

Department of Natural Resources
Economic & Revenue Forecast

Fiscal Year 2020, Third Quarter
February 2020



Forecast Summary

Lumber and Log Prices. Lumber prices increased substantially from the beginning of 2017 through mid-2018, from \$351/mbf in January 2017 to \$635/mbf in June 2018. Since then, prices have dropping markedly and averaged \$376/mbf in 2019.

Prices for the 'typical' DNR log also grew rapidly between the beginning of 2017 and early 2018, climbing from \$578/mbf in January 2017 to peak at \$735/mbf in March 2018. Prices fell through the remainder of 2018 to a low of \$519/mbf in December 2018. Since then, they have recovered slightly to average \$549/mbf for 2019.

Log and lumber prices were expected to weaken in the final two quarters of 2018, but they were still expected to stay above recent years' averages, before climbing back to near early-2018 levels in early 2019. That, obviously, did not happen. The steepness of the price decline was surprising and appears to be due to a confluence of a number of factors. As discussed in the main forecast, throughout the latter half of 2018 housing starts stalled, house price growth flattened (and declined in some areas, like Seattle) and lumber mills built significant inventories of both logs and lumber. Log prices are expected to grow meaningfully in the first two quarters of 2020, before falling back in the later half of the year.

Timber Sales Volume. Sales plans in the current and outlying years have not changed, so sales volume forecasts remain at 500 mmbf. Through December 2019, DNR sold 210 mmbf in stumpage, with 45 mmbf of contracts offered passed-in with no bids. That leaves 290 mmbf to auction in the remainder of the year to reach our forecast sales volume. It is DNR's intention to bring much more than this to auction, however, given the number of contracts with no bidders and the potential issues with the planned volume, 500 mmbf remains a reasonable estimate of what will actually sell.

Timber Sales Prices. The average prices for sales in July and August 2019 were extremely low at \$164/mbf. While the composition of the timber in

the first two auctions is not representative of what will be brought forward in the remainder of the year and prices were expected to recover, the forecast average sales price for FY 20 was reduced to \$330 in September. Although sales prices since then have recovered, the average price for sales through January is only \$302/mbf. The average sales price forecast is unchanged

Timber Removal Volume and Prices. The removal volume forecast for FY 20 is increased by 8 mmbf to 520 mmbf. This was reduced in the November auction because harvests through September had been quite low, averaging only 31 mmbf/month. However, a very large harvest volume in October was followed by strong harvests in November and December, making the previous forecast likely too low. However, the forecast average removal price is reduced due to the removal of more low value timber from inventory. Consequently, the removal values in outlying years are increased slightly.

Timber Revenue. Forecast timber revenue are decreased in FY 20 by \$0.3 million and increased slightly in outlying years.

Timber revenues for the 2019-2021 biennium are forecast to remain at \$345 million, while revenues for the 2021-2023 biennium are increased by \$0.2 million to \$353 million.

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

The non-timber uplands revenue forecasts are changed slightly in FY 20, due to weaker than anticipated dryland agricultural prices. The likely impacts of the trade war has already been built in to the forecast.

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

The forecast geoduck revenue has been revised downward for FY 20 due primarily to the outbreak of the a novel coronavirus that has essentially shut down China. Geoduck prices had already fallen substantially because of the slowdown in Chinese

economic growth and the impact of the trade war. Since the outbreak, harvest of geoduck destined for China has basically stopped, leaving only about 10% of the normal daily harvest, which is bound for other international locations or for domestic consumption. The current geoduck forecast is based on the assumption that the coronavirus will not turn into a pandemic, but will remain a source of uncertainty and fear and a powerful downward driver to Chinese demand for at least two months. Consequently, the geoduck forecast for FY 20 is reduced by \$1.0 million to \$9.9 million.

In outlying years the geoduck forecast is also reduced by over \$2 million per year due to updated price forecast based on assumptions about tariffs, which are expected to continue through the beginning of 2021; Chinese consumption; and competition from farm and other luxury seafoods.

Total Revenues. Forecast revenues for the 2019-2021 Biennium (FYs 20 and 21) are decreased by 0.9 percent (\$4 million) to \$474 million. Revenues for the 2021-2023 Biennium are decreased by 1.0 percent (\$5 million) to \$489 million.

Notes to the Forecast. While we strive to produce an accurate forecast, there are a number of sources of uncertainty that may affect DNR revenue specifically, and the overall economic activity more broadly. These include: legal challenges to the newly determined 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 three months out; the trade-war and slow-down in the Chinese economy directly affecting timber and agricultural exports and prices, as well as affecting overall economic growth; uncertainty about future housing starts; a potentially weaker economic climate, though probably not an out-right recession; and the coronavirus outbreak, among other things.

The most concerning factor in this forecast is the uncertainty created by the novel coronavirus outbreak in China on top of the combined problem of a slowdown in housing construction (which may have turned around with strong starts in December 2019) and decreasing exports to China.

The coronavirus is an ongoing epidemic in China that began in early January, that, as of this writing, has infected more than 17,000 people and killed more than 150. There are currently more than 50 million people quarantined in a number of Chinese cities with many across the country self-quarantining or avoiding public places. The outbreak has had a massive impact on life and business in China.

For this forecast, we are assuming that the novel coronavirus outbreak is contained reasonably quickly, such that China begins returning to normal in March. Even with this timeline, geoduck revenue will be seriously affected, though we do not forecast timber or agricultural revenue to be affected. However, this is a fast moving and uncertain situation. If the disease starts spreading in other countries (there have only been a few cases of human-to-human transmission outside of China thus far) and it becomes a pandemic, then there could be broader economic consequences.

Countries that have had previous epidemics similar to the novel coronavirus have generally bounced back with stronger GDP in the year after the epidemic. We are not making that assumption in this forecast, leaving it as a potential upside in outlying fiscal years.

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

Although exports to China have dropped by almost 70 percent since 2014, it remains a meaningful export market for Washington logs. Demand is expected to continue to decrease in the coming years, but a faster than expected decline remains a downside risk for the forecast. The coronavirus outbreak could cause that drop in demand. However, we haven't included it in our forecast because there are already fewer exports to China and it seems, as of this writing, as though the coronavirus will only af-

fect first quarter economic growth in China.

Aside from the trade tensions discussed above, there are other things that could undermine Chinese demand, such as the current apparent slowdown in Chinese economic growth or continued loss of PNW market share to international and Southeastern U.S. competitors.

Domestic housing demand had been picking up and more than offset the decrease in China-bound exports—it appears that the strong log and lumber price growth from 2017 and the beginning of 2018 was due largely to housing construction. However, housing construction growth stalled in mid-2018, while the U.S. dollar became more expensive. Additionally, year-to-date through November 2019 exports to China were 35 percent lower than 2018, and that was before the coronavirus became an issue. The combination of these things undermined prices through 2019.

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

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

Table 1: February 2020 Forecast by Source (millions of dollars)

| Timber Sales | | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 | FY 23 | FY 24 | FY 25 |
|------------------------------|----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Volume (mmbf) | | 496 | 488 | 500 | 500 | 500 | 500 | 500 | 500 |
| | Change | | | - | - | - | - | | |
| | % Change | | | 0% | 0% | 0% | 0% | | |
| Price (\$/mbf) | | 458 | 325 | 330 | 340 | 340 | 340 | 340 | 340 |
| | Change | | | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| | % Change | | | 0% | 0% | 0% | 0% | 0% | 0% |
| Value of Timber Sales | | 227.1 | 158.8 | 165.0 | 170.0 | 170.0 | 170.0 | 170.0 | 170.0 |
| | Change | | | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| | % Change | | | 0% | 0% | 0% | 0% | 0% | 0% |
| Timber Removals | | | | | | | | | |
| Volume (mmbf) | | 528 | 502 | 520 | 520 | 510 | 529 | 500 | 500 |
| | Change | | | 8 | (6) | (3) | 0 | | |
| | % Change | | | 2% | -1% | -1% | 0% | | |
| Price (\$/mbf) | | 338 | 385 | 325 | 339 | 341 | 340 | 340 | 340 |
| | Change | | | (5.8) | 4.1 | 1.6 | 0.5 | | |
| | % Change | | | -2% | 1% | 0% | 0% | | |
| Timber Revenue | | 178.6 | 193.3 | 169.0 | 176.3 | 173.7 | 179.7 | 170.0 | 170.0 |
| | Change | | | (0.3) | 0.2 | (0.2) | 0.4 | - | - |
| | % Change | | | 0% | 0% | 0% | 0% | 0% | 0% |
| Upland Leases | | | | | | | | | |
| Irrigated Agriculture | | 10.4 | 8.9 | 8.7 | 8.7 | 9.0 | 9.0 | 9.0 | 9.0 |
| | Change | | | - | - | - | - | | |
| | % Change | | | 0% | 0% | 0% | 0% | | |
| Orchard/Vineyard | | 8.5 | 9.0 | 8.2 | 8.2 | 8.2 | 8.2 | 8.2 | 8.2 |
| | Change | | | - | - | - | - | | |
| | % Change | | | 0% | 0% | 0% | 0% | | |
| Dryland Ag/Grazing | | 6.6 | 6.6 | 5.7 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| | Change | | | (0.3) | - | - | - | | |
| | % Change | | | -5% | 0% | 0% | 0% | | |
| Commercial | | 10.9 | 10.2 | 10.4 | 10.8 | 10.8 | 10.8 | 10.4 | 10.4 |
| | Change | | | - | 0.4 | 0.4 | 0.4 | | |
| | % Change | | | 0% | 4% | 4% | 4% | | |
| Other Leases | | 9.8 | 10.0 | 10.2 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 |
| | Change | | | - | - | - | - | | |
| | % Change | | | 0% | 0% | 0% | 0% | | |
| Total Upland Leases | | 46.1 | 44.6 | 43.2 | 44.0 | 44.3 | 44.3 | 43.9 | 43.9 |
| | Change | | | (0.3) | 0.4 | 0.4 | 0.4 | - | - |
| | % Change | | | -1% | 1% | 1% | 1% | 0% | 0% |
| Aquatic Lands | | | | | | | | | |
| Aquatic Leases | | 12.0 | 13.5 | 11.3 | 11.2 | 11.2 | 11.2 | 11.2 | 11.2 |
| | Change | | | - | - | - | - | | |
| | % Change | | | 0% | 0% | 0% | 0% | | |
| Geoduck | | 26.4 | 23.6 | 9.9 | 10.2 | 12.0 | 12.6 | 13.2 | 16.4 |
| | Change | | | (1.0) | (2.4) | (3.0) | (2.7) | | |
| | % Change | | | -9% | -19% | -20% | -18% | | |
| Aquatic Lands Revenue | | 38.4 | 37.1 | 21.2 | 21.4 | 23.2 | 23.8 | 24.4 | 27.6 |
| | Change | | | (1.0) | (2.4) | (3.0) | (2.7) | | |
| | % Change | | | -5% | -10% | -11% | -10% | | |
| Total All Sources | | | | | | | | | |
| | | 263.1 | 275.0 | 233.3 | 241.7 | 241.1 | 247.8 | 238.3 | 241.5 |
| | Change | | | (1.6) | (1.8) | (2.8) | (1.9) | | |
| | % Change | | | -1% | -1% | -1% | -1% | | |

Table 2: February 2020 Forecast by Fund (millions of dollars)

| Key DNR Operating Funds | | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 | FY 23 | FY 24 | FY 25 |
|--------------------------------------|-------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 041 | RMCA - Uplands | 40.6 | 39.9 | 33.1 | 37.7 | 38.4 | 39.6 | 38.1 | 38.1 |
| | Change | | | (1.2) | (0.6) | (0.2) | 0.2 | | |
| | % Change | | | -3% | -2% | -1% | 0% | | |
| 041 | RMCA - Aquatic Lands | 17.6 | 16.7 | 8.9 | 9.0 | 9.9 | 10.2 | 10.5 | 12.1 |
| | Change | | | (0.5) | (1.2) | (1.5) | (1.4) | | |
| | % Change | | | -5% | -12% | -13% | -12% | | |
| 014 | FDA | 22.1 | 25.6 | 23.3 | 22.7 | 21.7 | 22.2 | 20.9 | 20.9 |
| | Change | | | 0.3 | 0.2 | 0.1 | 0.1 | | |
| | % Change | | | 1% | 1% | 0% | 0% | | |
| 21Q | Forest Health Revolving | 4.4 | 6.5 | 8.6 | 9.6 | 10.3 | 11.0 | 10.6 | 10.6 |
| | Change | | | (0.2) | 0.5 | 0.2 | (0.1) | | |
| | % Change | | | -3% | 5% | 2% | -1% | | |
| Total DNR Key Operating Funds | | 84.7 | 88.7 | 73.8 | 79.0 | 80.3 | 83.0 | 80.2 | 81.8 |
| | Change | | | (1.7) | (1.1) | (1.4) | (1.2) | | |
| | % Change | | | -2% | -1% | -2% | -1% | | |
| Current Funds | | | | | | | | | |
| 113 | Common School Construction | 62.6 | 64.2 | 58.2 | 62.4 | 63.5 | 65.2 | 62.9 | 62.9 |
| | Change | | | (1.1) | (1.3) | (0.3) | 0.3 | | |
| | % Change | | | -2% | -2% | -1% | 0% | | |
| 999 | Forest Board Counties | 59.6 | 69.5 | 59.1 | 56.1 | 53.3 | 54.4 | 51.3 | 51.3 |
| | Change | | | 2.0 | 0.6 | 0.2 | 0.1 | | |
| | % Change | | | 4% | 1% | 0% | 0% | | |
| 001 | General Fund | 2.1 | 1.9 | 3.9 | 4.1 | 3.6 | 3.6 | 3.3 | 3.3 |
| | Change | | | (0.1) | 0.4 | 0.1 | 0.0 | | |
| | % Change | | | -3% | 10% | 3% | 1% | | |
| 348 | University Bond Retirement | 3.2 | 1.3 | 1.4 | 2.1 | 1.9 | 1.9 | 1.8 | 1.8 |
| | Change | | | (0.8) | 0.1 | 0.0 | 0.0 | | |
| | % Change | | | -35% | 6% | 3% | 1% | | |
| 347 | WSU Bond Retirement | 1.6 | 1.4 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| | Change | | | (0.0) | 0.0 | 0.0 | 0.0 | | |
| | % Change | | | -1% | 0% | 0% | 0% | | |
| 042 | CEP&RI | 5.3 | 2.7 | 2.2 | 3.6 | 3.9 | 4.1 | 4.0 | 4.0 |
| | Change | | | (0.3) | (0.2) | (0.1) | (0.0) | | |
| | % Change | | | -13% | -6% | -2% | 0% | | |
| 036 | Capitol Building Construction | 6.2 | 9.8 | 5.5 | 6.5 | 7.2 | 7.7 | 7.4 | 7.4 |
| | Change | | | 0.3 | (0.4) | (0.2) | 0.0 | | |
| | % Change | | | 6% | -6% | -3% | 0% | | |
| 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 | | | -1% | 0% | 0% | 0% | | |
| Other Funds | | 1.1 | 1.2 | 1.1 | 0.3 | 0.2 | 0.2 | 0.1 | 0.1 |
| | Change | | | (0.0) | 0.1 | 0.0 | 0.0 | | |
| | % Change | | | -3% | 39% | 17% | 3% | | |
| Total Current Funds | | 141.7 | 152.1 | 133.2 | 136.9 | 135.3 | 138.9 | 132.7 | 132.7 |
| | Change | | | (0.1) | (0.8) | (0.2) | 0.5 | | |
| | % Change | | | 0% | -1% | 0% | 0% | | |

(Continued)

Table 3: February 2020 Forecast by Fund (millions of dollars), cont'd

| Aquatic Lands Enhancement Account | | | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 | FY 23 | FY 24 | FY 25 |
|--|----------|--------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 02R | | | 20.8 | 20.4 | 12.3 | 12.4 | 13.3 | 13.6 | 13.9 | 15.5 |
| | Change | | | | (0.5) | (1.2) | (1.5) | (1.4) | | |
| | % Change | | | | -4% | -9% | -10% | -9% | | |
| Permanent Funds | | | | | | | | | | |
| | 601 | Agricultural College Permanent | 4.2 | 4.1 | 8.2 | 4.9 | 4.0 | 3.9 | 3.6 | 3.6 |
| | | Change | | | 1.3 | 0.9 | 0.3 | 0.1 | | |
| | | % Change | | | 19% | 21% | 7% | 2% | | |
| | 604 | Normal School Permanent | 4.1 | 2.9 | 2.4 | 3.0 | 2.7 | 2.7 | 2.5 | 2.5 |
| | | Change | | | 0.1 | 0.4 | 0.1 | 0.0 | | |
| | | % Change | | | 3% | 13% | 4% | 1% | | |
| | 605 | Common School Permanent | 0.8 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| | | Change | | | - | - | - | - | | |
| | | % Change | | | 0% | 0% | 0% | 0% | | |
| | 606 | Scientific Permanent | 7.0 | 5.4 | 2.8 | 4.7 | 4.6 | 4.8 | 4.5 | 4.5 |
| | | Change | | | (0.8) | 0.0 | (0.0) | 0.0 | | |
| | | % Change | | | -22% | 1% | 0% | 0% | | |
| | 607 | University Permanent | 0.3 | 0.7 | 0.2 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| | | Change | | | 0.0 | 0.1 | 0.0 | 0.0 | | |
| | | % Change | | | 24% | 19% | 2% | 2% | | |
| Total Permanent Funds | | | 16.5 | 13.3 | 14.0 | 13.4 | 12.2 | 12.3 | 11.5 | 11.5 |
| | | Change | | | 0.6 | 1.3 | 0.4 | 0.1 | | |
| | | % Change | | | 5% | 11% | 3% | 1% | | |
| Total All Funds | | | 263.7 | 274.4 | 233.3 | 241.7 | 241.1 | 247.8 | 238.3 | 241.5 |
| | | Change | | | (1.6) | (1.8) | (2.8) | (1.9) | | |
| | | % Change | | | -1% | -1% | -1% | -1% | | |

Figure 1: Timber Forecast Charts

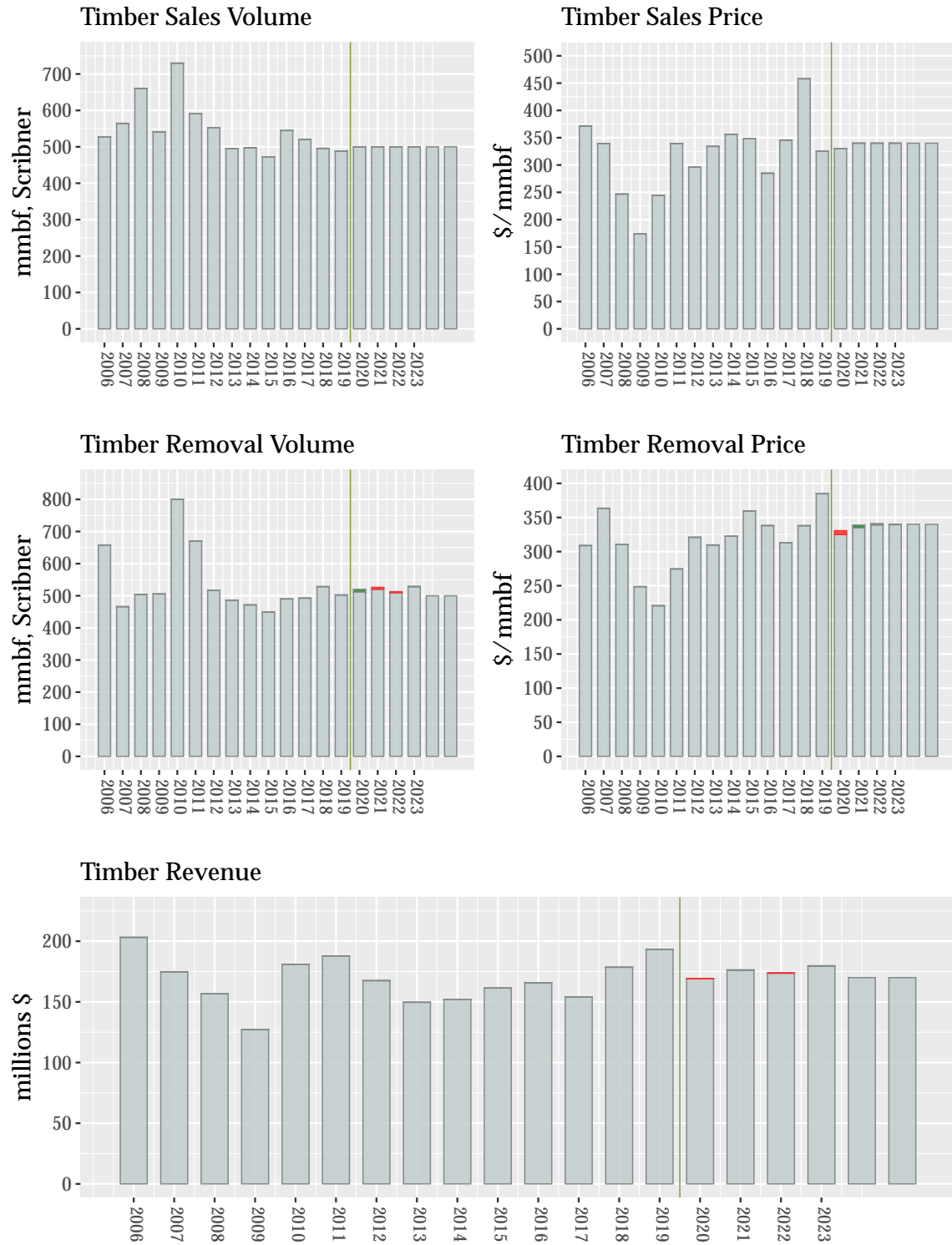


Figure 2: Other Uplands Forecast Charts

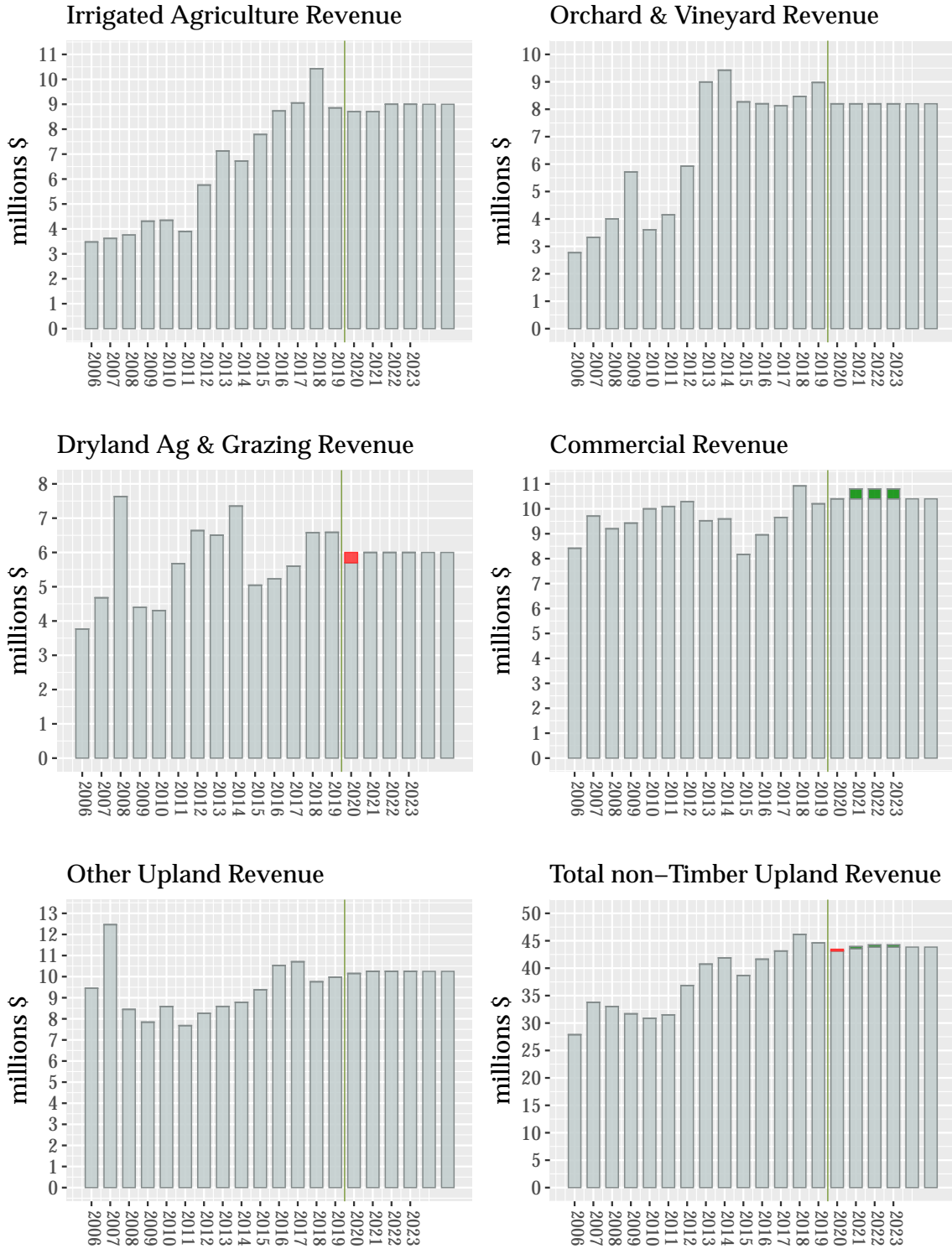
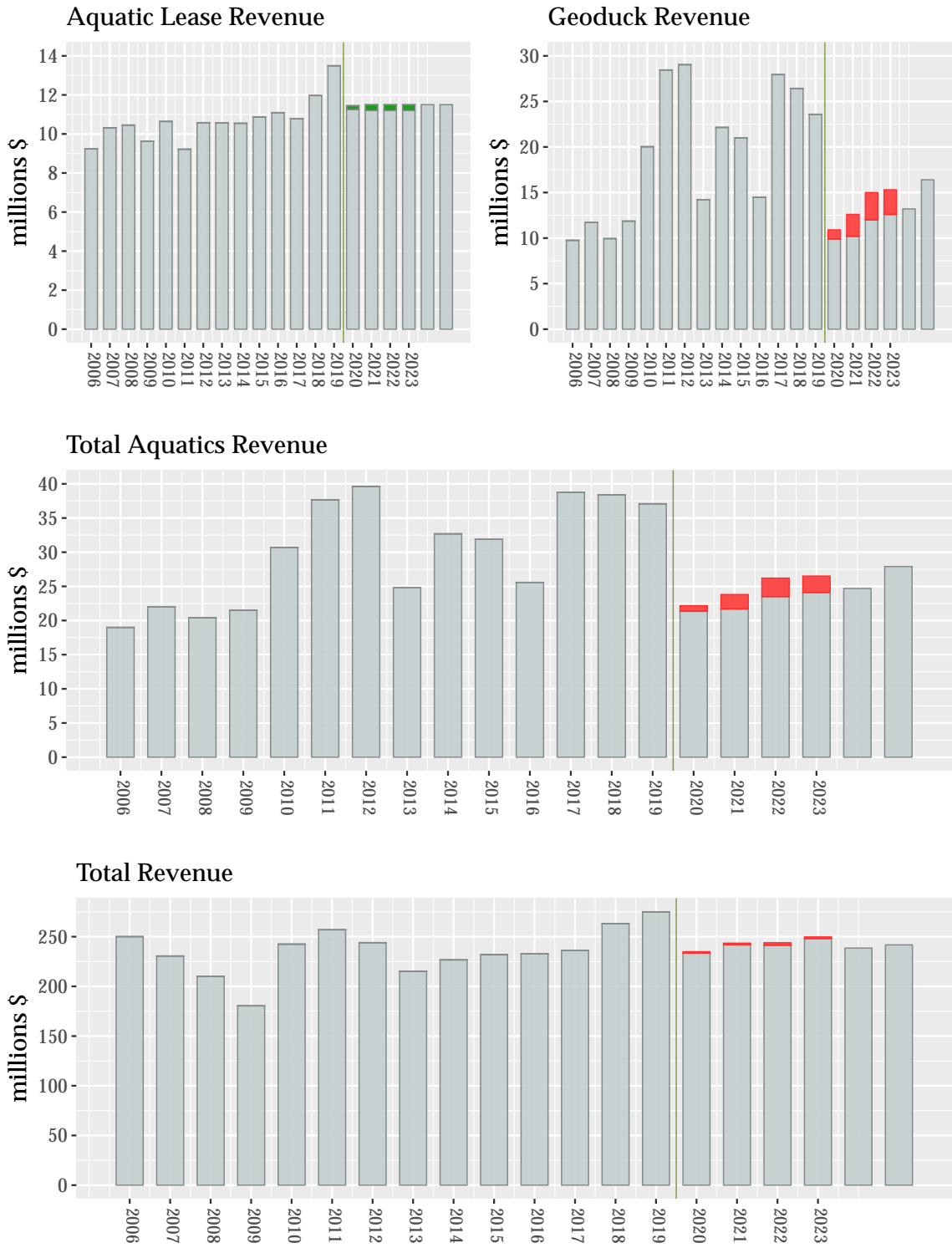


Figure 3: Aquatics and Total Forecast Charts



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Acronyms and Abbreviations

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

Preface

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

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

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

shows the anticipated schedule for future *Economic and Revenue Forecasts*.

This Forecast covers fiscal years 2020 through 2023. Fiscal years for Washington State government begin July 1 and end June 30. For example, the current fiscal year, Fiscal Year 2020, runs from July 1, 2019 through June 30, 2020.

The baseline date (the point that designates the transition from "actuals" to predictions) for DNR revenues in this Forecast is January 1st, 2020. 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 January 2020. 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 2020 | May 1, 2020 | June 15, 2020 |
| September 2020 | August 1, 2020 | September 15, 2020 |
| November 2020 | October 1, 2020 | November 15, 2020 |
| February 2021 | January 1, 2021 | February 15, 2021 |

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

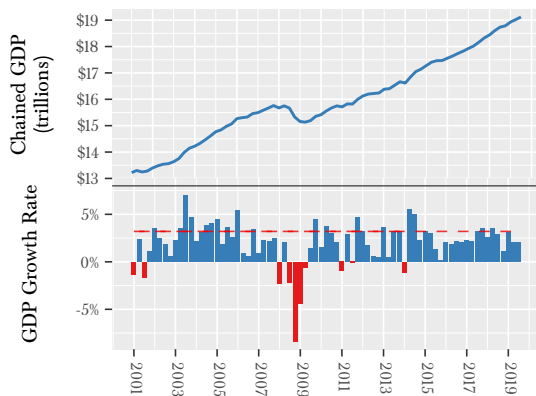
This section briefly reviews macroeconomic conditions in the United States and world economies because they influence DNR revenue—most notably through the bid prices for DNR timber and geoduck auctions and lease revenues from managed lands.

U.S. Economy

Gross Domestic Product

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

Figure 4: U.S. Gross Domestic Product



Typically, GDP growth rebounds after a recession, spiking to well above the historical average. For instance, after the recession in 1991, GDP grew 3.5 percent in 1992 and continued growing strongly

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

with a peak growth rate of 4.8 percent in 1999. However, this was not the case after the Great Recession in 2009. From the end of the Great Recession, during which GDP declined in five out of six quarters, to 2017, GDP growth averaged a relatively weak 2.2 percent on a real annualized basis (Figure 4). This is markedly less than the annualized average of 3.2 percent over the previous 50 years (1960-2009). The Great Recession set back economic growth and seriously harmed many sectors of the economy, with especially lasting effects on employment and wages.

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

Preliminary numbers show the GDP for 2019 having grown 2.3 percent. The FOMC signaled significant concerns about GDP growth throughout the year and decreased the funds rate twice since—to 2.25 percent in July and 2.0 percent in September.

The FOMC has a median prediction of 1.9 and 1.8 percent GDP growth in 2021 and 2022, but other forecasts are much lower, in particular, FEA has forecast in a short recession into 2021-2022.

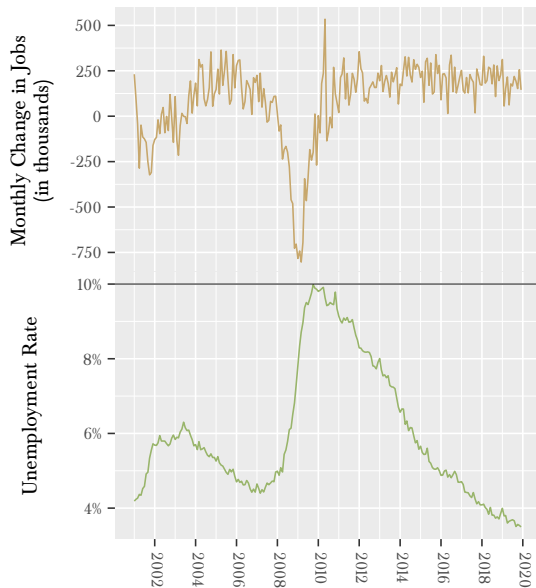
Employment and Wages

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

There were an average of 176,000 new jobs created per month in 2019. This is lower than the 2018 average of 223,000 jobs per month, but a slowdown

in job growth is expected as the economy gets close to operating at full capacity.¹

Figure 5: Unemployment Rate and Monthly Change in Jobs

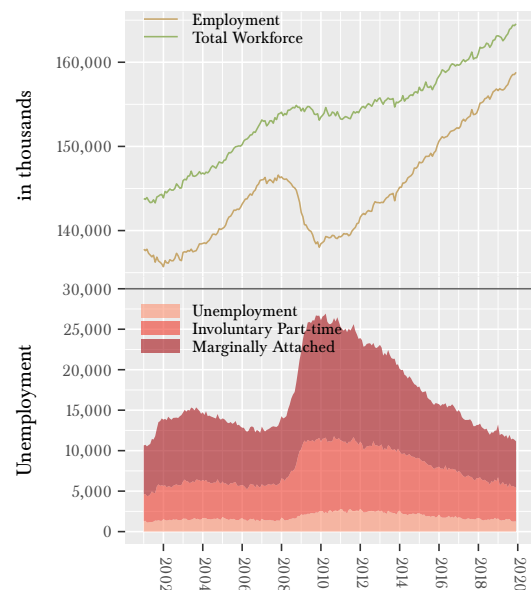


The unemployment rate is a useful indicator because it gives insight into slack in the labor market; that is, how many people are available to work before job growth drives wage growth that starts driving problematic inflation. The labor market is the driving force behind consumption, which constitutes about 70 percent of GDP and naturally extends to the demand for housing, a major driver of U.S. timber demand. Data and anecdotes abound that suggest that one of the major effects of high unemployment rates, particularly among young adults, is lower demand for housing as more people live with their parents or housemates.

One continual source of consternation for economists over the past several years has been the low unemployment rate combined with low inflation. Although the unemployment rate has declined and has been below the long run normal unemployment level expected by the FOMC, it has not yet translated into strong wage growth, which is likely a prerequisite for broader economic improve-

ment and an increase in the demand for housing, or higher inflation. One possible reason for this is that the headline unemployment rate may be underestimating the number of people willing to work. During the 2008-09 recession the number of people who were underemployed or marginally attached to the workforce increased dramatically. Additionally, from the beginning of the recession to mid-2015 the labor force participation rate declined significantly, falling by three percentage points from 66 percent to around 63 percent, where it has remained, possibly because workers left the labor force after they were unable to find jobs.

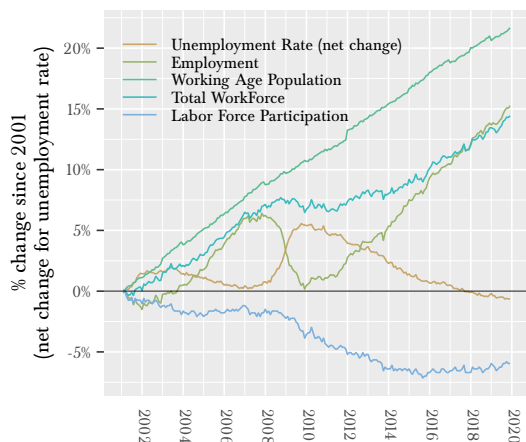
Figure 6: Employment and Unemployment



The U-6 is an alternative measure of unemployment that includes involuntarily part-time employment (underemployment) and marginally attached workers, who are not included in the headline unemployment rate but who, nevertheless, are likely to be looking for work and would benefit from better job prospects. The U-6 has declined from a high of 17.1 percent in 2010 to a low of 6.9 percent in September. This is lower than the average of 9.1 percent from 2001-2006 (Figure 6). The decline in the year-on-year U-6 is the result of a drop in all

three of its components.

Figure 7: Labor Market Indicators



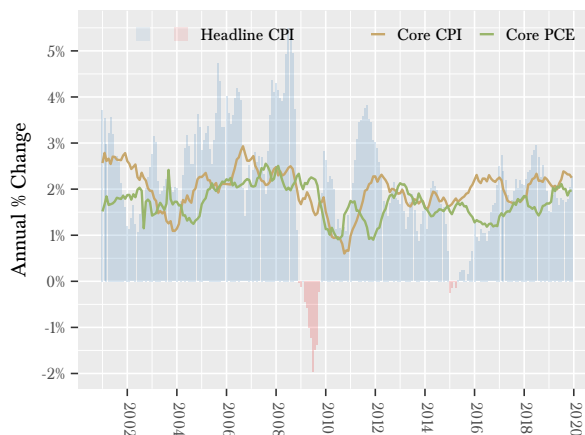
Reductions in the labor force participation rate helped move the unemployment rate and the U-6 lower roughly through January 2014 (Figure 7). The rate remained relatively stable between 62.4 and 63.0 percent until mid-2019. Since July 2019, it has risen to 63.2 percent.

The decline in the labor force participation rate is an important confounding factor when examining the unemployment rate and is a key consideration when forecasting whether an increase in employment will trigger an increase in wages and inflation. If there are many people waiting to search for employment until jobs are easier to find—such as when people stay out of the labor force and the participation rate declines—then as employment grows, more people will enter the labor force and there will be little or no pressure on wages despite a low unemployment rate. However, if people are not in the labor market for other reasons, then the unemployment rate is a more accurate reflection of the labor pool. In that case, a decrease in the unemployment rate means that there are fewer people looking for work, so in order to fill jobs companies will have to compete for labor, pushing up wages.

The increase in the labor force participation rate in the latter half of 2019 could be one of the reasons

that wage growth hasn't accelerated and inflation hasn't picked up.

Figure 8: U.S. Inflation Indices



Inflation

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

For policy purposes, the FOMC uses the core Personal Consumption Expenditures (PCE) index as the measure of inflation, which removes the more volatile fuel and food prices. This measure shows long-term inflation at or below the 2.0 percent target since September 2008. Core PCE growth 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. The FOMC expects core PCE to be in around 1.5 and 1.9 percent in 2020 and 2021, respectively.

Interest Rates

Interest rates are a powerful tool used by the Federal Reserve bank to influence the U.S. economy. An increase in interest rates will generally slow

down economic growth—business investment slows down because borrowing money becomes more expensive, so job and wage growth slow down (constraining consumption). Similarly, it becomes more expensive for consumers to borrow, impeding demand in the housing and auto markets. In normal times, a decrease in interest rates will expand investment, employment, wages, and consumer credit. The opposite of all of this is also true, decreasing or low interest rates can help drive economic expansion.

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

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

The mid-2019 FOMC meeting materials show that the Committee became much more uncertain about the strength of the economy and reduced their expectations for rates in both 2019 and 2020. In December they further revised down their outlook for 2020 and 2021, and now expect no interest rate increases in 2020 and only one in 2021. This is a significant change from the December 2018 meeting, where the FOMC expected to raise interest rates one to two times in 2019, leading to a federal funds rate between 2.6-3.1 percent, with further increases leading to 2.9-3.4 percent rates in 2020.

The U.S. Dollar and Foreign Trade

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

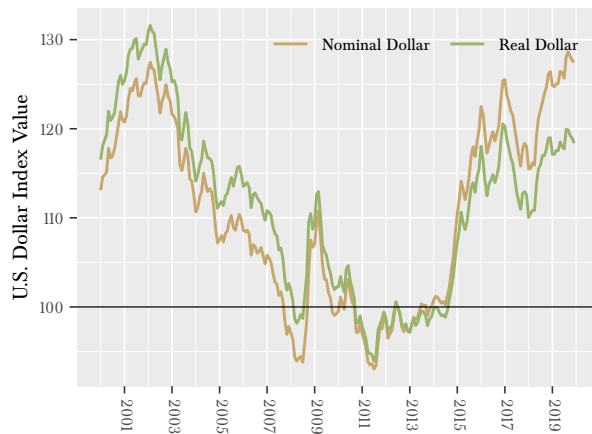
A rising dollar means that timber and lumber from the Pacific Northwest become more expensive for international buyers and, timber and lumber imported into the U.S. become less expensive. This will tend to suppress local prices and DNR's timber and agricultural revenues. Wildstock geoduck revenue will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

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

Although a 'Phase One' trade deal has been signed to deescalate the trade war, there doesn't appear to be actual changes to the tariffs that have been introduced. So, in addition to the high dollar pushing down export demand, the policies of the U.S. administration and the trade-war are likely to continue to suppress foreign demand and present a potential downside risk for DNR revenue. Currently, China is the main target of U.S. tariffs and it has imposed a number of tariffs on U.S. goods in response. Of the products relevant to DNR revenue, softwood logs are subject to a five percent tariff,

while geoduck, wheat, and many orchard/vineyard agricultural products (such as apples) are subject to a 25 percent tariff.

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

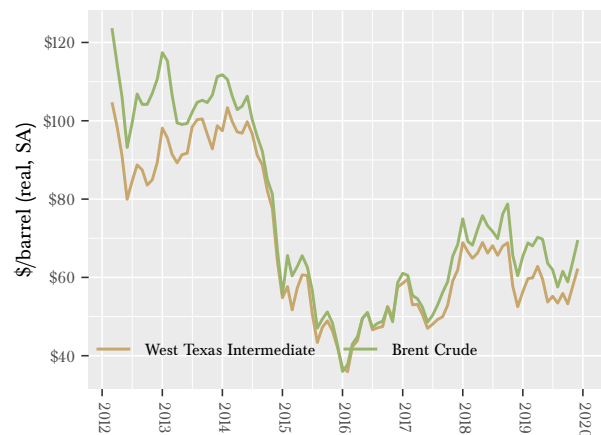


Chinese timber exports (Douglas-fir and Hemlock logs) had already fallen from a peak of 4.1 million m³ in 2011 to 1.7 million m³ in 2017 (unrelated to tariffs). Timber exports to China actually increased by two percent in 2018, but are 43 percent lower through November 2019.

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

Finally, China is the primary market for geoducks and the tariffs appear to have already had a large impact on the prices DNR receives. The average price of geoduck quotas in the last auction was less than half of the average price from FY 19, with tariffs being a major, but not singular contributor.

Figure 10: Crude Oil Prices



Petroleum

Broadly, a drop in oil prices acts like a tax cut for consumers and can encourage consumption. Additionally, all other things being equal, lower petroleum prices will decrease diesel fuel prices and will make transportation-sensitive industries—such as PNW logging and agriculture—more competitive in international markets. However, all other things are not equal: as discussed above, the U.S. dollar has been increasing, which will make PNW timber more expensive internationally, while tariffs are being introduced, making it less competitive still.

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

China

China is a major export market for logs, lumber, geoduck, and wheat and other agricultural products from the Pacific Northwest. Between 2011 and 2015, on average between 50 and 60 percent of the softwood log exports leaving the Seattle and Columbia

River Customs District have gone to China. Additionally, China is the primary export market for Washington's geoduck. Changes to the Chinese economy can have a dramatic impact on the prices for logs, lumber, and geoduck in the Pacific Northwest.

China started importing U.S. logs and lumber meaningfully in 2010 and provided support to prices in the worst years following the Great Recession in 2008-09, when U.S. housing construction was very low. However, Chinese demand has dropped dramatically since 2014. Year-to-date through November exports of untreated Douglas-fir and Hemlock logs from Washington and Oregon to China decreased by 67 percent between 2014 and 2019.

China's GDP and employment weathered the global economic and financial crises of 2008-09 better than most other economies. However, there have been concerns for several years that that resilience may be based on poor policy—the costs of propping up investment and maintaining significant political control over the economy. Although Chinese GDP growth has slowed from 10.4 percent in 2010 to 6.6 percent in 2018, it has not crashed. However, there are current indications that it is slowing markedly due to both business cycle factors and the trade war. This slowdown will be magnified by the effects of the novel coronavirus.

There remains some concern that Chinese GDP growth will fall much lower, possibly even into recession, with some analysts looking out for a 'Minsky moment'—a sudden sharp drop in economic activity triggered by excess debt. This risk is mostly due to the prominence of investment as a component of GDP, the huge amount of debt in the country, and the way that debt is held. Household and corporate debt (to non-financial corporations) ballooned from about 110 percent of GDP in 2008 to over 190 percent in 2014, and much of it is linked to real estate. Investment comprises almost 50 percent of China's GDP. At those levels of debt a slowdown in an economy can lead to a drop in income and an inability to service debt en-masse, potentially leading to a debt crisis that would undermine that investment and have a tremendous impact on

China's GDP.

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

Novel coronavirus

On January 9 the World Health Organization confirmed that a novel coronavirus had been isolated in a hospital patient in China. This happened in the lead-up to the Lunar New Year, one of the largest holidays in China where many millions of people travel and gather with their families to celebrate. After many more people were confirmed to have the disease and a number died, the Chinese government cancelled a number of public New Year celebrations. Later it quarantined the city where the outbreak started and then subsequently quarantined a number of other cities. The rapid spread of the disease, its apparent contagiousness and deadliness, and the quarantines have been tremendously disruptive to life in China. Many parts of the country are essentially shut down on a forced extension to the Lunar New Year holiday period, while many international airlines have suspended service, and Russia and Hong Kong have closed their land borders. Outside of the quarantined areas there are reports of people avoiding public places and gatherings. On January 30, the WHO declared the outbreak a public health emergency and encouraged the international community to help address it and protect against the virus's spread. It appears, as of drafting this forecast, that the spread of the virus has slowed, and is no longer growing exponentially.

In relation to DNR, the affect the coronavirus will have is highly dependent on the course of the outbreak. If, as it looks now, the outbreak is brought under control fairly swiftly, then its possible things will come back to relative normalcy by mid-to-late March. However, if the disease starts spreading in

other countries (there have only been a few cases of human-to-human transmission outside of China as of this writing) and becomes a pandemic, then the broader economic consequences could be enormous.

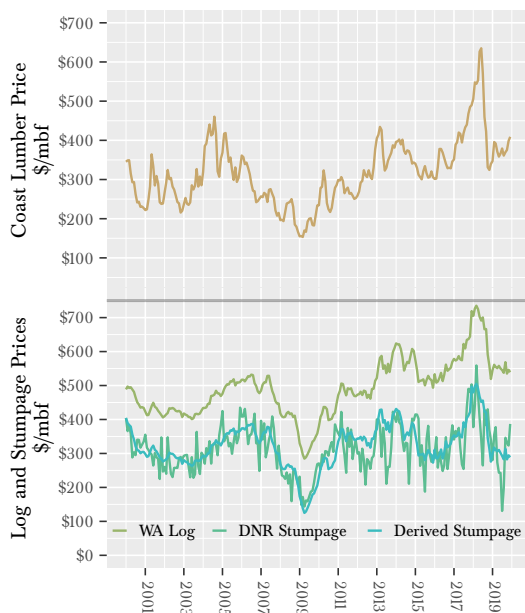
This forecast is assuming latter scenario, that the outbreak will soon be largely under control and that things will begin returning to normal sometime in March or April. It is assuming that there will be no noticeable affect on U.S. GDP growth, but will reduce Chinese GDP growth by some small amount. These reductions will not be enough to affect the annual timber or agricultural products demand, or, at least not affect them enough to be differentiated from the continued decline and affects of the tariffs. However, there will remain a significant effect on geoduck, disrupting the December harvest and the February auction and harvest.

Countries that have had epidemics similar to this have generally rebounded with stronger GDP in the year after the epidemic. We are not making that assumption in this forecast.

Wood Markets

Timber stumpage revenue constitutes about 70 percent of total DNR revenues on average. DNR is, therefore, vitally concerned with understanding stumpage prices, log prices, lumber prices, and the related supply and demand dynamics underlying all three. This section focuses on specific market factors that affect timber stumpage prices and overall timber sales revenue generated by DNR.

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

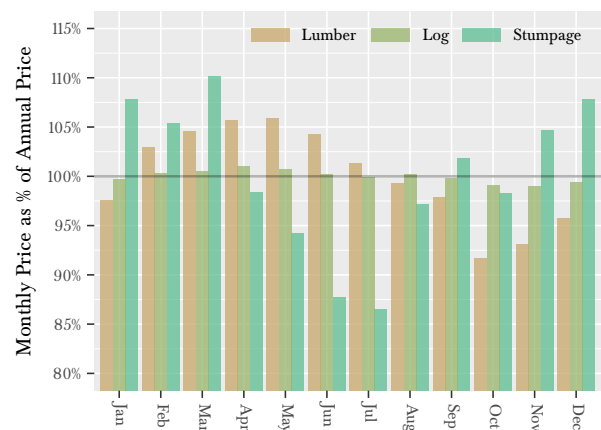


In general, timber stumpage prices reflect demand for lumber and other wood products, timber supply, and regional lumber mill capacity. There is a consistent, positive relationship between log prices and DNR's stumpage prices, despite notable volatility in stumpage prices (Figure 11). High log prices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

and the road-building requirements of a particular sale.

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

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



There are differences in price seasonality between lumber, logs, and stumpage, as illustrated in Figure 12. These prices are affected by a degree of seasonality that is largely the result of when each of these commodities will be used. For instance, lumber prices tend to peak in spring, when housing construction picks up, and decline through fall as demand wanes, while stumpage prices tend to be highest in January-March, when harvesters are lining up harvestable stock for the summer. DNR stumpage price volatility is also affected by the fire-fighting season and the quality of the stumpage

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

U.S. Housing Market

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

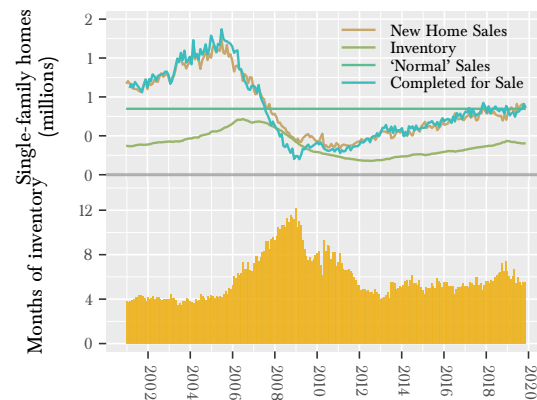
New residential construction (housing starts) and residential improvements are major components of the total demand for timber in the U.S. From 2000-2018 these sectors have averaged 69 percent of softwood consumption—37 percent going to housing starts and 32 percent to improvements—with the remainder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

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

New Home Sales

Unsurprisingly, new home sales plummeted during the recession, reaching a record low of 306,000 (SAAR) in 2011 before beginning a slow rise (Figure 13). New home sales increased from 440,000 (SAAR) in 2014 to an average of 616,000 in 2017, still well below the long-term (1963-2010) 'normal' rate of 678,000 sales per year. New home sales averaged 651,000 (SAAR) through May 2018, before dropping meaningfully to average 593,000 for June-December. Through November, 2019 new home sales have averaged and annualized 680,000 (SAAR) sales—this is the first time since before the Great Recession that sales have been above the 'normal' long term average.

Figure 13: New Single-Family Home Sales

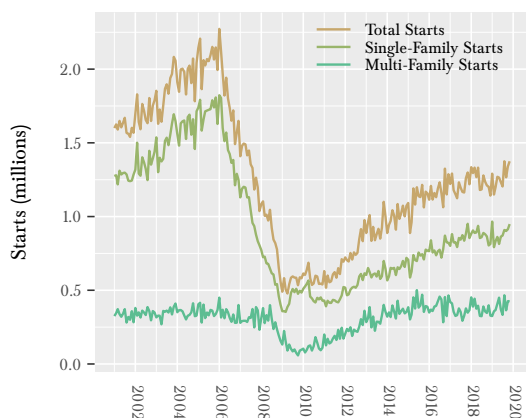


As low as new home sales fell, new home construction fell even lower from early 2007 through mid-2011, causing the inventory of newly built homes for sale to decline over the period. After bottoming out in July 2012 at 142,000 units, the inventory of new homes has crept up as construction slightly outpaced sales, averaging 314,000 homes in 2018. Since the beginning of 2019, inventory has started to slowly decline again, from 347,000 in January to 322,000 units in November.

Housing Starts

In April 2009, U.S. housing starts fell to the lowest point on record since the Census Bureau began tracking these data in 1959. U.S. housing starts picked up in 2011 and continued to rise, largely because of increases in multi-family starts. Single-family starts were more or less flat after the recession through 2012, but have been rising slowly since (Figure 14). Starts picked up meaningfully in the last quarter of 2019 to average 1.3 million (SAAR), above the as the 1.25 million average for 2018. Although these are well above the 2012 average of 0.78 million (SAAR), it is still well below the pre-recession long-term average of 1.6 million.

Figure 14: Housing Starts



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

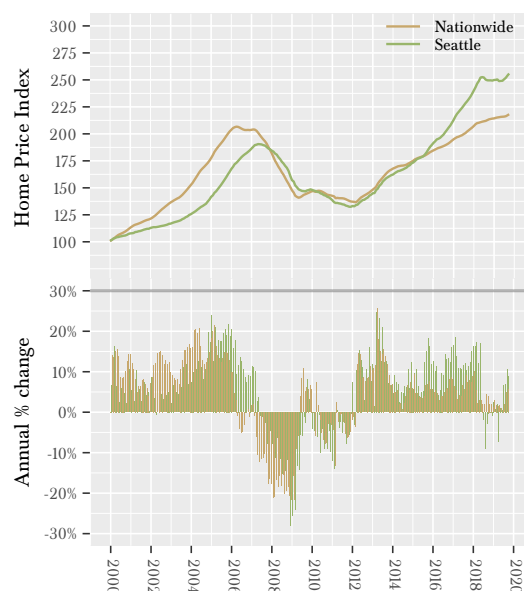
Builder confidence is no longer an impediment to housing starts, as estimates of confidence are consistent with housing starts of over 1 million. However, there are some supply impediments, such as the shortage of buildable lots and skilled workers, and permit delays. Given the lead time necessary to build houses, these are likely to cause volatility in both prices and supply. Additionally, recent research suggests that since the Great Recession there has been significant consolidation of local construction businesses, so that in many local areas they are able to exert market power, reducing supply and increasing prices.

In addition to the supply side impediments, there are constraints on demand limiting the market. These include persistently stringent lending standards, a continued tough labor market for younger workers, enormous student loan debt, and poor wage growth. It has been surprising how high prices

have risen given these constraints.

Given the current price of houses and builder confidence about the industry, it seems that the combination of supply and demand impediments are constraining starts.

Figure 15: Case-Shiller Existing Home Price Index



Housing Prices

U.S. housing experienced six unprecedented years of falling or flat prices following the recession. House prices started rising again only in 2012 as economic and employment indicators continued to improve. Figure 15 charts the seasonally adjusted S&P/Case-Shiller Home Price Index for the 20-city composite, which estimates national existing home price trends.

Nationally, the 20-city composite index has increased in most months since bottoming out in January 2012—its lowest point since October 2002, but growth has slowed significantly since May 2018. Seattle house prices had been growing much faster than national prices, doubling from its low in February 2012 to July 2018, while nationally house prices increased by 62 percent. From July 2018

Seattle house prices were essentially flat until August. Despite the recent pause in growth, the average Seattle home was worth over 30 percent more in November than its peak price before the recession (in nominal terms).

Generally, a recovery in house prices should facilitate the ‘move-up’ market, where homeowners sell their current home in order to buy a larger, more expensive one. An increase in the move-up market combined with low total inventories constraining the supply of existing housing should in general put upward pressure prices and provide incentives to build more houses. While that seems to be happening to a certain extent, its effect appears to be limited for a number of reasons. First, the price increases themselves are keeping people from the lower end of the market, meaning that prices have risen so much that homeowners are beginning to have difficulty selling at market rates. Second, Baby Boomers are retiring and many are looking to purchase smaller homes, creating a ‘move-down’ market. However, many of the houses being built are higher value—the median price of a new home built in December was \$331,000, while the average existing home was worth \$275,000. So people wanting to downsize are have difficulty finding appropriate houses.

Export Markets

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

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

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

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 m³ per year since 2009. China primarily imports hemlock, but 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.

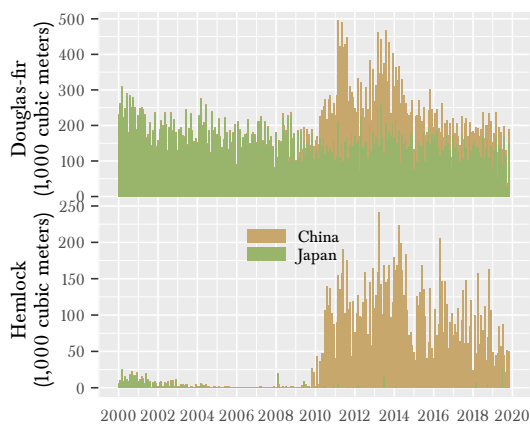
Figure 16: Log Export Prices



The trend of decreased exports to China is still ongoing, with hemlock exports from Seattle and the Columbia River Customs Districts falling from a peak of 1.7 million m³ in 2014 to 1.0 million m³ in 2018 and douglas-fir export falling from 2.2 million m³ in 2013 to 0.7 million m³ in 2018. Export volumes to China increased by two percent in 2018, while exports to Japan decreased by two percent. Year-to-date exports through November have decreased by 15 percent to Japan and by 36 percent to China.

The export premium appears to have shrunk since 2014 due to strong demand from recovering domestic markets and decreased demand from importing countries, China in particular. In the long run, the export premium may shrink further as West Coast log exports face stronger international competition and export prices are pushed down. Much will depend on supply constraints from key international suppliers and transportation constraints from the southeastern U.S.

Figure 17: Log Export Volume



Timber Supply

Since the beginning of the recession timber growth throughout the U.S. has generally exceeded timber harvest, increasing the timber inventory. However, strong log exports from the West Coast drove up harvests, so that inventory growth was slower than in other parts of the country, particularly the U.S. South. Harvests rebounded strongly enough in 2013-2014 that they began to exceed growth and the standing timber inventory fell. Since then, harvests have been slightly below, or just at the growth rate, leading to slightly increasing standing log inventory. However, this inventory is not large and the ability to increase harvests will be constrained—potentially leading to higher log prices if demand conditions are right.

Since the late 1990s British Columbian forests have been devastated by the mountain timber beetle,

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

The supply from Canada was further diminished by Quebec's allowable annual cut being reduced by Bill 57, which was implemented in April 2013, and may be additionally reduced by the 'North for All' plan.

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

Price Outlook

Lumber Prices

As shown in Figure 11, lumber prices increased in 2016 to average \$341/mbf and increased sharply in 2017 to average \$425/mbf. In June 2018, prices hit \$635/mbf, higher in real terms than any since 2000. However, from June 2018 prices dropped dramatically to a low of \$324/mbf in November 2018—a 47 percent drop. Prices through October 2019 have made a modest recovery to average \$371/mbf, but jumped to \$409/mbf in December 2019.

A drop in prices at the end of the third quarter 2018 was expected due to the end of the building season and increased supply from additional capacity being put online, but this drop was much larger than expected. In outlying years prices are expected to remain around the 2017 average, but will not reach the peaks of 2018. Prices for 2020 are expected to be around 10 percent higher than prices in 2019.

Log Prices

Figure 18 presents prices for Douglas-fir, hemlock, and DNR's composite log. The latter is calcu-

lated from prices for logs delivered to regional mills, weighted by the average geographic location, species, and grade composition of timber typically sold by DNR. In other words, it is the price a mill would pay for delivery of the typical log harvested from DNR-managed lands. The dark green line for the DNR composite log price on Figure 18 is the same as the light green line on Figure 11.

Readily visible on the graph is the decline in the premium for Douglas-fir between 2007 and 2014, due in large part to the Great Recession and then to Chinese demand driving up hemlock prices. Also readily visible is the drop in prices from late 2014 to early 2016 which was primarily driven by the slowdown in demand from China and ample regional supply of both logs and lumber.

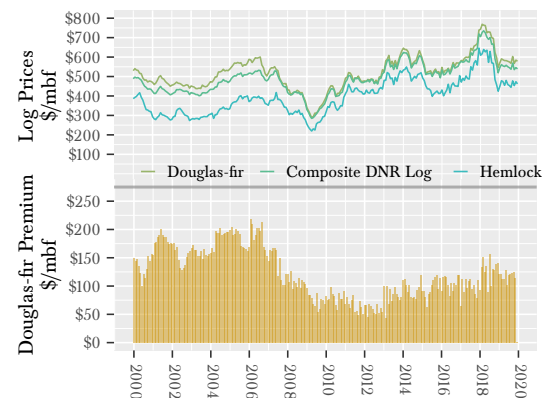
Stumpage Prices

Timber stumpage prices are the prices that successful bidders pay for the right to harvest timber from DNR-managed lands (Figure 19). At any time, the difference between the delivered log price and DNR's stumpage price is equivalent to the sum of logging costs, hauling costs, and harvest profit (Figure 11). Subtracting the average of these costs from the log price line gives us a derived DNR stumpage price.

When actual DNR stumpage prices differ significantly from the derived stumpage prices, a correction is likely to occur. In the November 2018 forecast, we noted that DNR actual stumpage prices were well above the inferred prices, suggesting that stumpage prices would be lower in the near future. That was correct—prices moved sharply lower from an October auction high of \$430/mbf, to a December auction average of \$340/mbf.

Since then, aside from higher prices in February and March 2019, stumpage auction prices continued to fall until September 2019. Since the September auction, prices have average \$349/mbf, though average stumpage for the year is still quite low at \$293/mbf.

Figure 18: DNR Composite Log Prices

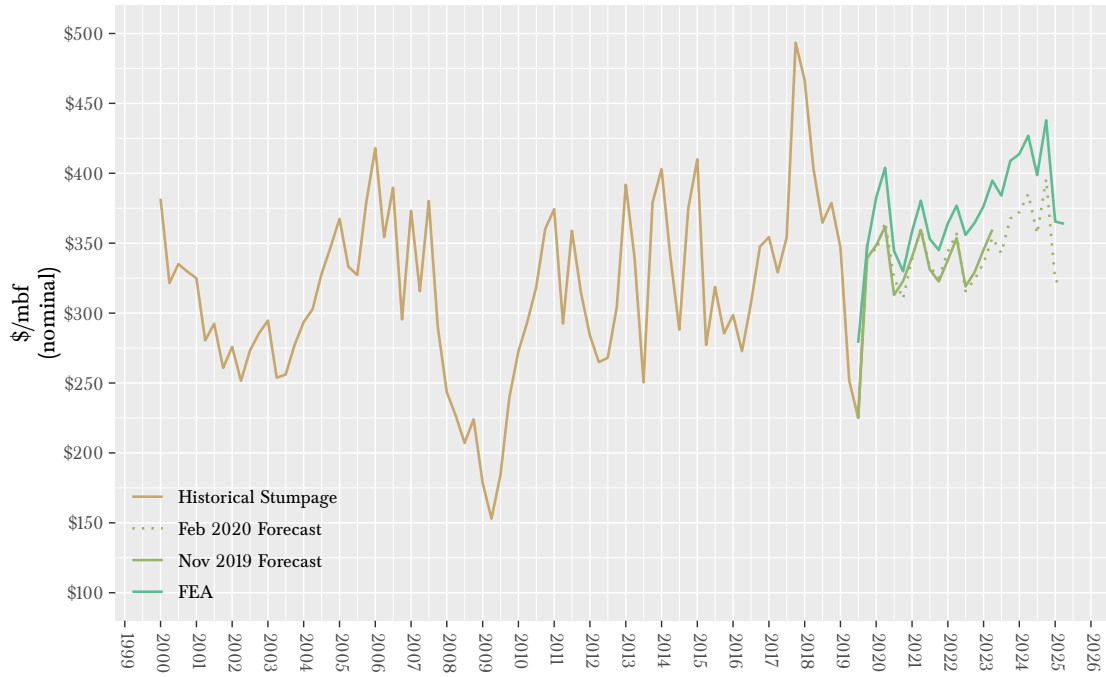


DNR Stumpage Price Outlook

DNR currently contracts with a forest economics consulting firm that provides log and timber stumpage price forecasts, as well as valuable insights into the housing, lumber, and timber markets. By modeling DNR's historical data on its price forecasts, we arrive at a stumpage price outlook (Figure 19, note that the FEA 'forecast' series reflects the species and class characteristics of typical DNR timber; the original series were West Coast averages, and are not shown).

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

Figure 19: DNR Timber Stumpage Price



DNR Revenue Forecast

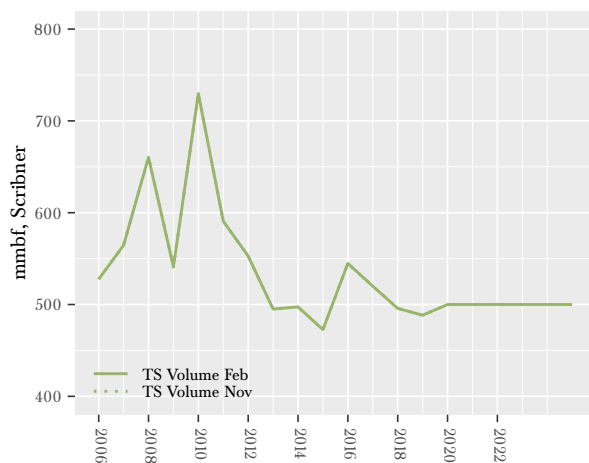
This Revenue Forecast includes revenue generated from timber sales on trust uplands, leases on trust uplands, and leases on aquatic lands. It also forecasts revenues to individual funds, including DNR management funds, beneficiary current funds, and beneficiary permanent funds. Caveats about the uncertainty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

Timber Revenue

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

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

Figure 20: Forecast Timber Sales Volume

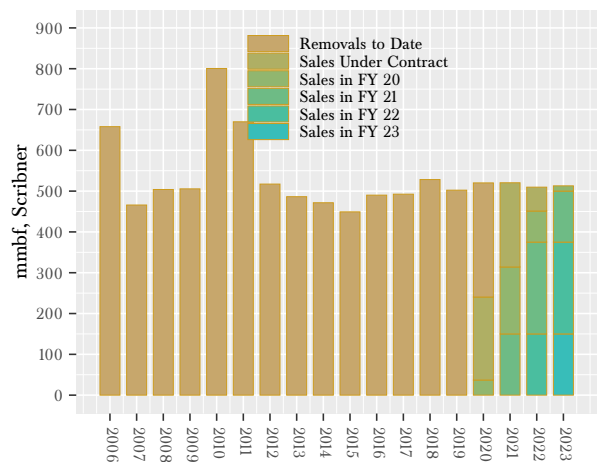


Timber Sales Volume

Sales volume forecasts for all years are unchanged (Figure 20). This is despite an increase in the number of contracts that were offered at auction that have been passed-in with no bids. DNR plans on offering for auction more than 600 mmbf for the fiscal year, but our volume forecast builds in the probability that some of those contracts offered will not be sold in this fiscal year, either because of no-bids or because they are pulled from auction.

FY15 was the first year of the new sustainable harvest decade (FY 15 through FY 24) for Western Washington, though new harvest targets for this sustainable harvest decade were not available until recently. 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 are forecast to be 450 mmbf for future years. Together with projected Eastside timber sales of 50 mmbf for each of the next several years, we arrive at a projected annual timber sales volume of about 500 mmbf for FYs 21-25.

Figure 21: Forecast Timber Removal Volume



Timber Removal Volume

The forecast FY 20 removal volume is increased to 520 mmbf (+8 mmbf) due to higher than expected harvest to-date. The FY 21 volume harvest forecast

is reduced to 520 mmbf (-0 mmbf, Figure 21). Removal volumes in outlying years are adjusted downward slightly.

Figure 22: Forecast Timber Sales Price

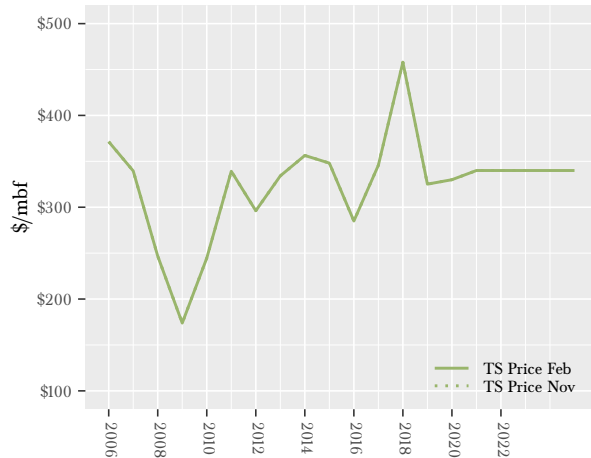
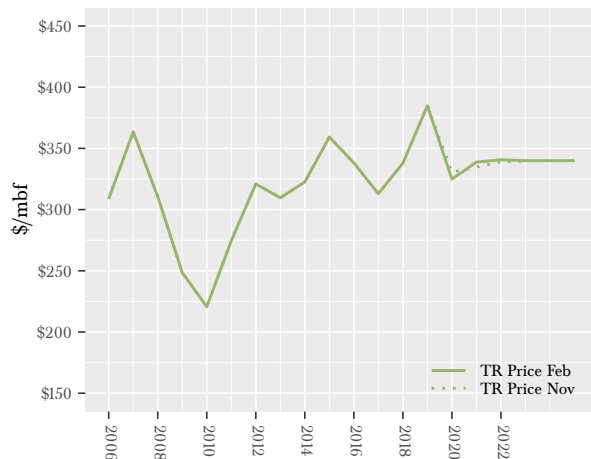


Figure 23: Forecast Timber Removal Price



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 sales price forecast for FY 20 was decreased in the September by

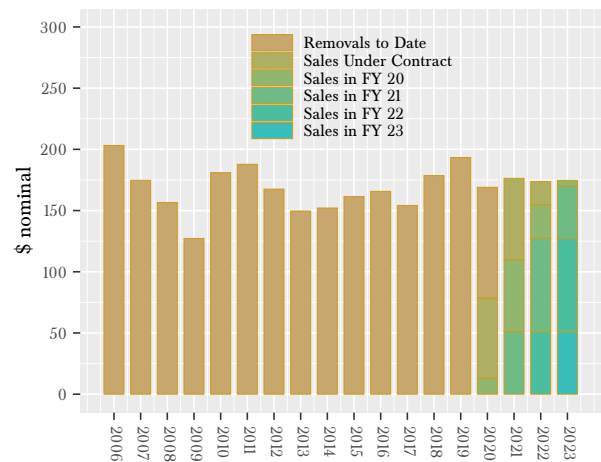
\$10/mmbf to \$330/mmbf due primarily to the very low prices from the July and August auctions, though these were on a relatively small auction volume. The sales price forecasts are unchanged in all years.

Timber Removal Prices

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

Removal prices in FY 20 are decreased by \$6/mmbf to \$325, due to a lower than expected average value for harvests to date. Prices for FY 21 and outlying years are increased slightly.

Figure 24: Forecast Timber Removal Value

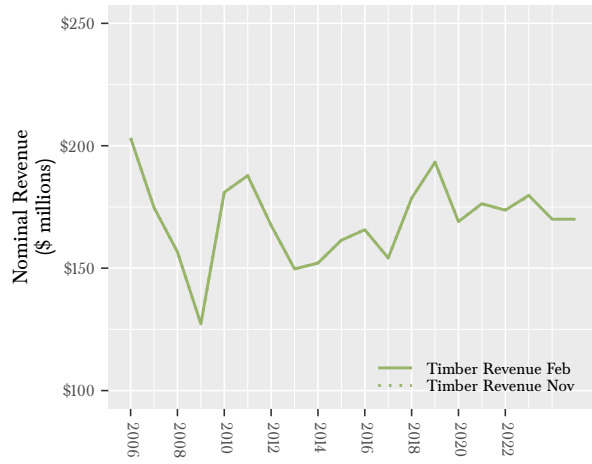


Timber Removal Revenue

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 2019-2021 biennium are uncharted at \$345 million while revenues for the 2021-2023 biennium are decreased by slightly to \$353 million.

Figure 25: Forecast Timber Removal Revenue

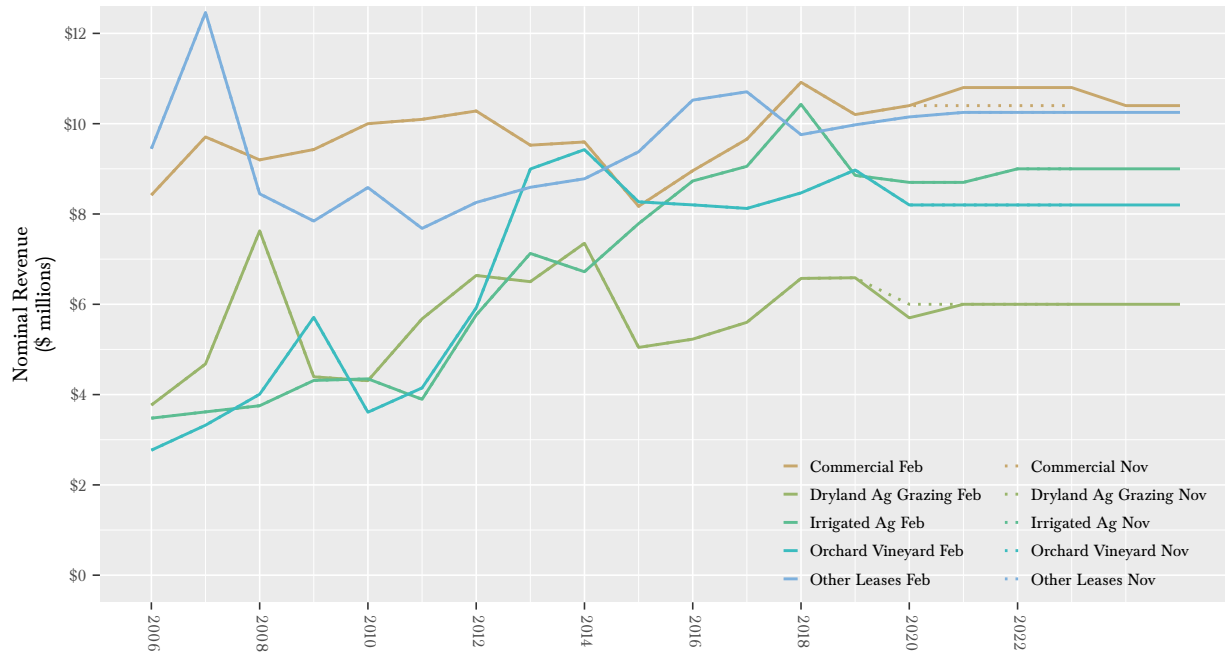


Upland Lease Revenues

Upland lease revenues are generated primarily from leases and the sale of valuable materials, other than timber, on state trust lands (Figure 26). Aside from dryland/grazing, which is reduced by \$0.3 million

to \$5.7 million, all other uplands forecast revenue are unchanged for FY 20. For outlying years, a new lease has increased the likely revenue from commercial sources, so the forecast for that source is increased by \$0.4 million to \$10.8 million per year.

Figure 26: Forecast Upland Lease Revenue



Aquatic Lands Revenues

Aquatic lands revenues are generated from leases on aquatic lands and from sales of geoduck. On average, leases account for one-third of the revenue while geoduck sales account for the remainder. However, prices for geoduck have plummeted since the beginning of the fiscal year so we are now forecasting geoduck to make up half or less of the aquatic lands revenue.

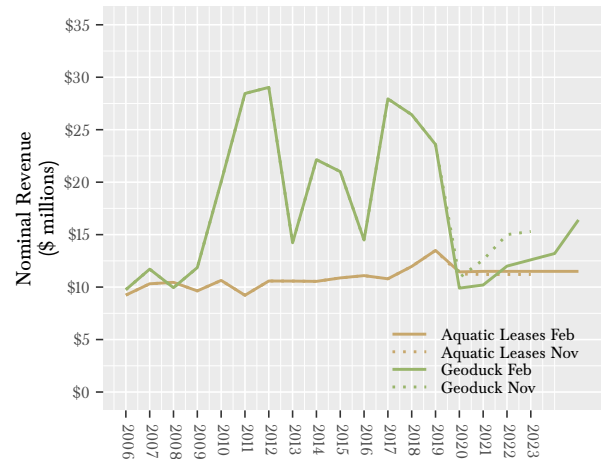
The aquatic lease revenue forecast increased by \$0.2 million in FY 20 and \$0.3 million in outlying years. An increase in revenue from water dependent rents is expected to bring in an additional \$0.3 million per year for all years, while easement revenue has been weak and is expected to subtract \$0.1 million from revenue in FY 20 (Figure 27).

The current geoduck forecast is based on the assumption that the coronavirus will not turn into a pandemic, but will remain a source of uncertainty and fear, and a powerful downward driver to Chinese demand for at least two months. It is likely that DNR will offer some sort of relief to purchasers of quotas from the December auction, but it is unclear whether that is the case at the time of writing. The December auction contracts have a harvest window between February 3 and March 27 and cover 283,000 pounds at an average price of \$4.08/pound—a total potential auction value of \$1.2 million. The forecast assumes that only 10% of the sold pounds at the December auction will actually be harvested.

Prior to the emergence of the coronavirus, the geoduck revenue was slated to be reduced due to comparatively very low prices since the August auction (Figure 28). The October auction prices was already particularly concerning because the harvest period overlapped with the Chinese New Year, historically these auctions are the highest prices DNR receives in a year. Aside from the coronavirus, price weakness in geoduck auctions are expected to continue as long as the 25 percent tariff to China continues. Additionally, there are media reports that Chinese consumers are starting to turn to other luxury seafood, suggesting that even after the tariffs are removed and the scare surrounding the coron-

avirus has abated, geoduck will have more competition and prices may not ever return to their previous highs.

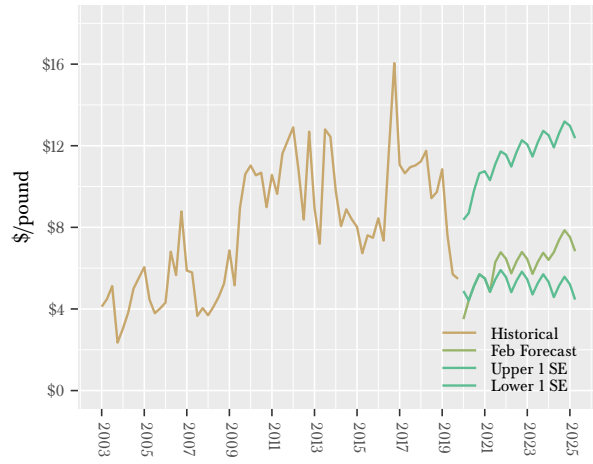
Figure 27: Aquatic Lands Revenues



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

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

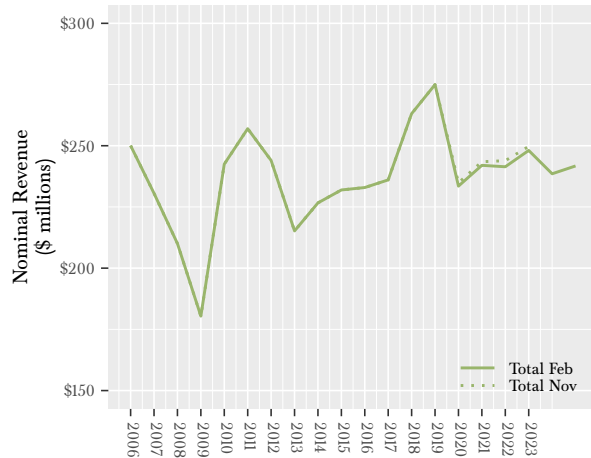
Figure 28: Geoduck Auction Prices



Total Revenues from All Sources

Forecast revenues for the 2019-2021 Biennium (FYs 20 and 21) are decreased by 0.6 percent (\$3 million) to \$475 million, and revenues for the 2021-2023 biennium are decreased by 0.8 percent (\$4 million) to \$489 million (Figure 29).

Figure 29: Total Revenues



Some Caveats

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

See the Forecast Summary for more details.

Distribution of Revenues

The distribution of timber revenues by trust are based on:

- The volumes and values of timber in the inventory (sales sold but not yet harvested) by trust;
- The volumes of timber in planned sales for FYs 20 by trust, and relative historical timber prices by DNR region by trust; and
- The volumes of timber by trust for FYs 21-23 based on provisional output of the sustainable harvest model and relative historical timber prices by DNR region by trust.

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

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

Management Fee Deduction. The underlying statutory management fee deductions to DNR as authorized by the Legislature are 25 percent or less, as determined by the Board of Natural Resources

(Board), for both the Resources Management Cost Account (RMCA) and the Forest Development Account (FDA). In biennial budget bills, the Legislature has authorized a deduction of up to 30 percent to RMCA since July 1, 2005. In 2015, they authorized a deduction up to 31 percent.

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

The Forecast uses the 31 percent deduction for the all forecast years. This assumes that the Legislature will approve RMCA deductions of up to 31 percent.

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

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