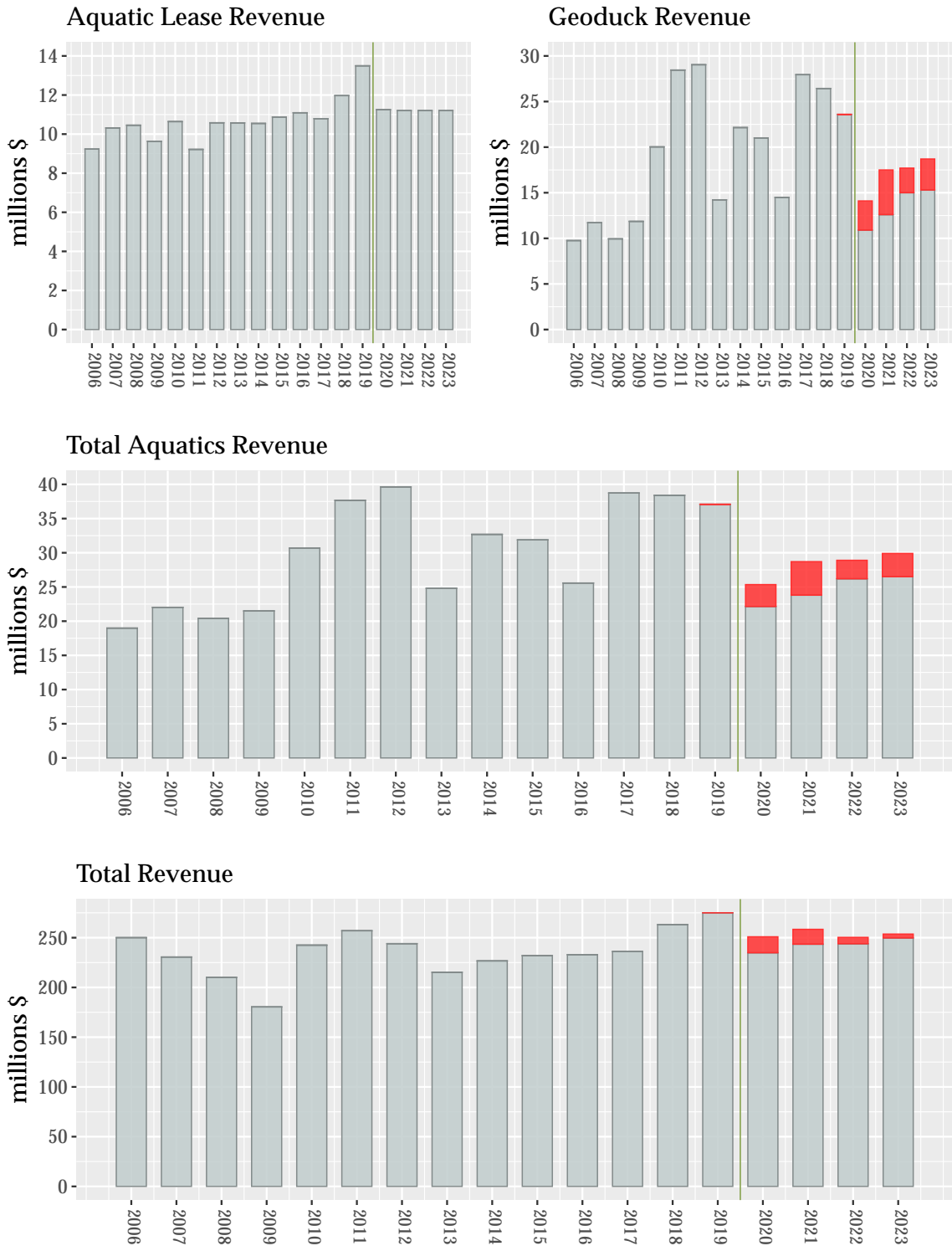


Figure 3: Aquatics and Total Forecast Charts



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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
ITC	U.S. International Trade Commission
mbf	Thousand board feet
mmbf	Million board feet
PSP	Paralytic Shellfish Poisoning
PPI	Producer Price Index
Q1	First quarter of year (similarly, Q2, Q3, and Q4)
QE	Quantitative Easing
RCW	Revised Code of Washington
RMCA	Resource Management Cost Account
SA	Seasonally Adjusted
SAAR	Seasonally Adjusted Annual Rate
SLA	Softwood Lumber Agreement
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* 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. Forecasts re-evaluate world and national macroeconomic conditions, and the demand and supply for forest products and other goods. Finally, each Forecast 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 influenced 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 2020 through 2023. Fiscal years for Washington State government begin July 1 and end June 30. For example, the current fiscal year, Fiscal Year 2020, runs from July 1, 2019 through June 30, 2020.

The baseline date (the point that designates the transition from "actuals" to predictions) for DNR revenues in this Forecast is October 1st, 2019. 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 August 2019. 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	Final Data and Publication Date (approximate)
February 2020	January 1, 2020	February 15, 2020
June 2020	May 1, 2020	June 15, 2020
September 2020	August 1, 2020	September 15, 2020
November 2020	October 1, 2020	November 15, 2020

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 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: Koshare Eagle, Tom Heller, Keith Jones, Pat Ryan, Katy Mink, Janet Ballew, Katrina Lassiter, Linda Farr, and Michelle McLain. They provided data and counsel, including information on markets and 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.

Office of Finance, Budget, and Economics

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Macroeconomic Conditions

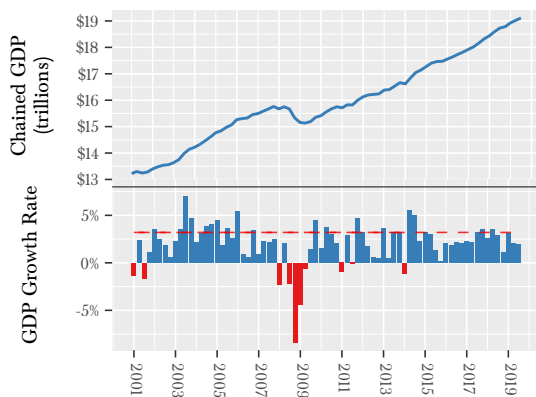
This section briefly reviews macroeconomic conditions in the United States and world economies because they influence DNR revenue—most notably through the bid prices for DNR timber and geoduck auctions and lease revenues from managed lands.

U.S. Economy

Gross Domestic Product

GDP is a useful indicator of how the U.S. economy is growing overall. When GDP is growing well, then generally there will be an increase in jobs, spending and overall economic welfare. This can translate into growth in housing spending and construction, which influence timber prices and DNR's income from timber. It is a useful indicator of how other, more directly relevant indicators, may move in the future.

Figure 4: U.S. Gross Domestic Product



Typically, GDP growth experiences a rebound after a recession, spiking to well above the historical average. For instance, after the recession in 1991, GDP grew 3.5 percent in 1992 and continued growing strongly with a peak growth rate of 4.8 percent in 1999. However, this has not been the case since the end of the Great Recession in 2009. From the end

of the Great Recession, during which GDP declined in five out of six quarters, to 2017, GDP growth averaged a weak 2.2 percent on a real annualized basis (Figure 4). 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, with especially lasting effects on employment and wages.

The pattern of slow GDP growth was widely predicted to break in 2014, then again in 2015, 2016, 2017 and yet again in 2018, with economists expecting or hoping for a rebound. However, as each year progressed expectations were repeatedly reduced. However, with very strong second and third quarter annualized growth of 4.2 and 3.2 percent, respectively, 2018 had the strongest GDP growth since the end of the recession, 2.9 percent—again, still below the long term average.

With most of the year gone, predictions for real GDP in 2019 seem to have coalesced around 2.0 percent. The FOMC has signaled significant concerns about GDP growth this year and have decreased the funds rate twice since the June Forecast—to 2.25 percent in July and 2.0 percent in September.

Predictions for GDP growth in the coming years are uncertain because there is so much uncertainty around the behavior of the U.S. administration with respect to trade and some leading indications were suggesting a recession was likely, though those have reversed recently. The FOMC has a median prediction of 1.9 and 1.8 percent GDP growth in 2021 and 2022, but other forecasts are much lower, in particular, FEA has forecast in a short recession into 2021-2022.

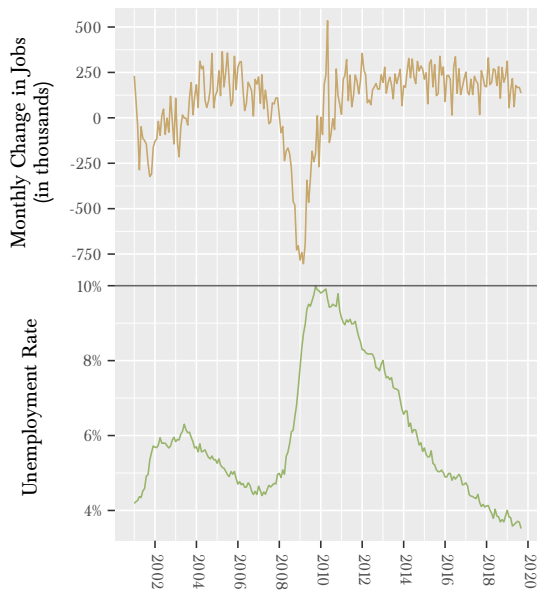
Employment and Wages

The U.S. headline unemployment rate has been trending downward since peaking at 10 percent in 2010 and is 3.5 percent as of August, the lowest it's been since 1969 (Figure 5).

There were an average of 161,000 new jobs per month through September. This is lower than the

2018 average of 223,000 jobs per month, but a slowdown in job growth is expected as the economy gets close to operating at full capacity.¹

Figure 5: Unemployment Rate and Monthly Change in Jobs

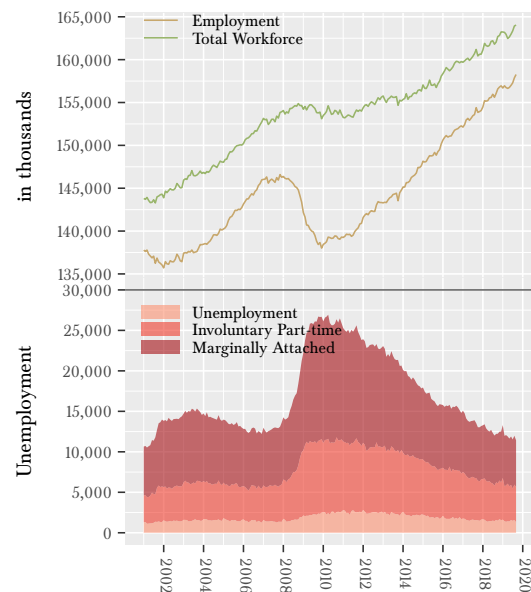


The unemployment rate is a useful indicator because it gives insight into slack in the labor market; that is, how many people are available to work before job growth drives wage growth that starts driving problematic inflation. The labor market is the driving force behind consumption, which constitutes about 70 percent of GDP and naturally extends to the demand for housing, a major driver of U.S. timber demand. Data and anecdotes abound that suggest 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 housemates.

One continual source of consternation for economists over the past several years has been the low unemployment rate combined with low inflation. Although the unemployment rate has de-

clined and has been below the long run normal unemployment level expected by the FOMC, it has not yet translated into strong wage growth, which is likely a prerequisite for broader economic improvement and an increase in the demand for housing, or higher Inflation. One possible reason for this 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, from the beginning of the recession to mid-2015 the labor force participation rate declined significantly, falling by three percentage points from 66 percent to around 63 percent, where it has remained, possibly because workers left the labor force after they were unable to find jobs.

Figure 6: Employment and Unemployment

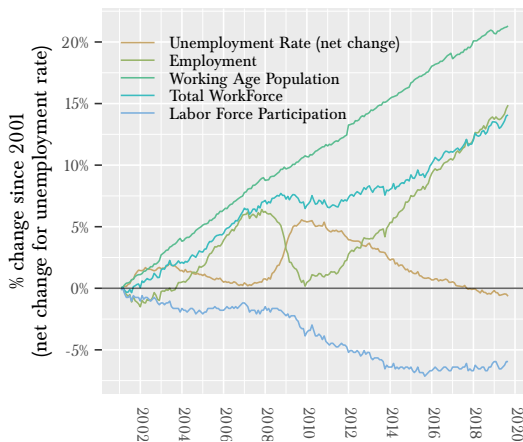


The U-6 is an alternative measure of unemployment that includes involuntarily part-time employment (underemployment) and marginally attached workers, who are not included in the headline unemployment rate but who, nevertheless, are likely

¹These job growth numbers are from the BLS Payroll survey. More information can be found here: https://www.bls.gov/web/emp/sit/ces_cps_trends.htm

to be 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 a low of 6.9 percent in September. This is lower than the average of 9.1 percent from 2001-2006 (Figure 6). The decline in the year-on-year U-6 is the result of a drop in all three of its components.

Figure 7: Labor Market Indicators

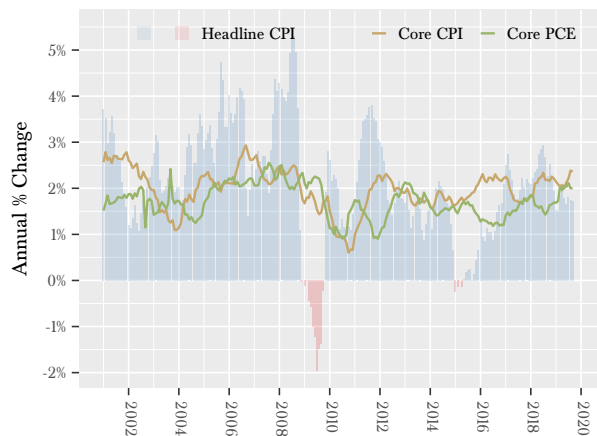


Reductions in the labor force participation rate helped move the unemployment rate and the U-6 lower roughly through January 2014 (Figure 7). Since then the rate has remained relatively stable between 62.4 and 63.0 percent and has averaged 62.8 percent. The decline in the labor force participation rate 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 search for employment until jobs are easier to find—such as when people stay 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 unemployment rate is a more accurate reflection of the labor pool. In that case, a decrease in the unemployment rate means that there are fewer people looking for work, so in or-

der to fill jobs companies will have to compete for labor, pushing up wages.

The drop in the participation rate since 2008 suggests that the recession itself caused people to leave the labor market, and implies that they may return when things look a bit better. However, Federal Reserve analysts have suggested that the decline in participation 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 8: U.S. Inflation Indices



Inflation

Aside from a short period in 2012, core inflation has been below the FOMC's target since the recession in 2008. Similarly to GDP forecasts, inflation forecasts have been consistently too high, with each year predicted to break the cycle of weak inflation, only to disappoint as the year progresses. (Figure 8).

For policy purposes, the FOMC uses the core Personal Consumption Expenditures (PCE) index as the measure of inflation, which removes the more volatile fuel and food prices. This measure shows long-term inflation at or below the 2.0 percent target since September 2008. Core PCE growth aver-

aged between 1.4 and 1.7 percent from 2015-2017, but rose to average 1.9 percent in 2018. However, the year-to-date annualized average through September 2019 has been 1.6 percent. The FOMC expects core PCE to be in around 1.5 and 1.9 percent in 2020 and 2021, respectively.

Interest Rates

Interest rates are a powerful tool used by the Federal Reserve bank to influence the U.S. economy. An increase in interest rates will generally 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. The opposite of all of this is also true, decreasing or low interest rates can help drive economic expansion.

From December 2008 to December 2015, the Federal Reserve held the federal funds rate in the 0.0-0.25 percent range. To keep rates that low, for that long was unprecedented and reflected the immense damage done by the Great Recession. During that time the Fed pledged to keep the rates near zero until it judged that there had been sufficient progress toward its dual-mandate of maximum employment and around 2.0 percent inflation.

Beginning in December 2015 the FOMC gradually raised interest rates from 0.0-0.25 percent range to 2.25-2.5 percent range by the end of 2018. Its notable that these increases were made based on progress in the recovery of employment and inflation, and a strong the economic growth outlook, rather than employment or inflation that had reached any threshold. These increases were widely expected because the FOMC carefully prepared markets for it with each successive meeting statement.

The June and September 2019 FOMC meeting materials show that the Committee has become much

more uncertain about the strength of the economy and now expects to hold rates steady or decrease them in 2019 and 2020, down to 1.6-2.1 percent. This is a significant change from the December 2018 meeting, where the FOMC expected to raise interest rates one to two times in 2019, leading to a federal funds rate between 2.6-3.1 percent, with further increases leading to 2.9-3.4 percent rates in 2020.

The U.S. Dollar and Foreign Trade

The trade-weighted U.S. dollar index climbed dramatically from 2014 through late 2016. Through 2015 and 2016 this was largely due to the relative strength of the U.S. economy, which, although fairly weak, was growing faster than most other advanced countries. Although the value of the U.S. dollar was below its 2015 peak for most of 2016, the results of the U.S. presidential election pushed the exchange rate well above its previous high. From mid-2017 to May 2018, the dollar dropped back to around its 2015 start; however, since May 2018 it increased above its earlier 2016 high, and is now the highest its been, in nominal terms, since before 1996 (Figure 9).

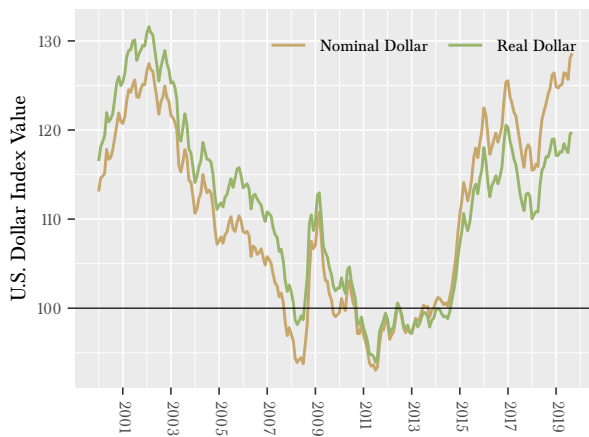
A rising dollar means that timber and lumber from the Pacific Northwest become more expensive for international buyers and, timber and lumber imported into the U.S. become less expensive. This will tend to suppress local prices and DNR's timber and agricultural revenues. Wildstock geoduck revenue will also be negatively affected because geoduck is primarily marketed abroad. A falling dollar leads to the opposite effects.

Foreign trade and access to export markets is important for DNR revenues. Chinese demand for timber and lumber have been a major factor supporting lumber prices since 2010, even though DNR timber cannot be exported directly and Chinese demand has been declining. Additionally, much of the soft white wheat produced in Washington is exported to Asia and a large portion of the PNW geoduck harvest is exported to China.

Given the proposed policies of the U.S. administra-

tion, and the escalating imposition of tariffs, the upcoming months and years are likely to see suppressed foreign trade and present a large potential downside risk for DNR revenue. Currently, China is the main target of U.S. tariffs and it has imposed a number of tariffs on U.S. goods in response. Of the products relevant to DNR revenue, softwood logs are subject to a five percent tariff, while geoduck, wheat, and many orchard/vineyard agricultural products (such as apples) are subject to a 25 percent tariff.

Figure 9: Trade-Weighted U.S. Dollar Index



The effects of the tariffs DNR revenue will be negative—higher prices to purchasers will reduce export demand. However, that doesn't necessarily mean that revenue from some affect sources will go down. It is possible that increased demand from elsewhere or external supply constraints will support higher prices or revenue.

Chinese timber exports (Douglas-fir and Hemlock logs) had already fallen from a peak of 4.1 million m³ in 2011 to 1.7 million m³ in 2017 (unrelated to tariffs). Timber exports to China actually increased by 1.6 percent in 2018, but are currently 17 percent lower through July. Analysts had been predicting that increases in domestic demand will offset the drop in Chinese demand, however, there would still be a meaningful drop in overall demand if China were to turn away from Washington log and lumber

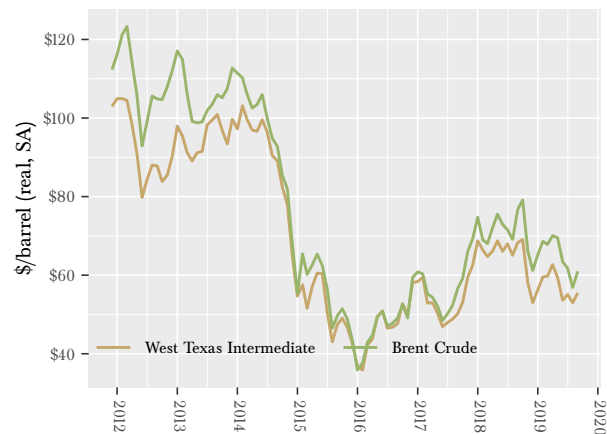
²There is very little information about the geoduck market, so much of our understanding is anecdotal.

exports entirely.

Previously, some analysts argued that access to wheat and other agricultural export markets are not in any serious danger because the U.S.'s largest trading partners are dependent upon imports to satisfy their demand and food prices in developing countries are highly political. However, that doesn't mean that they aren't able to preferentially purchase from U.S. competitors, particularly Australia, which is the world's largest exporter of soft white wheat.

Finally, China is apparently the primary market for geoducks and the tariffs appear to have already had a large impact on the prices DNR receives². The average prices of the geoduck auctions since the imposition of tariffs have been around 37 percent lower than those of the recent past, suggesting that the tariffs are having a meaningful impact.

Figure 10: Crude Oil Prices



Petroleum

Broadly, a drop in oil prices acts like a tax cut for consumers and can encourage consumption. Additionally, all other things being equal, lower petroleum prices will decrease 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 been increasing, which will make PNW timber more expensive internationally, while tariffs are being introduced, making it less competitive still.

Crude oil and its derivatives strongly affect production, transportation, and consumption in the world and U.S. domestic economies. Prices for Brent crude oil plummeted from \$108/barrel in January 2014 to \$30/barrel in January 2016, a 70 percent drop. Since then prices have ranged between \$40/barrel and \$75/barrel.

China

China is a major export market for logs, lumber, geoduck, and wheat and other agricultural products from the Pacific Northwest. Between 2011 and 2015, on average between 50 and 60 percent of the softwood log exports leaving the Seattle and Columbia River Customs District have gone to China. Additionally, China is (anecdotally) the primary export market for Washington's geoduck. Changes to the Chinese economy can have a dramatic impact on the prices for logs, lumber, and geoduck in the Pacific Northwest.

China's GDP and employment weathered the global economic and financial crises better than most other economies. There have been concerns for several years that that resilience may be based on poor policy, as the costs of propping up investment and maintaining significant political control over the economy mount. However, although Chinese GDP growth has slowed from 10.4 percent in 2010 to 6.6 percent in 2018, it has not crashed, though there are current indications that it is slowing markedly due to both business cycle factors and the trade war.

There is still some concern that Chinese GDP growth will fall much lower, possibly even into recession, with some analysts looking out for a 'Minsky moment'—a sudden sharp drop in economic activity triggered by excess debt. This risk is mostly due to the prominence of investment as a component of GDP, the huge amount of debt in the coun-

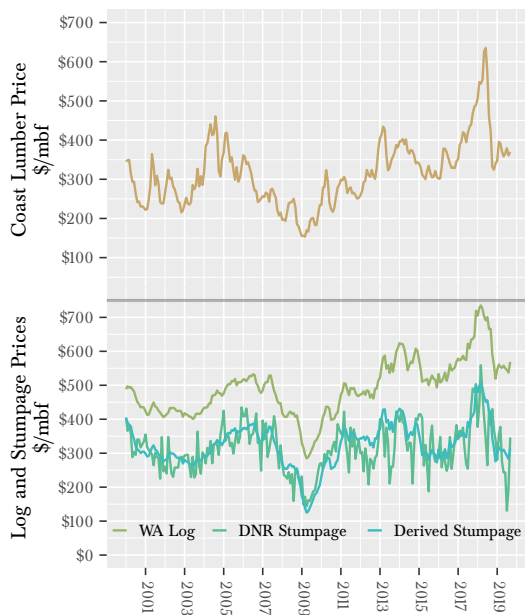
try, and the way that debt is held. Household and corporate debt (to non-financial corporations) ballooned from about 110 percent of GDP in 2008 to over 190 percent in 2014, and much of it is linked to real estate. Investment comprises almost 50 percent of China's GDP. At those levels of debt a slowdown 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.

The concern about the overall economy is amplified by the U.S. administration, which has been very critical of trade with China and has imposed tariffs on Chinese goods. China is particularly vulnerable to changes in access to international markets, with exports making up 25 percent of its GDP and a large proportion of employment dependent upon labor-intensive export industries.

Wood Markets

Timber stumpage revenue has constitutes about 70 percent of total DNR 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 revenue generated by DNR.

Figure 11: Lumber, Log, and Stumpage Prices in Washington

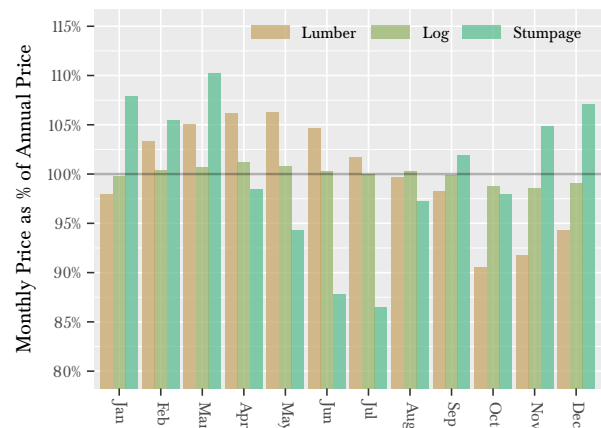


In general, timber stumpage prices reflect demand for lumber and other wood products, timber supply, and regional lumber mill capacity. There is a consistent, positive relationship between log prices and DNR's stumpage prices, despite notable volatility in stumpage prices (Figure 11). High log prices make access to logs more valuable, increasing purchasers' willingness to pay for stumpage (the right to harvest). Volatility in stumpage prices arise not only from log prices, but also from the volume 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 region,

and the road-building requirements of a particular sale.

The relationship between lumber 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 or stumpage prices to take advantage of high lumber prices. From the supply side, land owners often do not 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.

Figure 12: Lumber, Log, and DNR Stumpage Price Seasonality



There are differences in price seasonality between lumber, logs, and stumpage, as illustrated in Figure 12. 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 demand wanes, while stumpage prices tend to be highest in January-March, when harvesters are lining up harvestable stock for the summer. DNR stumpage price volatility is also affected by the fire-fighting season and the quality of the stumpage

mix, which varies throughout the year but tends to be lower from July through September.

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.

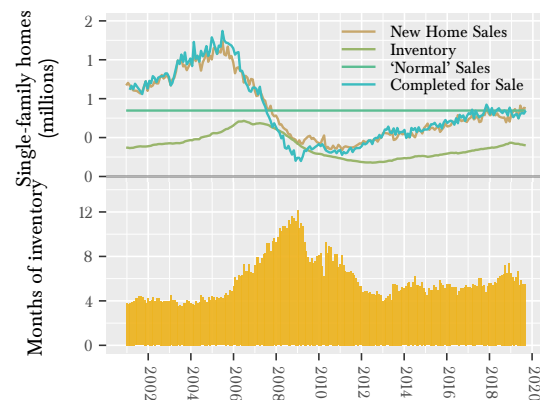
New residential construction (housing starts) and residential improvements are major components of the total demand for timber in the U.S. From 2000-2018 these sectors have averaged 69 percent of softwood consumption—37 percent going to housing starts and 32 percent to improvements—with the remainder going to industrial production and other applications.

The 2007 crash in the housing market and the following recession drastically reduced demand for new housing, which undermined the total demand for lumber. Since the 2009-11 trough, the increase in housing starts has driven an increase in lumber demand, though not to nearly the extent of the peak. Prolonged growth in starts is essential for a meaningful increase in the demand for lumber.

New Home Sales

Unsurprisingly, new home sales plummeted during the recession, reaching a record low of 306,000 (SAAR) in 2011 before beginning a slow rise (Figure 13). New home sales increased from 440,000 (SAAR) in 2014 to an average of 616,000 in 2017, still well below the long-term (1963-2010) ‘normal’ rate of 678,000 sales per year. New home sales averaged 651,000 (SAAR) through May 2018, before dropping meaningfully to average 593,000 for June-December. Through September, 2019 new home sales have averaged and annualized 673,000 (SAAR) sales.

Figure 13: New Single-Family Home Sales

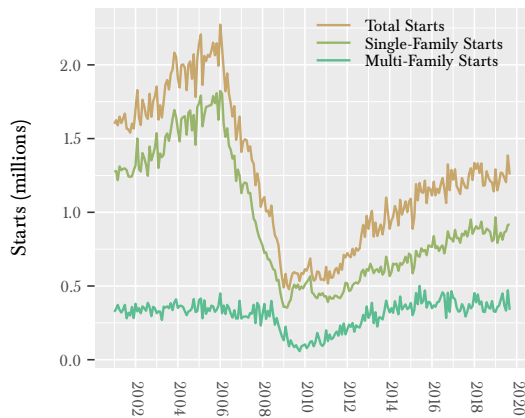


As low as new home sales fell, new home construction fell even lower from early 2007 through mid-2011, causing the inventory of newly built homes for sale to decline over the period. After bottoming out in July 2012 at 142,000 units, the inventory of new homes has crept up as construction slightly outpaced sales, averaging 314,000 homes in 2018. Since the beginning of 2019, inventory has started to slowly decline again, from 347,000 in January to 321,000 units in September.

Housing Starts

In April 2009, U.S. housing starts fell to record lows since the Census Bureau began tracking these data in 1959. 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 14). Starts have averaged 1.25 million (SAAR) through September in 2019, which was the average for 2018. Although these are well above the 2012 average of 0.78 million (SAAR), it is still well below the pre-recession long-term average of 1.6 million.

Figure 14: Housing Starts



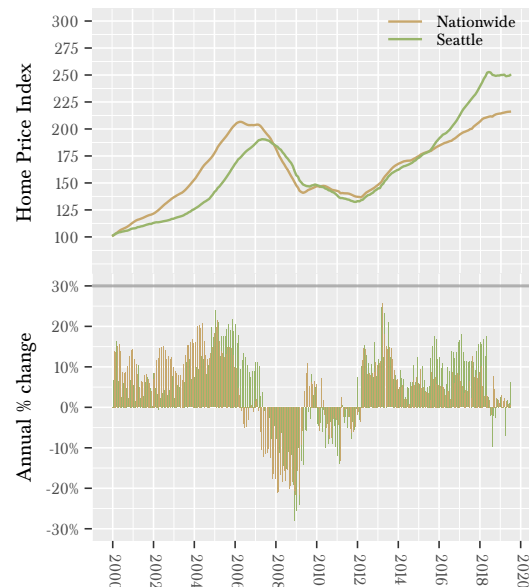
Since the recession, total housing starts have been made up of a larger portion of multi-family units than in the past—from 2000-2007 multi-family start were around 20 percent of the total starts, but increased to average around 30 percent of total starts for the last several years. This is pertinent because multi-family structures use much less lumber than single-family houses per unit, so the slow recovery in overall starts has had a more muted effect on timber prices than historical increases.

The recovery in house prices should facilitate the ‘move-up’ market, where homeowners sell their current home in order to buy a larger, more expensive one. An increase in the move-up market combined with low total inventories constraining the supply of existing housing should in general put upward pressure prices and provide incentives to build more houses. While that seems to be happening to a certain extent, it’s effect appears to be limited because the price increases themselves are keeping people from the lower end of the market, meaning that prices have risen so much that homeowners are beginning to have difficulty selling at market rates.

Builder confidence is no longer an impediment to housing starts, as estimates of confidence are consistent with housing starts of over 1 million. However, there are significant supply impediments, such as the shortage of buildable lots and permit de-

lays. Given the lead time necessary to build houses, these are likely to cause volatility in both prices and supply. Additionally, recent research suggests that since the Great Recession there has been significant consolidation of local construction businesses, so that in many local areas they are able to exert market power, reducing supply and increasing prices.

Figure 15: Case-Shiller Existing Home Price Index



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 15 charts the seasonally adjusted S&P/Case-Shiller Home Price Index for the 20-city composite, which estimates national existing home price trends.

Nationally, the 20-city composite index has increased in most months since bottoming out in January 2012—its lowest point since October 2002, but growth has slowed significantly since May 2018. Seattle house prices had been growing much faster

than national prices, doubling from its low in February 2012 to July 2018, while nationally house prices increased by 62 percent. However, since July 2018 Seattle house price changes have been essentially flat. Despite the recent flat growth, the average Seattle home was worth over 30 percent more in September than its peak price before the recession (in nominal terms).

Export Markets

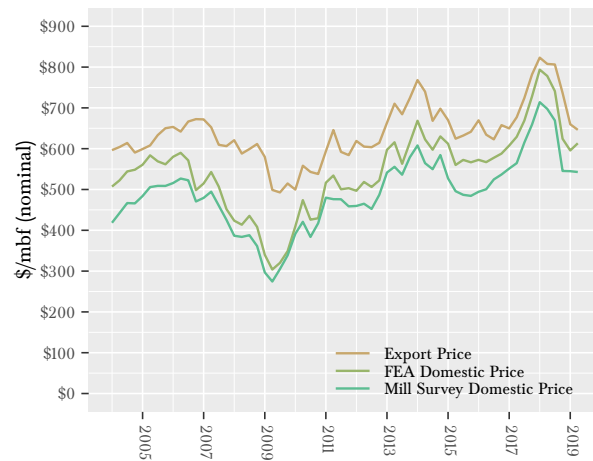
Although Federal law prohibits export of logs from public lands west of the 108th meridian, log exports still have a meaningful impact on DNR stumpage prices. Exports compete with domestic purchases for privately sourced logs and strong export competition pulls more of the supply from the domestic market,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

Export prices are almost always higher than domestic prices, a difference which is referred to as the ‘export premium’ (Figure 16). The export premium is 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.

Between 2010 and 2014, demand from China was a major support for log and lumber prices in Washington. That demand dropped 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 a 25 percent Russian tariff on log exports was reduced. The downward trend in Chinese demand continued since then. (Figure 17). Exports to China from the Seattle and Columbia-Snake River Customs Districts for both Douglas-fir and Hemlock were 11 percent lower in 2016 than 2015, 1.9 million m³, compared to 2.1 million m³ in 2015 and 3.2 million m³ in 2014.

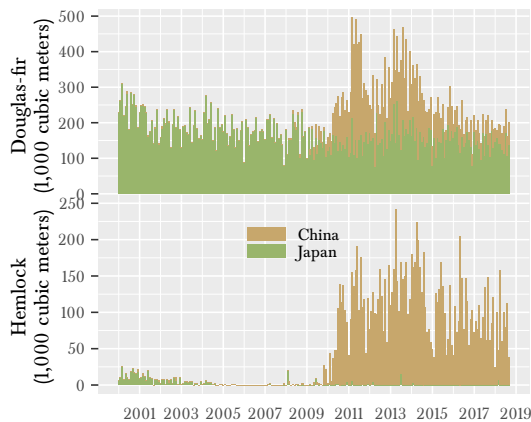
Figure 16: Log Export Prices



The trend of decreased exports to China continued in 2017 with hemlock exports from Seattle and the Columbia River Customs Districts falling from a peak of 1.7 million m³ in 2014 to 1.1 million m³ in 2017 and douglas-fir export falling from 2.2 million m³ in 2013 to 0.6 million m³ in 2017. Export volumes to China increased by two percent in 2018, while exports to Japan decreased by two percent. Year-to-date exports through August have decreased by 18 percent to both Japan and China.

The export premium appears to have shrunk since 2014 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 further as West Coast log exports face stronger international competition and export prices are pushed down. Much will depend on supply constraints from key international suppliers, transportation constraints from the southeastern U.S, and whether tariffs are imposed on softwood logs.

Figure 17: Log Export Volume



Timber Supply

Since the beginning of the recession timber growth throughout the U.S. has generally exceeded timber harvest, increasing the timber inventory. However, strong log exports from the West Coast drove up harvests, so that inventory growth was slower than in other parts of the country, particularly the U.S. South. Harvests have rebounded strongly enough that timber harvest began to exceed growth in 2017, so the standing timber inventory is beginning to fall. Drawing down the standing timber inventory will constrain the region's ability to expand outputs—although harvests are expected to continue to increase for several years, they will not reach the levels of the mid-2000s, nor will the increased harvest push prices down.

Since the late 1990s British Columbian forests have been devastated by the mountain timber beetle, which affected about a third of the province's timber resources. Typically, timber killed by beetles must be harvested within 4 to 10 years so in 2007 the government increased the allowable harvest to ensure that the dead timber was not wasted, which increased British Columbia's harvestable timber supply. Most of the remaining beetle kill is now unviable and there will be no harvestable beetle kill after 2020.

The supply from Canada was 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).

These constraints have already reduced Canada's lumber production capacity by forcing mill closures.

Price Outlook

Lumber Prices

As shown in Figure 11, lumber prices increased in 2016 to average \$341/mbf and increased sharply in 2017 to average \$425/mbf. In June 2018, prices hit \$635/mbf, higher in real terms than any since 2000. However, from June prices dropped dramatically to a low of \$324/mbf in November—a 47 percent drop. Prices through October 2019 have made a modest recovery to average \$371/mbf.

A drop in prices at the end of the third quarter 2018 was expected due to the end of the building season and increased supply from additional capacity being put online, but this drop was much larger than expected. In outlying years prices are expected to remain around the 2017 average, but will not reach the peaks of 2018.

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 11.

Readily visible on the graph is the decline in the premium for Douglas-fir between 2007 and 2014, due in large part to Chinese demand driving up hemlock prices. Also readily visible is the drop in prices from late 2014 to early 2016 which was

primarily driven by the slowdown in demand from China and ample regional supply of both logs and lumber.

Stumpage Prices

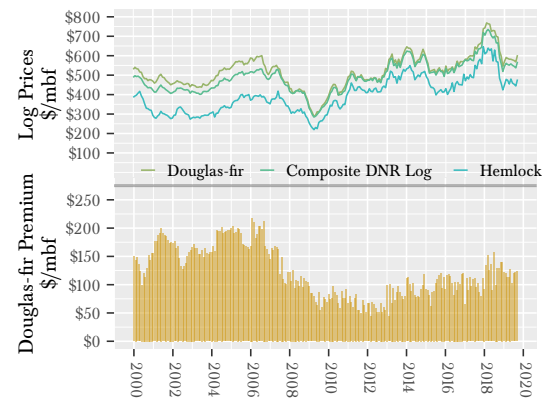
Timber stumpage prices are the prices that successful bidders pay for the right to harvest timber from DNR-managed lands (Figure 19). At any time, the difference between the delivered log price and DNR's stumpage price is equivalent to the sum of logging costs, hauling costs, and harvest profit (Figure 11). 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, a 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. In the November 2018 forecast, we noted that DNR actual stumpage prices were well above the inferred prices, suggesting that stumpage prices would be lower in the near future. That was correct—prices moved sharply lower from an October auction high of \$430/mbf, to a December auction average of \$340/mbf.

Since then, aside from higher prices in February and March 2019, stumpage auction prices have continued to fall. The first two auctions of the fiscal year had an average price \$171/mbf, well below the derived stumpage price in Figure 11. However,

prices recovered in the following two auctions, averaging \$339/mbf. Average stumpage prices for the year are still quite low, at \$246/mbf.

Figure 18: DNR Composite Log Prices

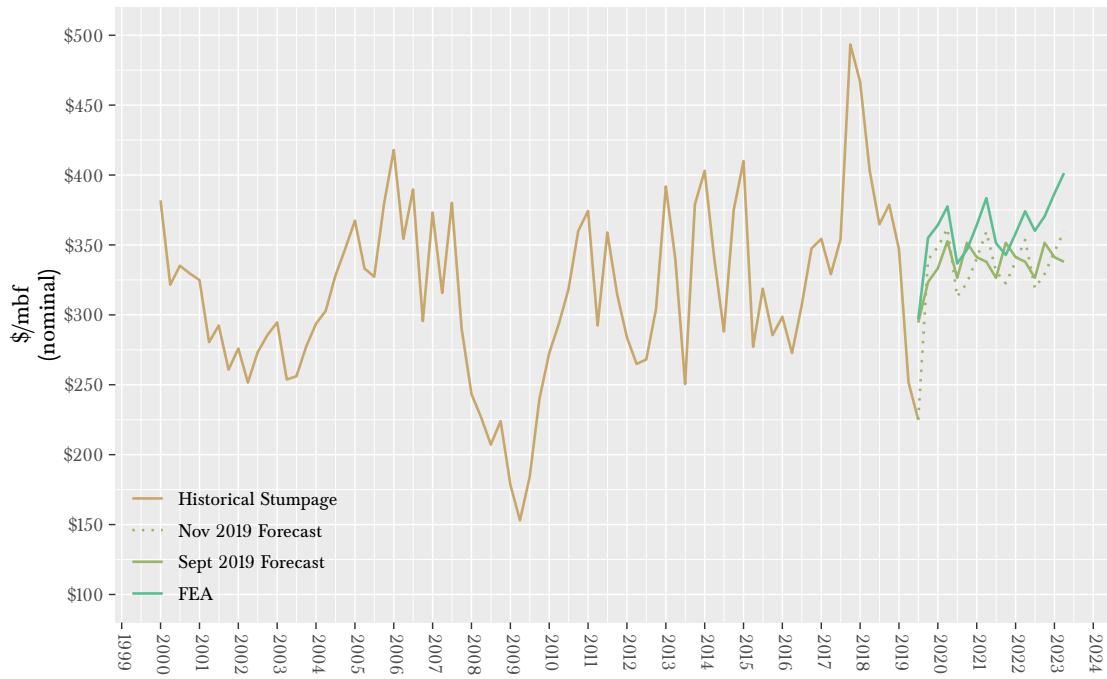


DNR Stumpage Price Outlook

DNR currently contracts with a forest economics consulting firm that provides 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 its price forecasts, we arrive at a stumpage price outlook (Figure 19, note that the FEA 'forecast' series reflects the species and class characteristics of typical DNR timber; the original series were West Coast averages, and are not shown).

It is important to note that these are nominal price expectations.

Figure 19: DNR Timber Stumpage Price



DNR Revenue Forecast

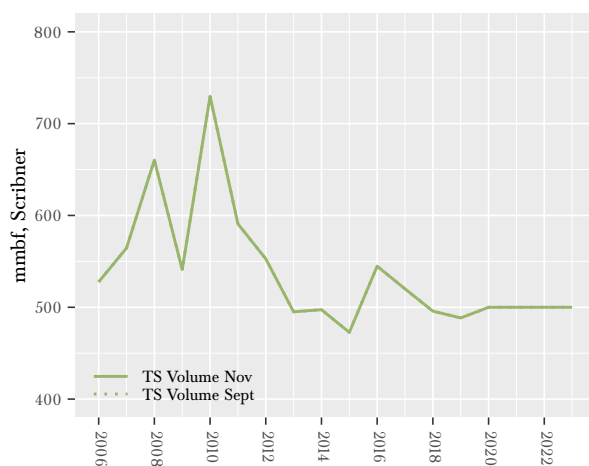
This Revenue Forecast includes revenue generated from timber sales on trust uplands, leases on trust uplands, and leases on aquatic lands. It also forecasts revenues to individual funds, including DNR management funds, beneficiary current funds, and beneficiary permanent funds. Caveats about the uncertainty 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, which is likely based on perceptions of market conditions. As a result, timber revenues to beneficiaries and DNR management funds lag behind sales.

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 when the timber is harvested.

Figure 20: Forecast Timber Sales Volume

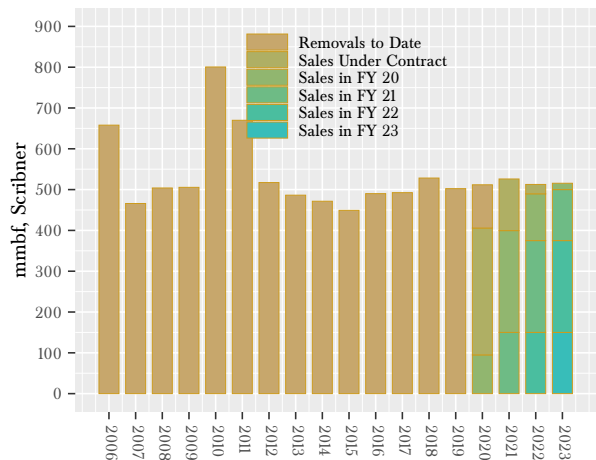


Timber Sales Volume

Sales volume forecasts for all years are unchanged (Figure 20). This is despite an increase in the number of contracts that were offered at auction that have been passed-in with no bids. DNR plans on offering for auction more than 500 mmbf, but our volume forecast builds in the probability that some of those contracts offered will not be sold in this fiscal year.

FY15 was the first year of the new sustainable harvest decade (FY15 through FY 24) for Western Washington; however, new harvest targets for 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 19-23.

Figure 21: Forecast Timber Removal Volume



Timber Removal Volume

In the previous forecast we began revising the methods used to forecast harvest volume. Essentially, the previous method used likely harvest volumes estimated from a purchaser survey, as well as historical averages of volume harvested from sales

remaining in the year. Downward revisions in volume harvested in a given year were pushed into future years, because that volume is still in inventory and has a contractual time limit to when it must be harvested by. While this is conceptually sound, in practice it led to apparently systematic overestimation of harvest volumes in future years. This problem propagated at the start of new fiscal years when we begin revising the volumes down based on recent harvest history, and pushing that volume out to future years. This issue is illustrated in the appendix review of historical forecasts in the September Forecast.

Our new method for forecasting timber volume has not yet been finalized, but will likely still involve surveying purchasers and using their responses to scale our forecast, along with sales to-date and some estimate of the likely harvests from sales remaining. The effect of this method revision is a decrease in the forecast harvest volume for the current and all outlying fiscal years.

The forecast FY 20 removal volume is reduced to 512 mmbf (-22 mmbf) and FY 21 is reduced to 526 mmbf (-11 mmbf, Figure 21).

Figure 22: Forecast Timber Sales Price

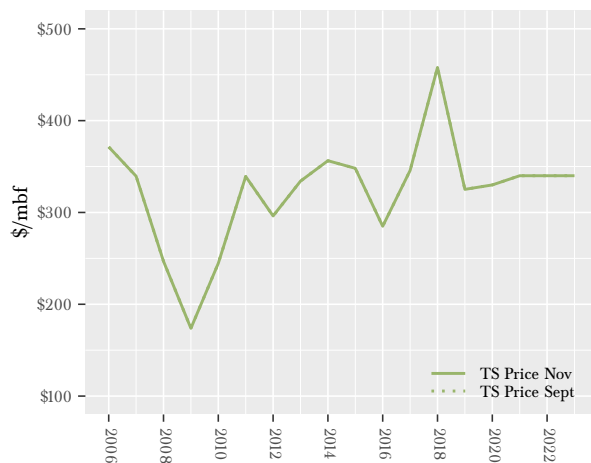
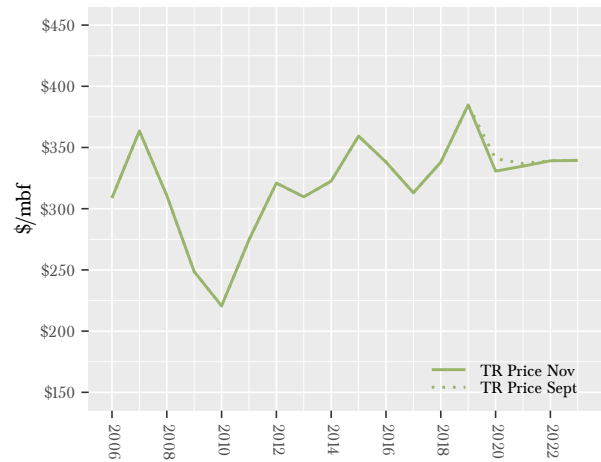


Figure 23: Forecast Timber Removal Price



Timber Sales Prices

The price results of monthly DNR timber sales are quite volatile (Figure 11). As discussed in the stumpage price outlook, the DNR sales price (stumpage) forecast uses estimates from a forest economics consulting firm. The sales price forecast for FY 20 was decreased in the previous forecast by \$10/mbf to \$330/mbf due primarily to the very low prices from the July and August auctions, though these were on a relatively small auction volume. This change appears sufficient given that stumpage prices in the most recent two auctions have recovered. The sales price forecasts are unchanged in all years.

Timber Removal Prices

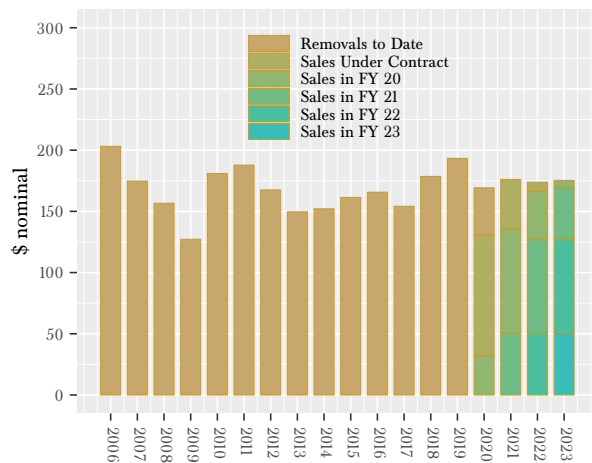
Timber removal prices are determined by sales prices, volumes, and harvest timing. They can be thought of as a moving average of previous timber sales prices, weighted by the volume of auctioned timber removed in each time period (Figure 23).

The timber removal price forecast for FY19 was increased in June, but ended the year even higher than expected at \$385/mbf. This revision and the end result were due entirely to an increased proportion of the harvest to-date being higher priced

timber. It appears that the increase to the removal price forecast was too high. Although the average removal price for the fiscal year through September was \$388/mbf, the average price of removals in October was \$269/mbf, dragging down the average for the fiscal year to-date to \$338/mbf. Additionally, the average price of volume expiring this fiscal year has fallen to only \$332, so it is unlikely to support the previous forecast price.

Removal prices in FY 20 are decreased by \$10/mbf to \$331, and decreased by \$2/mbf in FY 21.

Figure 24: Forecast Timber Removal Value



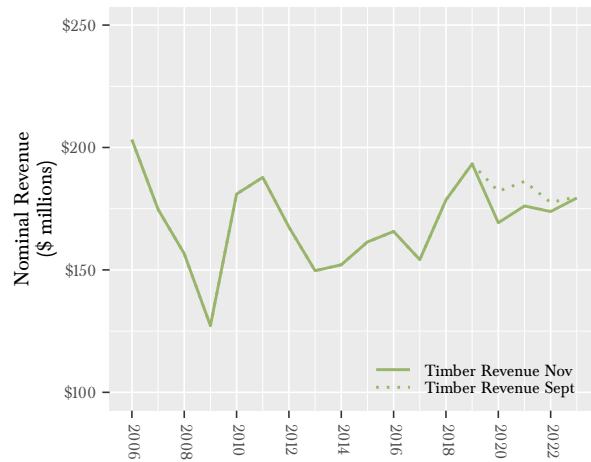
Timber Removal Revenue

Figure 24 shows projected annual timber removal revenues, broken down by the fiscal year in which the timber was sold ('sales under contract' were sold as of January 1st, 2019). Revenue estimates reflect all of the changes described above.

Revenue in FY 20 and FY 21 are reduced by \$13 million and \$10 million respectively.

Revenues for the 2019-2021 biennium are forecast to total \$345 million, a decrease of 6.2 percent (\$22 million) from the September Forecast, while revenues for the 2021-2023 biennium are decreased by 1.2 percent (\$4 million) to \$357 million.

Figure 25: Forecast Timber Removal Revenue

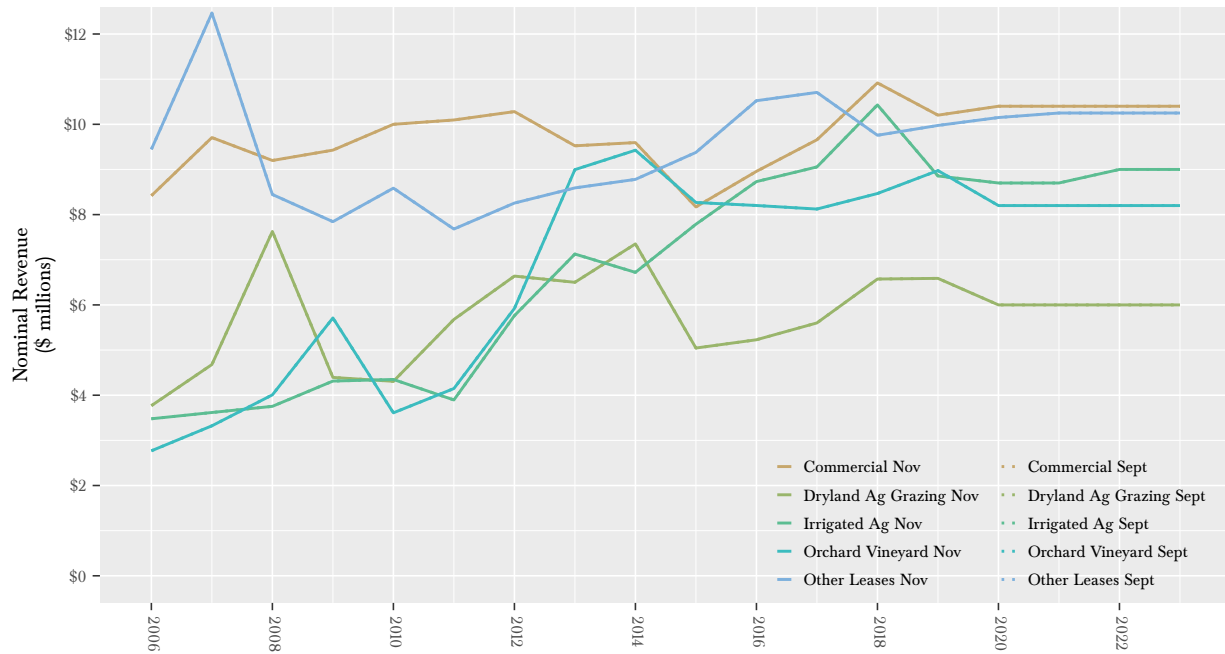


Upland Lease Revenues

Upland lease revenues are generated primarily from leases and the sale of valuable materials, other than timber, on state trust lands (Figure 26). Revenue

to-date support the current forecast and there have been no other developments to suggest the current forecast is unlikely, so projected revenue from uplands leases are unchanged.

Figure 26: Forecast Upland Lease Revenue



Aquatic Lands Revenues

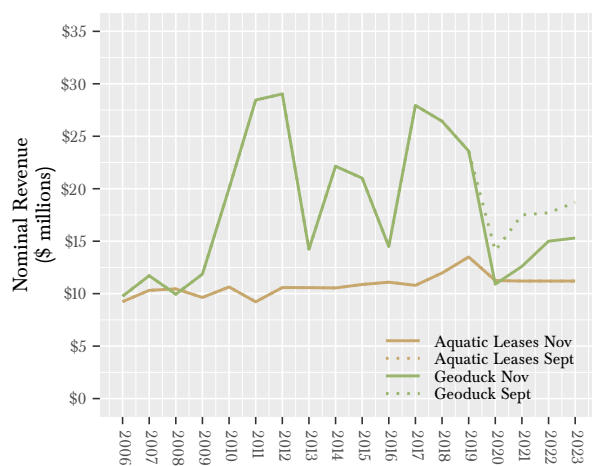
Aquatic lands revenues are generated from leases on aquatic lands and from sales of geoduck. On average, leases account for one-third of the revenue while geoduck sales account for the remainder.

The aquatic lease revenue forecast is unchanged for all forecast years (Figure 27).

The geoduck revenue forecast has been revised downward for all forecast years due to very low prices in the geoduck auctions in August and October (Figure 28). The October auction prices are particularly concerning because the harvest period overlaps with the Chinese New Year, historically these auctions are the highest prices DNR receives in a year. Price weakness in geoduck auctions are expected to continue as long as the 25 percent tariff to China continues. Additionally, there are media reports that Chinese consumers are starting to turn to other luxury seafood, suggesting that even after the tariffs are removed, geoduck will have more competition and prices may not ever return to their previous highs.

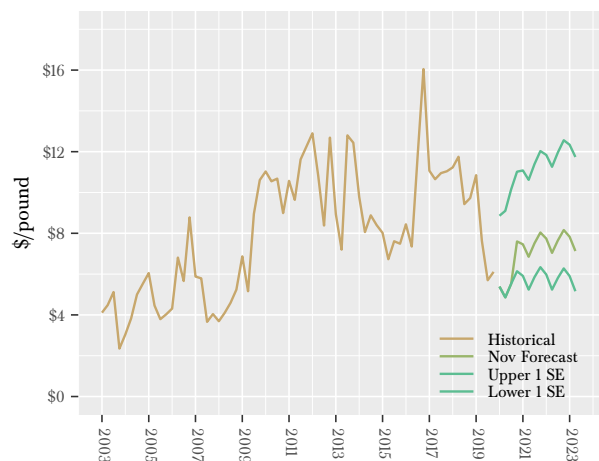
- Harvests (and therefore revenues) could be deferred or lost if geoduck beds are closed due to occurrence of paralytic shellfish poison.
- An escalation in the trade war could see tariffs increased
- A further slowdown in China’s economic growth or the tariffs on geoduck could lower demand for this luxury export in its largest market.
- In light of recent WDFW surveys of closed South Puget Sound geoduck tracts showing declining recovery rates, and evidence of active poaching, future commercial harvest levels may be further reduced.

Figure 27: Aquatic Lands Revenues



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

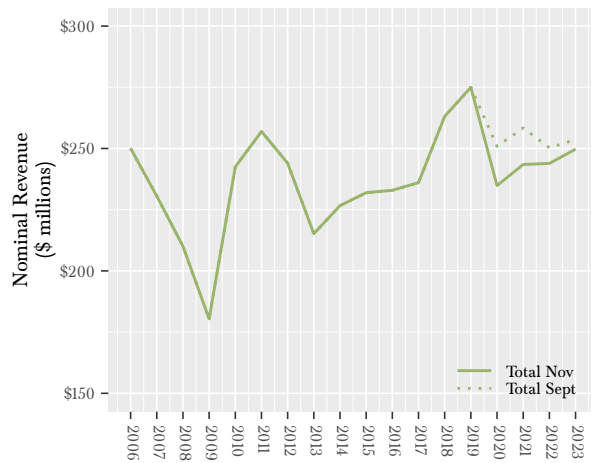
Figure 28: Geoduck Auction Prices



Total Revenues from All Sources

Forecast revenues for the 2019-2021 Biennium (FYs 20 and 21) are decreased by 6.1 percent (\$31 million) to \$478 million, and revenues for the 2021-2023 biennium are decreased by 2.0 percent (\$10 million) to \$493 million (Figure 29).

Figure 29: Total Revenues



Some Caveats

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

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 FYs 20 by trust, and relative historical timber prices by DNR region by trust; and
- The volumes of timber by trust for FYs 21-23 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 more than \$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 biennial budget bills, the Legislature has authorized a deduction of up to 30 percent to RMCA since July 1, 2005. In 2015, they authorized a deduction up to 31 percent.

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 2017-2019 and 2019-2021 biennia. This assumes that the Legislature will approve RMCA deductions of up to 31 percent.

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

	FY 20	FY 21	FY 22	FY 23
FDA	25	25	25	25
RMCA	31	31	31	31