

Department of Natural Resources  
**Economic & Revenue Forecast**

Fiscal Year 2022, Third Quarter  
February 2021





## Forecast Summary

### Coronavirus pandemic<sup>1</sup>

The COVID-19 pandemic has significantly altered the economic landscape. It has affected almost every aspect of economic life, from consumer behavior and purchasing decisions to production and supply chain operations. And although the threat of large-scale COVID-19 lock-downs seems to be gone, at least for the moment, it is clear that the disease can still cause widespread disruption even without significant government action.

However, with the waning of the Omicron variant and no new variant vying to replace it (again, at least for the moment), we are back to where we were in early 2021 — cautiously optimistic that the worst of the pandemic is behind us. The new case rate has fallen from around 805,000 cases per day to 135,000, while hospitalizations and deaths are also falling, though not as steeply. Around 65 percent of the United States population is vaccinated, which will likely help limit deaths from another wave, and new are antivirals available to help treat the disease.

Having said that, a meaningful part of the COVID-19's effect will depend on how other countries react to outbreaks. China, in particular, is following a zero-COVID policy. The effect of this is that even a couple of cases can put a city into lock-down. If those cities happen to be a port cities, like Shenzhen or Ningbo-Shoushan, then even small outbreaks can disrupt international shipping, cause supply-chain issues, push up costs and inflation, and cause all sorts of economic turmoil.

Unfortunately, even if there are no more shutdowns, many of the pandemic's larger economic effects are already working their way through the economy, will take some time to resolve and continue to pose risks to economic growth. These include chip shortages, supply chain bottlenecks, altered

consumer behavior from services spending to more goods spending, etc. As an example of how things are unlikely to change quickly, car manufacturing delays due to chip shortages emerged in late 2020, leading to constrained car supplies and extraordinary prices in late 2021<sup>2</sup>. Even if COVID-19 were to disappear from the U.S., the chip shortage would not end immediately and it would still take some time for car manufacturing to return to normal.

Taken all together, the forecast is now built with the expectation that the pandemic will continue indefinitely, but this is unlikely to *seriously* affect DNR revenue. DNR revenue comes predominantly from timber, with some from agriculture and other uplands leases as well. Timber prices are largely driven by the demand coming from housing markets and agricultural revenue is largely driven by the prices of agricultural products. These will be discussed in their respective sections of the forecast — but, in short, although these sectors have their own risks, they will likely be largely unaffected by the ongoing pandemic.

Even without clear effects such as stay-at-home orders, the ongoing pandemic, with waves of variants like Delta and Omicron, will probably still have some effect on the economy, though some will likely be more insidious and difficult to quantify, and occur over a longer time horizon. The repercussions could include things such as:

- Reduced demand for services or fluctuations in demand for different types of goods and services as people change behavior dependent on whether there is a spike in cases.
- Disruptions to shipping, both international and domestic, because of overrun ports and outbreaks in port cities, as happened in mid-August at Ningbo-Zhoushan, the world's third largest container port<sup>3</sup>.
- Reduced economic output across the global

<sup>1</sup>As a reminder, we are not epidemiologists or experts on public health or pandemics. This section is written with our best understanding of the pandemic and its dynamics gathered from reputable sources with the aim of translating those into likely broader economic effects and then more direct effects on DNR revenue. In addition to the significant uncertainty still surrounding the future path of the epidemic even for experts, uncertainty arises from our limited experience and understanding.

<sup>2</sup><https://www.ft.com/content/13094950-fb45-4686-9ef9-8199c674b90d>

<sup>3</sup><https://www.ft.com/content/el263950-1173-4832-a011-ada04dfle93c>

economy due to outbreaks among labor in other sectors, further disrupting supply chains.

- Reduced labor availability due to school closures or availability.
- Impaired productivity growth due to long COVID (ongoing symptoms that can severely affect normal life after the illness) affecting a meaningful portion of the workforce — current estimates are that between 10 and 30 percent of those infected are affected by long COVID <sup>4</sup>.

To summarize, the assumptions underlying this forecast are:

- There will be no more stay-at-home orders or significant limitations on economic activity by governments in the U.S.
- Successive waves of COVID-19 will not cause major disruptions to DNR revenue streams, which are relatively insulated from the direct effects of COVID-19.
- Even if new COVID-19 infections drop substantially, it will not create a meaningful boost in economic activity that will affect DNR revenues.

Having written all that, the COVID-19 pandemic is still a wild card and significantly increases the potential risks and volatility of DNR revenue. This does not affect the point forecasts provided, but it does increase the range of potential and *equally likely* outcomes.

**Lumber and Log Prices.** Lumber prices have been exceptionally volatile the past two years. In late 2021, prices peaked at around \$1,600/mbf in May then plummeted to \$414/mbf in August (West Coast standard or better 2x4, Douglas-fir/Hemlock). Prices rebounded over the next several months to \$1,200/mbf in January. Since mid-January, the CME cash price for lumber shows it dropping to \$1,300/mbf to \$900/mbf in early February and then rebounding to \$1,300/mbf again in mid-February. Demand remains high and prices

are expected to remain than they have historically been through 2022, even if they fall from their current level.

The high lumber prices pulled up log prices, with the price of a "typical" DNR log rising from a low of \$498/mbf in April 2020 to peak at \$718/mbf in April 2021. These are very high historically, but interestingly, still below the highs of early 2018. Since April, log prices have softened, averaging \$660/mbf over the last six months of 2021. This is, notably, still higher than the prices of early 2020. Log prices are expected to increase a little through 2022.

**Timber Sales Volume.** DNR currently plans to offer around 530 mmbf for sale in FY 22. However, some of that volume is at risk. There is currently a proposal to limit DNR timber harvests to only stands less than 120 years old. If that proposal were implemented, around 15 to 20 mmbf would likely be removed from sales planned for FY 22. Additionally, there is always the risk that some sales plans are not completed in time or that the sales are passed in with no bids.

Given the above, the sales volume forecasts are unchanged for this forecast.

**Timber Sales Prices.** In the last forecast we were wary of increasing the sales price forecast because the prices for the August and September auctions were lower and had more no-bids than previous auctions. The auctions since then have assuaged those reservations with a weighted average price of \$406/mbf. The forecast timber sales prices are increased to \$380/mbf for FY 22 and \$350/mbf for FY 23. This may still prove to be too conservative if demand remains as strong as it is currently.

#### **Timber Removal Volume and Prices.**

The removal volume forecast is unchanged in all years. Removals to date in FY 22 are in line with expectations.

Removal prices are increased due to changes in the value of timber in inventory (sales have been selling for higher prices than we had forecast) and the increased sales price forecast.

<sup>4</sup><https://pascdashboard.aapmr.org/> and

**Timber Revenue.** Timber revenue in all years is increased due to the adjustments in removal prices.

Timber revenues for the 2021-23 biennium are \$371 million — around 4 percent higher (\$14 million) than previously forecast. Forecast revenues for the 2023-25 biennium are increased to \$353 million — around 3 percent higher (\$11 million).

**Non-Timber Revenues.** In addition to revenue from timber removals on state-managed lands, DNR generates sizable revenues from managing leases on uplands and aquatic lands.

Forecast uplands revenue for FY22 is decreased by \$0.5 million to \$46 million, due to slower revenue from orchard/vineyard leases and from rights of way.

The aquatic lease forecast for FY22 is increased slightly due to increased expectations for water-dependent revenue offsetting decreased expectations for mineral and hydrocarbon extraction on aquatic lands.

The geoduck forecast revenue for FY22 is increased to \$18 million, and by various amounts in outlying years, based on sustained high prices increasing our price forecast. The revenue forecast for geoduck would have been increased more if harvests for did not face significant risks in all years. Paralytic shellfish poison harvesting closures are a major risk — harvesting on one of the more valuable tracts was unavailable for a time due to PSP. Additionally, there are serious issues with compliance vessel availability. Of the five boats DNR has for compliance monitoring, only two are regularly in working order at any given time. The rest need repairs, but these have been delayed indefinitely because the parts are unavailable. Finally, a slew of other risks remain, including labor shortage risks from a small pool of licensed divers, the potential for China to ban geoduck imports for a variety of reasons, and sewerage contamination from flooding run-off closing tracts. Additionally, geoduck are still covered by tariffs initiated during the 'trade-war' between China and the US from 2018. These have been suspended during the COVID-19 pandemic, but they are still on the books.

**Total Revenues.** Revenues for the 2019-21 biennium (FYs 20 and 21) were \$503 million. The forecast revenue for the 2021-23 biennium are increased to \$523 million, and the forecast revenue for the 2023-2025 biennium are increased to \$506 million.

**Other notes to the Forecast.** In addition the ongoing a COVID-19 resurgence, a number of sources of uncertainty may affect DNR revenue specifically, and the overall economic activity more broadly. These include: legal challenges to the sustainable harvest volume and marbled murrelet conservation strategy; uncertainty about the type and quality of stumpage DNR is able to bring to market more than six months out; the ongoing trade war and political tension with China directly affecting timber, agricultural products and geoduck exports and prices; supply chain issues across the world economy threatening to undermine economic growth more broadly as well as affecting timber-specific industries, such as a lack of glue impairing plywood manufacturing or the slow-moving default by one of China's largest real estate developers. Additionally, although the timber sales volume estimates are based on the best available internal planning data, they are subject to adjustments due to ongoing operational and policy issues.

From the beginning of 2018 until just before the COVID-19 pandemic, the U.S. and China engaged in an escalating trade dispute. Prior to the pandemic, the tariffs on geoduck were 25 percent and were a significant driver of the drop in geoduck prices in late 2019. The log tariffs and a slowdown in housing starts were the major contributors to the lower domestic price of logs through late 2019. With the pandemic, tariffs were reduced to 5 percent tariff on geoduck, wheat, and softwood logs. There is no indication that tariffs between the countries will be reduced further or removed soon.

In addition to the coronavirus and the trade tensions discussed above, other things could undermine Chinese demand for wood, such as the continued loss of Pacific Northwest market share to international and Southeastern U.S. competitors.

Another issue on the horizon that should be men-

tioned in relation to timber markets is that Russia appears to be moving forward with legislation banning the export of timber from the beginning of 2022. It appears that they have banned exports to Japan, but unclear whether that extends to other countries. Given that Russia supplies around 12 percent of world log exports, the ban will have a significant impact on log supply across the world. In the short term, this will likely push up log prices across the world, and will mainly affect China, which gets a significant amount of logs from Russia. This will also likely push up lumber and wood product prices. This has not been built into the forecast prices.

Finally, climate change has emerged as a more meaningful immediate risk as opposed to an amorphous risk in the far future, as previously rare extreme weather events become more common. Most recently, in September and October, extraordinary rainfall in British Columbia destroyed roads and railways, essentially halting timber harvests and lumber production and timber exports through the Port of Vancouver. Additionally, the drought in Washington this year appears to have decreased wheat production on DNR lands by about 40 percent.

Droughts and high temperatures are also increasing wildfires. Although these do not appear to have seriously affected revenue from DNR timberlands since 2015, they pose a significant risk to both our short-term timber revenue forecast, potentially destroying standing timber under contract, as well as long-term revenue by destroying younger stands that would be harvested in future decades. Recent research suggests that the massive fires in Oregon around Labor Day 2020 caused not only immediate damage, but will reduce future Oregon harvests by *115 to 365 mmbf per year for the next 40 years*. That, with the more immediate damage of the fires, suggests an overall economic impact of \$5.9 billion<sup>5</sup>.

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<sup>5</sup>2020 Labor Day Fires: Economic Impacts to Oregon's Forest Sector, Oregon Forest Resources Institute ' 'https://oregonforests.org/sites/default/files/2021-09/OFRI-LaborDayFiresEconomicReport\_Final\_2021.pdf' '

Table 1: February 2022 Forecast by Source (millions of dollars)

<b>Timber Sales</b>		FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27
Volume (mmbf)		534	542	500	500	500	500	500	500
	Change			-	-	-	-		
	% Change			0%	0%	0%	0%		
Price (\$/mbf)		291	395	380	350	340	340	340	340
	Change			\$ 40	\$ 10	\$ -	\$ -	\$ -	\$ -
	% Change			12%	3%	0%	0%	0%	0%
<b>Value of Timber Sales</b>		<b>155.3</b>	<b>214.2</b>	<b>190.0</b>	<b>175.0</b>	<b>170.0</b>	<b>170.0</b>	<b>170.0</b>	<b>170.0</b>
	Change			\$ 20.0	\$ 5.0	\$ -	\$ -	\$ -	\$ -
	% Change			12%	3%	0%	0%	0%	0%
<b>Timber Removals</b>									
Volume (mmbf)		529	528	520	520	510	510	500	500
	Change			(0)	(0)	0	10		
	% Change			0%	0%	0%	2%		
Price (\$/mbf)		345	341	356	358	350	344	340	340
	Change			9.3	17.1	11.4	3.6		
	% Change			3%	5%	3%	1%		
<b>Timber Revenue</b>		<b>182.5</b>	<b>180.2</b>	<b>185.1</b>	<b>186.0</b>	<b>178.7</b>	<b>175.1</b>	<b>170.0</b>	<b>170.0</b>
	Change			4.8	8.9	5.8	5.1	-	-
	% Change			3%	5%	3%	3%	0%	0%
<b>Upland Leases</b>									
Irrigated Agriculture		9.0	8.8	9.4	9.0	9.0	9.0	9.0	9.0
	Change			-	-	-	-		
	% Change			0%	0%	0%	0%		
Orchard/Vineyard		8.8	9.4	8.6	9.0	9.0	9.0	9.0	9.0
	Change			(0.4)	-	-	-		
	% Change			-4%	0%	0%	0%		
Dryland Ag/Grazing		6.2	6.8	5.0	6.0	6.0	6.0	6.0	6.0
	Change			-	-	-	-		
	% Change			0%	0%	0%	0%		
Commercial		10.3	11.3	10.8	10.8	10.8	10.8	10.8	10.8
	Change			-	-	-	-		
	% Change			0%	0%	0%	0%		
Other Leases		10.0	13.7	11.9	12.1	12.2	12.3	12.3	12.3
	Change			(0.1)	-	-	-		
	% Change			-1%	0%	0%	0%		
<b>Total Upland Leases</b>		<b>44.3</b>	<b>50.0</b>	<b>45.7</b>	<b>46.9</b>	<b>47.0</b>	<b>47.1</b>	<b>47.1</b>	<b>47.1</b>
	Change			(0.5)	-	-	-		
	% Change			-1%	0%	0%	0%	0%	0%
<b>Aquatic Lands</b>									
Aquatic Leases		12.7	9.7	12.4	12.4	12.4	12.4	12.4	12.4
	Change			0.2	-	-	-		
	% Change			1%	0%	0%	0%		
Geoduck		10.6	13.0	18.0	17.0	16.7	16.3	16.3	16.3
	Change			0.9	1.8	1.5	1.1		
	% Change			5%	12%	10%	7%		
<b>Aquatic Lands Revenue</b>		<b>23.4</b>	<b>22.6</b>	<b>30.4</b>	<b>29.4</b>	<b>29.1</b>	<b>28.7</b>	<b>28.7</b>	<b>28.7</b>
	Change			1.1	1.8	1.5	1.1		
	% Change			4%	7%	5%	4%		
<b>Total All Sources</b>									
		<b>250.1</b>	<b>252.9</b>	<b>261.2</b>	<b>262.3</b>	<b>254.8</b>	<b>250.9</b>	<b>245.8</b>	<b>245.8</b>
	Change			5.3	10.7	7.3	6.2		
	% Change			2%	4%	3%	3%		

Table 2: February 2022 Forecast by Fund (millions of dollars)

<b>Key DNR Operating Funds</b>		FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27
041	RMCA - Uplands	33.5	33.5	40.1	41.8	40.9	40.4	39.6	39.6
	Change			(0.1)	1.5	1.0	0.8		
	% Change			0%	4%	3%	2%		
041	RMCA - Aquatic Lands	9.9	10.2	13.3	12.8	12.7	12.5	12.5	12.5
	Change			0.5	0.9	0.8	0.6		
	% Change			4%	8%	6%	5%		
014	FDA	28.3	27.2	22.7	22.6	22.0	21.8	21.1	21.1
	Change			1.3	1.2	0.8	0.6		
	% Change			6%	6%	4%	3%		
21Q	Forest Health Revolving	8.7	13.5	15.3	11.9	9.3	8.3	8.2	8.2
	Change			0.5	(0.6)	(0.4)	0.1		
	% Change			4%	-5%	-4%	1%		
<b>Total DNR Key Operating Funds</b>		<b>80.5</b>	<b>84.4</b>	<b>91.5</b>	<b>89.0</b>	<b>84.9</b>	<b>83.0</b>	<b>81.5</b>	<b>81.5</b>
	Change			2.2	3.0	2.2	2.1		
	% Change			2%	4%	3%	3%		
<b>Current Funds</b>									
113	Common School Construction	59.5	53.2	61.8	68.0	67.3	66.9	65.7	65.7
	Change			(1.8)	2.0	1.4	1.2		
	% Change			-3%	3%	2%	2%		
999	Forest Board Counties	68.7	69.5	51.8	53.8	53.7	53.3	51.8	51.8
	Change			1.7	2.9	1.8	1.5		
	% Change			3%	6%	4%	3%		
001	General Fund	4.7	4.4	4.5	3.9	3.6	3.5	3.4	3.4
	Change			0.7	0.1	0.1	0.1		
	% Change			18%	3%	3%	3%		
348	University Bond Retirement	0.6	1.6	3.0	2.2	2.0	1.9	1.9	1.9
	Change			(0.1)	0.3	0.1	0.0		
	% Change			-2%	14%	6%	3%		
347	WSU Bond Retirement	1.9	2.6	1.5	1.5	1.6	1.6	1.6	1.6
	Change			(0.0)	-	-	-		
	% Change			-2%	0%	0%	0%		
042	CEP&RI	3.6	2.2	3.5	4.6	4.5	4.5	4.4	4.4
	Change			(0.2)	0.4	0.2	0.1		
	% Change			-6%	9%	4%	2%		
036	Capitol Building Construction	4.4	7.7	7.3	8.4	7.9	7.6	7.4	7.4
	Change			0.9	1.1	0.4	0.2		
	% Change			14%	15%	6%	3%		
061/3/5/6	Normal (CWU, EWU, WWU, TESC) School	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
	Change			(0.0)	-	-	-		
	% Change			-4%	0%	0%	0%		
Other Funds		1.1	0.6	1.5	0.8	0.3	0.1	0.1	0.1
	Change			(0.3)	0.3	0.1	0.0		
	% Change			-18%	76%	49%	3%		
<b>Total Current Funds</b>		<b>144.7</b>	<b>141.9</b>	<b>135.1</b>	<b>143.4</b>	<b>141.0</b>	<b>139.6</b>	<b>136.4</b>	<b>136.4</b>
	Change			0.8	7.0	4.2	3.2		
	% Change			1%	5%	3%	2%		

(Continued)



Table 3: February 2022 Forecast by Fund (millions of dollars), cont'd

<b>Aquatic Lands Enhancement Account</b>			<b>FY 20</b>	<b>FY 21</b>	<b>FY 22</b>	<b>FY 23</b>	<b>FY 24</b>	<b>FY 25</b>	<b>FY 26</b>	<b>FY 27</b>
02R			13.5	12.4	17.1	16.5	16.4	16.2	16.2	16.2
	Change				0.5	0.9	0.8	0.6		
	% Change				3%	6%	5%	4%		
<b>Permanent Funds</b>										
	601	Agricultural College Permanent	5.4	5.7	4.4	4.2	4.0	3.9	3.8	3.8
		Change			(0.1)	(0.0)	0.1	0.1		
		% Change			-3%	0%	3%	3%		
	604	Normal School Permanent	2.6	2.8	3.6	3.0	2.8	2.7	2.6	2.6
		Change			0.9	0.2	0.1	0.1		
		% Change			34%	7%	4%	3%		
	605	Common School Permanent	0.2	0.4	0.3	0.3	0.3	0.3	0.3	0.3
		Change			-	-	-	-		
		% Change			0%	0%	0%	0%		
	606	Scientific Permanent	3.1	4.9	8.8	5.3	4.9	4.7	4.6	4.6
		Change			1.1	(0.5)	0.0	0.1		
		% Change			15%	-8%	1%	3%		
	607	University Permanent	0.1	0.3	0.5	0.5	0.5	0.5	0.5	0.5
		Change			(0.1)	(0.0)	0.0	0.0		
		% Change			-16%	-6%	1%	3%		
<b>Total Permanent Funds</b>			<b>11.4</b>	<b>14.2</b>	<b>17.5</b>	<b>13.3</b>	<b>12.5</b>	<b>12.1</b>	<b>11.8</b>	<b>11.8</b>
		Change			1.8	(0.3)	0.3	0.4		
		% Change			11%	-2%	2%	3%		
<b>Total All Funds</b>			<b>250.1</b>	<b>252.9</b>	<b>261.2</b>	<b>262.3</b>	<b>254.8</b>	<b>250.9</b>	<b>245.8</b>	<b>245.8</b>
		Change			5.3	10.7	7.3	6.2		
		% Change			2%	4%	3%	3%		

Figure 1: Timber Forecast Charts

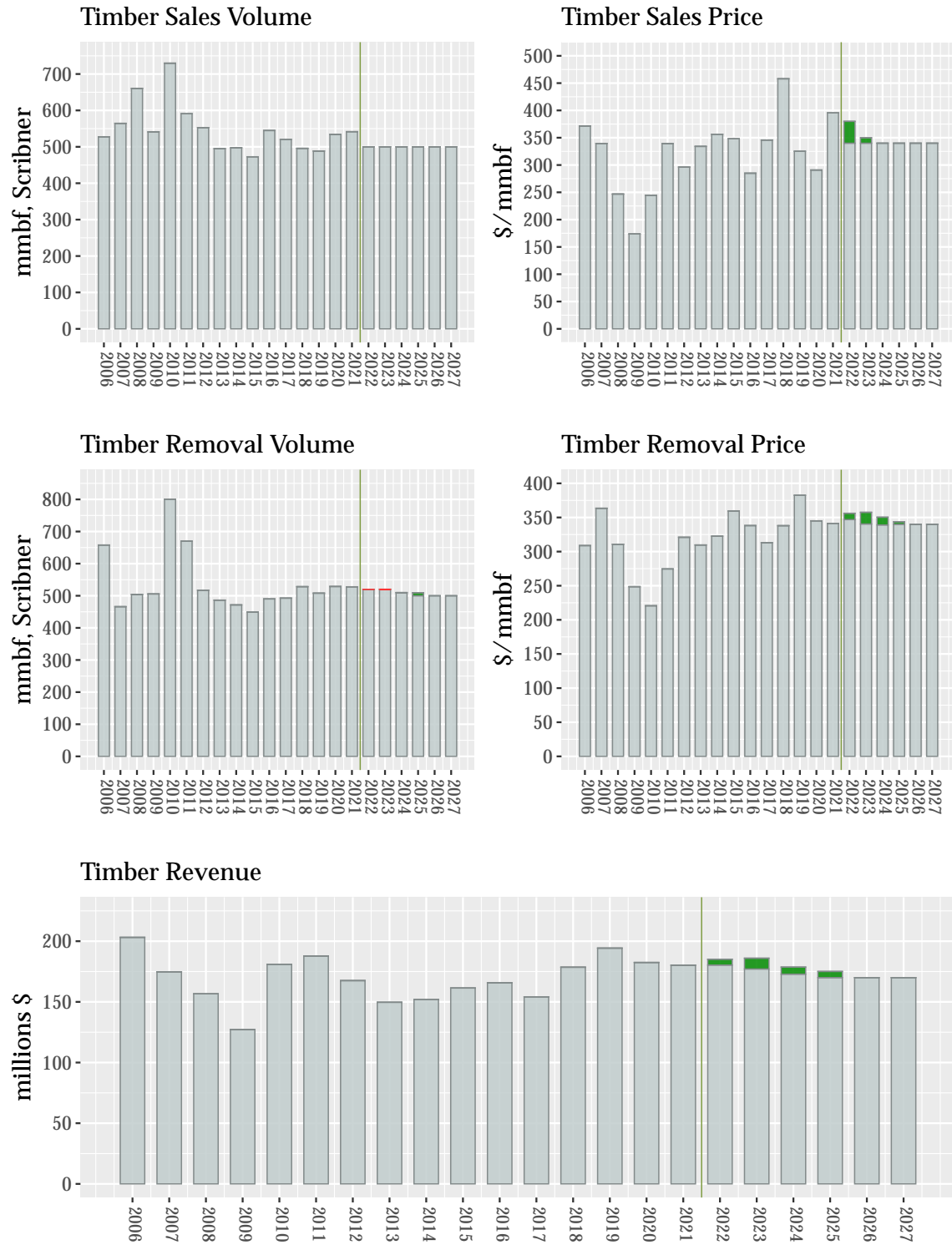


Figure 2: Other Uplands Forecast Charts

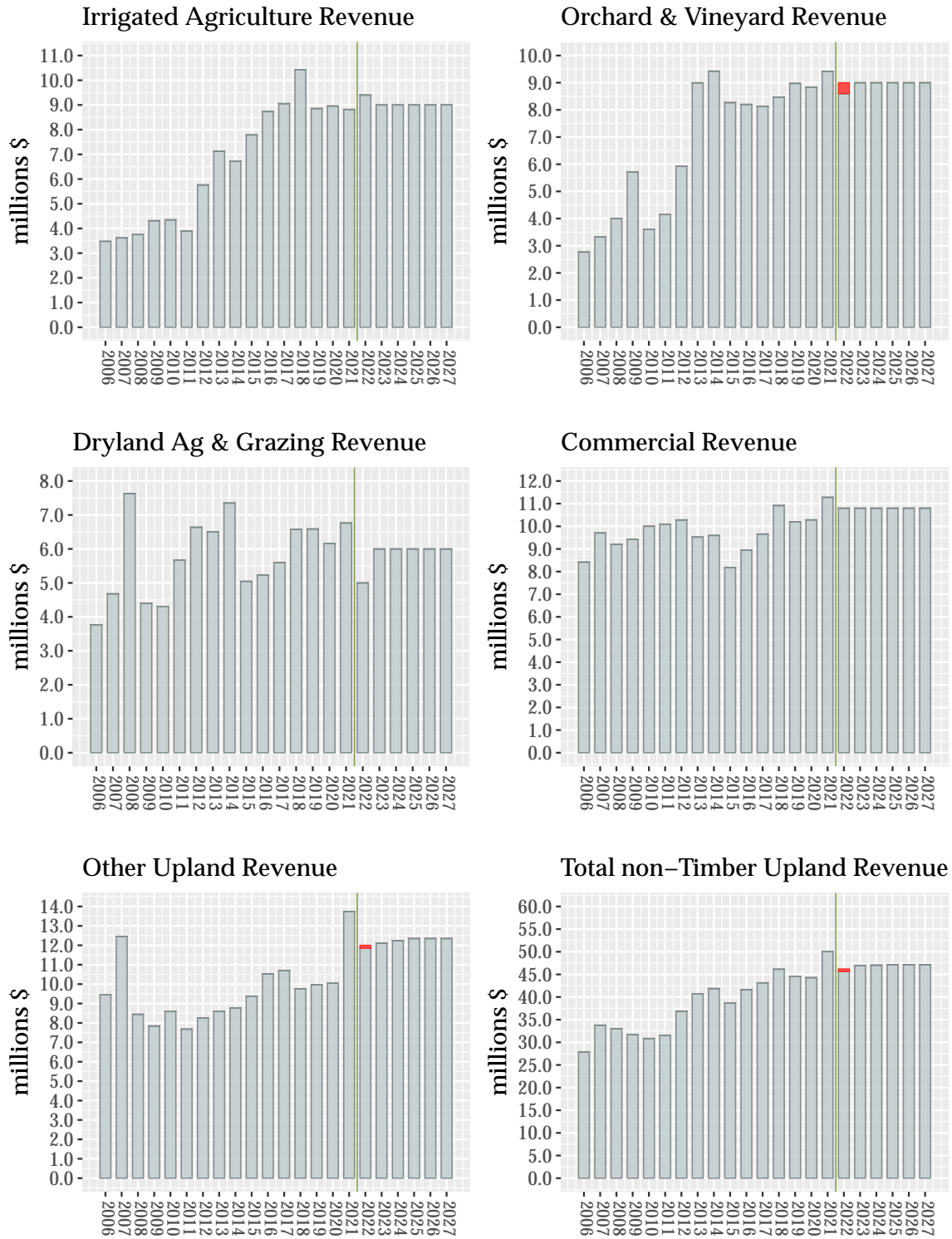
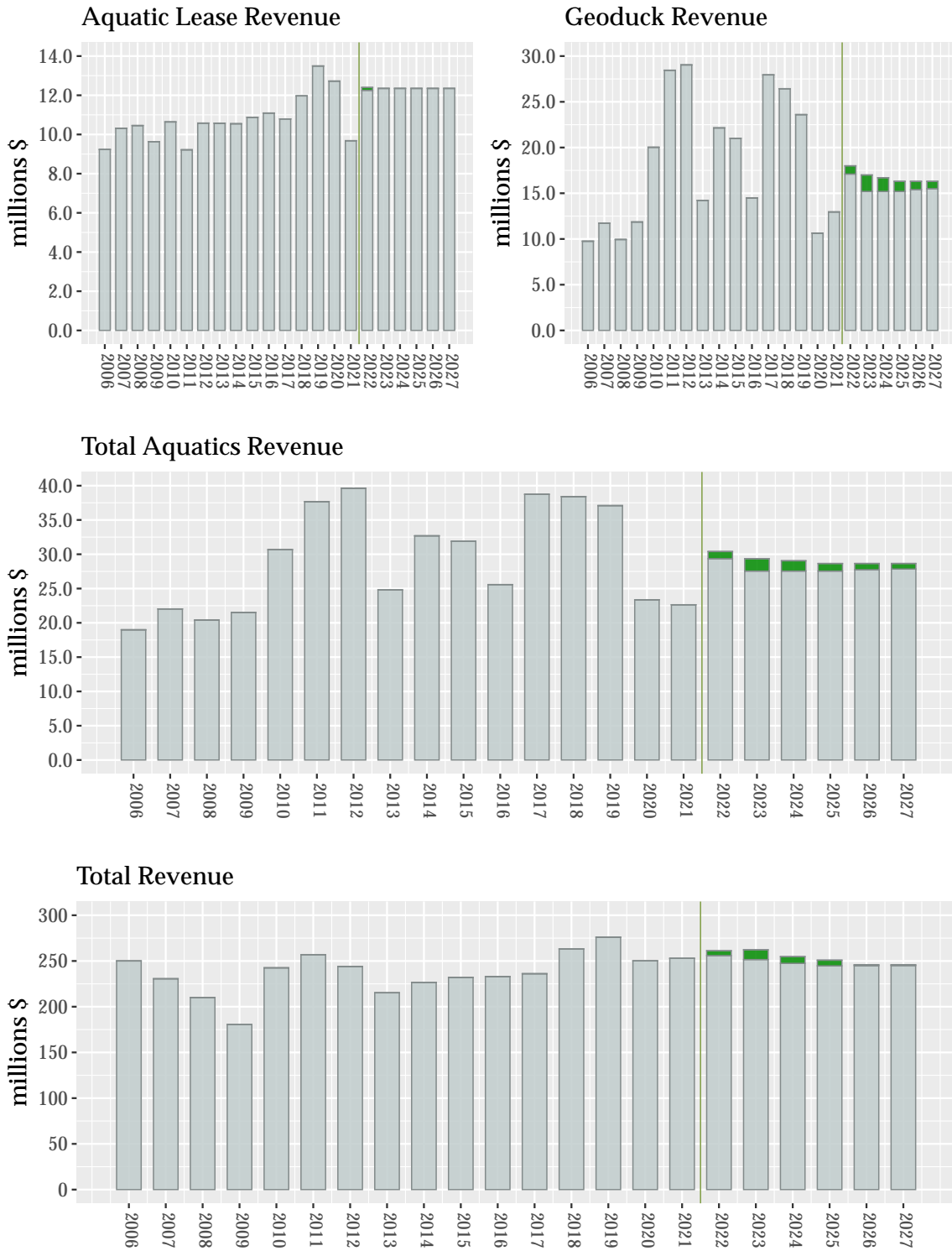


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## Acronyms and Abbreviations

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 State 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 2022 through 2027. Fiscal years for Washington State government begin July 1 and end June 30. For example, the current fiscal year, Fiscal Year 2022, runs from July 1, 2021, through June 30, 2022.

The baseline date (the point that designates the transition from “actuals” to predictions) for DNR revenues in this Forecast is January 1, 2022. 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 December 2021. 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)
June 2022	May 1, 2022	June 15, 2022
September 2022	August 1, 2022	September 15, 2022
November 2022	October 1, 2022	November 15, 2022
February 2023	January 1, 2023	February 15, 2023



## **Acknowledgements**

The Washington State 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.

Thanks go to DNR staff who contributed to the Forecast: Tom Heller, Patrick Ferguson, Kari Fagerness, Kathryn Mink, Michael Kearney, Sherry Land, Linda Farr, Michelle McLain, and Tom Gorman. 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.

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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.

### COVID-19 Pandemic

In addition to the real health and economic problems caused by the pandemic reviewed in the summary, the upheaval of the economic systems and the above ongoing pandemic impacts have dramatically increased the difficulty of economic modeling. Broadly, economic models rely on historical data to try to forecast or understand how the future will look. And most economic data that feed into these models is delayed by at least a month, and often longer. The suddenness and severity of the coronavirus impacts mean that economic models are operating well outside of their historical bounds. This causes "out of sample" or "generalization" errors — the current data is just so far outside of the normal bounds that the models become ever more inaccurate. Even some of the models that use more frequent data are having difficulty — for instance the New York Fed's Nowcast model's publication was suspended on September 3, 2021 due to uncertainty and volatility caused by the pandemic<sup>6</sup>.

Altogether, this means that the path of the economic recovery and how long it will take is inordinately unclear. The massive multiple fiscal stimulus packages and monetary policy response of the U.S. appear to have been enough to mitigate the worst of the damage and even driven a strong rebound, at least as far as GDP is concerned. Importantly, personal income and savings *increased* in 2020. This means that U.S. consumers, as a whole, were flush with cash to spend at the end of 2020 and early 2021 (though this is a very uneven situation, with a significant portion of the population worse off).

However, the effects of the direct fiscal stimulus programs have likely already moved through

the economy and the additional economic programs have ended or are ending soon. For instance, the expanded and extended unemployment benefits and the Federal Housing Administration moratorium on single-family evictions for foreclosed borrowers ended in September 2021 and the moratorium on rental property evictions has expired.

Additionally, the relatively high savings sharply increased demand for goods (at the same time that demand for services plummeted) while supply chain issues and labor constraints across the world limited the supply response, causing large price spikes from everything from cars to lumber to aluminum. Its uncertain when this price volatility will settle down — for instance, the lumber price spike from mid-2021 to \$1,600/mbf seemed to resolve with prices falling to the \$400/mbf range, only to dramatically increased again. Additionally, new supply constraints are emerging across industries — the newest seems to be a shortage of paper in Europe. Over time the supply chains and labor constraints will likely resolve and the high prices will suppress demand in the interim, but it seems likely that it will take some time to reach new price equilibria.

Although the recovery may be happening in fits and starts, most major indicators currently suggest that economy is recovering very well. However, as mentioned in the summary, the COVID-19 pandemic is still a wild card and has the potential to suddenly change and undermine current growth in a number of ways.

### U.S. Economy

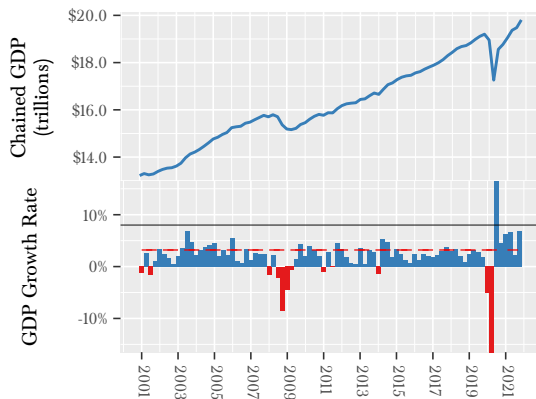
#### Gross Domestic Product

Typically, 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 often includes growth in housing spending and construction, which influences timber prices and DNR's income from timber. It is a useful indicator of how other, more directly relevant indicators may move

<sup>6</sup><https://www.newyorkfed.org/research/policy/nowcast>

in the future.

Figure 4: U.S. Gross Domestic Product



Note that the y-axis of the bottom chart is limited to 15 percent because the Q2 and Q3 2020 GDP growth are such outliers that they distort the chart.

The onset of the COVID-19 pandemic caused the sharpest quarterly GDP decline in history: first -0.86 percent in Q1 and then a staggering -9.62 percent in Q2 (-31.4 percent SAAR). However, it rebounded with growth of 33.4 (SAAR) percent in Q3 and 4.0 percent (SAAR) in Q4. This meant that the average annualized GDP was -3.5 percent for 2020, and left chained GDP at roughly what it was in Q3 2018 (Figure 4).

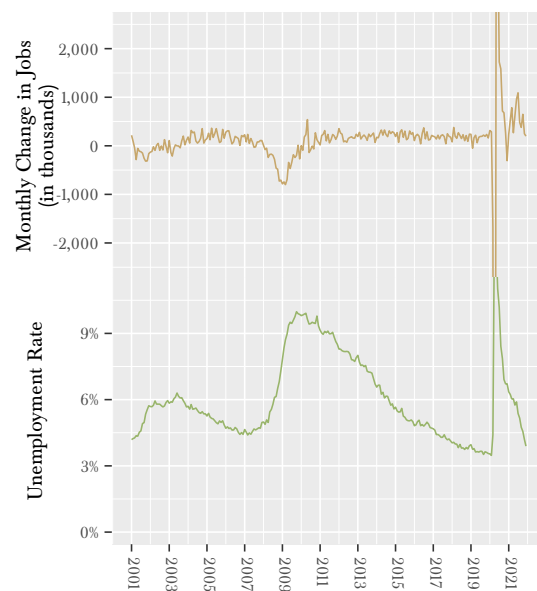
Generally, GDP growth rebounds after a recession, spiking to well above the historical average. This did not happen with the Great Recession in 2008-09, but with the fiscal stimulus packages and monetary stimulus, the U.S. economy grew very well in 2021, with annual growth of 5.5 percent. Continuing to see growth of this rate is unrealistic, but seeing growth of around 4 percent in 2022 is not.

First quarter 2022 GDP growth will likely be undermined by the Omicron pandemic spike in January, but will pick up in the last three quarters of the year. The Atlanta Fed’s GDPNow high-frequency forecast predicts Q1 2022 GDP at 1.5 percent. As noted in the summary section, the New York Fed’s Nowcast,

the other major high-frequency forecast we typically look at, suspended publication on September 3, 2021, because of uncertainty and volatility caused by the pandemic.

The FOMC forecasts between 3.6 and 4.5 percent real GDP growth in 2022. Expectations for outlying years are much closer to what we saw before the pre-pandemic, at around 2.0 to 2.5 percent.

Figure 5: Unemployment Rate and Monthly Change in Jobs



Note that the y-axes for these charts are limited because of the extreme changes in Q2 2020.

A lot of uncertainty remains around all of these forecasts because, as noted previously, economic models are typically based on historical relationships — which the pandemic has upended. The global economy still is not operating anything like how it normally would be.

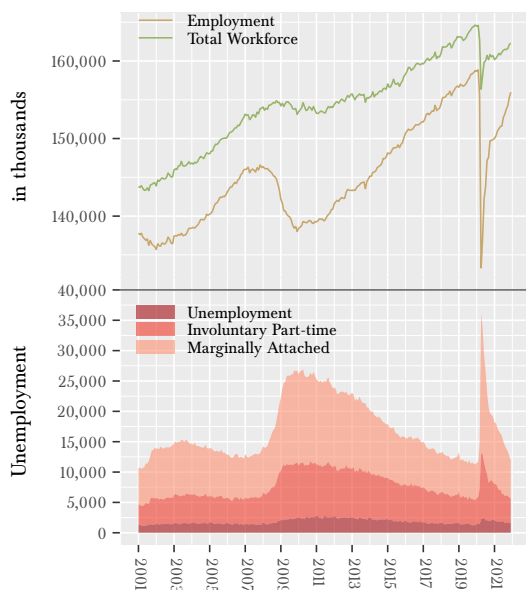
**Employment and Wages**

The labor market is the driving force behind consumption, which typically constitutes about 70 percent of GDP and naturally extends to the demand

for housing, the major driver of U.S. timber demand. The U.S. headline unemployment rate measures the number of people looking for work as a percentage of the number of people in the labor force. It had been trending downward since peaking at 10 percent in 2010 and was 3.5 percent in February 2020, one of its lowest points since 1969 (Figure 5).

With the shutdown of the economy at the beginning of the pandemic, the unemployment rate shot up to 14.7 percent in April 2020, the highest it has been since the Great Depression. At the same time, the labor force participation rate — that is, the percentage of the working-age population that is in the labor force — decreased substantially from 63.4 percent in February to 60.2 percent in April 2020. The decrease in the labor force participation rate meant that the increase in the unemployment rate was a meaningful underestimate of the actual rate of unemployed people who would have preferred employment.

Figure 6: Employment and Unemployment



Since mid-2020, both have improved considerably, with the unemployment rate decreasing to 4.0 percent in January 2022 and the labor force participa-

tion rate increasing to 62.2 percent.

Overall, despite the rebound, there are around 3 million fewer jobs in January 2022 than in February 2020 and about 1 million fewer people in the labor force (that is, employed or looking for work).

There have been 540,000 jobs created per month in the six months between August 2021 and January 2022. If this average rate were to continue, the economy will have recovered all of the jobs lost to the pandemic around mid-2022.

There are numerous reports of employers having difficulty filling roles. These are largely in lower-skill and lower-wage areas (which are not necessarily always the same); however, they are also in some higher-skilled areas. This is likely due in part to everything opening up all at once, spiking demand while supply catches up. It will likely take some time before labor markets reach a new equilibrium. However, the ongoing pandemic almost certainly plays a role as well. The BLS Employment Situation Summary shows that 1.8 million people reported that they were prevented from looking for work in January because of the pandemic. They were part of the 5.7 million people who wanted a job in January but were not in the labor force (and therefore not looking for work and not counted as unemployed).

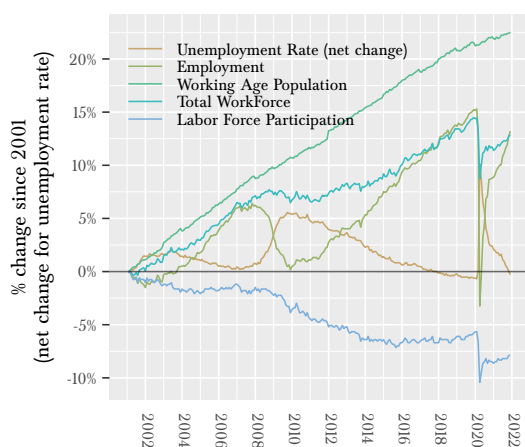
As long as the Omicron wave of the pandemic continues to wane, the unemployment rate is expected to continue to trend downward, with many job openings and meaningful wage growth drawing people back into the labor market.

Another way to get insight into the unemployment situation is to look at how many people have been unemployed for a long period of time. The number of long-term unemployed (27 weeks or longer) ballooned from a low of 939,000 in April 2020 to 4.0 million in January. The number of long-term unemployed continued to rise through early 2021, even as the unemployment rate has fallen. As of January, there were 1.7 million long-term unemployed.

Another metric used to understand long-term unemployment is continued unemployment claims — a measure of the number of people who have con-

tinued to file unemployment insurance claims after their initial claim. During the Great Recession, continued claims peaked at 6.6 million in 2009. The most recent week's estimate on February 10, 2022 was 2.1 million. This is an increase from December 2, 2021, when continued claims were 1.9 million and is likely due to the spike in COVID cases due to the Omicron variant. This is well below the recent peak of 24.9 million in May 2020, and about what the same number of claims as in late 2013.

Figure 7: Labor Market Indicators



Finally, 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 to be looking for work and would benefit from better job prospects. The U-6 also ballooned, increasing from 7.0 percent in February 2020 to 22.8 percent in April 2020. Since then, it has fallen to 7.1 percent in January 2022 (Figure 6).

Overall, the employment situation appears to be improving and will likely continue to support decent economic growth.

## Inflation

Until recently, aside from a short period in 2012, core inflation was been below the FOMC's target since the recession in 2008. Similarly to GDP forecasts, inflation forecasts were consistently too high,

with each year predicted to break the cycle of weak inflation, only to disappoint as the year progresses (Figure 8). However, since April 2021, inflation has been higher than the FOMC's target, has remained high on the back of supply chain issues and is looking like it will remain high as supply chain issues and pandemic waves persist.

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. Except for short periods in 2012 and 2018, this measure shows inflation at or below the 2.0 percent target since September 2008. Core PCE growth averaged between 1.4 and 1.7 percent from 2015-2017, rose to average 1.9 percent in 2018 and fell back to average 1.5 percent in 2019.

In a fairly striking policy change, the FOMC announced in September 2020 that it would "aim to achieve inflation moderately above 2 percent for some time so that inflation averages 2 percent over time and longer-term inflation expectations remain well anchored at 2 percent." This is a marked departure from policy in the last 10 years, when there were a number of (sometimes-contentious) interest rate increases, even though inflation was well below 2 percent.

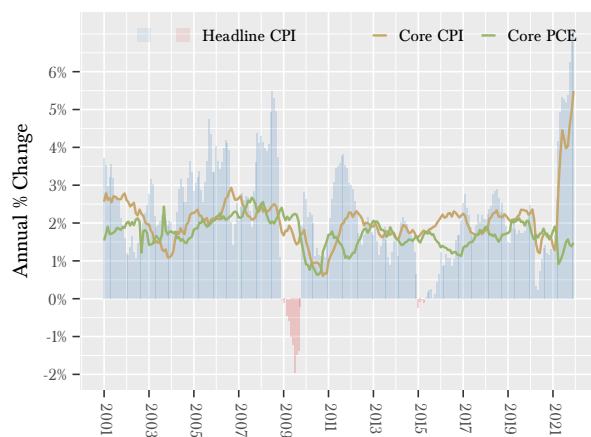
Inflation in 2020 remained low at 1.5 percent. Only in April 2021 did core PCE break above the 2 percent target. Since then, inflation has been above 3.0 percent. Notes from its December meeting show that the FOMC now expects core inflation between 2.5 and 3.0 in 2022, though this may have changed with the most recent inflation data showing that Core CPI was 6.0 percent in January.

The fiscal stimulus packages, expansionary monetary policy, and recent jump in inflation have precipitated a lot of discussion and worry about potential runaway inflation. However, as many economists have noted, employment is still well below pre-pandemic levels, and short-term jumps in the inflation rate are to be expected as economies open up and issues with ramping up production are worked through. Having said that, most analysts were expecting the supply chain and shipping issues to be getting better by now and they have

not — if anything, it appears that they've gotten worse with Omicron. However, the current inflation appears to be largely driven by those issues — once they resolve, or even start to get better, then inflation should calm down.

It already looks like inflation has stayed high enough for long enough that the Fed will likely increase interest rates in its meeting in March to rein it in. The Fed has a number of tools at its disposal to ensure that inflation spiral.

Figure 8: U.S. Inflation Indices



## Interest Rates

Interest rates are a powerful tool used by the Federal Reserve Bank to influence the U.S. economy<sup>7</sup>. 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 Fed-

<sup>7</sup>We refer to interest rates broadly, but the Fed governs the Federal funds rate, which heavily influences interest rates across the economy.

eral 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 0 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. It is notable that these increases were made based on progress in the recovery of employment and inflation, and a strong economic growth outlook, rather than employment or inflation that had reached any threshold. Given this history, it was a significant change that the FOMC backed away from this policy in late 2020, promising to keep rates very low until the *average* inflation is around 2 percent.

Recently, the Fed released statements that indicate it is likely to increase interest rates in its meeting in March in response to the consistently high inflation that the U.S. has experienced. This is a pretty significant change from the expectations last September when it was expecting the Federal funds rate to remain at between 0.1 and 0.4 percent at the end of 2022. The Fed increased this range to 0.6 to 0.9 in December and now there is talk of the rate more likely being between 1.0 and 1.5 percent.

This will likely slow down economic activity, but it is unclear how much, in part because these interest rates are still very low historically. Even with these rates baked in, it seems that the consensus forecast is that the economy will still grow at something like 4.0 percent in 2022, which is excellent compared to the period since 2008.

## The U.S. Dollar and Foreign Trade

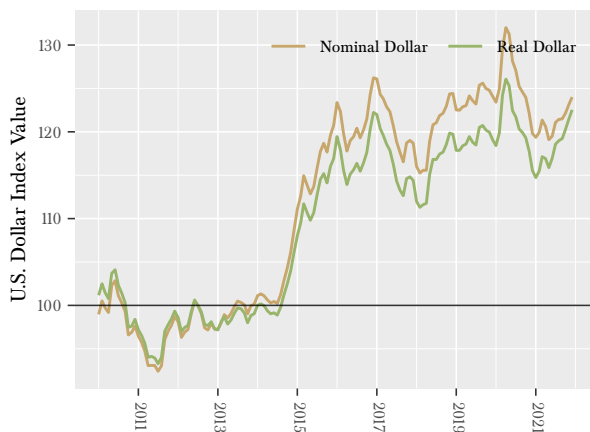
Between February and April 2020, the U.S. dollar trade-weighted index jumped almost 6 percent, largely due to a "flight to safety" from the uncertainty caused by the pandemic (Figure 9). From

April 2020 to mid-2021, the index fell, but since mid-2021 it began quickly climbing again.

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

However, given the strong domestic demand for timber products, it is doubtful that any price effect on stumpage will be readily identifiable. Additionally, agricultural product prices remain high, and geoduck had one of the highest auction prices ever in the December auction. So if exchange rates are having an impact, it appears to be only that it may be reducing the high prices that are currently being seen.

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



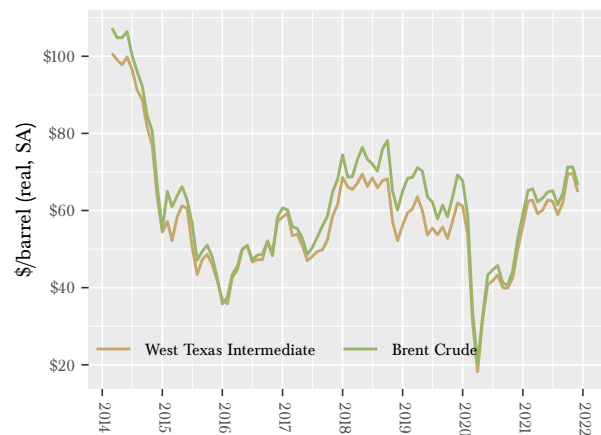
Foreign trade and access to export markets is normally important for DNR revenues. Chinese demand for timber and lumber was a major support for lumber prices after 2010, even though DNR timber cannot be exported directly. Additionally, much of the soft white wheat produced in Washington is exported to Asia and the vast majority of the Pacific Northwest geoduck harvest is exported to China.

Prior to the COVID-19 pandemic, there were ongoing trade tensions between the U.S. and China with both countries implementing tariffs. Although a "Phase One" trade deal had been signed before the pandemic to deescalate the trade war, there were not actually any apparent changes to tariffs. Of the products relevant to DNR revenue, softwood logs are subject to a 5 percent tariff. Geoduck, wheat, and many orchard/vineyard agricultural products (such as apples) were subject to a 25 percent tariff, though this was reduced to 5 percent due to the pandemic.

It appears that the new U.S. administration is focused on matters other than resolving the trade war with China, so we do not expect any easing of tariffs anytime soon. Having said that, it is unclear whether there will be any appetite to increase the tariffs back to their pre-pandemic levels either.

Another recent issue is that the United States has increased the taxes on imported Canadian lumber. This will likely put upward pressure on lumber prices, and by extension, timber prices.

Figure 10: Crude Oil Prices



**Petroleum**

Crude oil and its derivatives strongly affect production, transportation, and consumption in the world and U.S. domestic economies. Broadly, an increase in oil prices acts like a tax increase for consumers



and can discourage consumption. Additionally, all other things being equal, higher petroleum prices will increase diesel fuel prices and will make transportation-sensitive industries — such as Pacific Northwest logging and agriculture — less competitive in international markets.

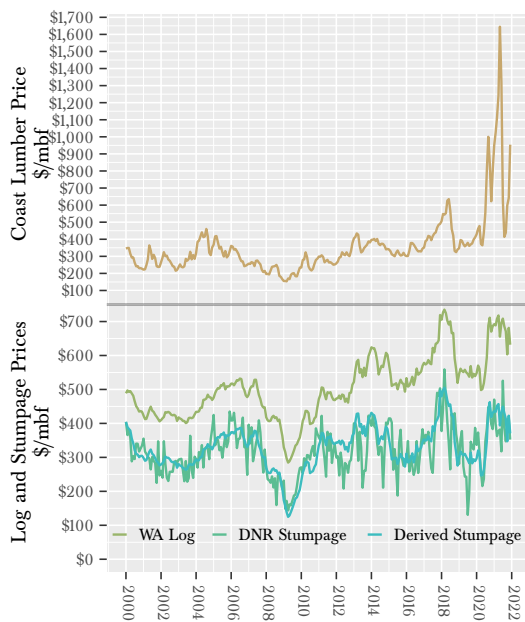
As with everything else, the coronavirus pandemic has increased oil price volatility, even sending the spot prices negative for a short time (Figure 10). However, since then, prices recovered and have spiked to almost \$100/barrel in the last couple of weeks — the highest they've been since 2014. These prices are high enough that they are likely going to create a drag on economic growth. Additionally, already Russian activity in Ukraine has spiked oil prices. Depending upon the geopolitical effects of the Russian invasion, oil could be entering a period of much higher prices.



## Wood Markets

Timber stumpage revenue constitutes about 70 percent of total DNR revenues on average. Therefore, DNR is 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

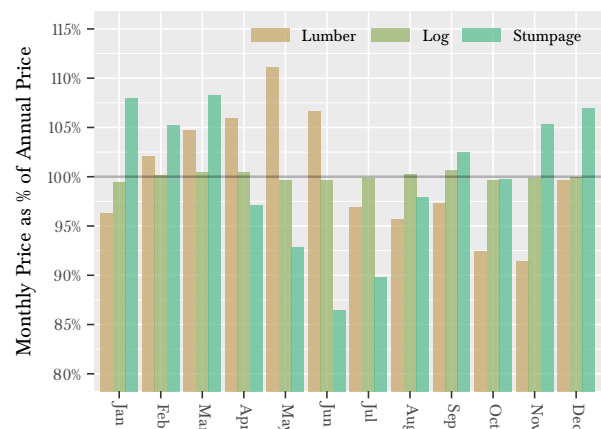


In general, timber stumpage prices reflect demand for lumber and other wood products, timber supply, and regional lumber mill capacity. There is a consistent, positive relationship between log prices and DNR's stumpage prices, despite notable volatility in stumpage prices (Figure 11). High log prices 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, landowners 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 be higher starting in February, when housing construction starts to pick up, and decline through fall as demand wanes, while stumpage prices tend to be highest in December-March, 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 lower from July through September.

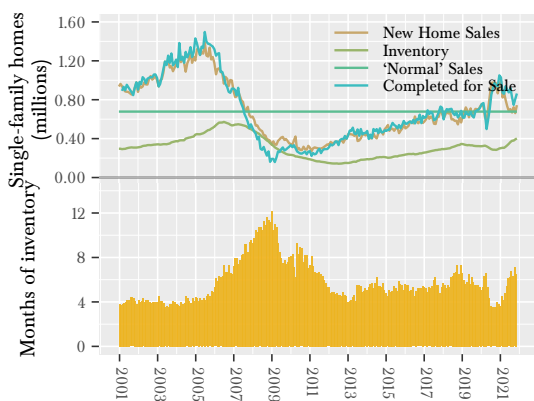
## U.S. Housing Market

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

New residential construction (housing starts) and residential improvements are major components of the total demand for timber in the U.S. From 2000-18, 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 through to the beginning of the COVID-19 pandemic in early 2020, an increase in housing starts drove an increase in lumber demand.

Figure 13: New Single-Family Home Sales



As with almost every other part of the economy, the coronavirus pandemic created a lot of uncertainty in the housing market. Since the initial collapse in activity in early 2020, both starts and new home sales have risen significantly — largely driven

by strong household balance sheets and record-low mortgage rates.

## New Home Sales

Unsurprisingly, new home sales plummeted during the 2008-09 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 (SAAR) sales per year. In 2018, new home sales averaged 651,000 (SAAR) through May, before dropping meaningfully to average 593,000 for June-December. From November 2019 through January 2020, new home sales rose steeply to peak at 756,000, the highest it had been since the recession.

From January through April 2020, new single-family home sales fell back to 570,000 (SAAR) as the initial effects of the pandemic took hold. However, April was the bottom. From then, new home sales quickly grew well beyond their January 2020 highs to a peak of 977,000 (SAAR) in August, averaging 934,000 in the latter half of the year. In January 2021, 993,000 (SAAR) new homes were sold, and have averaged 907,000 (SAAR) per month — 24 percent more than highest peak month between 2008 and 2020. Since January, sales have fallen to a low of 649,000 (SAAR) in October, but have increased since to 811,000 in December.

New home sales are expected to remain high for some time. Households still have strong balance sheets and, although they are increasing, interest rates are still very low historically. Additionally, the housing stock in the U.S. is quite old. New housing was underbuilt from 2008 and there is record-low inventories of existing housing on the market while there is still strong demand.

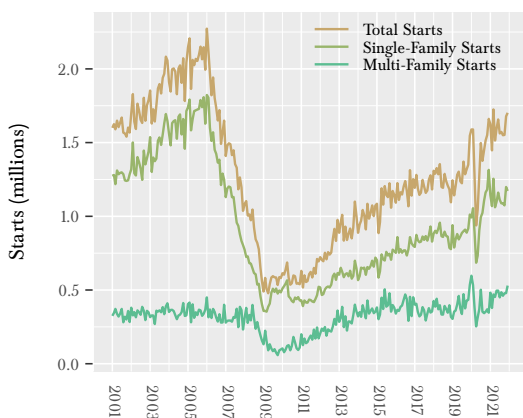
## Housing Starts

In April 2009, U.S. housing starts fell to the lowest point 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 rose slowly through most of 2019 (Figure 14).

Starts picked up meaningfully in the last quarter of 2019 to average 1.3 million (note that all of the housing starts figures are SAAR), above the 1.25 million average for 2018. Although this was well above the 2012 average of 0.78 million, it is still well below the pre-recession long-term average of 1.6 million.

Figure 14: Housing Starts



Starts hit 1.6 million in January and February 2020 before dropping sharply in April to 0.9 million. Again, as with sales, April 2020 was the nadir, and starts climbed back quickly to more than 1.5 million in October through January. Through October 2021, starts averaged 1.6 million. However, in November and December, starts jumped to above 1.7 million.

Like sales, expectations for starts are high for the foreseeable future. Although interest rates may start to bite, prices remain high and it is still profitable for builders to build. Having said that, increases in lumber prices are already squeezing profit margins. It is possible that interest rate increase will suppress demand enough that starts could drop off, particularly in the latter half of this year.

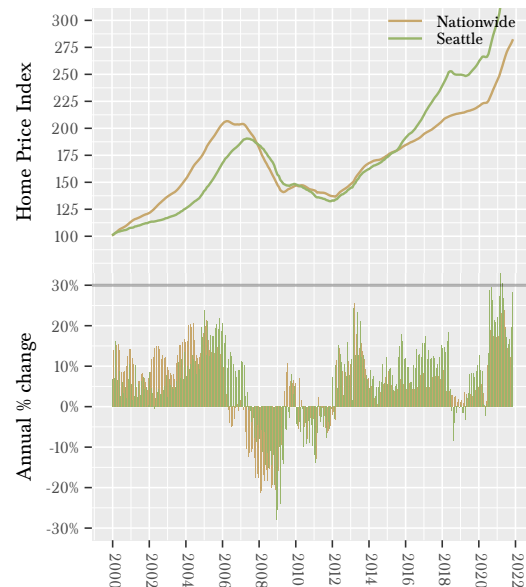
It is notable that the share of single-family starts

increased markedly over 2020. In January 2020, around 62 percent of the new starts were single family. In January 2021, this share had grown to 70 percent. Single-family housing uses more lumber than multi-family housing, so that increase in starts likely had a meaningful effect on lumber demand.

### Housing Prices

U.S. housing experienced six unprecedented years of falling or flat prices following the 2008 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, as well as the Index for Seattle.

Figure 15: Case-Shiller Existing Home Price Index



Nationally, after increasing in most months since bottoming out in January 2012, the Case-Shiller 20-city composite price index growth slowed significantly from May 2018 to late 2019. Seattle house prices had been growing much faster than national prices, doubling from their low in February 2012 to July 2018, while nationally house prices increased

by 62 percent. From late 2019, the index started growing strongly again.

Although the pandemic initially stalled national price growth, the national Case-Shiller ended 2020 with 10 percent year-over-year price growth. Locally, for Seattle, the year-over-year price growth was 13 percent. Since then, prices have increased even faster. Through December 2021, year-over-year prices nationwide were 17 percent higher, and Seattle prices were 22 percent higher.

This rapid price growth is the result of both strong demand — largely due to low interest rates but also possibly due to demand from teleworkers looking for homes outside of cities — and *very* limited supply. The inventory of homes for sale fell as fewer people put their homes up for sale, likely not wanting to have potential buyers walking through. Since around mid-2020, the inventory of new single-family homes has steadily increased, but is still quite low compared to the demand for homes.

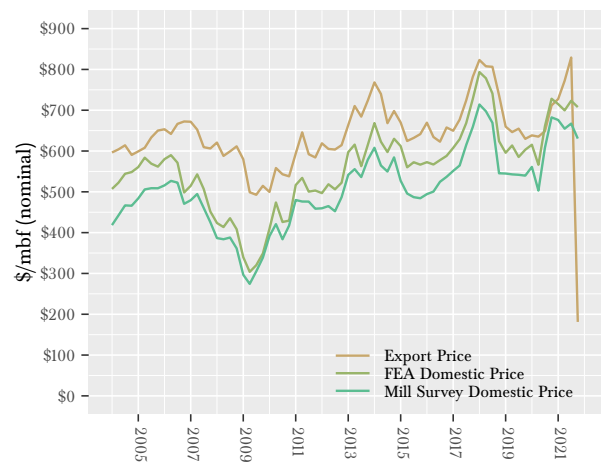
## Export Markets

Although federal law prohibits export of logs from public lands west of the 108th meridian, log exports can 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, pushing up domestic prices. However, changes in export prices do not necessarily influence domestic prices in a one-to-one relationship.

Export prices are almost always higher than domestic prices, a difference that 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.

Figure 16: Log Export Prices



The primary markets for logs and lumber from Washington are China and Japan. Japan primarily imports Douglas-fir and has been relatively consistent, averaging 1.8 million m<sup>3</sup> per year since 2009<sup>8</sup>. China primarily imports hemlock, but it has been much more variable in its demand.

After entering the market meaningfully in 2010, demand from China was a major support for log and lumber prices in Washington (Figure 17). That started waning 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.

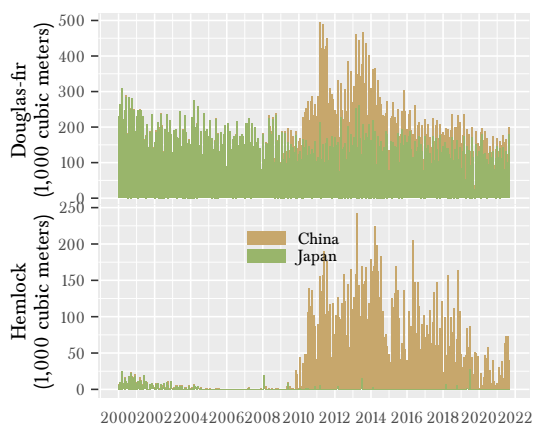
Surprisingly, exports to Japan in 2020 actually increased by about 7 percent. However, exports to China continue to fall, and were down 41 percent in 2020 compared to 2019. Through September, exports to Japan are down by 2 percent, but exports to China have rebounded and are up around 60 percent — though this is still well below the levels of the mid-2010s.

There was legislation moving forward in Russia that would ban log exports from January 2022, though it is unclear if this passed, and the country just recently increased export duties for lumber. While, these both seem targeted to get more rev-

<sup>8</sup>Trade data is from the U.S. International Trade Commission Dataweb at [urlhttps://dataweb.usitc.gov/](https://dataweb.usitc.gov/)

enue from China, Russia supplies around 12 percent of the world's export logs so the ban itself has the potential to seriously shock global timber trade. China imports a significant amount of lumber from Russia, as well as timber to supply mills located close to the border. These policies will almost certainly push up prices of timber and lumber in international markets, as Chinese buyers look elsewhere for supply. However, it may not have much of an impact on U.S. prices, at least in the short term, as prices here are largely being driven by demand from housing construction.

Figure 17: Log Export Volume



## Current Lumber Prices

Lumber prices skyrocketed in late 2020, with Hemlock-Douglas-fir 2x4 prices rising from around \$450/mbf in June 2020 to \$1,000/mbf in September 2020. After weakening a little from September through November, prices again shot up and passed \$1,320/mbf in June 2021. From June through August, prices plummeted to around \$410/mbf, which is still much higher than the average price in the past decade. Since August 2021, prices have again shot up. In December, they were \$954/mbf. Prices have continued to increase, with the spot cash price of around \$1,200/mbf on the CME for random lengths of 2x4 lumber.

Broadly, at least four key factors made lumber prices explode earlier in 2021:

- housing starts and home improvements;
- the loss of supply from British Columbia;
- lead time and inventory management for projects; and
- the production capacity of mills and their caution about expanding.

The high prices have been across the board in wood-based building materials (all building materials, really). But the story for lumber is representative of most other wood products as well.

First, as mentioned above, housing starts are the dominant driver of lumber demand in the U.S., making up almost 70 percent of demand historically.

Single-family housing starts collapsed from February 2020 at 1.1 million units (SAAR) to 0.7 million in April 2020. At the same time, mills drastically slowed down, either actually completely stopping production or seriously reducing it – putting people out of work or furloughing them. Some of those people went to other lines of work, making it harder to ramp up production later. Notably, this is generally the time when mills are ramping up production, building up their inventory in preparation for higher demand for the housing construction season.

However, April 2020 was the nadir. From there, starts increased dramatically every month; by August, they were higher than any month from 2008-19. Single-family starts peaked at 1.3 million (SAAR) in December 2020, shooting up demand for lumber, and have remained above the December 2019 peak. Mills started increasing production again in July 2020, but took a while to ramp back up. While production was still catching up, orders were piling up and *piling up for the future*. Since December 2020, starts have averaged 1.1 million (SAAR) – every month has had more starts than any month between 2009 and 2019.

Remodeling and renovation demand started climbing earlier and peaked much earlier, but was also much higher than previous years. In 2019, home improvement consumption peaked at 1.78 billion board feet (bbf) in September. In 2020, June had

just under that at 1.73 bbf and then every month from July to November had more lumber consumption than the peak in 2019.

The huge increase in residential improvements started this wave in demand. That demand took up much more lumber than previous years, started to bid up prices, and took up supply that would have been inventory to fill orders for home-building.

Second, this all happened with the backdrop of British Columbia's supply falling off a cliff from 2018. The beetle kill harvest there, which increased harvest volume from 2000, is basically done and mills have started closing, shutting down a key lumber import supply. With that decreased supply and the closing mills, there is less flexibility in supply — it just cannot be ramped up as easily. This likely decreased the elasticity of supply, so that even small increases in (unexpected) demand resulted in sharp increases in prices.

Third comes from the orders piling up for the future. The snowball of lumber orders started rolling in mid-year 2020 with the surprising home improvement demand. It kept getting bigger because everyone wanted wood, but the new supply was still taxed and mills had not built up their inventories.

When home-building started picking up, builders also needed lumber. Typically, home builders buy their lumber in advance, tying up production into the future. But they do not always get it right, so some need wood as soon as possible. However, nobody had lumber available because all of the mills' output had already been bought months in advance. Those who needed wood immediately had two choices: buy on the cash market at exorbitant prices and/or buy up unsold wood in the future. To do so meant that purchasers had to bid up prices to make sure they have the supply they need.

The home-building demand is, of course, linked to house prices. Builders have been willing to pay higher prices for lumber because the houses they are building have high prices. Housing demand right now is such that many home-builders are sell-

ing the homes far in advance of building them — so they are guaranteed to sell at current high prices, and the company can preorder the lumber at the high price of lumber, knowing that their profit is locked in.

Fourth, the Great Recession devastated mills. For instance, the number of lumber mills in Washington decreased from 68 mills in 2006 to 37 in 2016 (according to the Washington Mill Survey). The remaining mills survived because they are cautious about expanding capital, taking on debt, or hiring too many people. They are part of a cyclical commodity market, so they know it has booms and busts. Lumber is fairly cyclical, so if a company takes on a lot of debt and expands during a boom, then the bust will bankrupt them.

Mills saw the high prices in July and August 2020 and likely thought that it was a nice bonus, but unlikely to last — as the recent spike in 2018 did not. Mills did expand production, albeit slowly, while selling off their future production. West Coast lumber production increased from mid-2020, but by the end of the year was only up to what it was in peak 2019. Only in the second quarter of 2021 was lumber production on the West Coast higher than in 2018 (when West Coast lumber prices spiked to \$635/mbf). However, third quarter production for the West Coast and North America as a whole fell by about 6 percent from the second quarter.

Similar to the reduced production from British Columbia, having fewer mills in Washington state likely limited the flexibility in the lumber supply, further reducing the elasticity of supply.

In addition to the major drivers above, there are also supply chain issues — particularly glue for oriented strand board and plywood, and transport issues for everyone. For instance, early in 2021 companies were apparently offering bonuses of \$1,500/day for log truck drivers in Oregon to haul fire salvage because they were having difficulty finding drivers.

Some financial speculation is likely occurring as well, contributing to the volatility of prices. Lumber is traded on futures markets and futures are financial contracts that can be traded by anyone.



Therefore, when the price increases sharply, some people are likely purchasing contracts to speculate on it, which increases the volatility of prices, at least in the short term.

## Price Outlook

### Lumber Prices

As shown in Figure 11, lumber prices started increasing rapidly in late 2017. In June 2018, prices hit \$635/mbf, higher in real terms than any since 2000. However, from June 2018, prices dropped dramatically to a low of \$324/mbf in November 2018 — a 47 percent drop. Prices through October 2019 made a modest recovery to average \$371/mbf before jumping to \$411/mbf in December 2019.

As discussed above, lumber prices skyrocketed in late 2020, then fell dramatically and have recently shot up again. A pullback from the extraordinarily high price in late 2020 was expected, but they were not expected to fall as much as they did. Since August 2021, prices have started climbing rapidly again, rising from \$410/mbf in August to \$950/mbf in November. In the past couple of weeks the cash price for lumber on the Chicago Merchantile Exchange has jumped significantly, and is again over \$1,200/mbf. It is unclear how long this price spike will last, but the outlook for lumber prices is still broadly positive — a large population of people are entering prime-home-buying age, employment and wages are improving, etc.

Average prices for 2022 are now expected to be higher than normal, averaging above \$700/mbf.

### 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.

Log prices appear to have also bottomed in April 2020 and had recovered by August, but they have obviously not reached the same extremes as lumber prices. Timber harvesters and mills often have an inventory of standing timber to draw from, so they don't always need to bid up new logs. Since September 2020, log prices appear to have reached a plateau, vacillating between \$600/mbf and \$720/mbf. Log prices are expected to start to plateau or slowly increase in 2022.

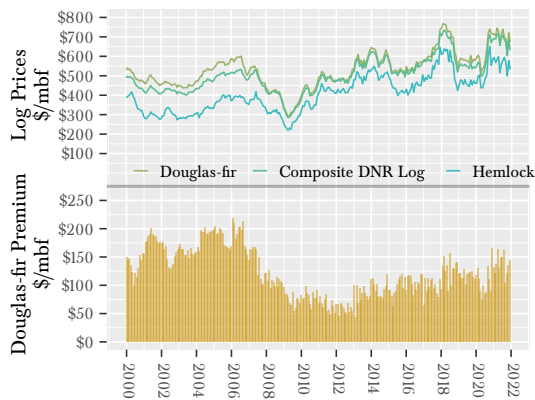
### Stumpage Prices

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. Currently, stumpage prices are roughly in line with what we would expect, given log prices. Although log and lumber prices bottomed out in April 2020, DNR stumpage prices fell through May 2020, to a low average auction price of \$215/mbf. However, they rebounded earlier than expected, jumping to \$347/mbf in July, which typically has the lowest auction prices of a year. DNR timber auctions had very strong prices through the end of the year, so that the average stumpage for FY 21 was \$396/mbf. The average price for stumpage through the January FY 22 auction was \$408/mbf.

As always, these prices also depend heavily upon the characteristics of the sales, particularly the type and quality of the wood, the type of logging, and the costs associated with road-building and maintenance. Right now, sales prices may also be more heavily influenced by the ready availability of the sales — that is, whether purchasers can begin harvesting soon or whether they have to do a lot of preparatory work.

Figure 18: DNR Composite Log Prices



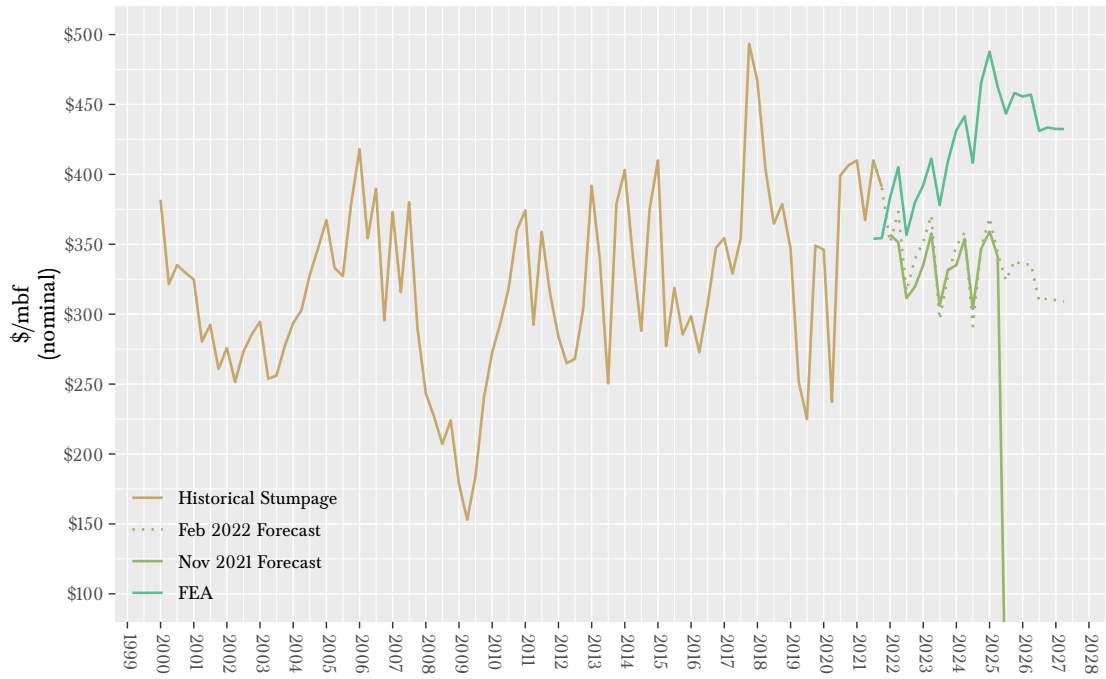
### DNR Stumpage Price Outlook

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

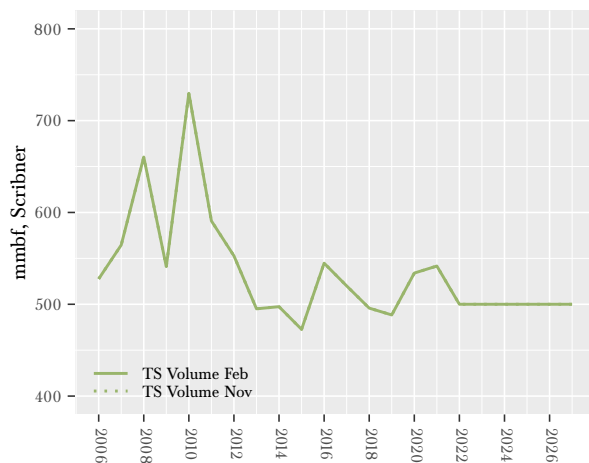
This Revenue Forecast includes revenue generated from timber sales on trust uplands, leases on trust uplands, and leases on aquatic lands. It also forecasts revenues to individual funds, including DNR management funds, beneficiary current funds, and beneficiary permanent funds. Caveats about the uncertainty 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 2019 needed to be harvested between three months and three years from the date of sale, with most being about two years in length. 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

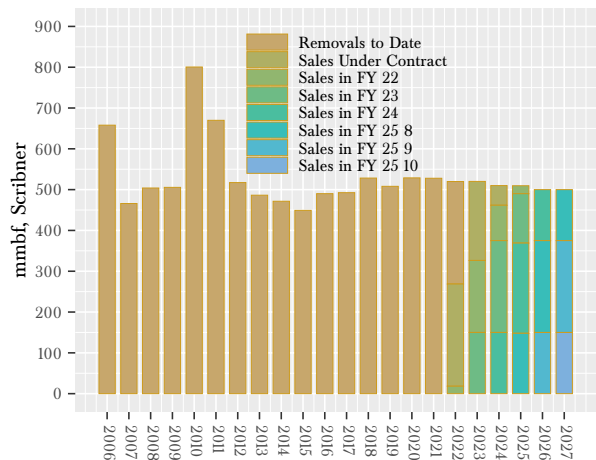


### Timber Sales Volume

The sales volume forecast for FY 22 and outlying years is unchanged at 500 mmbf, though the current plan is for DNR to offer around 530 mmbf for auction. Although demand still appears to be relatively high, a proposal to limit DNR harvest to stands that originated no earlier than 1900 may affect sales volumes. Additionally, there is always risk of no-bids or sales not being prepared in time to be sold in this fiscal year.

FY15 was the first year of the new sustainable harvest decade (FY15 through FY 24) for Western Washington, though the new Sustainable Harvest Calculation was not officially adopted until December 2019. However, multiple lawsuits have been filed that put the status of the new sustainable harvest estimates into question. Without certainty on the sustainable harvest limit, annual Westside sales volumes forecasts are unchanged at 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 22-25.

Figure 21: Forecast Timber Removal Volume



### Timber Removal Volume

The removal volume forecast is unchanged in outlying years. Removals to-date for FY 22 are in line with expectations.

Figure 22: Forecast Timber Sales Price

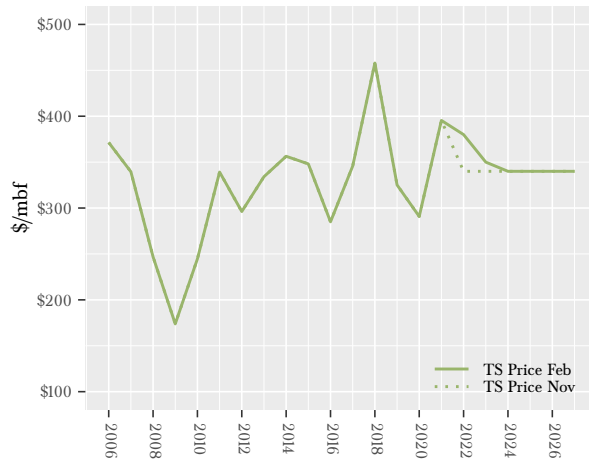
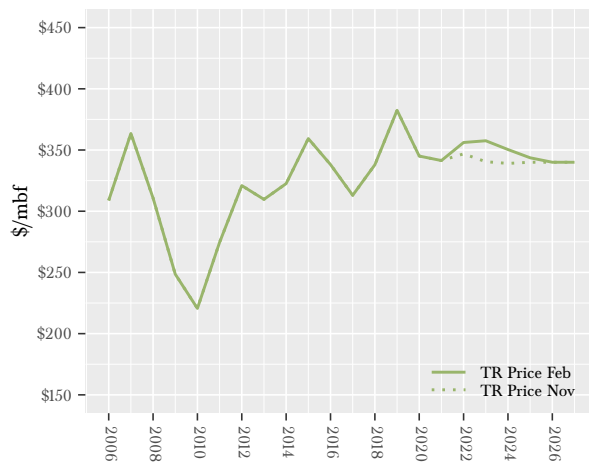


Figure 23: Forecast Timber Removal Price



**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 is informed by West Coast log and stumpage price estimates from a forest economics consulting firm.

Sales prices through FY 21 were consistently high, with every sale being above the five-year average of \$340/mbf, and many of them well above. In June the sales price forecast for FY 21 was increased to \$395/mbf — well above our initial FY 21 fore-

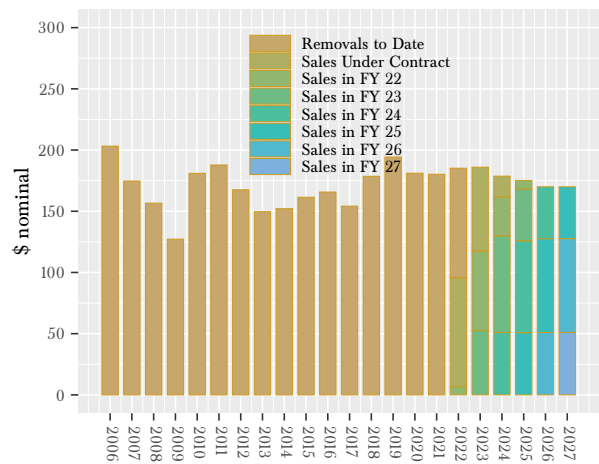
cast of \$300/mbf in the June 2020 — and this was very close to the final FY 20 average price of \$396/mbf.

Timber price forecasts are increased for FY 22 to \$380/mbf, and to \$350/mbf for FY 23. Auction prices to-date are \$408/mbf. Although there is still a meaningful amount of volume to sell in the latter half of the fiscal year, timber prices would have to drop dramatically to bring prices down to below \$380/mbf. We expect higher prices to extend into FY 23, though they are unlikely to be as high as they are now.

**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). Removal prices are slightly altered for all years based on changes in the value of the current inventory.

Figure 24: Forecast Timber Removal Value

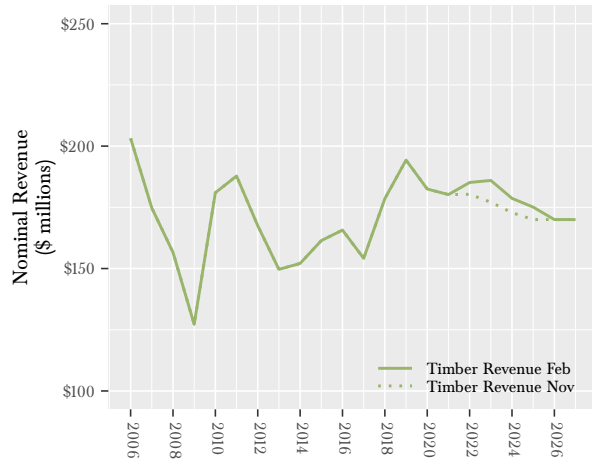


**Timber Removal Revenue**

Figure 24 shows projected annual timber removal revenues, broken down by the fiscal year in which the timber was sold. Revenue estimates reflect all of the changes described above.

Forecast revenues for the 2021-23 biennium are increased by \$14 million to \$363 million.

Figure 25: Forecast Timber Removal Revenue

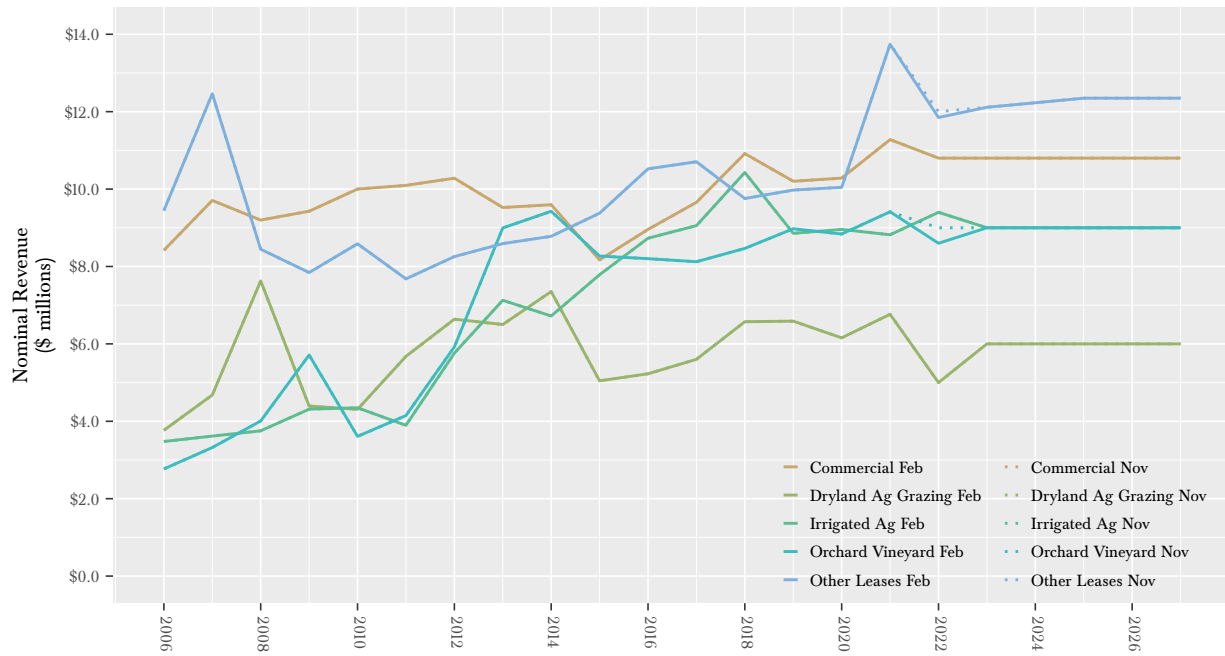


### Upland Lease Revenues

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

Forecast uplands revenue for FY 22 is decreased by \$1 million to \$46 million due to lower than expected revenue from orchard/vineyard leases and a drop in other revenue.

Figure 26: Forecast Upland Lease Revenue



### Aquatic Lands Revenues

Aquatic lands revenues are generated from leases on aquatic lands and from sales of geoduck. In the past, on average, leases have accounted for one-third of the revenue and geoduck sales accounted for the remainder. However, prices for geoduck plummeted in the beginning of FY 20, but they have recovered somewhat and are now forecast to account for around 60 percent of aquatic revenue.

The aquatic lease forecast for FY 22 is increased slightly due to higher water-dependent revenue offsetting slower mineral and hydrocarbon extraction on aquatic lands (Figure 27).

By late 2019, geoduck prices had already fallen substantially because of the slowdown in Chinese economic growth and the impact of the trade war. After the lockdown in China due to COVID-19, harvest of geoduck destined for China basically stopped, leaving only about 10 percent of the normal daily harvest — which is bound for other international locations or for domestic consumption.

Demand from China recovered considerably by mid-2020. We had assumed that harvest volumes would recover reasonably quickly to the roughly 95 percent of sales volume that we typically see. However, that was too optimistic and harvest volumes lagged for much longer. Our harvest volume assumptions are 85 percent of the sales volume for the foreseeable future.

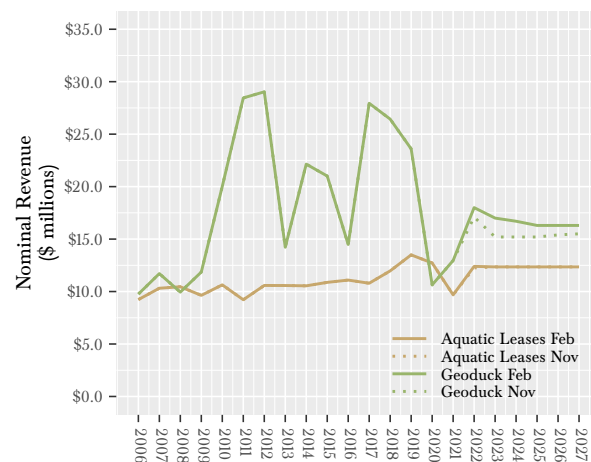
Prices held up much better than we had feared at the outset of the pandemic. The April 2020 auction offered indemnification for purchasers if they did not harvest all of their contracted pounds — which led to a surprising \$8.98/lb. average price (Figure 28). However, the June 2020 auction had an average price of \$8.46/lb. and, importantly, did not offer a blanket indemnification. Prices for the July and September 2020, auctions fell to \$5.05/lb. and \$6.11/lb., respectively. The December price rebounded to \$8.64/lb. — higher because this auction harvest period covered Chinese New Year, typically a period of very high demand. In January 2021, prices fell back to \$6.82/lb. before fetching

almost \$10/lb. in the February auction. The most recent auctions, in April and the beginning of June, fetched \$10.35/lb. and \$9.54/lb., respectively.

The consistency of these prices, combined with the fact that they have fallen in what is seasonally a lower-priced time of the year, suggests that demand has indeed returned from China..

The geoduck forecast revenue for FY 22 is increased to \$18 million based on consistent high prices from auctions. The revenue forecast for geoduck would have been increased more if harvests for the rest of the year didn't face significant risks. Harvesting on one of the more valuable tracts was unavailable for a time due to paralytic shellfish poison. And now that tract will be unavailable until early next year because of weather conditions, so it is unlikely that those lost pounds will be recovered for this fiscal year.

Figure 27: Aquatic Lands Revenues



Additionally, there are serious issues with compliance vessel availability. Of the five boats DNR has for compliance monitoring, only two are regularly in working order at any given time. The rest need repairs, but these have been delayed indefinitely because the parts are unavailable.

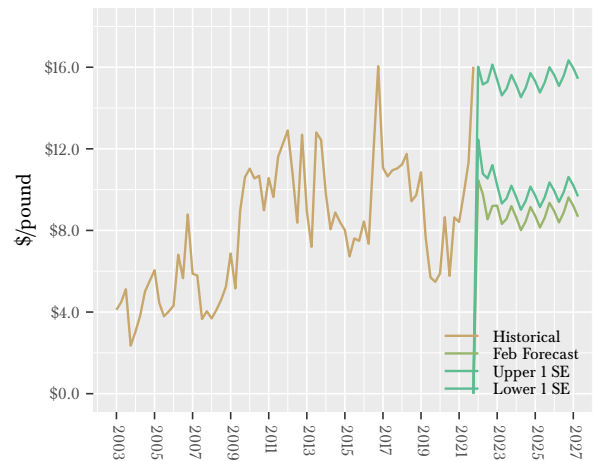
At this point, we do not expect to see prices return to consistently being between \$10-12/lb., though we will still see exceptional sales like December's.

It is notable that the FY22 geoduck forecast is much higher than the surrounding years. This is because of the timing of some of the latter sales in FY21, which have their revenue come in in FY22.

There are, as always, potentially significant downside risks to geoduck revenues, even in the near term and in addition to the pandemic, that are important to consider but difficult to forecast:

- China’s zero-COVID policy and political actions in Hong Kong have made some companies wary and driven some to move their operations elsewhere, at least temporarily. Hong Kong is one of the main destinations for live geoduck, which are then sold onward to the mainland. Difficulties in Hong Kong already appear to be hampering current harvests. It is unclear if they will further affect geoduck revenue.
- Harvests (and therefore revenues) could be deferred or lost if geoduck beds are closed due to occurrence of paralytic shellfish poison.
- Harvests are slowed or delayed due to injury or death of divers.
- Early in 2021, heavy rains overwhelmed sewage treatment plants in the Puget Sound, spilling untreated sewage into the sound and closing geoduck tracts for several weeks. Although program staff were able to offer alternative harvest from different tracts, this type of risk will continue as climate change grows more severe.
- In light of recent Washington Department of Fish and Wildlife 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.

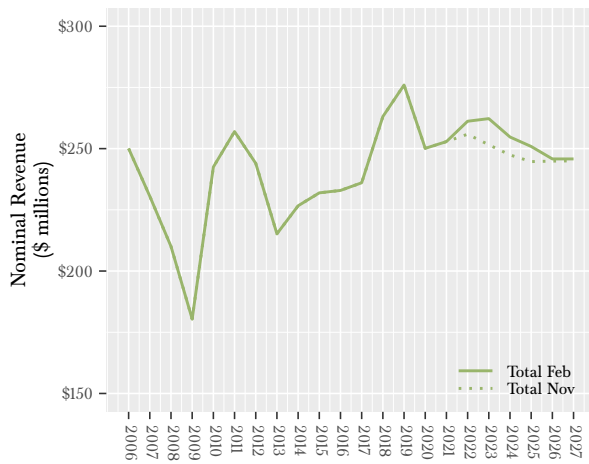
Figure 28: Geoduck Auction Prices



### Total Revenues from All Sources

Forecast revenues for the 2021-2023 biennium are increased by \$16 million to \$523 million, and are increased by \$14 million to \$506 million in the 2023-2025 biennium (Figure 29).

Figure 29: Total Revenues





**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 22 by trust, and relative historical timber prices by DNR region by trust; and
- The volumes of timber by trust for FYs 23-25 based on output of the sustainable harvest model and relative historical timber prices by DNR region by trust.

Because 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 Forecast assumes that the Legislature and Board will continue to approve the Resource Management Cost Account management deduction at 31 percent and the Forest Development Account management deduction at 25 percent.