

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

Fiscal Year 2023, Second Quarter  
November 2022





## Forecast Summary

**Lumber and Log Prices.** Lumber prices have been exceptionally volatile throughout the past two years. In 2021, prices peaked at around \$1,600/mbf in May, then plummeted to a low of \$414/mbf in August (West Coast standard or better 2x4, Douglas-fir/Hemlock). Prices rebounded over the next several months to peak at \$1,400/mbf in March 2022, but again fell dramatically to \$640/mbf in August, where they've remained through October. Prices are expected to continue falling slowly until the beginning of 2023. However, they are still expected to remain above \$400/mbf — the average price for several years prior to 2019. However, given the price behavior in recent years, as well as increasing interest rates and a stalling housing market, it is entirely possible that prices will fall further.

The high lumber prices pulled up log prices, with the price of a "typical" DNR log rising from a low of \$500/mbf in April 2020 to peak at \$720/mbf in April 2021. Prices then softened to a trough of \$600/mbf in October 2021, before increasing again to peak at \$790/mbf in July 2022. Since then they have fallen to \$720/mbf in August 2022. Although the decrease in one month's prices can't be taken as a trend, prices are expected to continue to fall through Q4 of 2022.

**Timber Sales Volume.** DNR currently plans to offer around 530 mmbf for sale in FY 23. Building in likely no-bids and sales falling off for various reasons, our sales volume forecast is unchanged at 500 mmbf for FY 23 and outlying years.

Currently, there is no expectation that the timber sales program will be able to recoup the sales delayed in FY22. Additionally, it is possible that future forecast volumes will be reduced due to the Department's Carbon Project, which will remove 10,000 acres of forest land from the planned harvest schedule and instead generate revenue through carbon offsets. However, the current 500 mmbf forecast in outlying years is typically quite conservative, so it is also possible that the new program will have no meaningful effect on the forecast.

**Timber Sales Prices.**

The forecast timber sales prices are increased to \$370/mbf for FY 23. Sales prices have averaged \$393/mbf through the November auction — a \$370/mbf forecast is a reasonable middle ground, reflecting both the continued strength of prices as well as the likely decline in prices due to slower housing construction. The outlying years' forecast prices are unchanged at the long-term average of \$350/mbf.

**Timber Removal Volume and Prices.**

Removal volumes for FY 22 were much lower than we had anticipated in June. Typically there is a large spike in recognized removals in June, and our forecast takes that into account. Unfortunately, the expected jump in removals didn't happen in FY 22.

The removal volume forecast for FY 23 and outlying years is unchanged.

Removal prices are decreased slightly in FY 23 due to an error that inflated prices in the June forecast — without that error, the forecast price would actually have increased. Removal prices in outlying years are increased slightly due to both higher sales prices in FY 22 and lower removals in FY 22, which leaves more high value timber to be harvested in later years.

**Timber Revenue.** Timber revenue in FY 23 is reduced slightly due to a lower-than-expected price of timber harvested to date, while outlying years' is increased due to the increase in the FY 23 forecast average sales price.

Timber revenues for the 2021-23 biennium are \$364 million — around \$0.3 million lower than previously forecast. Forecast revenues for the 2023-25 biennium are increased to \$372 million — around 1 percent higher (\$4.5 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 all years is increased by \$0.6 million due to unexpectedly high minerals and hydrocarbon revenue and an increase in Other revenue — specifically revenue associated

with clean energy. Forecast revenue in outlying years has increased by \$0.3 million due to higher expected revenue from clean energy.

The aquatic lease forecast for FY 23 and outlying years is unchanged.

The geoduck forecast revenue for FY 23 is increased to \$19.7 million, and increased to \$17.5 million in outlying years. These changes are due to continued strong auction results pushing up the price forecast. There remain a very wide range of possibilities for geoduck prices.

In addition to the normal risks that can swing geoduck revenue wildly — including paralytic shellfish poison closures, compliance vessel availability, and sewage contamination from flooding run-off — there are concerns about the ongoing strength of geoduck demand from China, with the renminbi-dollar exchange rate dropping substantially since the beginning of the year and large protests in the country over COVID policy. In the poorer, but still possibly, scenarios, a drop in geoduck demand will lead to a market more like FY 20 and FY 21, with revenue in the \$10-\$13 million range.

Additionally, geoduck are still covered by tariffs initiated during the trade war between China and the U.S. from 2018. These have been suspended during the COVID-19 pandemic, but they are still on the books.

**Total Revenues.** The forecast revenue for the 2021-23 biennium is increased slightly to \$523 million, and the forecast revenue for the 2023-25 biennium is increased to \$525 million.

#### **Other notes to the Forecast.**

There are, as always, a number of sources of uncertainty around DNR revenue specifically, and the overall economy 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;

- and the ongoing (but apparently dormant) trade war and political tension with China directly affecting timber, agricultural products and geoduck exports and price;
- the Russian invasion of Ukraine, which could further disrupt global wheat and timber markets; and
- although it seems as though it is having little effect now, the COVID-19 pandemic is ongoing, with immune-evasive variants appearing roughly every three to six months, and continues to have the potential to create widespread supply and production difficulties.

Additionally, although timber sales volume estimates are based on the best available internal planning data, they are subject to adjustments due to operational and policy decisions.

Finally, climate change has emerged as a meaningful immediate risk as opposed to an amorphous risk in the far future, as previously rare extreme weather events become more common. In 2021, drought in Washington decreased wheat production on DNR lands by about 40 percent. In September and October of 2021, extraordinary rainfall in British Columbia destroyed roads and railways, essentially halting timber harvests, lumber production, and timber exports through the Port of Vancouver. More recently, in mid-June 2022, there was concurrently: massive flooding wreaking havoc in Montana and Wyoming, thunderstorms that took out power-grids throughout the Great Lakes, and a record setting heat-wave that killed at least 2,000 cattle in Kansas<sup>1</sup>.

Climate change affects Washington state's fire seasons — drought and rising temperatures dry out fuels fast, leaving conditions ripe for wildfires to begin earlier in the year, burn longer, and spread more unpredictably than in the past. 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 rev-

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<sup>1</sup><https://www.washingtonpost.com/climate-environment/2022/06/16/summer-climate-disasters/>

enue forecast, potentially destroying standing timber under contract, as well as long-term revenue by destroying younger stands that would be harvested in future decades. 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>2</sup>.

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<sup>2</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: November 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	429	500	500	500	500	500
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Price (\$/mbf)		291	395	419	370	350	350	350	350
	Change				\$ 10	\$ -	\$ -	\$ -	\$ -
	% Change				3%	0%	0%	0%	0%
<b>Value of Timber Sales</b>		<b>155.3</b>	<b>214.2</b>	<b>179.7</b>	<b>185.0</b>	<b>175.0</b>	<b>175.0</b>	<b>175.0</b>	<b>175.0</b>
	Change				\$ 5.0	\$ -	\$ -	\$ -	\$ -
	% Change				3%	0%	0%	0%	0%
<b>Timber Removals</b>									
Volume (mmbf)		555	528	485	510	510	510	500	500
	Change				(0)	0	(0)	-	-
	% Change				0%	0%	0%	0%	0%
Price (\$/mbf)		334	341	364	369	372	358	350	350
	Change				(0.7)	6.0	2.9	-	-
	% Change				0%	2%	1%	0%	0%
<b>Timber Revenue</b>		<b>185.6</b>	<b>180.2</b>	<b>176.6</b>	<b>188.3</b>	<b>190.0</b>	<b>182.4</b>	<b>175.0</b>	<b>175.0</b>
	Change				(0.4)	3.1	1.4	-	-
	% Change				0%	2%	1%	0%	0%
<b>Upland Leases</b>									
Irrigated Agriculture		9.0	8.8	8.9	9.0	9.0	9.0	9.0	9.0
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Orchard/Vineyard		8.8	9.4	8.2	8.4	8.4	8.4	8.4	8.4
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Dryland Ag/Grazing		6.2	6.8	6.0	6.4	6.4	6.1	6.1	6.1
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Commercial		10.3	11.3	11.2	11.2	11.2	11.2	11.2	11.2
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Other Leases		10.0	13.7	11.9	11.4	11.5	11.8	11.8	11.8
	Change				0.6	0.3	0.3	0.3	0.3
	% Change				6%	3%	3%	3%	3%
<b>Total Upland Leases</b>		<b>44.3</b>	<b>50.0</b>	<b>46.3</b>	<b>46.4</b>	<b>46.5</b>	<b>46.5</b>	<b>46.5</b>	<b>46.5</b>
	Change				0.6	0.3	0.3	0.3	0.3
	% Change				1%	1%	1%	1%	1%
<b>Aquatic Lands</b>									
Aquatic Leases		12.7	9.7	14.5	12.3	12.3	12.3	12.3	12.3
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
Geoduck		10.6	13.0	19.3	19.7	17.5	17.5	17.5	17.5
	Change				1.8	1.0	1.3	1.3	1.3
	% Change				10%	6%	8%	8%	8%
<b>Aquatic Lands Revenue</b>		<b>23.4</b>	<b>22.6</b>	<b>33.8</b>	<b>32.0</b>	<b>29.8</b>	<b>29.8</b>	<b>29.8</b>	<b>29.8</b>
	Change				1.8	1.0	1.3	1.3	1.3
	% Change				6%	3%	5%	5%	5%
<b>Total All Sources</b>									
		<b>253.2</b>	<b>252.9</b>	<b>256.8</b>	<b>266.7</b>	<b>266.3</b>	<b>258.7</b>	<b>251.3</b>	<b>251.3</b>
	Change				2.0	4.4	3.0	1.6	1.6
	% Change				1%	2%	1%	1%	1%

Table 2: November 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	38.1	43.0	42.5	41.1	39.9	39.9
	Change				0.5	0.7	0.4	0.1	0.1
	% Change				1%	2%	1%	0%	0%
041	RMCA - Aquatic Lands	9.9	10.2	14.8	14.2	13.1	13.1	13.1	13.1
	Change				0.9	0.5	0.7	0.7	0.7
	% Change				7%	4%	5%	5%	5%
014	FDA	28.3	27.2	23.9	19.0	22.5	22.2	21.5	21.5
	Change				(0.9)	0.6	0.2	0.0	0.0
	% Change				-5%	3%	1%	0%	0%
21Q	Forest Health Revolving	11.8	13.5	12.3	19.6	11.6	10.7	10.4	10.4
	Change				2.2	(1.0)	(0.3)	0.1	0.1
	% Change				13%	-8%	-3%	1%	1%
<b>Total DNR Key Operating Funds</b>		<b>83.6</b>	<b>84.4</b>	<b>89.1</b>	<b>95.7</b>	<b>89.7</b>	<b>87.1</b>	<b>84.9</b>	<b>84.9</b>
	Change				2.7	0.8	0.9	0.8	0.8
	% Change				3%	1%	1%	1%	1%
<b>Current Funds</b>									
113	Common School Construction	59.5	53.2	57.6	66.3	68.9	67.5	65.8	65.8
	Change				(1.6)	0.8	0.5	0.1	0.1
	% Change				-2%	1%	1%	0%	0%
999	Forest Board Counties	68.7	69.5	53.6	45.9	55.3	54.5	52.6	52.6
	Change				(2.1)	1.3	0.6	0.0	0.0
	% Change				-4%	2%	1%	0%	0%
001	General Fund	4.7	4.4	5.5	3.7	3.7	3.6	3.4	3.4
	Change				(0.4)	0.1	0.0	(0.0)	(0.0)
	% Change				-9%	4%	1%	0%	0%
348	University Bond Retirement	0.6	1.6	2.6	2.9	2.4	2.0	1.9	1.9
	Change				0.3	0.1	0.0	0.0	0.0
	% Change				10%	3%	2%	0%	0%
347	WSU Bond Retirement	1.9	2.6	1.6	1.6	1.6	1.6	1.6	1.6
	Change				0.0	0.0	0.0	0.0	0.0
	% Change				1%	1%	1%	1%	1%
042	CEP&RI	3.6	2.2	3.7	5.4	5.0	4.8	4.6	4.6
	Change				(0.0)	(0.0)	0.0	0.0	0.0
	% Change				0%	-1%	0%	0%	0%
036	Capitol Building Construction	4.4	7.7	6.0	9.6	8.5	8.0	7.5	7.5
	Change				0.7	0.2	0.1	(0.0)	(0.0)
	% Change				7%	2%	1%	0%	0%
061/3/5/6	Normal (CWU, EWU, WWU, TESC) School	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Change				0.0	0.0	0.0	0.0	0.0
	% Change				3%	3%	3%	3%	3%
Other Funds		1.1	0.6	0.1	1.0	0.5	0.2	0.1	0.1
	Change				(0.0)	0.0	0.0	(0.0)	(0.0)
	% Change				-2%	6%	7%	0%	0%
<b>Total Current Funds</b>		<b>144.7</b>	<b>141.9</b>	<b>130.8</b>	<b>136.5</b>	<b>146.0</b>	<b>142.2</b>	<b>137.8</b>	<b>137.8</b>
	Change				(3.2)	2.5	1.3	0.1	0.1
	% Change				-2%	2%	1%	0%	0%

(Continued)

Table 3: November 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	19.0	17.8	16.7	16.7	16.7	16.7
	Change				0.9	0.5	0.6	0.6	0.6
	% Change				5%	3%	4%	4%	4%
<b>Permanent Funds</b>									
	601 Agricultural College Permanent	5.4	5.7	3.9	5.9	4.9	4.2	3.8	3.8
	Change				(0.0)	0.0	0.0	(0.0)	(0.0)
	% Change				-1%	0%	1%	0%	0%
	604 Normal School Permanent	2.6	2.8	4.0	4.1	3.2	2.8	2.7	2.7
	Change				1.0	0.5	0.1	(0.0)	(0.0)
	% Change				30%	20%	5%	0%	0%
	605 Common School Permanent	0.2	0.4	0.2	0.3	0.3	0.3	0.3	0.3
	Change				-	-	-	-	-
	% Change				0%	0%	0%	0%	0%
	606 Scientific Permanent	3.1	4.9	9.3	4.8	4.8	4.8	4.6	4.6
	Change				0.5	0.1	0.0	(0.0)	(0.0)
	% Change				10%	2%	1%	0%	0%
	607 University Permanent	0.1	0.3	0.5	1.5	0.6	0.6	0.5	0.5
	Change				0.2	(0.1)	(0.0)	(0.0)	(0.0)
	% Change				19%	-16%	-4%	0%	0%
<b>Total Permanent Funds</b>		<b>11.4</b>	<b>14.2</b>	<b>17.8</b>	<b>16.7</b>	<b>13.9</b>	<b>12.7</b>	<b>12.0</b>	<b>12.0</b>
	Change				1.6	0.6	0.2	(0.0)	(0.0)
	% Change				11%	4%	2%	0%	0%
<b>Total All Funds</b>		<b>253.2</b>	<b>252.9</b>	<b>256.9</b>	<b>266.7</b>	<b>266.3</b>	<b>258.7</b>	<b>251.3</b>	<b>251.3</b>
	Change				2.0	4.4	3.0	1.6	1.6
	% Change				1%	2%	1%	1%	1%



Figure 1: Timber Forecast Charts

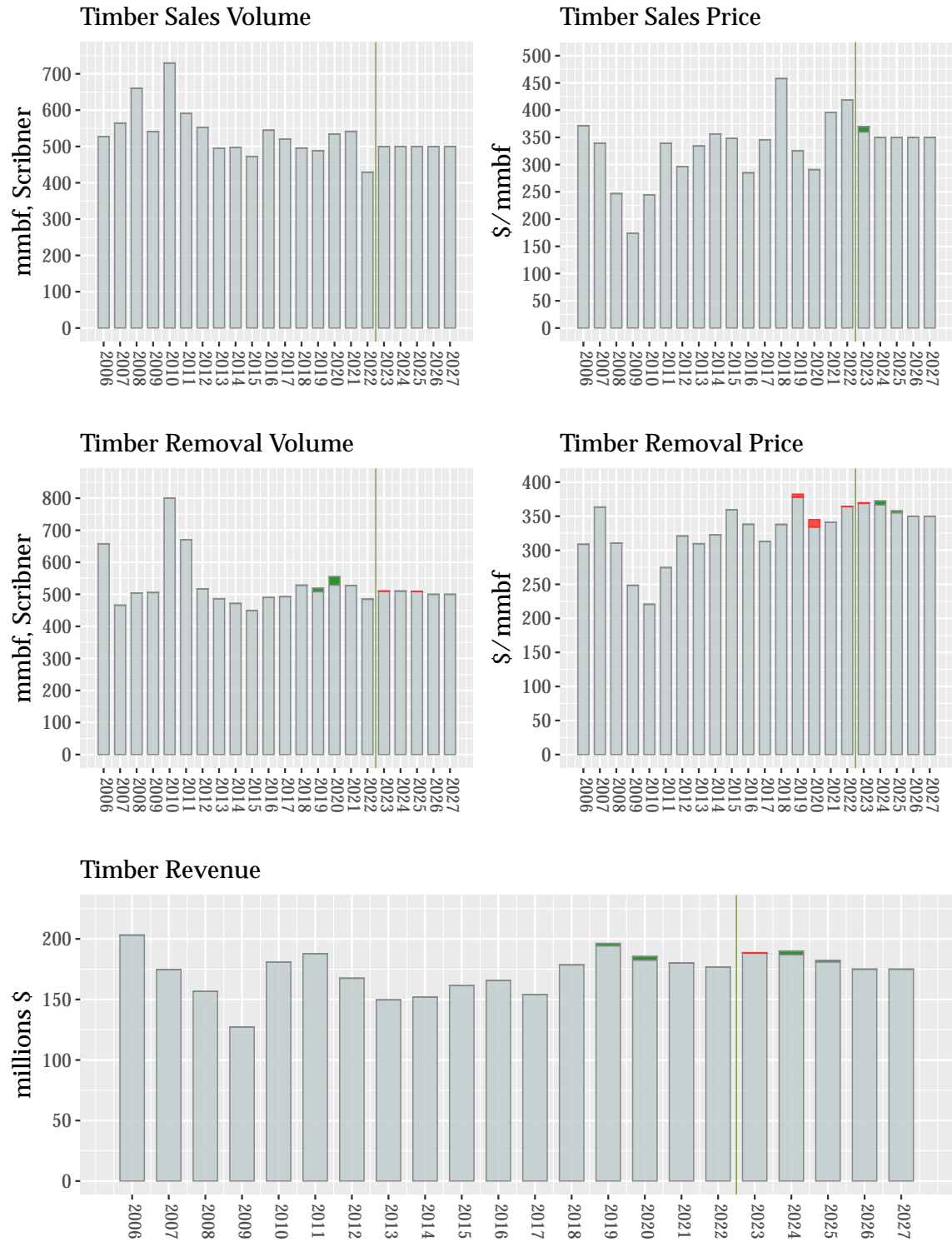


Figure 2: Other Uplands Forecast Charts

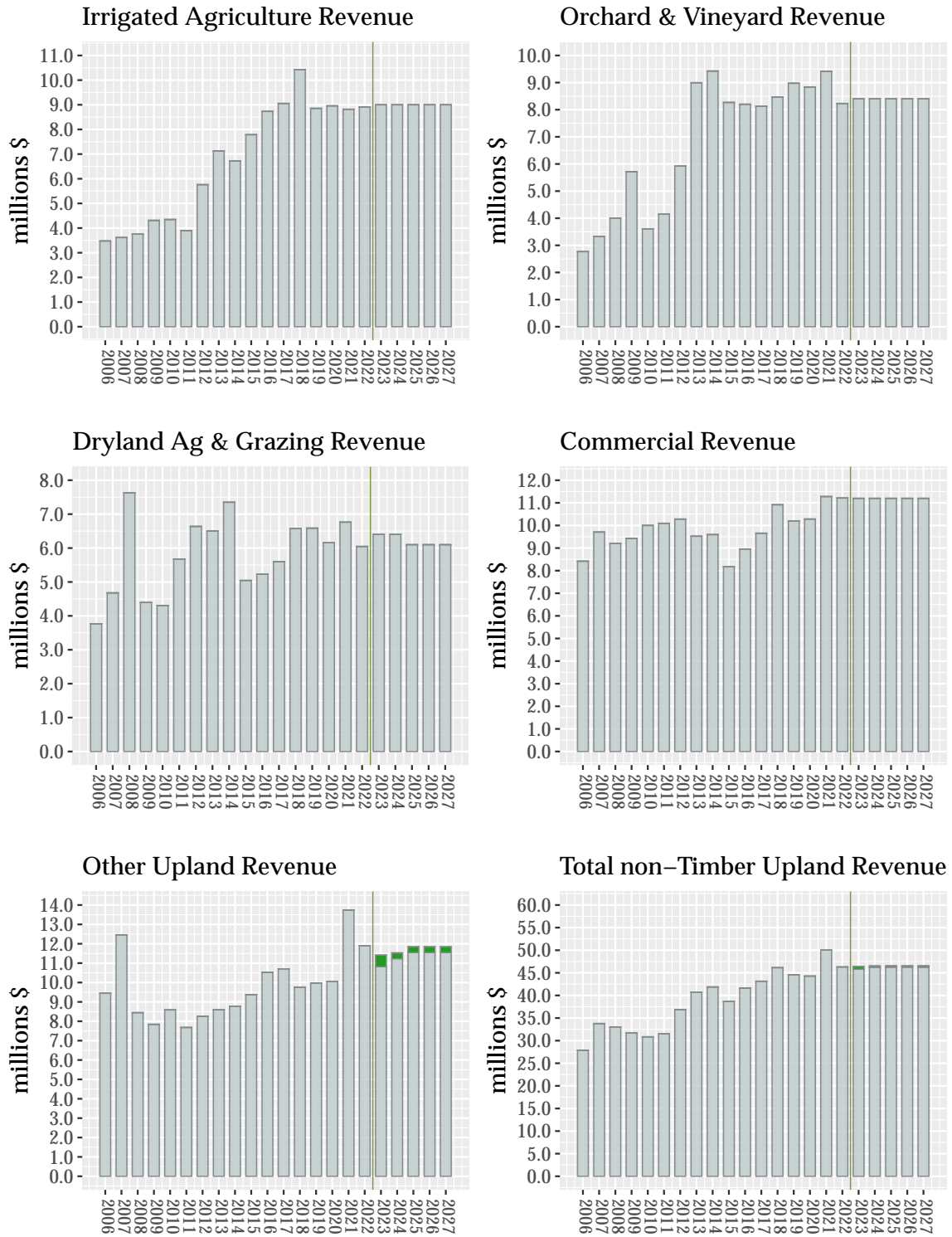
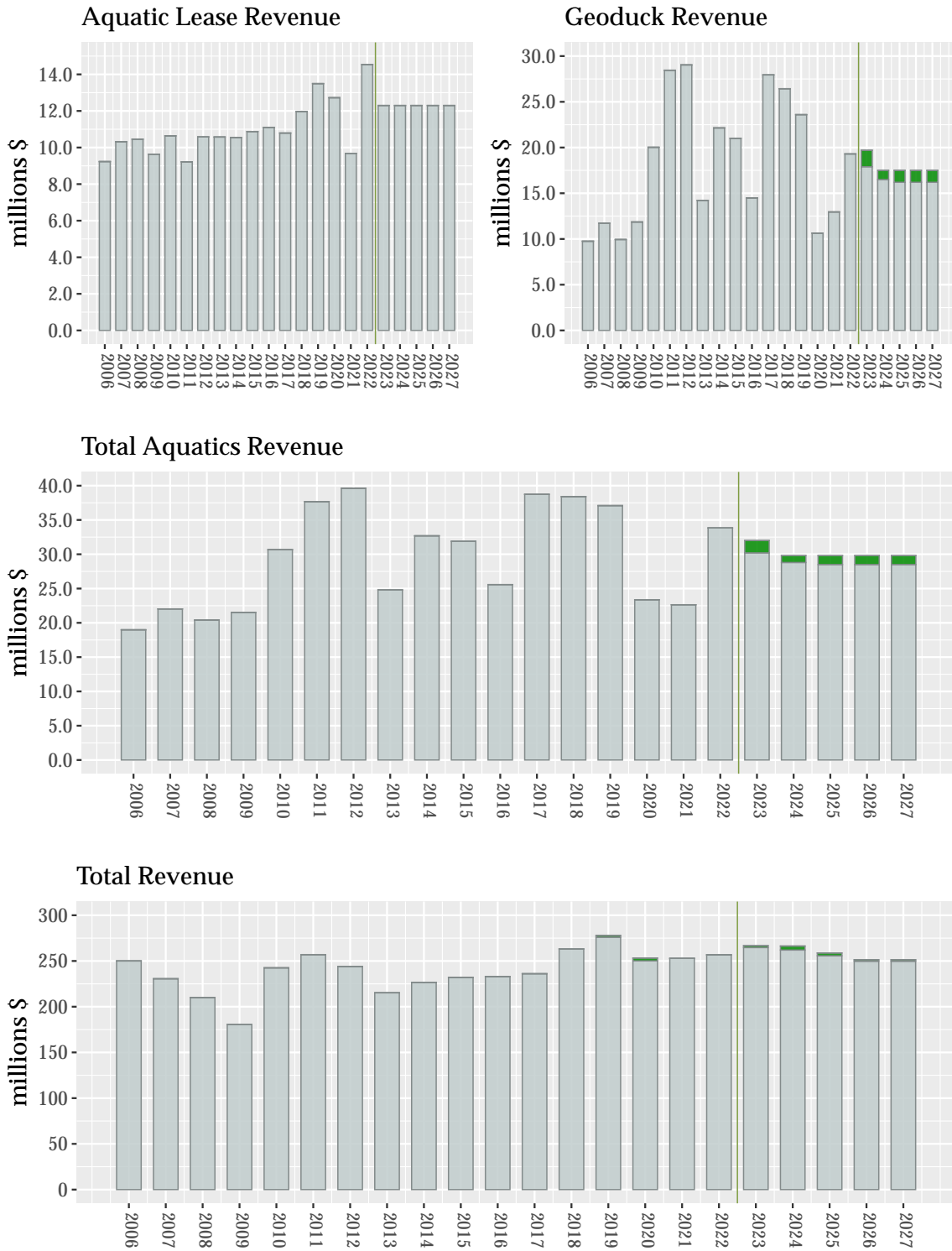


Figure 3: Aquatics and Total Forecast Charts



# Contents

<b>Forecast Summary</b>	<b>I</b>
<b>Macroeconomic Conditions</b>	<b>1</b>
COVID-19 Pandemic . . . . .	1
U.S. Economy . . . . .	2
Gross Domestic Product . . . . .	2
Employment and Wages . . . . .	3
Inflation . . . . .	5
Interest Rates . . . . .	5
The U.S. Dollar and Foreign Trade . . . . .	6
Petroleum . . . . .	7
<b>Wood Markets</b>	<b>8</b>
U.S. Housing Market . . . . .	9
New Home Sales . . . . .	9
Housing Starts . . . . .	10
Housing Prices . . . . .	10
Export Markets . . . . .	11
Price Outlook . . . . .	12
Lumber Prices . . . . .	12
Log Prices . . . . .	12
Stumpage Prices . . . . .	12
DNR Stumpage Price Outlook . . . . .	13
<b>DNR Revenue Forecast</b>	<b>15</b>
Timber Revenue . . . . .	15
Timber Sales Volume . . . . .	15
Timber Removal Volume . . . . .	16
Timber Sales Prices . . . . .	16
Timber Removal Prices . . . . .	16
Timber Removal Revenue . . . . .	16
Upland Lease Revenues . . . . .	18
Aquatic Lands Revenues . . . . .	19
Total Revenues from All Sources . . . . .	20
Distribution of Revenues . . . . .	21

## List of Tables

1	November 2022 Forecast by Source (millions of dollars) . . . . .	IV
2	November 2022 Forecast by Fund (millions of dollars) . . . . .	V
3	November 2022 Forecast by Fund (millions of dollars), cont'd . . . . .	VI

## List of Figures

4	U.S. Gross Domestic Product . . . . .	3
5	Unemployment Rate and Monthly Change in Jobs . . . . .	3
6	Employment and Unemployment . . . . .	4
7	Labor Market Indicators . . . . .	4
8	U.S. Inflation Indices . . . . .	5
9	Trade-Weighted U.S. Dollar Index . . . . .	6
10	Crude Oil Prices . . . . .	7
11	Lumber, Log, and Stumpage Prices in Washington . . . . .	8
12	Lumber, Log, and DNR Stumpage Price Seasonality . . . . .	8
13	New Single-Family Home Sales . . . . .	9
14	Housing Starts . . . . .	10
15	Case-Shiller Existing Home Price Index . . . . .	10
16	Log Export Prices . . . . .	11
17	Log Export Volume . . . . .	11
18	DNR Composite Log Prices . . . . .	12
19	DNR Timber Stumpage Price . . . . .	14
20	Forecast Timber Sales Volume . . . . .	15
21	Forecast Timber Removal Volume . . . . .	15
22	Forecast Timber Sales Price . . . . .	16
23	Forecast Timber Removal Price . . . . .	16
24	Forecast Timber Removal Value . . . . .	16
25	Forecast Timber Removal Revenue . . . . .	17
26	Forecast Upland Lease Revenue . . . . .	18
27	Aquatic Lands Revenues . . . . .	19
28	Geoduck Auction Prices . . . . .	19
29	Total Revenues . . . . .	20

## 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 2023, runs from July 1, 2022, through June 30, 2023.

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

## **Acknowledgements**

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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

Although the COVID-19 pandemic is in the rearview mirror for most people and there are no more government enforced public health measures in the U.S., it remains a potentially significant issue in the macroeconomy<sup>3</sup>. The pandemic and government and business reactions to it, have affected almost every aspect of economic life, from consumer behavior and purchasing decisions to production and supply chain operations.

Although global supply chains are still sorting out the problems caused by the pandemic, the two most salient potential COVID-19 issues on the horizon appear to be China's zero-COVID policy and the effect of repeated infections on the labor force.

A meaningful part of COVID-19's ongoing effects will depend on how other countries react to outbreaks. China, in particular, is at the moment still following a zero-COVID policy, though there are rumblings of push-back on this policy. The effect of this is that even a few cases can shut down large parts of cities. If those cities happen to be a port cities, like Shenzhen or Ningbo-Shoushan, then even small outbreaks can disrupt international shipping, and cause more supply-chain issues, putting upward pressures on costs and inflation. Fortunately, it appears that at least some

of the congestion in U.S. ports has eased, alleviating at least one part of the supply-chain problem, but outbreaks in China could change that at any point<sup>4</sup>.

Additionally, current research suggests that around 1 in 15 of those who get COVID-19 will suffer from long COVID — a poorly defined condition that currently encompasses symptoms ranges from a persistent cough to debilitating impairment to memory and attention<sup>5</sup>. It appears that vaccination reduces long COVID risks by only 15 percent<sup>6</sup>, so even in highly vaccinated areas, future waves will likely leave some amount of the workforce less productive at least, if not pull them from the labor force entirely<sup>7</sup>.

Although it's impossible to say with certainty how the pandemic will behave in the future, with very few precautions taken to avoid the spread of the disease within the U.S. and many countries across the globe, waning immunity from current vaccines<sup>8</sup>, and repeated evolution of immunity escaping variants thus far, it seems likely that COVID-19 will continue to cause waves of disease and disruption for quite some time<sup>9</sup>.

Assuming that this is the course that the pandemic takes, these waves would likely cause some small short-term economic disruption by periodically debilitating some portion of the labor force for one to three weeks at a time. Over the longer term, these sorts of labor disruptions combined with increased incidence of long-COVID could undermine output, constraining supply and keeping upward pressure on inflation.

Taken all together, the forecast is built with the expectation that the pandemic will continue indefi-

<sup>3</sup>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, there is additional uncertainty due to our limited experience and understanding.

<sup>4</sup><https://www.wsj.com/livecoverage/stock-market-news-inflation-consumer-price-index-may-2022/card/southern-california-port-congestion-falls-PuSRA17k13DzDJuzkVjF>

<sup>5</sup><https://www.nature.com/articles/s41467-021-26513-3>

<sup>6</sup><https://www.nature.com/articles/d41586-022-01453-0>

<sup>7</sup><https://www.brookings.edu/research/is-long-COVID-worsening-the-labor-shortage/> and [https://www.nber.org/system/files/working\\_papers/w30435/w30435.pdf](https://www.nber.org/system/files/working_papers/w30435/w30435.pdf)

<sup>8</sup><https://www.nature.com/articles/s41467-022-30884-6>

<sup>9</sup><https://www.nature.com/articles/s41598-022-13137-w>

nately, with waves of infections from new variants every three to six months<sup>10</sup>. However, it is unlikely to *seriously* affect DNR revenue in the short- to mid-term. DNR revenue comes predominantly from timber, with some from agriculture and other uplands leases as well. Housing construction demand largely drives timber and commodity prices largely drive agricultural revenue. These will be discussed in their respective sections of the forecast, but, in short, they will likely be largely unaffected by ongoing circulation of COVID-19.

Even without clear effects such as stay-at-home orders, the ongoing pandemic will probably still have some effects on the economy, though most are likely to be more insidious and difficult to quantify, and occur over a longer time horizon. These 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 2021 at Ningbo-Zhoushan, the world's third-largest container port<sup>11</sup>.
- Reduced economic output across the global economy due to outbreaks among labor in other sectors, further disrupting supply chains.
- Reduced labor availability due to school and child-care closures or availability.
- Impaired productivity growth due to long COVID.

To summarize, the assumptions underlying this forecast are:

- There will be no more stay-at-home orders or significant limitations on economic activ-

ity 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.

## 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 in the future.

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

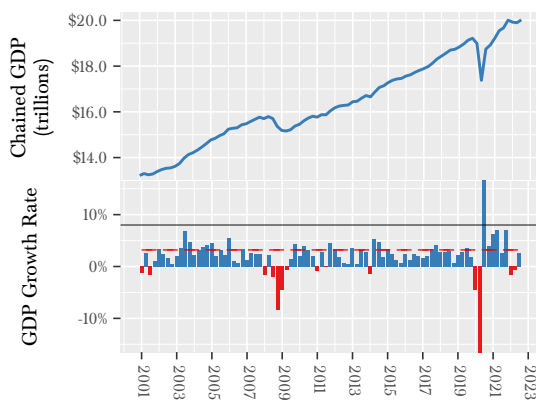
<sup>10</sup>Though these waves are unlikely to appear in the case data. With the availability of at-home testing undermining centralized surveillance, epidemiologists estimate that true COVID infections are somewhere between 3 and 31 times official reports - <https://www.medrxiv.org/content/10.1101/2022.05.25.22275603v1.full.pdf+html> and <https://www.bloomberg.com/news/newsletters/2022-06-04/coronavirus-daily-just-how-wildly-are-COVID-cases-undercounted>

<sup>11</sup><https://www.ft.com/content/e1263950-1173-4832-a011-ada04df1e93c>

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.

That was extremely unlikely to last. First-quarter 2022 GDP shrank by 1.6 percent and second-quarter it shrank by 0.6 percent (SAAR). Additionally, inflation has been much higher and the Federal Reserve has started raising interest rates. The rate rises will likely ensure that GDP is much lower than 2021, and will likely force the economy into a recession in early 2023.

Figure 4: U.S. Gross Domestic Product



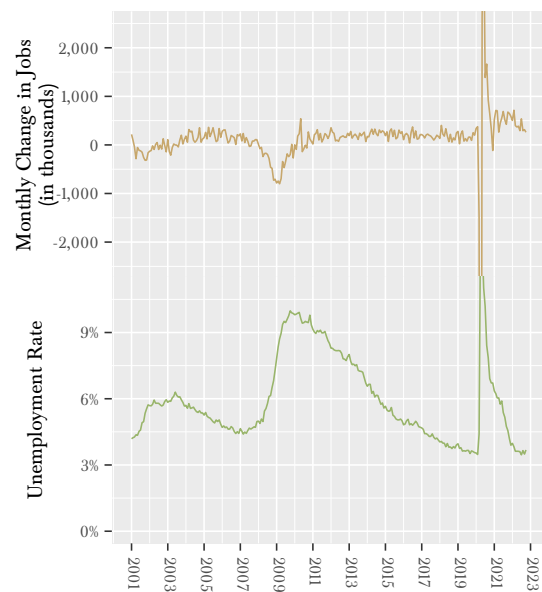
Note that the y-axis of the bottom chart is limited to 15 percent because the Q2 and Q3 2020 GDP growth are such outliers that they distort the chart.

The Atlanta Fed’s GDPNow high-frequency forecast predicts Q4 2022 GDP at 4.3 percent. This is well above the forecast from other sources, with the Blue Chip consensus ranging from -1.0 percent to around 1.8 percent. The other major high-frequency forecast we typically look at, the New York Fed’s Nowcast, suspended publication on September 3, 2021, because of uncertainty and volatility caused by the pandemic.

The September FOMC meeting materials shows forecasts between 0.1-0.3 percent real GDP growth in 2022. This is a well below their June forecast

of 1.5-1.9 percent, and a steep drop from the 3.6-4.5 percent growth expectations in the December materials. Expectations for 2023 are slightly better at 0.5-1.5 percent growth, while outlying years are closer to what we saw pre-pandemic at between 1.4 and 2.0 percent from 2024.

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.

**Employment and Wages**

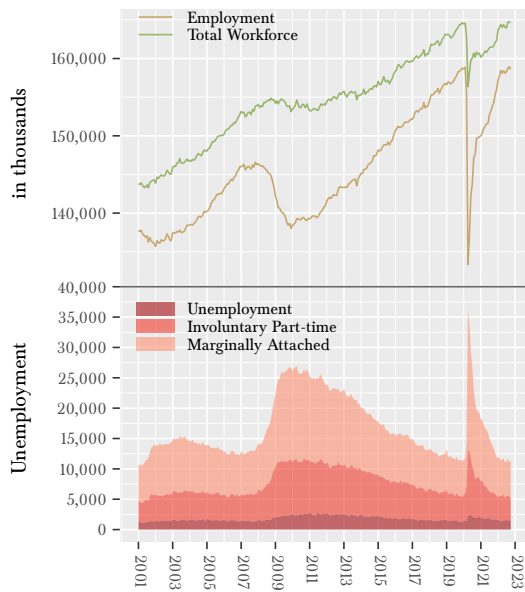
The labor market is the primary driving force behind consumption, which typically constitutes about 70 percent of GDP and naturally extends to the demand for housing, the major driver of U.S. timber demand. The U.S. headline unemployment rate measures the number of people looking for work as a percentage of the number of people in the labor force.

In August, a Brookings Institute report was updated with new Census data and estimated that around 16 million Americans had long COVID and between 2

<sup>12</sup>[https://www.brookings.edu/research/is-long COVID-worsening-the-labor-shortage/](https://www.brookings.edu/research/is-long-COVID-worsening-the-labor-shortage/)

and 4 million had left the labor force because of it<sup>12</sup>. A separate study estimated that long COVID had reduced the labor force by around 500,000 people<sup>13</sup>. Given that the headline unemployment rate only represents people who are part of the workforce, it will miss the people dropping out of the labor force due to long COVID.

Figure 6: Employment and Unemployment



With 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 (Figure 5). 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.

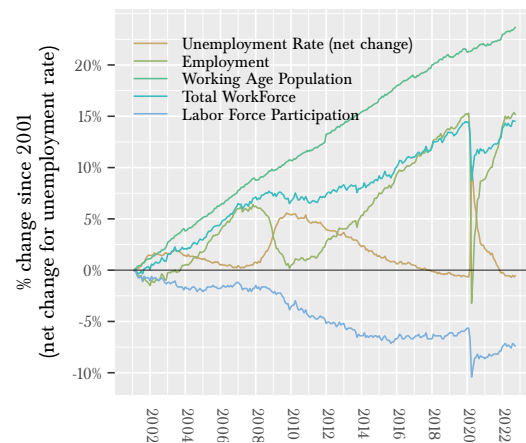
Since mid-2020, both have improved considerably, with the unemployment rate at 3.7 percent

in October 2022, and the labor force participation rate at 62.2 percent (Figure 6). Overall, there are around 800,000 more jobs in October 2022 than in February 2020 and about 100,000 more people in the labor force (that is, employed or looking for work).

The unemployment rate is likely to either remain stable or increase slowly from its current level. Since the FOMC has started raising rates more aggressively, the number of job openings has fallen from 11.9 million in March 2022 to 10.3 in October. Given that one of the stated purposes of the Fed raising rates is to slow down job growth, it seems fairly likely that the Fed will continue raising rates until the national unemployment rate starts to increase. The FOMC expected unemployment between 4.1 to 4.5 percent in 2023.

However, decreasing the unemployment rate may be difficult given the low, and seemingly stable, labor force participation rates. In addition to the long-COVID issues mentioned above, the labor force participation rate will continue to have meaningful downward pressure on it from both demographic changes — essentially, the large population of baby boomers retiring — as well as a significant drop in immigration — that had supported the participation rate in the past.

Figure 7: Labor Market Indicators



<sup>13</sup>[https://www.nber.org/system/files/working\\_papers/w30435/w30435.pdf](https://www.nber.org/system/files/working_papers/w30435/w30435.pdf)

## Inflation

Until recently, aside from a short period in 2012, core inflation had 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 progressed (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. 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 was 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.

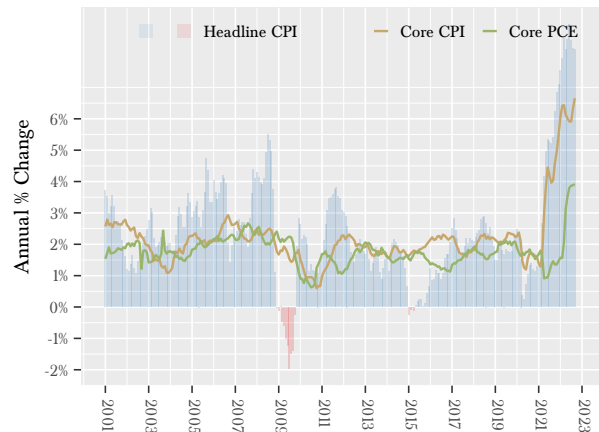
However, since April 2021, inflation has been higher than the FOMC's target, and remained high on the back of supply chain issues and strong demand, as well as shocks to the market like Russia's invasion of Ukraine.

In March 2022 the FOMC decided to start raising interest rates to bring inflation down. Notes from its September 2022 meeting show that the FOMC expects core inflation between 5.3 and 5.7 percent in 2022, a substantial increase from their December 2021 expectations of 2.5 to 3.0 percent.

In the previous forecast, we were expecting inflation to continue to remain relatively high but dropping off through the year. However, we now expect inflation to drop off substantially in the coming months. There are a number of reasons for this. The main reason is that the FOMC are raising rates much more quickly than expected and are signaling in statements to the press that they see no reason to slow down yet. Additionally, a number of indicators suggest that economic growth is already slow-

ing rapidly: Job openings have decreased by around 15 percent from March to October; the prices for shipping freight have decreased on slower demand and untangling supply chains; and vehicle and gas prices have dropped dramatically.

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>14</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, particularly in the housing and auto markets. The opposite of all of this is also true — decreasing or lowering interest rates can help drive economic expansion through expanded investment and consumption.

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 0 until it judged that there had been sufficient progress

<sup>14</sup>We refer to interest rates broadly, but the Fed specifically governs the Federal funds rate, which heavily influences interest rates across the economy.

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 after dropping rates back to 0.0-0.25 earlier in the year, and promising to keep rates very low until the *average* inflation averages around 2 percent.

The Fed began increasing interest rates in March 2022 due to continued high inflation. They increased rates by 0.25 percent in each month from March through May, and then increased rates more dramatically by 0.75 percent in June, September *and* November. At the June meeting, the FOMC expected the rate would be between 3.1 and 3.6 percent at the end of 2022. At the September meeting was increased substantially to between 4.1 and 4.4 percent. These are an enormous change from the expectations in December 2021 when it was expecting the Federal funds rate to remain at between 0.6 and 0.9 percent.

As mentioned above, these increases are likely already slowing down the economy and have made it likely that the economy will fall into a recession in late 2022 or early 2023.

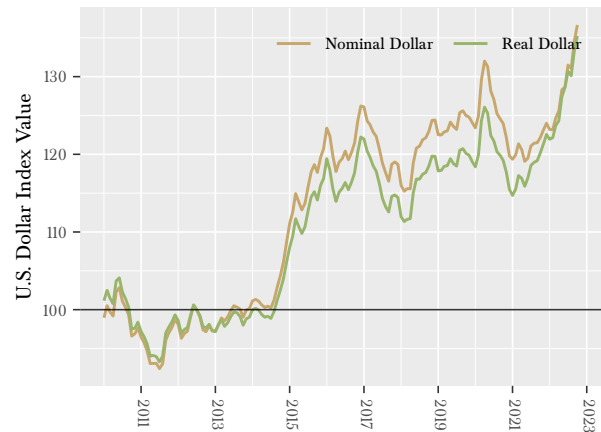
### The U.S. Dollar and Foreign Trade

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 it has been quickly climbing since mid-2021. Currently it is higher than any point since at least 2006 (the earliest date for the data set we use).

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.

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.

Until recently, the dollar's strength hasn't been particularly concerning. Strong domestic demand supported prices for timber products, such that any price effect on stumpage would likely be small. Agricultural product prices also remained high, and geoduck auctions continued to have very strong prices — even as economic trouble in China has become more apparent.

However, the dollar continues to get stronger, likely from increased interest rates compared to other countries, while domestic demand is likely to drop off due to high interest rates suppressing house price growth and housing demand. This means that if domestic demand falters, then there is not likely

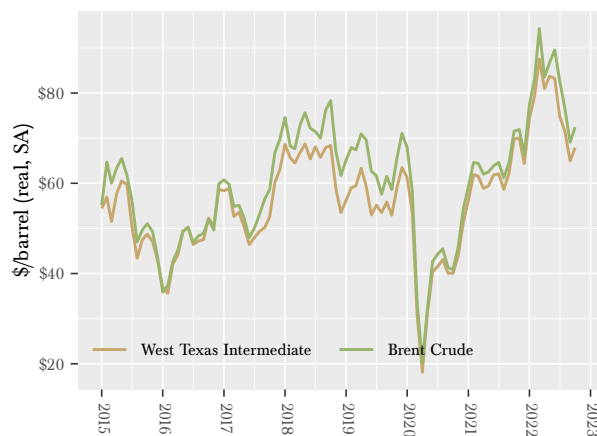
to be much in the way of international demand to support prices. This is a meaningful risk to our price forecast.

**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.

The Russian invasion of Ukraine initially pushed oil prices much higher, with the nominal Brent Crude spot prices jumping from \$86/barrel in January to \$122/barrel in June — the highest they had been since 2014 (Figure 10). These prices were high enough to create a drag on economic growth. However, they were fairly short-lived. Since peaking in June, prices have dropped to \$90/barrel in September and October.

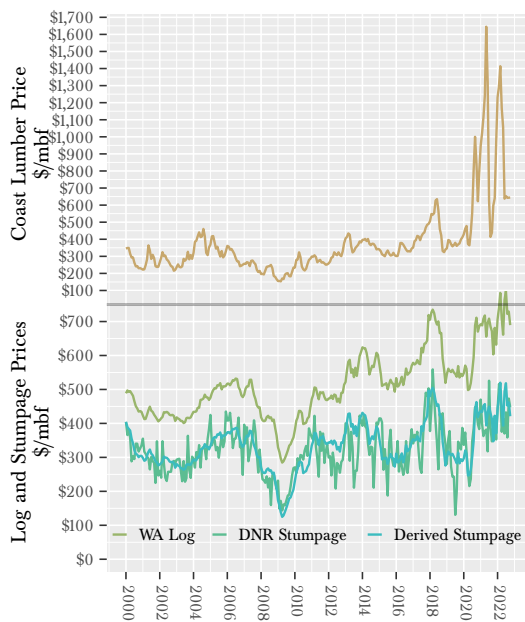
Figure 10: Crude Oil Prices



## 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

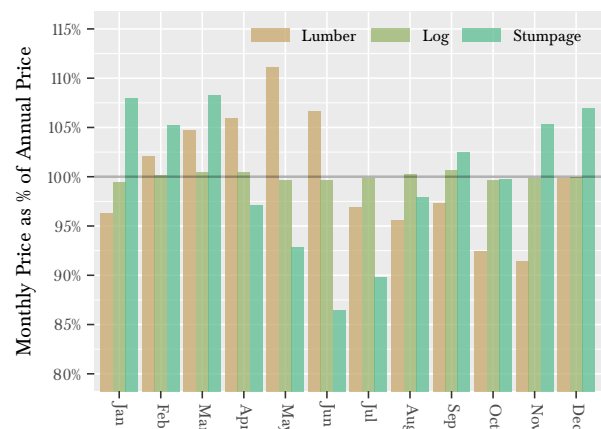


In general, timber stumpage prices reflect demand for lumber and other wood products, timber supply, and regional lumber mill capacity. There is a consistent, positive relationship between log prices and DNR's stumpage prices, despite notable volatility in stumpage prices (Figure 11). High log prices 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.

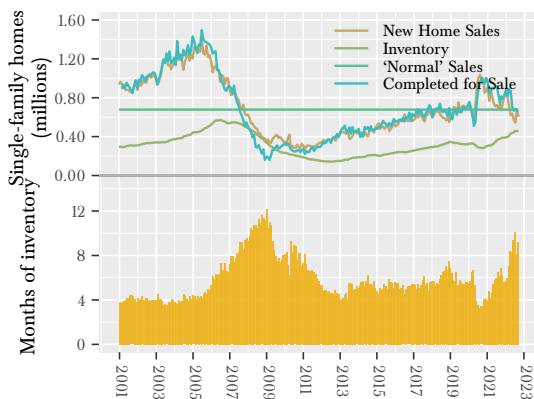
### U.S. Housing Market

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. After the initial collapse in activity in early 2020, both starts and new home sales increased substantially — largely driven

by strong household balance sheets and record-low mortgage rates. However, since the Fed began increasing interest rates, mortgage rates have more than doubled from under 3.0 percent to above 7.0 percent. The increased costs of financing have significantly affected both sales and construction of homes.

### 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 to average 680,000 (SAAR) in 2019 (Figure 13).

From January through April 2020, new single-family home sales fell from 708,000 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 1,036,000 (SAAR) in August 2020, averaging 960,000 in the latter half of the year. New home sales slowed a little in 2021, averaging 769,000 (SAAR) per month. With the increased mortgage rates, new single-family sales fell to a low of 588,000 in September, basically at the level of April 2020. Sales seem to have rebounded a bit to 632,000 in October. Of course, this doesn't mean that September is, or was, the bottom — July actually had only 543,000 sales before rebounding in August. However, it does suggest that the market is now at around its low point, with sales bouncing around from the high-500,000s to the mid-600,000s. This is largely inline with our expectations in the previous forecast.

Households still have strong balance sheets and wages are increasing, though not quite keeping up with inflation, which will mitigate some of the effect of increased interest rates. 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 demand, though there has been a meaningful buildup in new home inventory in the past several months.

Overall, it is likely that sales will remain higher than

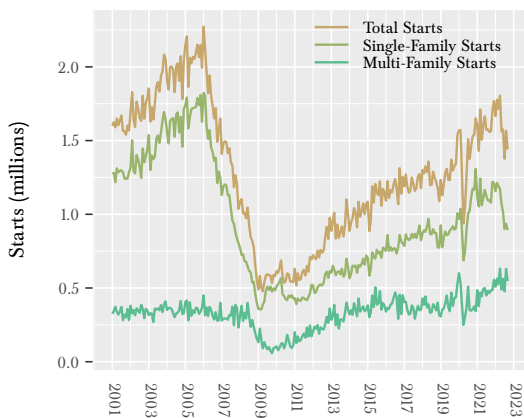
the period between 2008 and 2013, but it would not be surprising to see them stay below the long-term average for some time.

### 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).

Single family 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. Single family starts averaged 1.1 million in 2021, and increased slightly to an average of 1.2 million through April 2022. But, again as with sales, starts have fallen substantially since then.

Figure 14: Housing Starts



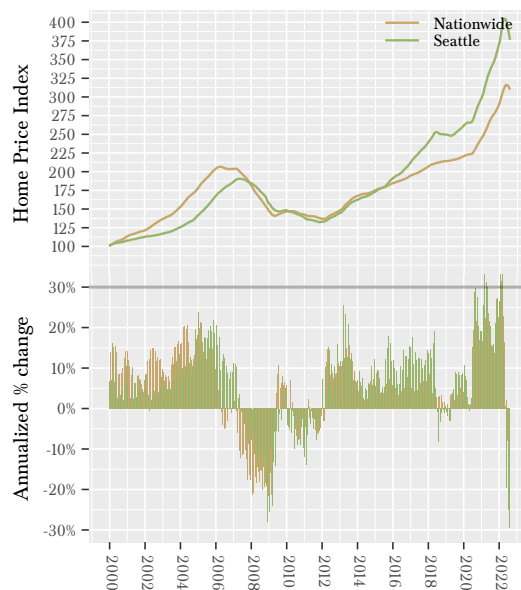
Two things are particularly notable about recent sales. First, even though there has been a significant drop in sales, they are still higher than any point between 2007 and mid-2019. Second, only single-family starts have dropped noticeably in the last several months. Multi-family starts have been

more stable, likely because rents are still quite high and those are typically built for the rental market. However, multi-family construction uses less lumber than single-family construction, so the drop in single-family starts will likely have a meaningful affect 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

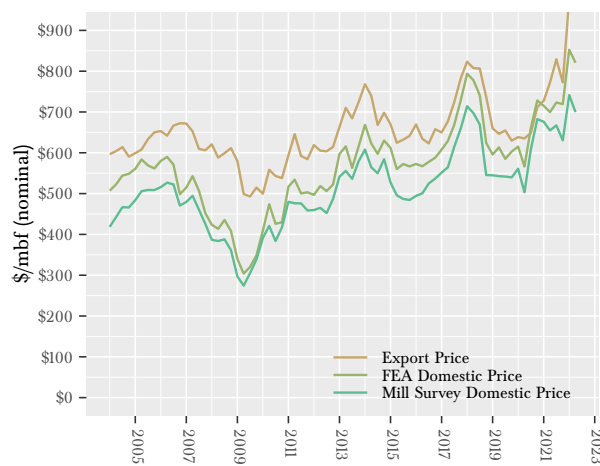


Although the pandemic initially stalled national price growth, the national Case-Shiller ended 2020 with 10 percent year-over-year price growth. Locally, for Seattle, the year-over-year price growth was 13 percent. Since then, prices have increased even faster. In March 2022, year-over-year prices nationwide were 21 percent higher, and Seattle prices were 28 percent higher.

However, price growth has turned negative. The Seattle Case-Shiller has fallen from a peak of 414.0 in May to 376.4 in August. Prices are still around 10 percent higher than they were in August 2021, but it remains a significant turn-around.

Although the Case-Shiller is a robust metric of house price changes, it is a slow moving metric because it is a three-month moving average of the index's previous three months. So the most recent index value from August reflects an average of the June, July, and August prices.

Figure 16: Log Export Prices



## 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-

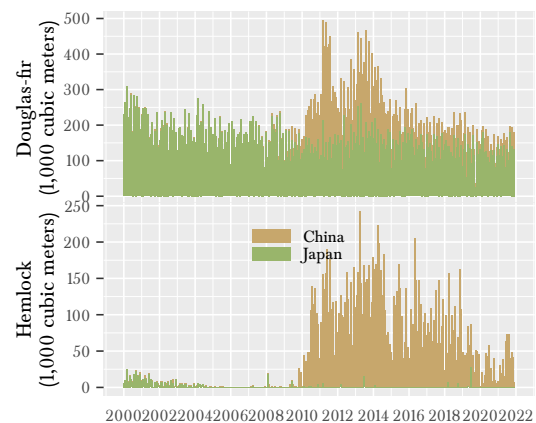
quality wood, a high value placed on long-term contracts, and high transaction costs.

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.

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>15</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.

Figure 17: Log Export Volume



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

<sup>15</sup>Trade data is from the U.S. International Trade Commission Dataweb at <https://dataweb.usitc.gov/>

of the mid-2010s.

As a result of the Russian invasion of Ukraine, sanctions were placed on Russia that limit its international trade. Russia supplies around 12 percent of the world's export logs. Although much of this is sold to China, the reduction of timber on the world market appears to have pushed up export prices (Figure 16).

## Price Outlook

### Lumber Prices

Lumber prices have been exceptionally volatile the past two years (Figure 11). In 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 peak at \$1,400/mbf in March 2022. However, after that they plummeted, dropping from \$1,056/mbf in May to \$638/mbf in June. As of October, they've dropped further to \$538/mbf. Prices are expected to fall further in early 2023, and remain lower for the year — averaging somewhere between \$450-\$500/mbf. Though, given the price behavior in recent years, as well as increasing interest rates and a stalling housing market, it is entirely possible that prices will fall further.

### Log Prices

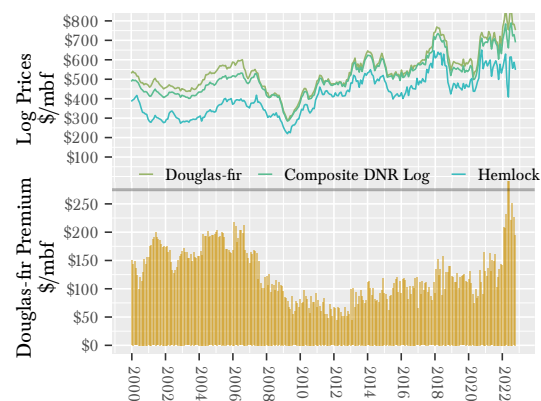
Figure 18 presents prices for Douglas-fir, hemlock, and DNR's composite log. The latter is calculated from prices for logs delivered to regional mills, weighted by the average geographic location, species, and grade composition of timber typically sold by DNR. In other words, it is the price a mill would 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 also bottomed in April 2020 and had recovered by August 2020, though 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.

### 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.

Figure 18: DNR Composite Log Prices



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 FY 22 was \$427/mbf. The average for FY 23 through October is \$411/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.

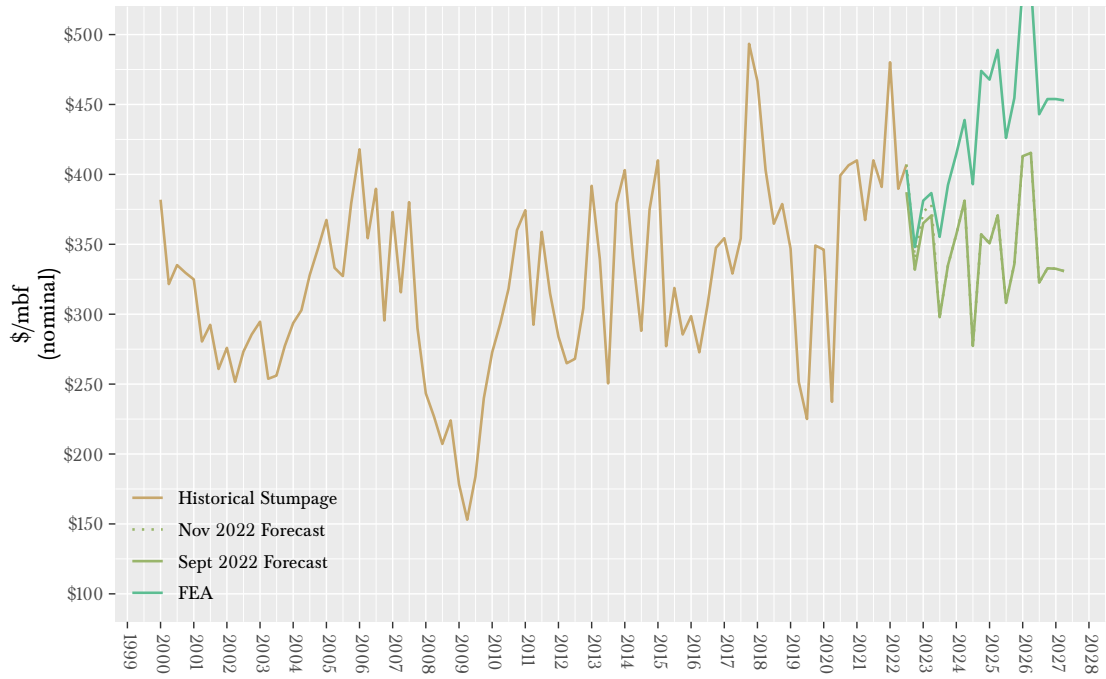
### **DNR Stumpage Price Outlook**

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.

### Timber Sales Volume

The sales volume for FY 22 was 430 mmbf, a significant decrease from the 530 mmbf planned at the beginning of the fiscal year. As noted in the previous forecasts, the proposal to limit DNR timber harvests to only stands less than 120 years old stalled many planned sales and required review of many sales that had already been prepared, delaying the preparation of other sales. Additionally, severe winter weather delayed some sales planning in December 2021 and January 2022, while staffing constraints in some regions also affected sales planning.

The sales volume forecast for FY 23 and outlying years is unchanged at 500 mmbf. Currently, there is no expectation that the timber sales program will be able to recoup the delayed sales to add these the future years. It is possible that future forecast volumes will be reduced due to the by the Department's Carbon Project, which will remove 10,000 acres of forest land from the planned harvest schedule and instead generate revenue through carbon offsets. However, the current 500 mmbf forecast in outlying years is typically quite conservative, so it is also possible that the new program will have no meaningful effect on the actual volume sold or harvested.

Figure 20: Forecast Timber Sales Volume

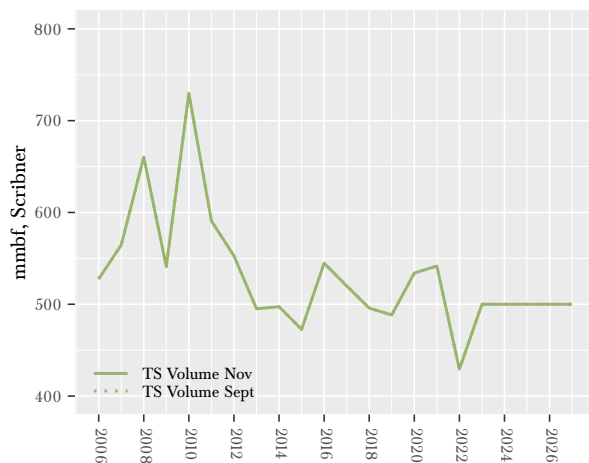
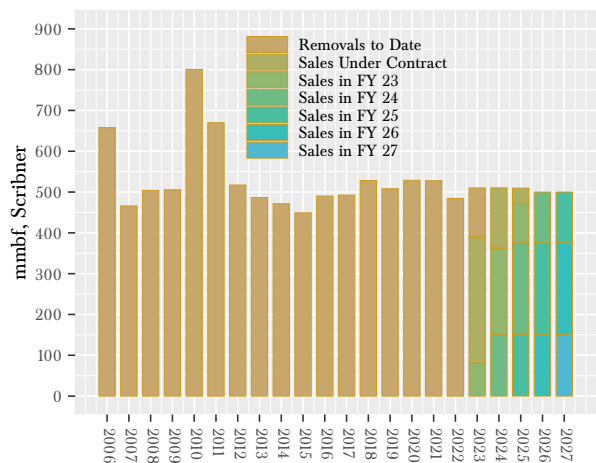


Figure 21: Forecast Timber Removal Volume



**Timber Removal Volume**

The removal volume forecast is unchanged in all years.

Figure 22: Forecast Timber Sales Price

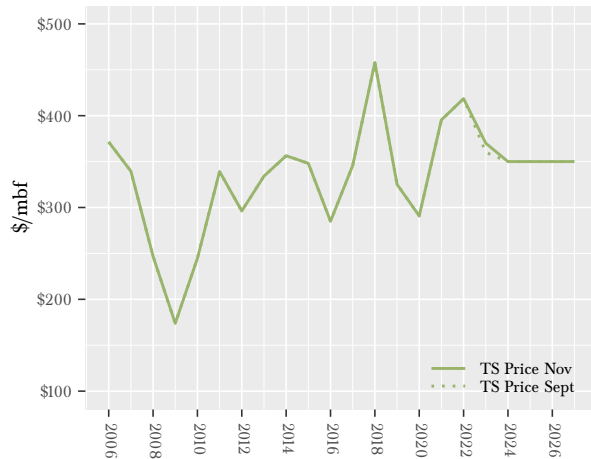
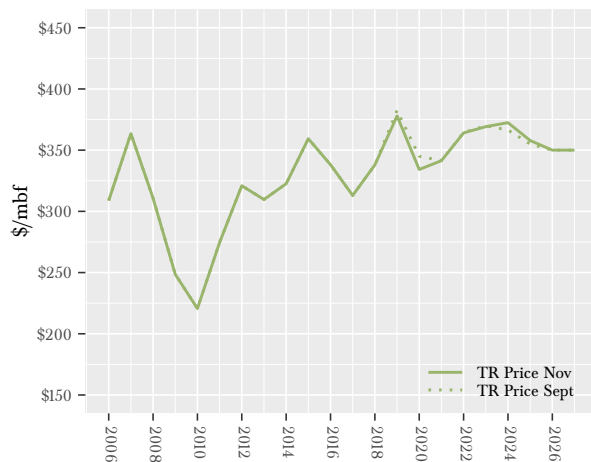


Figure 23: Forecast Timber Removal Price



**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.

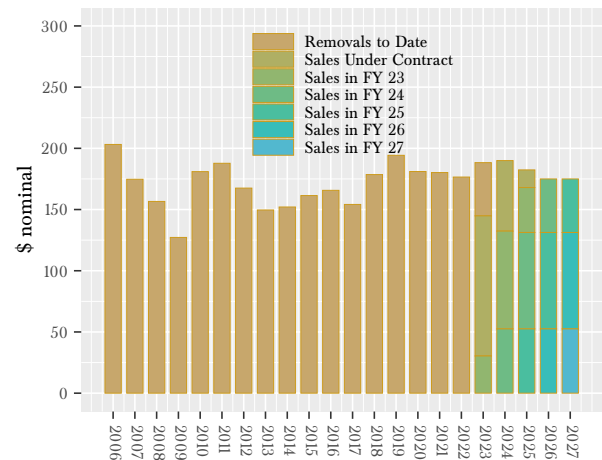
The forecast timber sales prices are increased to

\$370/mbf for FY 23. Given the most recent average sales prices from the October auction, this is a reasonable middle ground between the potential for higher prices if house construction remains high relative to pre-2020 and lower prices due to slower housing demand and decreased export demand. The outlying years' forecast prices are unchanged at \$350/mbf.

**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 decreased slightly in FY 23 due to the value of timber harvested to-date. Removal prices in outlying years are increased slightly due to the increased FY 23 sales price.

Figure 24: Forecast Timber Removal Value



**Timber Removal Revenue**

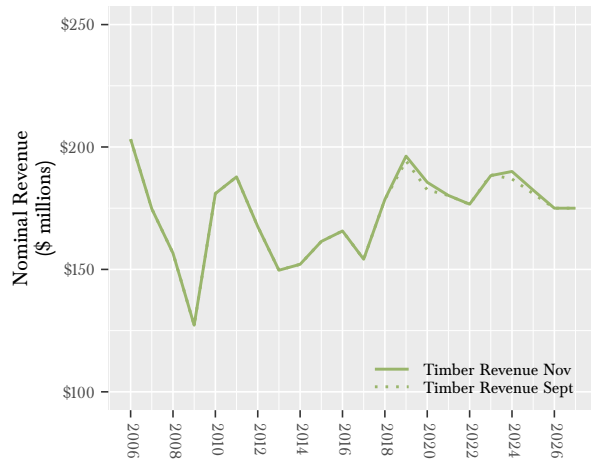
Figure 24 shows projected annual timber removal revenues, broken down by the fiscal year in which the timber was sold. Revenue estimates reflect all of the changes described above.

Timber revenues for the 2021-23 biennium are \$365 million — basically unchanged from the previous forecast. Forecast revenues for the 2023-25 biennium are increased to \$372 million — around 1



percent higher (\$5 million).

Figure 25: Forecast Timber Removal Revenue



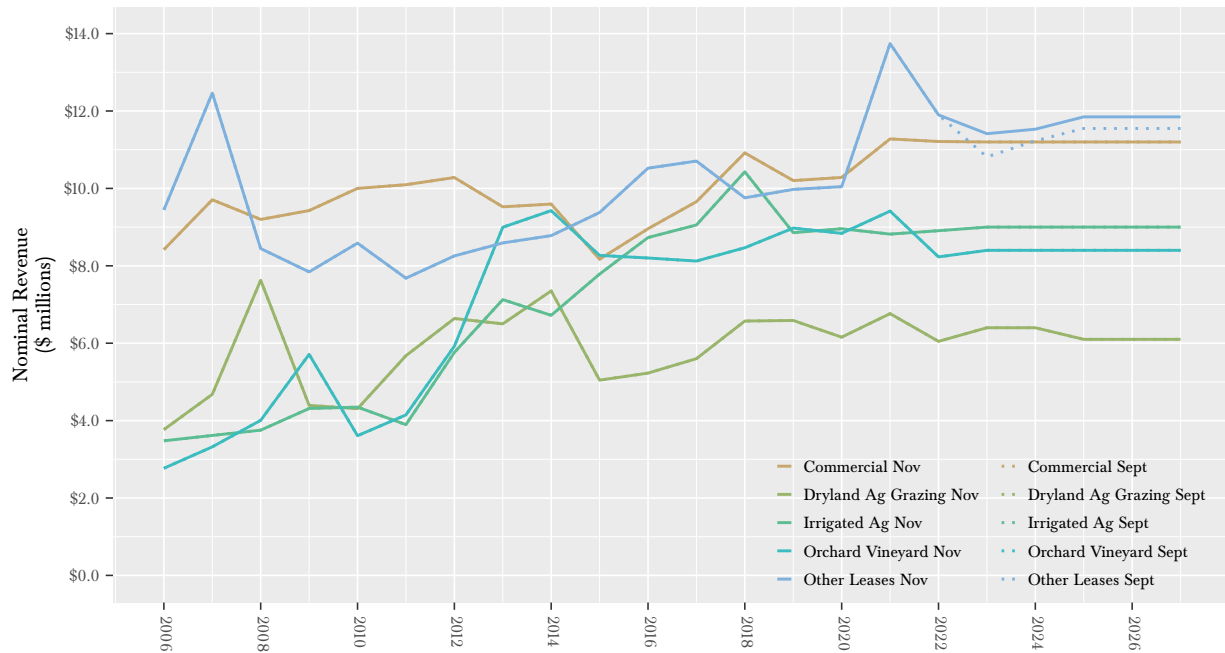
### Upland Lease Revenues

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 23 is increased by \$0.6 million to \$46.4 million, due to higher than

expected revenue to-date from both minerals and hydrocarbon, and special leases revenue — the increased special uses revenue is due to higher clean energy revenue, with some projects coming online earlier than expected. Outlying years' revenue is increased due to higher expectations for clean energy revenue.

Figure 26: Forecast Upland Lease Revenue

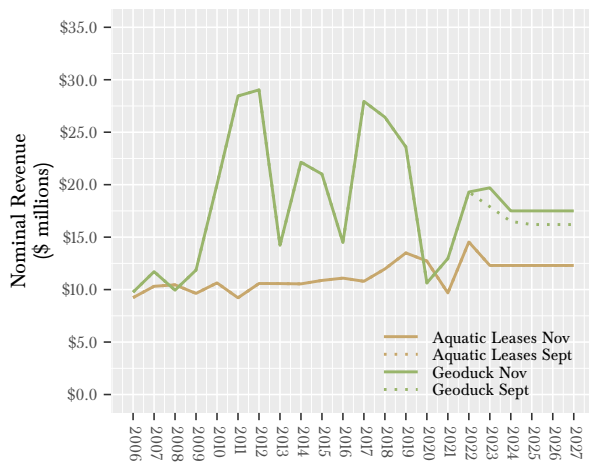


### Aquatic Lands Revenues

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 all years is unchanged in this forecast (Figure 27). However, the very recent announcement of the closure of net pen aquaculture on DNR managed lands will likely push revenue down in the next forecast.

Figure 27: Aquatic Lands Revenues



The geoduck price forecast is increased for all years. Consistently high prices, despite issues in the Chinese economy, suggest that geoduck prices are more resilient than we had expected, so we have increased the price forecast. It's useful to note that even though our price forecast has increased, it is still on the low end of the likely range in prices.

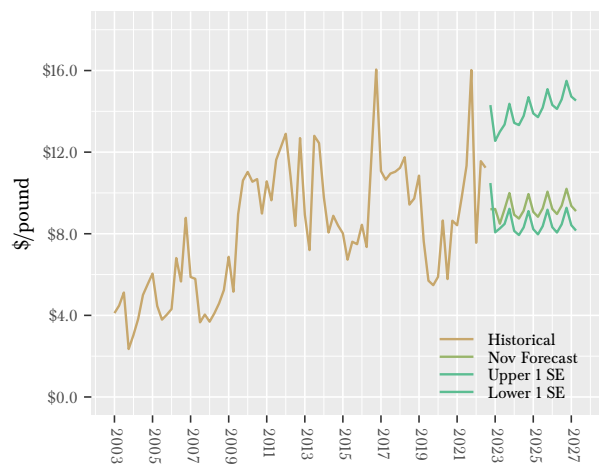
There are, as always, potentially significant downside risks to geoduck revenues, even in the near term and in addition to the pandemic, that are important to consider but difficult to forecast:

- China's zero-COVID policy and current polit-

ical unrest have increased the downside risk of economic problems or political action in China reducing geoduck demand.

- 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.

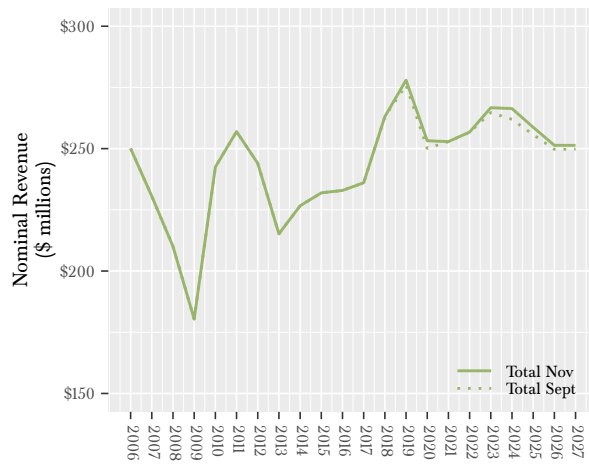
Figure 28: Geoduck Auction Prices



### Total Revenues from All Sources

The forecast revenue for the 2021-23 biennium are increased to \$523 million, and the forecast revenue for the 2023-25 biennium are increased to \$525 million (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 23 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 of Natural Resources will continue to approve the Resource Management Cost Account management deduction at 31 percent and the Forest Development Account management deduction at 25 percent.