Draft Financial Analysis

of

Alternatives for Establishment of a Sustainable Harvest Level for Forested State Trust Lands in Western Washington

July 2017

WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES

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Table of Contents

Appendices

List of Tables

Appendix Tables

List of Figures

Appendix Figures

Acronyms

DNR	Washington State Department of Natural Resources
DEIS	Draft Environmental Impact Statement
FY	Fiscal Year
HCP	State Trust Lands Habitat Conservation Plan
MMBF	Million Board Feet
NAP	Natural Area Preserve
NRCA	Natural Resources Conservation Area
OESF	Olympic Experimental State Forest
RCW	Revised Code of Washington

Preface

This draft financial analysis is meant to complement the *Draft Environmental Impact Statement on Alternatives for Establishment of a Sustainable Harvest Level for Forested State Trust Lands in Western Washington (*released in December, 2016). Conducting this financial analysis is part of being a prudent trust lands manager.

DNR will finalize this analysis after the sustainable harvest final environmental impact statement has been completed and released.

Acknowledgements

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Introduction

The Washington State Department of Natural Resources (DNR) is establishing a sustainable harvest level for the fiscal year 2015 to 2024 planning decade for over 1.4 million acres of forested state trust lands in western Washington (refer to Text Box 1). The sustainable harvest level is defined in Revised Code of Washington (RCW) 79.10.300(5) as "the volume of timber scheduled for sale from state-owned lands during a planning decade as calculated by DNR and approved by the board." Setting a level is required by both DNR policy (DNR 2006) and state law (RCW 79.10.320).

Selection of a sustainable harvest level requires three key decisions by the Board of Natural Resources (board):

- Selection of an alternative for the long-term marbled murrelet conservation strategy (marbled murrelet strategy),

- Selection of an option for harvesting the arrearage from the 2005 through 2014 planning decade, and

- Selection of an option for thinning in riparian areas.

For this analysis, DNR modeled 36 possible combinations[1] of these alternatives and options, each of which will be referred to as a "scenario" in this financial analysis (the model will be discussed later in this analysis). **The purpose of this analysis is to provide financial projections to help the board understand how each scenario affects DNR's ability to meet its trust management obligations.**

Text Box 1. State Trust Lands

This analysis refers to "state trust lands" or "trust lands" to describe the following trusts defined under state law and managed by DNR.

- **State Lands** (RCW 79.02.010(14)): State lands are the approximately 3 million acres of lands granted to the territory of Washington by the Omnibus Enabling Act of 1889 (25 U.S. Statutes at Large, c. 180 p. 676) as a source of financial support for named beneficiaries, primarily public schools and colleges.

- **State Forest Lands** (RCW 79.02.010(13)): DNR manages two categories of State Forest Lands. *State Forest Transfer Lands* were acquired by 21 counties in the 1920s and 1930s through tax foreclosures and deeded to the state to be managed as state trust lands. *State Forest Purchase Lands* were either purchased by the state or acquired as a gift and managed similarly to State Lands.

Two other trusts are located within the analysis area, covering significantly fewer acres:

- **Community College Forest Reserve** (RCW 79.02.420): DNR manages more than 3,200 acres of forestlands for community colleges. These lands are managed for sustained timber production, but special consideration is given to aesthetics, watershed protection, and wildlife habitat.

- **King County Water Pollution Control Division State Trust Lands**: DNR manages more than 4,300 acres of state trust lands for King County and its Wastewater Treatment Division. These lands are managed for long-term forestry, the same as other state trust lands.

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[1] There are 48 possible scenarios, but DNR modeled only 36 because 12 scenarios would produce the same results as those scenarios that were modeled. Refer to "Key Understandings" under "Analysis Methods" later in this analysis for more information.

This analysis addresses these obligations as follows:

- **The generation of revenue for trust beneficiaries**

  The fiduciary aspect of trust management requires DNR to manage state trust lands to produce perpetual income for the beneficiaries (DNR 2006). To assess revenue generation, DNR provides projections for net present value for each scenario. Net present value is a financial term referring to the sum of both current and future cash flows. It is the cash inflow (revenue from timber sales) minus cash outflow (costs of forest management). Future revenues and expenses are expressed in terms of their equivalent in today's dollars. All future revenues and expenses are discounted by 2 percent per year back to the present date. The 10-decade net present value allows the scenarios to be compared for their long-term revenue production potential.

- **Ability to generate revenue in perpetuity**

  A percentage of revenue from each timber sale is placed in a management account. In this analysis, the funds placed into this account are referred to as "management funds." Management funds are used to cover the expenditures incurred in managing state trust lands.

  A rise or drop in the harvest level will cause a corresponding rise or drop in management funds, which would in turn affect DNR's management. This analysis includes a qualitative analysis of DNR's ability to continue managing state trust lands under each scenario, given the scenario's harvest level and likely total management funds.

- **Impartiality with respect to current and future beneficiaries**

  As a trust lands manager, DNR must comply with the common law duties of a trustee. One of those duties is to ensure intergenerational equity, meaning DNR cannot favor either present or future beneficiaries over each other (DNR 2006). To assess this obligation, DNR reports harvest volumes by decade under each scenario.

- **Maintaining the corpus of the trust**

  The corpus of the trust, or trust assets that are kept or used for the benefit of the beneficiaries, include all state trust lands plus the funds in certain dedicated accounts and permanent funds associated with the trusts (DNR 2006). Maintaining the corpus of the trust is part of prudent trust land management.

  In the analysis area (discussed later in this analysis), the corpus of the trust includes forested state trust lands that are available for both thinning and harvest, lands restricted to thinning only, and lands that are not available for harvest or thinning. Lands that are available for both thinning and harvest generate the most revenue for the trusts. Therefore, a change in the number of those acres may affect the corpus of the trust. In this analysis, DNR considers the number of acres available for thinning and harvest under each marbled murrelet strategy alternative.

Key Decisions

Following is a description of the three key decisions now facing the board: the marbled murrelet strategy alternatives, arrearage harvest options, and riparian thinning options.

Marbled Murrelet Strategy Alternatives

All six marbled murrelet strategy alternatives are described in detail in the *Draft Environmental Impact Statement on a* Long-*Term Conservation Strategy for the Marbled Murrelet* (marbled murrelet DEIS, DNR 2016b) and included in this analysis. Table 1 lists each alternative and the conservation acres (collectively referred to as long-term forest cover[2]) proposed under each.

Table 1. Summary of Conservation Acres Proposed Under Each Alternative (alt.)

	Alt. A (no action)	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Acres of existing conservation that may provide benefits to marbled murrelets depending on forest condition	583,000	583,000	583,000	583,000	583,000	583,000
Acres of additional, marbled murrelet-specific conservation	37,000	10,000	53,000	51,000	57,000	151,000
Total approximate acres of long-term conservation (long-term forest cover)	620,000	593,000	636,000	634,000	640,000	734,000

Arrearage Harvest Options

Arrearage occurs when the actual harvest volume is less than the sustainable harvest level set by the board for a planning decade (refer to Chapter 2.1 of the *Draft Environmental Impact Statement on Alternatives for Establishment of a Sustainable Harvest Level for Forested State Trust Lands in Western Washington* [sustainable harvest DEIS, DNR 2016a] for more detail).

The options for arrearage harvest in this analysis and the sustainable harvest DEIS are based on recommendations from a board subcommittee created to review arrearage from the fiscal year 2005 through 2014 planning decade. For each option, DNR specifies a harvest volume for each sustainable

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[2] Lands managed to maintain forest cover (relatively closed canopy structure) for conservation. Long-term forest cover may have current marbled murrelet habitat or have the capability to develop into the types of structurally complex forest needed for marbled murrelet nesting. Refer to Appendix G of the marbled murrelet DEIS (DNR 2016a) for more information.

harvest unit; however, DNR does *not* specify the specific areas in the unit from which the arrearage should be harvested. For example, DNR did not require arrearage volume to come from riparian areas, even though thinning in riparian areas was well below the volume projected for the fiscal year 2005 through 2014 planning decade.

The arrearage options are to:

- Harvest 702 MMBF proportionally from those sustainable harvest units with deficits over 5 years.

- Harvest 462 MMBF proportionally from those sustainable harvest units with deficits over 10 years.

- Harvest 462 MMBF proportionally from sustainable harvest units with deficits in 1 year, and then harvest the remaining sustainable harvest level volume for the decade over the next 9 years. Under this option, harvest would occur only in units with deficits in one year of the decade.

- Set harvest levels without specifying arrearage quantity.

The higher number (702 MMBF) represents the total arrearage from all sustainable harvest units with deficits. The lower number (462 MMBF) represents the total arrearage minus overages (harvested volume that exceeded the sustainable harvest level for a given planning unit). For more information on the arrearage options, refer to the sustainable harvest DEIS.

Riparian Thinning Options

The riparian thinning options differ only in the amount of riparian thinning that can occur in the five west-side Habitat Conservation Plan[3] (HCP) planning units, excluding the Olympic Experimental State Forest (OESF) (refer to Figure 1 on the following page). These riparian harvest volumes are only estimates, expressed as maximums rather than requirements. The model used for this analysis (refer to "Analysis Methods" later in this document) calculates the riparian volume that best meets DNR's management objectives for riparian areas. However, any activities in riparian areas would be assessed at the operational level for environmental and economic feasibility.

In riparian areas in the five west-side planning units (excluding the OESF) in the planning decade:

- Thin up to 10 percent of the total riparian area. Riparian areas in the five west-side planning units cover 346,000 acres and are composed of stream, wetland, and wetland buffers. Buffers range from 100 to over 190 feet wide, depending on stream type or wetland size. This option would limit thinning in riparian thinning areas to a maximum of 34,600 acres for the decade.

- Thin an area less than or equal to 1 percent of the acres thinned or harvested in non-riparian areas. For example, if DNR expected to harvest or thin 100,000 acres outside of riparian areas in the five west-side planning units, a maximum of 1,000 riparian acres could be thinned during the decade.

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[3] *State Trust Lands Habitat Conservation Plan (HCP)*, available at http://www.dnr.wa.gov/programs-and-services/forest-resources/habitat-conservation-state-trust-lands.

No difference in management of riparian areas is proposed for the OESF HCP planning unit. Thinning and limited harvest can occur in riparian areas in the OESF under the *OESF HCP Planning Unit Forest Land Plan* (DNR 2016c). For more information on the riparian thinning options, refer to the sustainable harvest DEIS.

Understanding This Analysis

Analysis Area

The analysis area is all DNR-managed forestlands in western Washington. Western Washington is defined in this analysis as lands in the Columbia, North Puget, OESF, South Coast, South Puget, and Straights HCP planning units. This area includes approximately 1.4 million acres of DNR-managed lands, which include state trust lands as well as natural area preserves (NAP) and natural resources conservation areas (NRCA).

The marbled murrelet conservation strategy will apply only to a subset of this area: all DNR-managed lands within 55 miles of all marine waters in western Washington (refer to Figure 1).

Analysis Scope

Although there are other sources of revenue on forested state trust lands in western Washington, this analysis looks at the financial impacts that may occur to the trusts from projected timber harvest *only*.

DNR collects revenue from leases for communication sites, non-timber forest

Figure 1. Analysis Area for the Sustainable Harvest Level and Marbled Murrelet Strategy

products such as salal, and other uses. In addition, some trusts include lands in eastern Washington, where agricultural leases generate substantial revenue. DNR did not include these sources of revenue in this analysis because they would be constant across all 36 scenarios. DNR also did not include other possible sources of revenue, such as revenues from carbon sequestration, because they are outside the scope of the sustainable harvest need and purpose (refer to Chapter 1.1 of the sustainable harvest DEIS), do not yet have a market, or are speculative.

Setting a sustainable harvest level does not foreclose other revenue-generating activities. Decisions on revenue from other sources, as well as decisions on when and where to harvest, are—and will continue to be—made at the operational level, after considering what is in the best interests of the trusts and following appropriate environmental review.

Analysis Methods

This analysis uses data from a forest estate model. A forest estate model is a powerful, computer-based tool that enables DNR to consider the entire land base at once to find efficient and effective ways to achieve multiple objectives (refer to Appendix F of the sustainable harvest DEIS for more detail).

The forest estate model used for this analysis (model) was programmed to calculate the sustainable harvest level associated with each scenario.[4] The model results provide harvest levels for a 10-decade period. The first decade in this period corresponds to fiscal years 2015 through 2024, also called the planning decade, for which the board will set the sustainable harvest level. The model reports harvest volume per decade, which for this analysis is broken out by sustainable harvest unit, trust, and individual counties for the State Forest Transfer Trust.

The model was programmed to maximize the long-term value of timber harvest from state trust lands while meeting all other management objectives. Specifically, the model maximized the 10-decade net present value (refer to the sustainable harvest DEIS, Appendix F) of timber harvest. Maximizing net present value is different from maximizing timber harvest volume. Maximizing volume produces a lower net preserve value because the costs of harvesting the extra volume exceed the additional revenue from that volume.[5]

The net present value numbers presented in this analysis take into account the economic assumptions described in Appendix F of the sustainable harvest DEIS. These assumptions are based on average prices and expenditures. Another assumption is that the management funds—which are used to cover expenditures—are 25 percent of revenue from timber sales from State Forest Transfer lands and 31 percent of revenue from all other trusts. Although average prices, expenditures, and management funds could vary in the future, DNR held them constant across all 10 decades in the model. Any change would affect each scenario proportionately and would therefore not affect the relative differences between them.

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[4] For this financial analysis, DNR modified the forest estate model used for the sustainable harvest DEIS in two ways: arrearage formulation and assumptions for northern spotted owl habitat. These changes are described in Appendix A.
[5] An example of this was provided in the October 17, 2016 special board meeting. Meeting presentation available at http://file.dnr.wa.gov/publications/em_bc_bnr_shc_october2016special_presentation.pdf

Key Understandings

Arrearage

As stated previously, there are two arrearage options for harvesting 462 MMBF:

- Harvest 462 MMBF proportionally from those sustainable harvest units with deficits over 10 years.

- Harvest 462 MMBF proportionally from sustainable harvest units with deficits in 1 year, and then harvest the remaining sustainable harvest level volume for the decade over the next 9 years.

The model reports harvest volume in decades, not years. Therefore, the model's output data for both of these options would be the same. In the majority of this analysis, DNR therefore provided results for the first option only (harvesting 462 MMBF over 10 years). However, DNR did consider the qualitative differences between these two options. These differences are discussed in the results section.

This analysis assumes arrearage volumes will be available for harvest in the planning decade. However, they may not be. For example, although not required, part of the arrearage may come from thinning in riparian areas. Yet any thinning that occurs in riparian areas in the planning decade would be assessed at the operational level for environmental and economic feasibility and may or may not occur. Note that riparian thinning during the fiscal year 2005 through 2014 planning decade was less than projected (Table 2).

Table 2. Actual Harvest in the Fiscal Year 2005 Through 2014 Planning Decade by Location and Harvest Activity Type

	Harvest		Thinning		Total	
	MMBF	% of projected volume	MMBF	% of projected volume	MMBF	% of projected volume
Riparian lands	0	N/A	48	20%	48	12%
Non-riparian lands	4,604	108%	386	45%	4,991	98%
Total	**4,604**	**(104%)**	**434**	**(40%)**	**5,038**	**92%**

Refer to Appendix C of the sustainable harvest DEIS for a more detailed discussion on the reasons for the current arrearage.

Recent Timber Revenue and Volumes

DNR tracks both the timber volume sold and the timber volume harvested. Sales contracts typically require timber harvest to occur within two years of sale. As a result, timber is frequently harvested in a different fiscal year than when it was sold. Most revenue is generated when timber is harvested.[6]

This being the case, this analysis uses the harvest volume from fiscal years 2011 through 2015 to represent baseline conditions for comparison of model results for each scenario. This period best represents current conditions because it was a time of financial stability, and because harvest volumes were not affected by the following:

- The ramp-up in volume associated with the last sustainable harvest calculation,[7]

- Adjustments following the 2007 recalculation of the sustainable harvest level, or

- The 2008 windstorm that affected southwest Washington.

In addition, by fiscal year 2011, department staffing levels had recovered from losses due to the economic downturn in 2009.

For fiscal years 2011 through 2015, harvest volume averaged 456 MMBF per year.[8] Converting this annual figure into a decadal level requires multiplying by ten. Therefore, harvesting an average 456 MMBF per year equates to 4,560 MMBF per decade. Appendix B contains the actual harvest volumes from fiscal year 2011 through 2015 for each sustainable harvest unit, each trust, and the State Forest Transfer Trust for each county. In the appendix, volumes are converted into volume per decade for comparison with model results, along with revenue generated for each trust from harvest of this timber.

How Data are Presented

Since there are six marbled murrelet strategy alternatives, three arrearage harvest options (excluding the one year option, refer to "Arrearage" under "Key Understandings" earlier in this document), and two riparian thinning options, there are 36 total scenarios. Tables that show results for all 36 scenarios list the marbled murrelet strategy alternatives in the left-hand column and the arrearage harvest and riparian thinning options in right-hand columns (Figure 2).

Tables are color coded to show the results for each scenario clearly. Cells with the lowest value are shown in shades of orange and those with the highest values are shown in shades of blue. Cells with the same value have the same color. Some tables have an additional column on the far right showing the recent harvest level for comparison. That column is shown in green.

Volume data are presented in millions of board feet (MMBF) per decade unless otherwise noted.

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[6] A portion of the total revenue from a sale is collected as a deposit prior to harvest.
[7] The ramp-up period occurred in 2005 and 2006. This was the adjustment in volume from the prior decade's harvest level to the level set in 2004. This level was subsequently adjusted in 2007.
[8] In this same period, sales volume was 468 MMBF per year.

Figure 2. Example of a Table Showing Results for all 36 Scenarios Plus Comparison to Recent Harvest Level

The cell with the red border is marbled murrelet strategy Alternative B with arrearage harvest of 702 MMBF and thinning of up to 10 percent of the riparian area. Since it is dark blue, it had a higher value than cells show in lighter shades of blue or shades of orange.

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	Amount
Alt. A	Amount	Amount	Amount	Amount	Amount	Amount	
Alt. B	Amount	Amount	Amount	Amount	Amount	Amount	
Alt. C	Amount	Amount	Amount	Amount	Amount	Amount	
Alt. D	Amount	Amount	Amount	Amount	Amount	Amount	
Alt. E	Amount	Amount	Amount	Amount	Amount	Amount	
Alt. F	Amount	Amount	Amount	Amount	Amount	Amount	

Results

Net Present Value

In Western Washington

Under the different scenarios, the 10-decade net present value of timber harvest from state trust lands in Western Washington ranged from $4.21 billion to $4.91 billion (Table 3).

Table 3. 10-decade Net Present Value of Each Scenario ($ billions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	4.77	4.71	4.77	4.70	4.75	4.67
Alt. B	4.91	4.85	4.91	4.85	4.89	4.81
Alt. C	4.72	4.66	4.72	4.65	4.70	4.62
Alt. D	4.72	4.66	4.72	4.66	4.70	4.62
Alt. E	4.70	4.64	4.70	4.64	4.68	4.60
Alt. F	4.30	4.25	4.30	4.25	4.28	4.21

EFFECTS OF MARBLED MURRELET STRATEGY ALTERNATIVES ON NET PRESENT VALUE

The marbled murrelet strategy alternatives have a larger impact on 10-decade net present value than either arrearage harvest or riparian thinning options.

Marbled murrelet strategy Alternative B produces the highest 10-decade net present value, followed by alternatives A, D, C, E, and, finally, F, regardless of arrearage or riparian thinning option. For example, the 10-decade net present value of Alternative B is approximately $600 (or roughly 12 percent) higher than Alternative F, no matter which arrearage harvest and riparian thinning option is selected.

The extent to which a trust or county may be impacted by the marbled murrelet strategy corresponds mostly to the number of acres of long-term forest cover in each trust or county. Figure 3 shows that as the number of acres of long-term forest cover increases, net present value decreases. Appendix C shows the

net present value for each trust and, for the State Forest Transfer Trust, for each county. Appendix D shows the results by sustainable harvest unit.

Figure 3. Effect of Long-term Forest Cover on 10-decade Net Present Value

From left to right, the columns of blue dots correspond to marbled murrelet strategy alternatives B, A, D, C, E, and F. The orange dots represent the alternatives analyzed in the sustainable harvest DEIS for potential environmental impacts (excluding the No Action alternative).
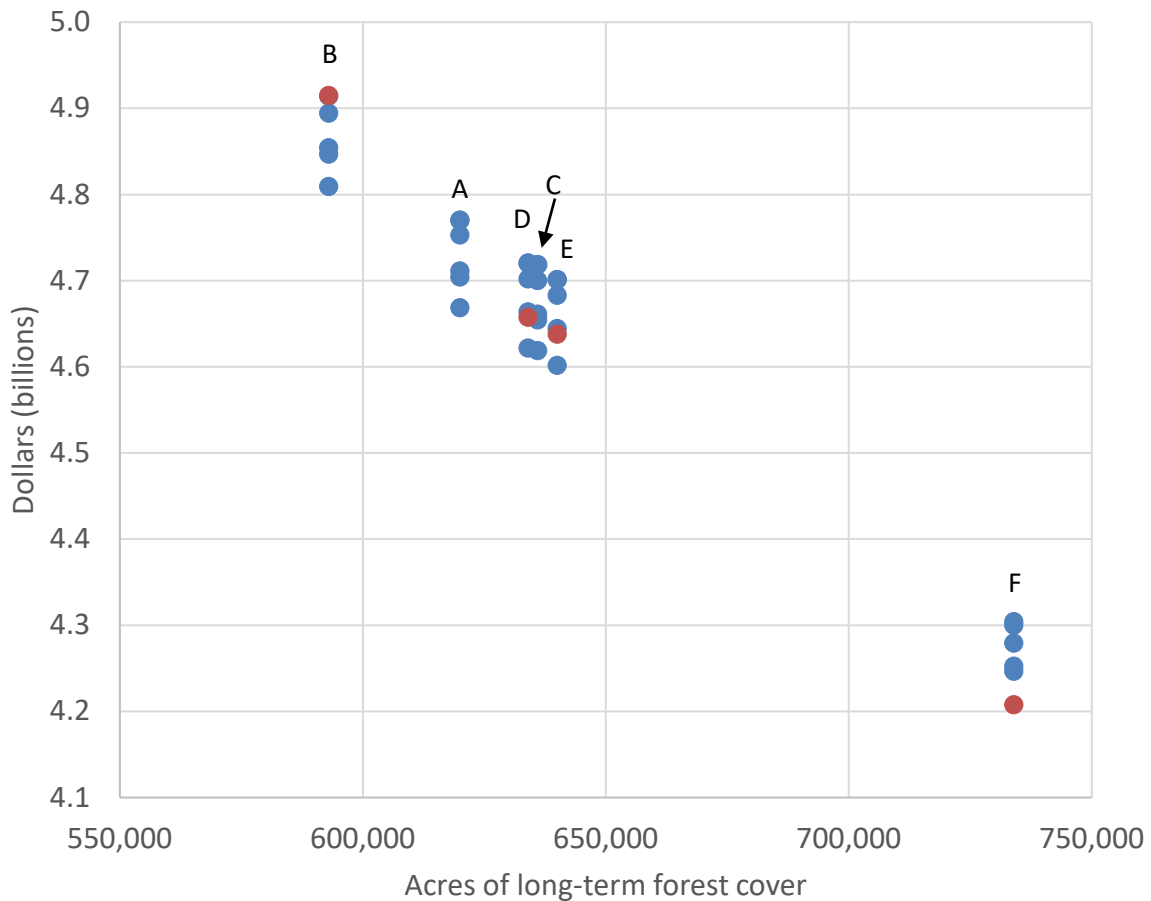
EFFECTS OF ARREARAGE HARVEST OPTIONS ON NET PRESENT VALUE

Arrearage harvest has a much smaller effect on 10-decade net present value than the marbled murrelet strategy. Arrearage of 462 MMBF and 702 MMBF of timber are both equivalent to the volume typically harvested by DNR over approximately 1 to 1.5 years, while 10-decade net present value spans 100 years of harvest.

All else being equal, net present value is up to $46 million higher for scenarios that include 702 MMBF of arrearage harvest than for those without a specific arrearage harvest volume. This difference ($46 million) is approximately 1 percent of 10-decade net present value.

EFFECTS OF RIPARIAN THINNING OPTIONS ON NET PRESENT VALUE

The effect of the riparian thinning level on 10-decade net present value is up to $85 million, or about 2 percent of the 10-decade net present value.

Scenarios that include the 10 percent riparian thinning option generate higher 10-decade net present values than scenarios that include the 1 percent thinning option. However, as will be discussed in the next section, scenarios with the 10 percent riparian thinning option sometimes result in *lower* harvest volume in the first decade.

By Trust and County

EFFECTS OF MARBLED MURRELET STRATEGY ALTERNATIVES ON NET PRESENT VALUE

The marbled murrelet strategy alternatives affect 10-decade net present values differently in the different trusts and counties. For example:

- For several trusts and counties, the 10-decade net present value is similar for alternatives A through E but substantially lower for Alternative F. For example, for the Scientific School Trust, the 10-decade net present value is at least 14 percent lower under Alternative F than the other alternatives (Table 4).[9]

- For State Forest Transfer Trust lands in Wahkiakum County, the 10-decade net present value is up to 48 percent lower under Alternative F than under Alternative B (Table 5; refer to Appendix C for 10-decade net present value and planning decade volumes for all trusts and counties).[10]

- For other trusts, such as State Forest Transfer Trust lands in Jefferson County, the marbled murrelet strategy alternatives have relatively little effect on 10-decade net present value (Table 5).[11]

Table 4. Effect of the Scenarios on 10-decade Net Present Value for Each Trust

Trust	Maximum 10-decade net present value ($ millions)	Magnitude of change in 10-decade net present value as a percent of maximum 10-decade net present value		
		Due to marbled murrelet conservation	Due to arrearage harvest	Due to riparian thinning
Agriculture School Grant	94	13%	2%	3%
Capitol Building Grant	310	16%	1%	2%
CEP&RI	114	22%	2%	3%
Common School and Indemnity	1,711	14%	1%	2%

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[9] A similar pattern occurs on the Common School and Indemnity Trust and the State Forest Transfer Trust in King, Lewis, Mason, Pierce, Skagit, Snohomish, and Whatcom counties.

[10] A similar pattern occurs on the Capitol Grant, CEPRI and CEPR Transferred, Normal School, Scientific School, State Forest Purchase, and University trusts, and in the State Forest Transfer Trust in Clallam and Pacific counties.

[11] A similar patter occurs on the Community College Forest Reserve and Water Pollution Control Division trusts, and State Forest Transfer Trust in Clark, Cowlitz, Grays Harbor, Jefferson, Kitsap, Skamania, and Thurston counties.

Trust	Maximum 10-decade net present value ($ millions)	Magnitude of change in 10-decade net present value as a percent of maximum 10-decade net present value		
		Due to marbled murrelet conservation	Due to arrearage harvest	Due to riparian thinning
Community College Forest Reserve	19	2%	1%	5%
Normal school	118	15%	2%	2%
Other	12	5%	1%	1%
Scientific School	200	17%	3%	3%
State Forest Purchase	392	3%	1%	2%
State Forest Transfer	1,781	11%	1%	1%
University Grant	134	31%	9%	1%
Water Pollution Control Division	30	1%	0%	2%

Table 5. Effect of the Scenarios on 10-decade Net Present Value for Each County with State Forest Transfer Trust Land

Note: total differs from State Forest Transfer maximum 10-decade net present value in Table 5 due to rounding.

County	Maximum 10-decade net present value ($ millions)	Magnitude of change in 10-decade net present value as a percent of maximum 10-decade net present value		
State Forest Transfer Trust				
		Due to marbled murrelet conservation	Due to arrearage harvest	Due to riparian thinning
Clallam	320	12%	1%	0%
Clark	88	0%	0%	1%
Cowlitz	37	0%	1%	3%
Grays Harbor	14	7%	0%	1%
Jefferson	57	4%	0%	1%
King	59	10%	0%	1%
Kitsap	22	0%	0%	1%
Lewis	162	19%	1%	2%
Mason	108	0%	0%	1%
Pacific	52	27%	1%	4%
Pierce	28	36%	1%	2%
Skagit	277	17%	0%	1%
Skamania	108	1%	3%	1%
Snohomish	217	11%	0%	2%
Thurston	104	2%	0%	1%
Wahkiakum	48	48%	1%	4%
Whatcom	81	25%	1%	2%

EFFECTS OF ARREARAGE HARVEST OPTIONS ON NET PRESENT VALUE

Similar to the results at the scale of western Washington, the effect of the arrearage harvest options is relatively small at the scale of individual trusts and counties. An example is the 10-decade net present value for State Forest Transfer Trust lands. For this trust, the difference in 10-decade net present value under the 702 MMBF arrearage harvest option and the no specific arrearage option is only 3 percent (Table 6).

Some counties do not have arrearage from the fiscal year 2005 through 2014 planning decade. In these counties, the arrearage option has no effect on 10-decade net present value.

Table 6. 10-decade Net Present Value for State Forest Transfer Trust lands in Skamania County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	108	107	107	106	105	104
Alt. B	108	107	107	106	105	104
Alt. C	108	107	107	106	105	104
Alt. D	108	107	107	106	105	104
Alt. E	107	107	107	106	105	104
Alt. F	108	107	107	106	105	104

EFFECTS OF RIPARIAN THINNING OPTIONS ON NET PRESENT VALUE

Similar to the results at the scale of western Washington, the effect of riparian thinning options on 10-decade net present value is relatively small at the scale of individual trusts and counties. For example, for Common School and Indemnity Trust lands, the difference in 10-decade net present value is about 2 percent between the riparian thinning options. This difference is similar in other trusts and counties (Table 7).

Table 7. 10-decade Net Present Value for Common School and Indemnity Trust Lands ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	1,679	1,654	1,679	1,652	1,674	1,638
Alt. B	1,711	1,685	1,709	1,683	1,704	1,670
Alt. C	1,664	1,639	1,664	1,637	1,655	1,621
Alt. D	1,655	1,631	1,655	1,628	1,648	1,614
Alt. E	1,659	1,636	1,659	1,633	1,651	1,617
Alt. F	1,476	1,456	1,477	1,457	1,477	1,449

Harvest Volume

In Western Washington

In western Washington, the planning decade timber harvest volume under the scenarios ranges from 3,800 MMBF to 4,961 MMBF (Table 8). The *annual* harvest level for each scenario varies depending on the arrearage option (refer to Appendix E).

Over 10 decades, the decadal harvest level follows a general pattern (Figure 4) in which the harvest level decreases from decades 1 to 2, increases in Decade 3, decreases from decades 3 to 6, and then increases through Decade 10.

Table 8. Planning-decade Timber Harvest Volume of Each Scenario (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	4,686	4,704	4,681	4,642	4,497	4,384

Alt. B	4,961	4,926	4,955	4,859	4,772	4,656
Alt. C	4,646	4,653	4,639	4,596	4,455	4,350
Alt. D	4,671	4,666	4,666	4,610	4,483	4,378
Alt. E	4,624	4,638	4,624	4,582	4,441	4,338
Alt. F	4,026	4,110	4,021	4,039	3,910	3,800

Figure 4. 10-decade Harvest Levels Under Each Scenario

Scenarios with the maximum, median, and minimum 10-decade net present values* are shown in blue, red, and green, respectively; other scenarios are in gray.
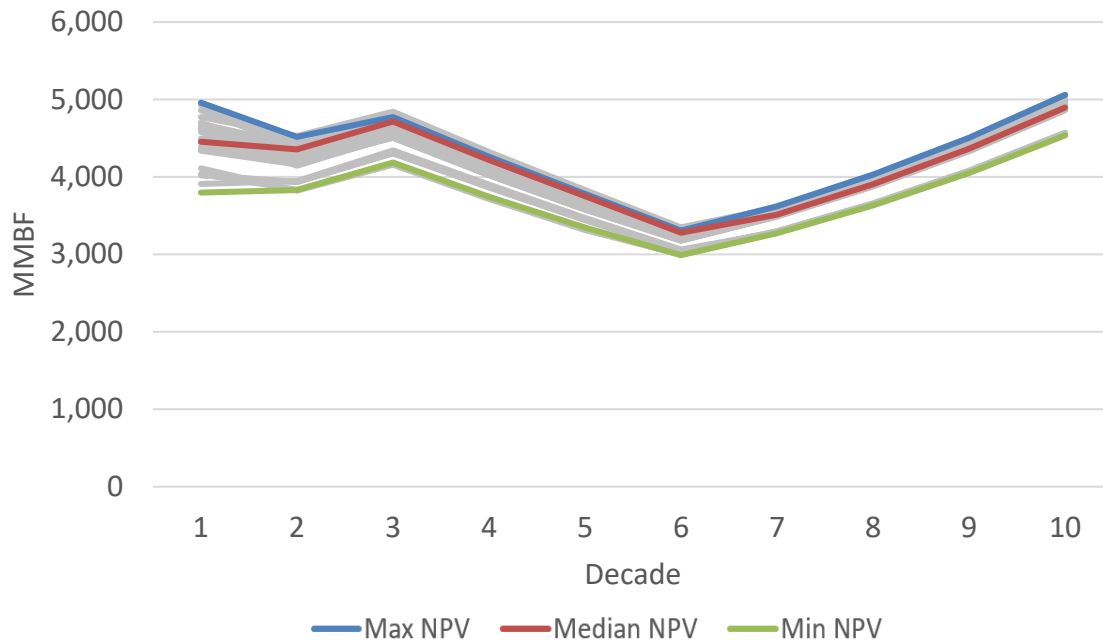
* The scenario with the maximum net present value is the combination of marbled murrelet strategy Alternative B, 702 MMBF of arrearage harvest option, and 10 percent riparian thinning option. The scenario with the median net present value (18th highest of 36 scenarios) is the combination of marbled murrelet strategy Alternative C, no specific arrearage harvest option, and 10 percent riparian thinning option. The scenario with the minimum net present value is the combination of marbled murrelet strategy Alternative F, no specific arrearage harvest option, and 1 percent riparian thinning option.

EFFECTS OF MARBLED MURRELET STRATEGY ALTERNATIVES ON HARVEST VOLUME

Results for harvest volume are similar to those for net present value. Alternative B produces the highest planning decade harvest volume, followed by alternatives A, D, C, E, and, finally, F. Alternative B produces between 820 and 934 MMBF (17 to 23 percent) more harvest volume in the planning decade than Alternative F, regardless of arrearage harvest or riparian thinning option (Figure 5). The effects of

marbled murrelet strategy alternatives on harvest volume moderate over time, but generally exceed 350 MMBF per decade.

As with 10-decade net present value, the effect of the marbled murrelet strategy alternatives on planning decade harvest volumes differs by trust and county (Tables 9 and 10)

Figure 5. 10-decade Harvest Volume by Area of Long-term Forest Cover

From left to right, the columns of dots correspond to marbled murrelet strategy alternatives B, A, D, C, E, and F. The orange dots represent the alternatives analyzed in the sustainable harvest DEIS for potential environmental impacts (excluding the No Action Alternative).
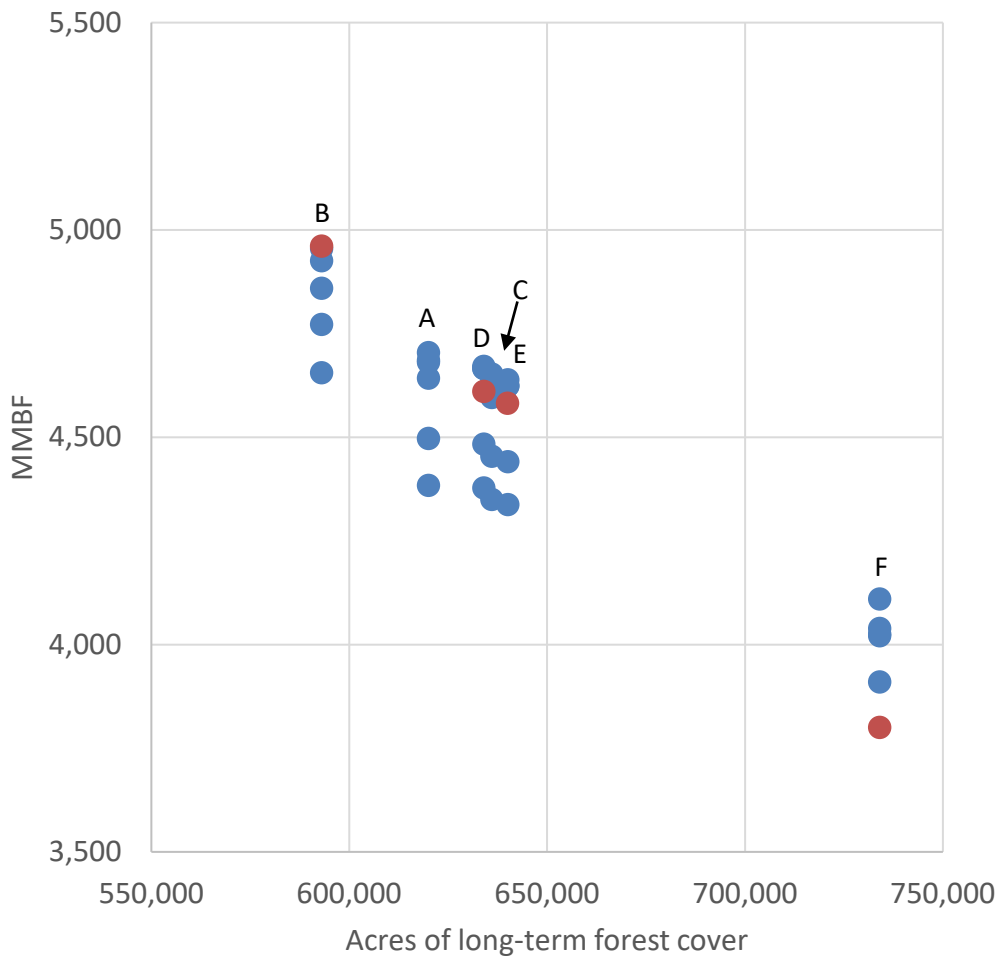
Table 9. Effect of the Scenarios on Planning Decade Harvest Volume for Each Trust

Trust	Maximum planning decade harvest volume (MMBF)	Magnitude of change in planning decade harvest volume as a percent of maximum planning decade harvest volume		
		Due to marbled murrelet conservation	Due to arrearage harvest	Due to riparian thinning
Agriculture School Grant	119	25%	19%	7%
Capitol Building Grant	434	18%	5%	3%
CEP&RI	134	33%	11%	4%
Common School and Indemnity	1,628	27%	8%	4%
Community College Forest Reserve	5	8%	40%	0%
Normal school	105	30%	19%	2%
Other	27	0%	4%	4%
Scientific School	292	24%	19%	3%
State Forest Purchase	421	7%	8%	1%
State Forest Transfer	1,660	13%	3%	2%
University Grant	163	44%	40%	2%
Water Pollution Control Division	12	4%	8%	2%

Table 10. Effect of the Scenarios on Planning Decade Harvest Volume for Each County with State Forest Transfer Trust Land

Note: The sum of maximum planning decade harvest volumes in Table 10 is different than the maximum planning decade harvest volume shown in Table 9 for State Forest Transfer trust land. The reason, is that no single scenario produces the maximum planning decade harvest volume in every county at once.

State Forest Transfer Trust County	Maximum planning decade harvest volume (MMBF)	Magnitude of change in planning decade harvest volume as a percent of maximum planning decade harvest volume		
		Due to marbled murrelet conservation	Due to arrearage harvest	Due to riparian thinning
Clallam	370	17%	6%	6%
Clark	69	1%	1%	3%
Cowlitz	72	1%	1%	1%
Grays Harbor	15	13%	1%	1%
Jefferson	51	6%	2%	2%
King	50	26%	4%	2%
Kitsap	12	0%	0%	2%
Lewis	186	19%	2%	2%
Mason	95	1%	1%	0%
Pacific	65	34%	3%	6%
Pierce	24	58%	1%	1%
Skagit	205	18%	1%	4%
Skamania	93	1%	4%	4%

Snohomish	158	12%	1%	4%
Thurston	102	5%	1%	1%
Wahkiakum	65	63%	9%	8%
Whatcom	72	21%	8%	6%

EFFECTS OF ARREARAGE HARVEST OPTIONS ON HARVEST VOLUME

Scenarios that include 702 MMBF in arrearage harvest result in a higher harvest volume in the planning decade than scenarios with either the 462 MMBF or no specific arrearage options. However, the difference is not that large. For example, harvest levels for scenarios with 702 MMBF of arrearage harvest are only 300 MMBF higher than scenarios with the no specific arrearage option, when paired with the 10 percent thinning option. When paired with the 1 percent riparian thinning option, the difference is even smaller: 191 MMBF.

Arrearage would be straightforward if the volume that was not harvested during a previous decade was available for harvest now. However, areas that were unavailable for harvest during the fiscal year 2005 through 2014 planning decade (for example, areas transferred out of trust status, and areas where DNR restricted harvest to avoid foreclosing future options for marbled murrelet conservation) continue to be unavailable for harvest during the 2015 through 2024 planning decade. For that reason, the model must make up the arrearage (702 or 462 MMBF, depending on arrearage harvest option) by bringing some harvests forward. That, in turn, reduces harvest volumes in future decades. Figure 6 shows a slightly higher harvest level in the planning decade and a small reduction in the harvest level in the second and third decades under the 702 and 462 MMBF arrearage harvest options.

Figure 6. Sustainable Harvest Level (solid bars) and Arrearage Harvest (hollow bars) in Western Washington Under Three Arrearage Options Combined with Marbled Murrelet Strategy Alternative A and the 10 Percent Riparian Thinning Option
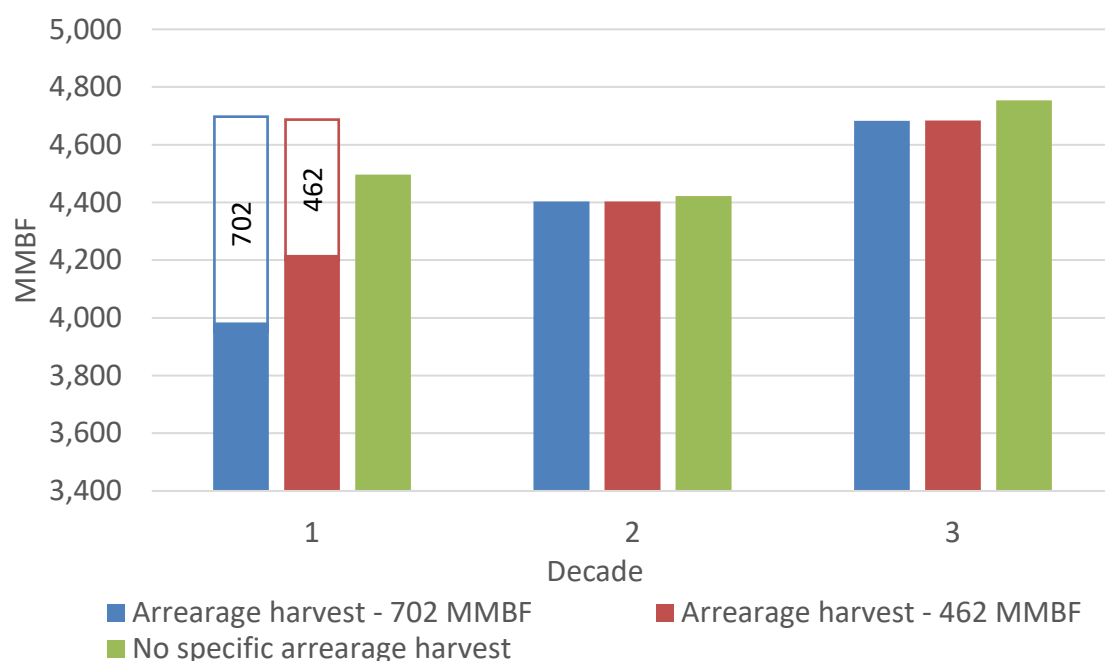
In the first three decades, scenarios that include arrearage harvest of 702 MMBF or 462 MMBF result in greater variability in harvest levels than scenarios with no specific arrearage volume (Figure 7). Harvest level variability will increase management expenditures because, when harvest levels rise, DNR will need to temporarily adjust staffing to accommodate additional timber sale planning and compliance.

Figure 7. Detail of the First Three Decades of Harvest Levels Under Three Arrearage Options Combined with Marbled Murrelet Strategy Alternative A and the 10 Percent Riparian Thinning Option
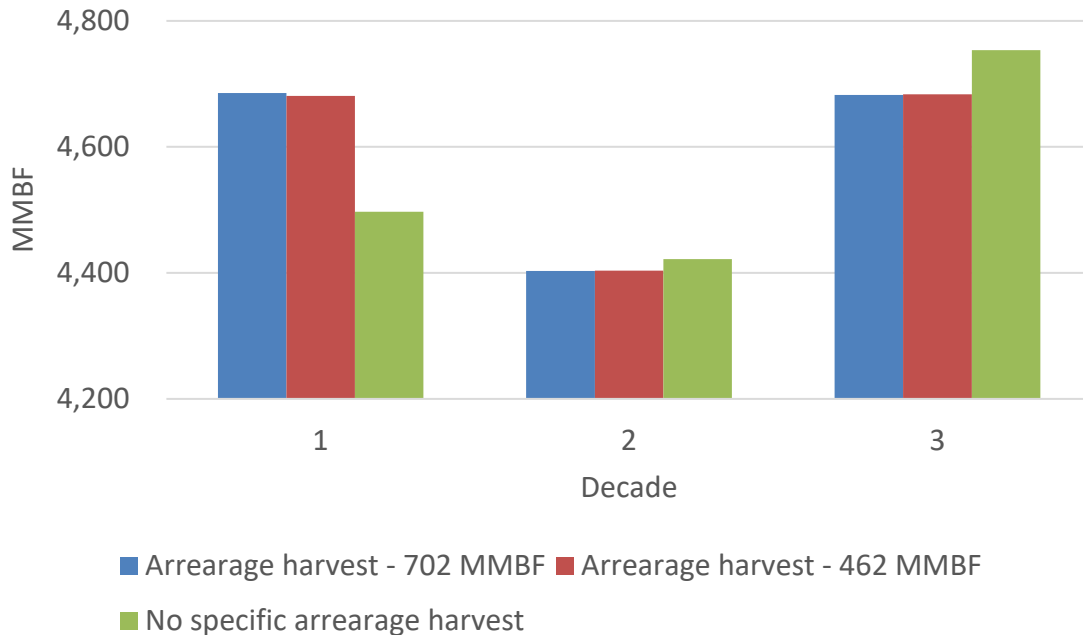
Scenarios that include arrearage harvest of 702 MMBF or 462 MMBF result in lower harvest levels (and lower revenue) in decades 3 through 7 than scenarios without specified arrearage harvest, although the effect will be small (Figure 8).

Figure 8. Harvest Levels Under the Three Arrearage Options Combined With Marbled Murrelet Strategy Alternative A and the 10 Percent Riparian Thinning Option

The line for 462 MMBF of arrearage harvest nearly completely overlaps the line for 702 MMBF of arrearage harvest.
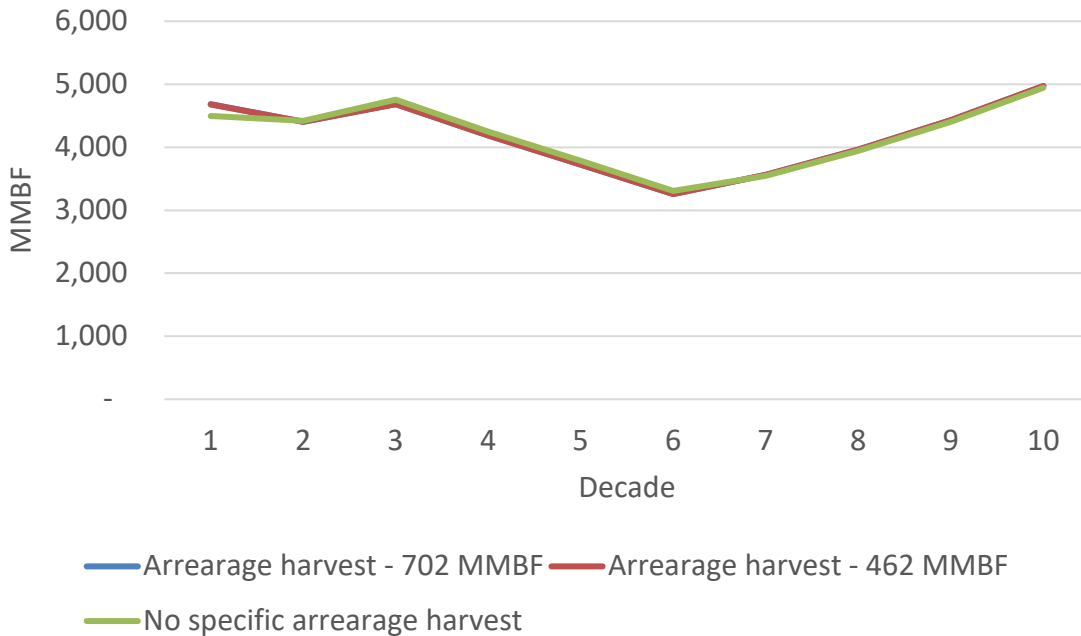
Timing of Arrearage and Within-decade Variability

Two of the arrearage harvest options call for the harvest of arrearage volume in less than ten years. As a result, under these two options the annual harvest level would vary during the decade (Text Box 2).

The model provides harvest volume data by decade, not year. Nonetheless, annual harvest levels can be calculated using model results. Variations in annual harvest levels are shown in Appendix E.

Under the 702 MMBF arrearage harvest option, harvest is front-loaded into the first five years of the decade. Harvest levels then drop for the remaining five years. Annual revenue production is anticipated to fall with the drop in harvest levels (refer to Figure 9; additional graphs can be found in Appendix E).

Text Box 2. Arrearage Harvest Options by Annual Harvest Level

Arrearage harvest options for which annual harvest levels vary during the planning decade:

- Harvest 702 MMBF proportionally from the sustainable harvest units with deficits over 5 years.

- Harvest 462 MMBF proportionally from sustainable harvest units with deficits in 1 year, and then harvest the remaining sustainable harvest level volume for the decade over the next 9 years.

Arrearage options for which annual harvest levels remain constant in the planning decade:

- Harvest 462 MMBF proportionally from the sustainable harvest units with deficits over 10 years.

- Set harvest levels without specifying arrearage quantity.

Figure 9. Annual Harvest in the Planning Decade Under the 702 MMBF Arrearage Harvest Option, Marbled Murrelet Strategy Alternative A, and the 10 Percent Riparian Thinning Option
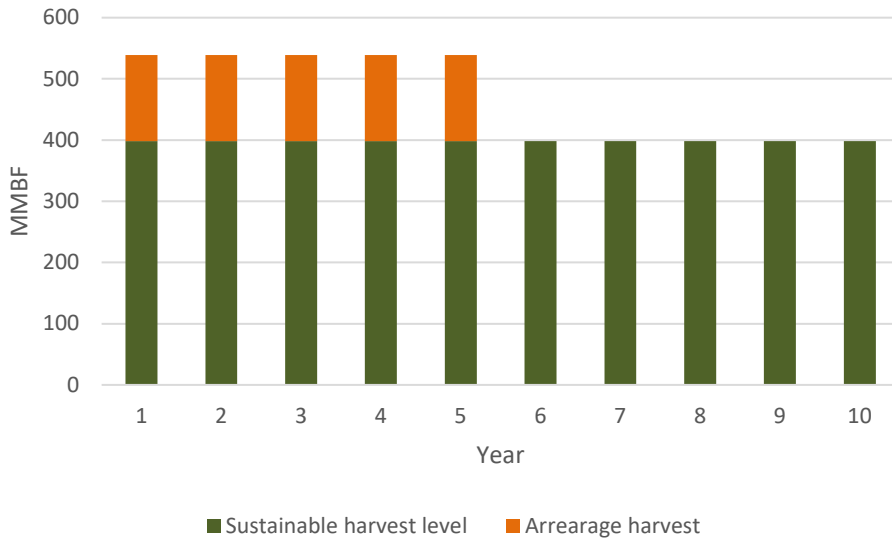
Under the option to harvest all the arrearage volume in one year, harvest occurs only in sustainable harvest units with arrearage. As a result, for one year no revenue would be generated on State Forest Transfer Trust lands that benefit Clark, Cowlitz, Jefferson, Lewis, Mason, Pierce, Skagit, or Snohomish counties (Figure 10).

Figure 10. Annual Harvest on State Forest Transfer Lands in Skagit County in the Planning Decade Under the 462 Over 1 Year Arrearage Harvest Option, Marbled Murrelet Strategy Alternative A, and the 10 Percent Riparian Thinning Option
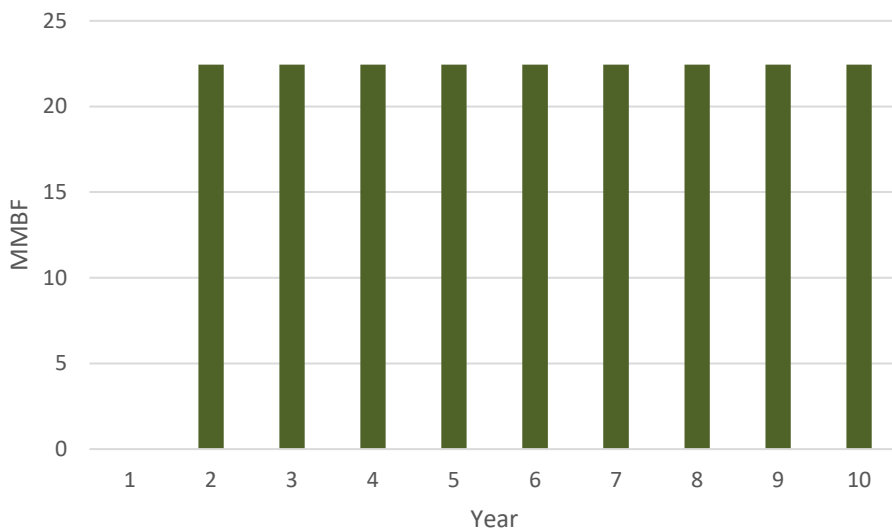
In particular, the option to harvest all the arrearage volume in one year results in large swings in harvest levels around the state, which may increase management expenditures, as explained previously. For example, harvest volumes in the OESF would be nearly 90 percent higher during that one year than in the other years of the decade. Significant additional staff would be needed to set up and do compliance on these additional sales. Staff would then need to be shifted to other regions to meet their subsequent harvest levels. To a lesser degree, shifts of staff also would be needed under the option to harvest arrearage volume in five years. Also, additional costs would be incurred from temporarily high demand for seedlings, staff, and contractors for planting.

The spike in volume offered for sale in one year also may depress revenue per volume sold: excess timber supply on the market may suppress prices, and increased demand for logging crews may increase logging costs for purchasers.

EFFECTS OF RIPARIAN THINNING OPTIONS ON HARVEST VOLUME

The effects of riparian thinning levels on harvest volume are less consistent than either the effects of arrearage harvest options or marbled murrelet strategy alternatives.

Scenarios that include the 10 percent riparian thinning option range from 117 MMBF *more* volume to 84 MMBF *less* volume in the planning decade than scenarios that include the 1-percent riparian thinning option. Scenarios with less volume include those with the 10-percent riparian thinning option and either the 702 MMBF or 462 MMBF arrearage harvest option. The additional volume under the 1 percent riparian thinning option does not come from riparian areas. Instead, additional non-riparian harvests occur. Further analysis is necessary to explain this result, but the preliminary interpretation of this result is that net present value is increased by delaying the harvest of some uplands areas.

The total harvest volume over the 10-decade period is highest with the 10 percent riparian thinning option under each pairing of marbled murrelet strategy alternative and arrearage harvest option (Figure 11).

Figure 11. Harvest Levels Under the Two Riparian Thinning Levels Combined With Marbled Murrelet Strategy Alternative A and no Specific Level Arrearage Harvest Option
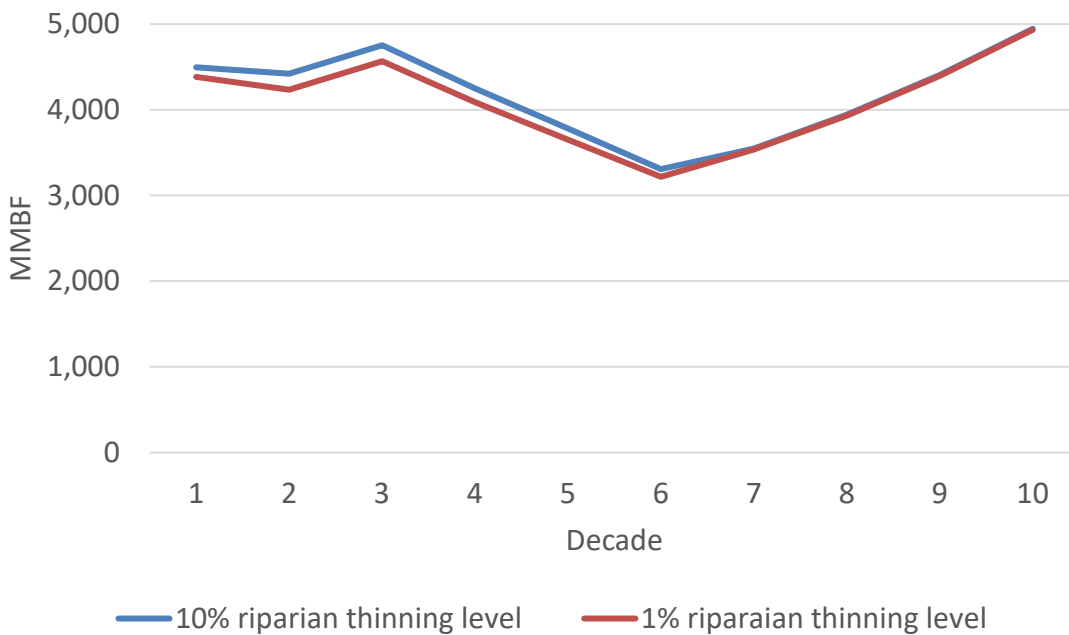
By Trust and County

EFFECTS OF MARBLED MURRELET STRATEGY ALTERNATIVES ON HARVEST VOLUME

Similar to 10-decade net present value, the effects of the scenarios on the planning decade harvest level differ at the scale of the individual trusts, or counties for the State Forest Transfer Trust.

The marbled murrelet strategy alternatives affect the harvest level differently in the different trusts and counties. For example, for State Forest Transfer Trust lands in Wahkiakum County, the harvest level under marbled murrelet strategy Alternative F is 40 percent of the level under Alternative B, and less than half of recent harvest levels (Table 11).

The other patterns in the 10-decade net present value results appear in the first decade results. Some trusts or counties are mainly affected by Alternative F (Table 12), while other are largely unaffected (Table 13 and 14).

Table 11. Planning Decade Harvest Level for State Forest Transfer Trust lands in Wahkiakum County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	43	46	43	46	43	42	54
Alt. B	65	62	65	62	65	60	
Alt. C	37	41	37	41	34	35	
Alt. D	37	39	37	39	36	35	
Alt. E	37	41	37	41	34	35	
Alt. F	26	30	26	30	24	24	

Table 12. Planning Decade Harvest Level for Scientific School Trust Lands (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	252	281	255	266	234	227	266
Alt. B	269	292	266	280	248	241	
Alt. C	260	286	259	271	238	232	
Alt. D	260	287	260	273	236	232	
Alt. E	259	286	259	273	240	231	
Alt. F	201	220	200	218	187	181	

Table 13. Planning Decade Harvest Level for State Forest Transfer Trust Lands in Jefferson County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	49	48	49	48	49	48	73
Alt. B	51	50	51	50	51	51	
Alt. C	50	49	50	49	50	50	
Alt. D	51	49	51	49	51	51	
Alt. E	50	49	50	49	50	50	
Alt. F	51	50	51	50	51	50	

EFFECTS OF ARREARAGE HARVEST OPTIONS ON HARVEST VOLUME

The effect of the arrearage harvest options on the planning decade harvest level is small but apparent between the arrearage options, as exemplified by the harvest level for State Forest Transfer Trust lands in Skamania County (Table 14).

Table 14. Planning Decade Harvest Level for State Forest Transfer Trust Lands in Skamania County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	93	90	93	90	90	87	55
Alt. B	93	90	93	90	90	87	
Alt. C	93	90	93	90	90	87	
Alt. D	93	90	93	90	90	87	

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. E	93	90	93	90	90	87	
Alt. F	93	91	93	90	90	87	

EFFECTS OF RIPARIAN THINNING OPTIONS ON HARVEST VOLUME

The effect of the riparian harvest options is relatively small on the planning decade harvest level at the trust and county level (Table 15).

Table 15. Planning Decade Harvest Level for Common School and Indemnity Trust Lands (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	1,538	1,532	1,525	1,518	1,469	1,403	1,140
Alt. B	1,626	1,606	1,628	1,577	1,556	1,507	
Alt. C	1,517	1,513	1,505	1,483	1,432	1,386	
Alt. D	1,531	1,511	1,518	1,485	1,468	1,410	
Alt. E	1,495	1,506	1,495	1,478	1,426	1,373	
Alt. F	1,189	1,249	1,214	1,234	1,200	1,155	

Land Base Available for Production

The area available for harvest varies by marbled murrelet strategy alternative. Lands managed to maintain long-term forest cover include areas where thinning can occur, and areas where thinning cannot occur, such as northern spotted owl nest patches, marbled murrelet occupied sites, NRCAs, and NAPs. Additional information about changes in land area available for production in each trust and county is

available in the marbled murrelet DEIS in Chapters 3.11 and 4.11. Table 16 provides the number of acres available for harvest under each alternative, since DNR generates the most revenue from these acres.

Table 16. Area Available for Harvest Activities in Western Washington

Marbled murrelet strategy alternative	Lands managed for long-term forest cover (acres)	Lands where thinning and harvest may occur (acres)	Total (acres)
Alt. A	708,000	758,000	1,466,000
Alt. B	700,000	766,000	1,466,000
Alt. C	729,000	737,000	1,466,000
Alt. D	731,000	735,000	1,466,000
Alt. E	732,000	734,000	1,466,000
Alt. F	816,000	650,000	1,466,000

Management Funds

As explained in the introduction to this analysis, management funds are used to cover expenditures incurred in managing state trust lands. Expenditures can be broken into three categories: direct expenditures associated with timber production such as timber sale setup, compliance, and marketing; silvicultural expenditures such as site preparation, planting, vegetation management, pre-commercial thinning, and surveys; and indirect expenditures of land management such as planning, inventory, right-of-way management, legal support, and research.[12]

During the planning decade, management funds available to DNR under each scenario range from $38 million to $50 million per year (Table 17). The marbled murrelet strategy alternatives have the greatest impact on management funds. Under Alternative F, funds are about $9 million per year less than under Alternative B and $7 million to $10 million less than they were in the fiscal years 2011 through 2015 period.

As described in Appendix F of the sustainable harvest DEIS, indirect expenditures are likely to remain constant over a range of harvest levels. Under marbled murrelet strategy Alternative F, indirect costs will either account for a much larger proportion of the total cost of harvesting timber than other under alternatives, *or* these activities will be curtailed.

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[12]   For more information on indirect costs, refer to slide 25 of the May 2015 Board of Natural Resources presentation available at http://file.dnr.wa.gov/publications/em_bc_bnr_shc_may2016_presentation.pdf.

Table 17. Management Funds in the Planning Decade ($ millions/year)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		Rolled in		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	47	48	47	47	45	44	48
Alt. B	50	50	50	49	48	47	
Alt. C	47	47	47	46	45	44	
Alt. D	47	47	47	46	45	44	
Alt. E	46	47	46	46	45	44	
Alt. F	41	41	40	41	39	38	

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Appendix A. Model Updates

For this financial analysis, DNR revised the forest estate model used for the sustainable harvest DEIS analysis (sustainable harvest DEIS model; for a description, refer to Appendix F of the DEIS). Revisions included the arrearage formulation and assumptions for northern spotted owl habitat.

Arrearage

DNR contracted with University of Washington professor Sándor Tóth to evaluate whether the sustainable harvest DEIS model sufficiently represented DNR's authorizing environment. Dr. Tóth recommended revising the model formulation for arrearage. Based on his recommendation, DNR changed the model to track arrearage harvest volume separately from the sustainable harvest level volume. Per this revision, volume generated by the harvest of arrearage volume is not included in the flow constraint (refer to page F-12 of the sustainable harvest DEIS). This change is consistent with RCW 79.10.330, which states that "the department shall offer for sale the arrearage in addition to the sustainable harvest level…"

Table A-1 presents the portion of first decade harvest volumes for each sustainable harvest unit that is specifically due to arrearage from the fiscal year 2005 through 2014 planning decade. The table includes volumes for each arrearage harvest option with 702 MMBF or 462 MMBF. The table shows volumes only for the sustainable harvest units in which arrearage occurred during the past decade. In sustainable harvest units not listed, actual harvest met or exceeded the planned harvest level.

Table A-1. Projected Arrearage Harvest Volume for Each Sustainable Harvest Unit in Arrears in the Fiscal Year 2005 through 2014 Planning Decade Under Each Arrearage Option

Sustainable harvest unit	Arrearage harvest volume under 702 MMBF option	Arrearage harvest volume under 462 MMBF option*
Capitol	56	37
Clallam	25	16
Federal	347	229
King	16	10
OESF	200	132
Pierce	4	3
Skamania	19	13
Wahkiakum	17	11
Whatcom	18	12

* Values sum to 463 due to rounding

Northern Spotted Owl Habitat Yield

Following the release of the sustainable harvest DEIS, new inventory data become available that allowed DNR to improve the modeling assumptions for development of northern spotted owl habitat. The sustainable harvest DEIS model was revised to reflect these improved assumptions.

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Appendix B. Fiscal Year 2011 Through 2015 Harvest Levels and Revenue

This appendix reports net revenue disturbed to the trusts during the fiscal year 2011 through 2015 planning period. Data came from DNR's revenue tracking database, NaturE. Revenue numbers were adjusted to 2015 dollars using the consumer price index (U.S. Bureau of Labor Statistics 2016).

Table B-1. Revenue by Sustainable Harvest Unit

Sustainable harvest unit	Harvest volume FY 2011–2015 (MMBF)	Annual average (MMBF)	Annual harvest converted into a decadal harvest level (MMBF)
Capitol	198	39.7	397
Clallam	74	14.9	149
Clark	126	25.2	252
Cowlitz	36	7.2	72
Federal	924	184.7	1,847
Grays Harbor	0	0.0	0.4
Jefferson	36	7.3	73
King	30	6.0	60
Kitsap	6	1.2	12
Lewis	127	25.4	254
Mason	46	9.1	91
OESF	161	32.3	323
Pacific	30	6.0	60
Pierce	7	1.4	14
Skagit	158	31.7	317
Skamania	28	5.5	55
Snohomish	188	37.6	376
Thurston	15	3.1	31
Wahkiakum	27	5.4	54
Whatcom	61	12.3	123
Total	2,280	456.0	4,560

Table B-2. Revenue by Trust

Sustainable harvest unit	Trust(s)	Harvest volume FY 2011–2015 (MMBF)	Annual average (MMBF)	Annual harvest converted into a decadal harvest level (MMBF)	Annual net revenue FY 2011–2015 (2015 dollars in million)
Federally granted trusts	Agricultural School Grant	46	9	91	$3
	Capitol Building Grant	143	29	286	$7
	CEP&RI (including CEP&RI Transferred) Grant	66	13	132	$4
	Common School and Indemnity	570	114	1,140	$28
	Normal School	31	6	62	$1
	Scientific School	133	27	266	$6
	University Grant (original and transferred)	25	5	49	$1
State Forest Lands	State Forest Purchase Trust*	171	34	341	$6
	State Forest Transfer Trust	1,086	217	2,171	$61
Other lands	Community College Forest Reserve	6	1	13	$0.5
	Water Pollution Control Division	3	1	7	$0.2
	Other	<0.1	<0.1	<0.1	$<0.1
Total		2,280	456	4,560	$118

* Includes timber trust lands for University repayment and Forest Board repayment.

Table B-3. Revenue by county for State Forest Transfer Trust lands

County	Harvest volume FY 2011–2015 (MMBF)	Annual average (MMBF)	Annual harvest converted into a decadal harvest level (MMBF)	Annual net revenue FY 2011–2015 (2015 dollars in million)
Clallam	138	28	275	$6
Clark	126	25	252	$7
Cowlitz	36	7	72	$2
Grays Harbor	5	1	11	$0.2
Jefferson	36	7	73	$2

County	Harvest volume FY 2011–2015 (MMBF)	Annual average (MMBF)	Annual harvest converted into a decadal harvest level (MMBF)	Annual net revenue FY 2011–2015 (2015 dollars in million)
King	30	6	60	$2
Kitsap	6	1	12	$0.4
Lewis	127	25	254	$7
Mason	46	9	91	$3
Pacific	30	6	60	$1
Pierce	7	1	14	$0.3
Skagit	158	32	317	$10
Skamania	28	6	55	$1
Snohomish	188	38	376	$11
Thurston	36	7	73	$3
Wahkiakum	27	5	54	$1
Whatcom	61	12	123	$3
Total	1,086	217	2,171	$61

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Appendix C. Trust and County Level Results

This appendix reports the fiscal year 2015 through 2024 planning decade projected volume and 10-decade net present value under each scenario for each trust, and for the State Forest Transfer trust, for each county. Planning decade volume is compared to the actual harvest volume from the fiscal year 2011 through 2015 planning period.

By Trust

Agricultural School Grant

Table C-1. Planning Decade Volume, Agricultural School Grant (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	115	117	115	117	107	102	91
Alt. B	112	107	114	110	111	105	
Alt. C	117	114	118	119	108	106	
Alt. D	116	111	115	118	108	105	
Alt. E	116	116	116	119	109	106	
Alt. F	93	98	93	91	84	75	

Table C-2. 10-decade Net Present Value, Agricultural School Grant ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	93	91	93	91	93	90

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. B	94	93	94	92	94	91
Alt. C	93	92	94	92	93	91
Alt. D	93	92	93	92	92	90
Alt. E	93	92	93	92	93	91
Alt. F	82	81	82	81	81	79

Capitol Building Grant

Table C-3. Planning Decade Volume, Capitol Building Grant (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	420	419	420	416	402	388	286
Alt. B	434	431	432	421	420	410	
Alt. C	408	406	405	409	402	388	
Alt. D	409	407	410	411	392	387	
Alt. E	424	412	424	421	403	398	
Alt. F	356	352	362	355	354	341	

Table C-4. 10-decade Net Present Value, Capitol Building Grant ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	294	292	294	292	293	288
Alt. B	310	308	310	307	308	304
Alt. C	288	286	288	285	288	284
Alt. D	295	294	295	293	293	291
Alt. E	290	287	290	287	288	285
Alt. F	262	259	262	260	258	255

CEP&RI[13] (including CEP&RI transferred)

Table C-5. Planning Decade Volume, CEP&RI (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	117	121	116	122	111	106	132
Alt. B	130	130	129	134	126	120	
Alt. C	110	112	110	112	104	100	
Alt. D	108	108	108	108	101	99	
Alt. E	110	114	110	112	104	101	
Alt. F	87	90	87	90	85	81	

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[13] Charitable, Educational, Penal, and Reformatory Institutions Grant

Table C-6. 10-decade Net Present Value, CEP&RI ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	109	108	109	107	108	106
Alt. B	114	113	114	112	113	111
Alt. C	105	103	105	103	104	102
Alt. D	103	102	103	102	102	100
Alt. E	105	103	105	103	104	102
Alt. F	89	88	89	88	89	87

Common School and Indemnity

Table C-7. Planning Decade Volume, Common School and Indemnity (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	1,538	1,532	1,525	1,518	1,469	1,403	1,140
Alt. B	1,626	1,606	1,628	1,577	1,556	1,507	
Alt. C	1,517	1,513	1,505	1,483	1,432	1,386	
Alt. D	1,531	1,511	1,518	1,485	1,468	1,410	
Alt. E	1,495	1,506	1,495	1,478	1,426	1,373	
Alt. F	1,189	1,249	1,214	1,234	1,200	1,155	

Table C-8. 10-decade Net Present Value, Common School and Indemnity ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	1,679	1,654	1,679	1,652	1,674	1,638
Alt. B	1,711	1,685	1,709	1,683	1,704	1,670
Alt. C	1,664	1,639	1,664	1,637	1,655	1,621
Alt. D	1,655	1,631	1,655	1,628	1,648	1,614
Alt. E	1,659	1,636	1,659	1,633	1,651	1,617
Alt. F	1,476	1,456	1,477	1,457	1,477	1,449

Community College Forest Reserve

Table C-9. Planning Decade Volume, Community College Forest Reserve (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	3	5	3	5	3	3	6
Alt. B	3	5	3	5	3	3	
Alt. C	3	5	3	5	3	3	
Alt. D	3	5	3	5	3	3	
Alt. E	3	5	3	5	3	3	
Alt. F	3	5	3	5	3	3	

Table C-10. 10-decade Net Present Value, Community College Forest Reserve ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	19	18	19	18	19	18
Alt. B	19	18	19	18	19	18
Alt. C	19	18	19	18	19	18
Alt. D	19	18	19	18	19	18
Alt. E	19	18	19	18	19	18
Alt. F	19	18	19	18	19	18

Normal School

Table C-11. Planning Decade Volume, Normal School (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	89	91	87	88	76	79	62
Alt. B	105	105	102	100	87	85	
Alt. C	78	82	80	78	70	71	
Alt. D	79	83	79	80	75	73	
Alt. E	74	81	74	78	69	71	
Alt. F	76	82	76	79	69	68	

Table C-12. 10-decade Net Present Value, Normal School ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	111	110	111	109	110	108
Alt. B	118	116	118	116	116	114
Alt. C	106	104	105	104	105	104
Alt. D	106	104	106	104	105	104
Alt. E	105	103	105	103	105	103
Alt. F	100	99	101	99	99	97

Scientific School

Table C-13. Planning Decade Volume, Scientific School (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	252	281	255	266	234	227	266
Alt. B	269	292	266	280	248	241	
Alt. C	260	286	259	271	238	232	
Alt. D	260	287	260	273	236	232	
Alt. E	259	286	259	273	240	231	
Alt. F	201	220	200	218	187	181	

Table C-14. 10-decade Net Present Value, Scientific School ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	196	193	196	192	194	188
Alt. B	200	198	200	197	199	193
Alt. C	196	193	195	192	194	188
Alt. D	196	193	196	192	194	188
Alt. E	196	193	196	192	194	188
Alt. F	167	165	167	165	166	161

State Forest Purchase

Table C-15. Planning Decade Volume, State Forest Purchase (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	408	398	408	382	378	374	341
Alt. B	421	409	420	393	393	388	
Alt. C	406	399	405	381	378	374	
Alt. D	407	399	406	380	376	374	
Alt. E	408	401	408	381	377	372	
Alt. F	395	395	395	388	365	363	

Table C-16. 10-decade Net Present Value, State Forest Purchase ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	386	381	387	380	385	379
Alt. B	392	387	392	386	391	384
Alt. C	384	379	384	378	382	376
Alt. D	382	377	382	375	380	374
Alt. E	384	379	384	377	382	376
Alt. F	376	371	376	370	374	368

State Forest Transfer

Table C-17. Planning Decade Volume, State Forest Transfer (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	1,550	1,548	1,570	1,544	1,535	1,524	2,171
Alt. B	1,660	1,644	1,660	1,641	1,638	1,606	
Alt. C	1,580	1,558	1,587	1,567	1,559	1,533	
Alt. D	1,593	1,589	1,606	1,589	1,572	1,542	
Alt. E	1,582	1,561	1,582	1,561	1,557	1,529	
Alt. F	1,442	1,432	1,438	1,426	1,443	1,414	

Table C-18. 10-decade Net Present Value, State Forest Transfer ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	1,715	1,697	1,715	1,696	1,711	1,689
Alt. B	1,781	1,763	1,781	1,762	1,776	1,752
Alt. C	1,711	1,693	1,711	1,692	1,707	1,684
Alt. D	1,730	1,712	1,730	1,711	1,725	1,702
Alt. E	1,708	1,690	1,708	1,688	1,703	1,681
Alt. F	1,589	1,573	1,588	1,571	1,584	1,562

University Grant (original and transferred)

Table C-19. Planning Decade Volume, University Grant (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	156	154	145	147	145	141	49
Alt. B	163	158	162	160	153	154	
Alt. C	130	140	130	132	123	122	
Alt. D	128	129	124	124	115	117	
Alt. E	116	120	116	116	116	117	
Alt. F	145	147	117	116	82	82	

Table C-20. 10-decade Net Present Value, University Grant ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	126	126	126	125	125	124
Alt. B	133	133	134	132	133	131
Alt. C	112	113	112	112	112	111
Alt. D	101	100	100	101	100	99
Alt. E	102	103	102	102	102	101
Alt. F	103	102	99	98	91	90

Water Pollution Control Division

Table C-21. Planning Decade Volume, Water Pollution Control Division (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	10	11	10	11	10	10	7
Alt. B	10	11	10	11	10	10	
Alt. C	10	11	10	11	10	10	
Alt. D	10	11	10	11	11	10	
Alt. E	10	11	10	11	10	10	
Alt. F	10	12	10	11	11	10	

Table C-22. 10-decade Net Present Value, Water Pollution Control Division ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	30	29	30	29	30	29
Alt. B	30	29	30	29	30	29
Alt. C	30	29	30	29	30	29
Alt. D	30	29	30	29	30	29
Alt. E	30	29	30	29	30	29
Alt. F	30	29	30	29	30	29

Other[14]

Table C-23. Planning Decade Volume, Other (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	27	27	27	27	27	26	NA
Alt. B	27	27	27	27	27	27	
Alt. C	27	27	27	27	27	26	
Alt. D	27	27	27	27	27	26	
Alt. E	27	27	27	27	27	26	
Alt. F	27	27	27	27	27	27	

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[14] Includes transacted lands where DNR holds timber rights.

Table C-24. 10-decade Net Present Value, Other ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	12	12	12	12	12	12
Alt. B	12	12	12	12	12	12
Alt. C	12	12	12	12	12	12
Alt. D	12	12	12	12	12	12
Alt. E	12	12	12	12	12	12
Alt. F	11	11	11	11	11	11

State Forest Transfer Trust by County

Clallam County

Table C-25. Planning Decade Volume, Clallam County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	306	314	327	312	293	314	126
Alt. B	369	370	368	367	350	353	
Alt. C	349	338	357	348	335	335	
Alt. D	355	362	369	363	339	338	
Alt. E	353	344	353	345	335	333	
Alt. F	340	339	335	336	347	341	

Table C-26. 10-decade Net Present Value, Clallam County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	282	281	282	281	280	281
Alt. B	319	318	320	318	316	315
Alt. C	292	290	292	291	291	290
Alt. D	306	305	307	305	304	302
Alt. E	290	288	290	288	288	287
Alt. F	301	300	301	299	299	297

Clark County

Table C-27. Planning Decade Volume, Clark County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	69	68	69	68	69	67	252
Alt. B	69	68	69	68	69	67	
Alt. C	69	68	69	68	69	67	
Alt. D	69	69	69	69	69	67	
Alt. E	69	68	69	68	69	67	
Alt. F	69	68	69	68	69	68	

Table C-28. 10-decade Net Present Value, Clark County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	88	88	88	88	88	87
Alt. B	88	88	88	88	88	87
Alt. C	88	88	88	88	88	87
Alt. D	88	88	88	88	88	87
Alt. E	88	88	88	88	88	87
Alt. F	88	88	88	88	88	87

Cowlitz County

Table C-29. Planning Decade Volume, Cowlitz County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	32	33	32	33	32	32	72
Alt. B	32	33	32	33	32	32	
Alt. C	32	33	32	33	32	32	
Alt. D	32	33	32	33	32	32	
Alt. E	32	33	32	33	32	32	
Alt. F	32	33	32	33	33	32	

Table C-30. 10-decade Net Present Value, Cowlitz County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	37	37	37	37	37	36
Alt. B	37	37	37	37	37	36
Alt. C	37	37	37	37	37	36
Alt. D	37	37	37	37	37	36
Alt. E	37	37	37	37	37	36
Alt. F	37	37	37	37	38	36

Grays Harbor County

Table C-31. Planning Decade Volume, Grays Harbor County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	14	14	14	14	14	14	10
Alt. B	15	15	15	15	15	15	
Alt. C	15	15	15	15	15	15	
Alt. D	15	15	15	15	15	15	
Alt. E	15	15	15	15	15	15	
Alt. F	14	14	14	14	14	14	

Table C-32. 10-decade Net Present Value, Grays Harbor County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	13	13	13	13	13	13
Alt. B	14	13	14	13	14	13
Alt. C	14	13	14	13	14	13
Alt. D	14	13	13	13	14	13
Alt. E	13	13	13	13	13	13
Alt. F	12	12	12	12	12	12

Jefferson County

Table C-33. Planning Decade Volume, Jefferson County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	49	48	49	48	49	48	73
Alt. B	51	50	51	50	51	51	
Alt. C	50	49	50	49	50	50	
Alt. D	51	49	51	49	51	51	
Alt. E	50	49	50	49	50	50	
Alt. F	51	50	51	50	51	50	

Table C-34. 10-decade Net Present Value, Jefferson County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	55	55	55	55	55	55
Alt. B	57	57	57	57	57	57
Alt. C	57	57	57	57	57	57
Alt. D	57	57	57	57	57	57
Alt. E	57	57	57	57	57	57
Alt. F	57	57	57	57	57	57

King County

Table C-35. Planning Decade Volume, King County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	49	51	49	51	49	49	60
Alt. B	50	51	50	51	50	49	
Alt. C	47	49	47	50	47	48	
Alt. D	49	51	49	51	49	49	
Alt. E	48	50	48	50	47	48	
Alt. F	38	39	38	38	38	37	

Table C-36. 10-decade Net Present Value, King County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	59	58	59	58	59	58
Alt. B	59	58	59	58	59	58
Alt. C	58	57	58	57	58	57
Alt. D	59	58	59	58	59	58
Alt. E	58	57	58	57	58	57
Alt. F	53	52	53	52	53	52

Kitsap County

Table C-37. Planning Decade Volume, Kitsap County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	12	12	12	12	12	12	12
Alt. B	12	12	12	12	12	12	
Alt. C	12	12	12	12	12	12	
Alt. D	12	12	12	12	12	12	
Alt. E	12	12	12	12	12	12	
Alt. F	12	12	12	12	12	12	

Table C-38. 10-decade Net Present Value, Kitsap County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	22	21	22	21	22	21
Alt. B	22	22	22	22	22	22
Alt. C	22	22	22	22	22	22
Alt. D	22	22	22	22	22	22
Alt. E	22	22	22	22	22	22
Alt. F	22	22	22	22	22	22

Lewis County

Table C-39. Planning Decade Volume, Lewis County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	185	183	185	184	185	182	254
Alt. B	186	184	186	184	186	182	
Alt. C	184	182	184	182	184	181	
Alt. D	186	184	186	184	186	182	
Alt. E	183	182	183	182	184	180	
Alt. F	152	151	152	150	152	148	

Table C-40. 10-decade Net Present Value, Lewis County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	161	159	161	159	161	158
Alt. B	162	160	162	160	162	159
Alt. C	161	159	161	159	161	158
Alt. D	162	160	162	160	162	159
Alt. E	161	159	161	159	161	158
Alt. F	132	130	132	130	132	130

Mason County

Table C-41. Planning Decade Volume, Mason County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	94	94	94	94	94	94	91
Alt. B	95	95	95	95	95	95	
Alt. C	94	94	94	94	94	94	
Alt. D	94	94	94	94	94	95	
Alt. E	94	94	94	94	94	94	
Alt. F	94	94	94	94	94	95	

Table C-42. 10-decade Net Present Value, Mason County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	108	107	108	107	108	107
Alt. B	108	108	108	108	108	108
Alt. C	108	108	108	108	108	108
Alt. D	108	108	108	108	108	108
Alt. E	108	108	108	108	108	108
Alt. F	108	108	108	108	108	108

Pacific County

Table C-43. Planning Decade Volume, Pacific County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	55	53	55	53	54	52	60
Alt. B	65	63	65	62	65	61	
Alt. C	52	50	52	50	52	49	
Alt. D	49	48	49	47	48	47	
Alt. E	52	50	52	50	52	49	
Alt. F	44	44	44	43	44	43	

Table C-44. 10-decade Net Present Value, Pacific County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	45	44	45	44	45	44
Alt. B	52	51	52	50	52	50
Alt. C	43	42	43	42	43	41
Alt. D	41	40	41	40	41	40
Alt. E	43	42	43	42	43	41
Alt. F	38	37	38	37	38	37

Pierce County

Table C-45. Planning Decade Volume, Pierce County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		Rolled in		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	24	24	24	24	24	24	14
Alt. B	24	24	24	24	24	24	
Alt. C	24	24	24	24	24	24	
Alt. D	24	24	24	24	24	24	
Alt. E	24	24	24	24	24	24	
Alt. F	11	11	11	11	11	10	

Table C-46. 10-decade Net Present Value, Pierce County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	28	28	28	28	28	28
Alt. B	28	28	28	28	28	28
Alt. C	28	28	28	28	28	28
Alt. D	28	28	28	28	28	28
Alt. E	28	28	28	28	28	28
Alt. F	19	18	19	18	19	18

Skagit County

Table C-47. Planning Decade Volume, Skagit County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	202	196	202	196	202	194	317
Alt. B	205	199	205	199	205	197	
Alt. C	200	194	200	194	200	193	
Alt. D	203	196	203	196	203	195	
Alt. E	200	194	200	194	200	193	
Alt. F	169	164	169	164	169	163	

Table C-48. 10-decade Net Present Value, Skagit County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	274	271	274	271	274	270
Alt. B	277	273	277	273	277	273
Alt. C	271	268	271	268	271	267
Alt. D	274	271	274	271	274	270
Alt. E	271	268	271	268	271	267
Alt. F	230	227	230	227	230	227

Skamania County

Table C-49. Planning Decade Volume, Skamania County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	93	90	93	90	90	87	55
Alt. B	93	90	93	90	90	87	
Alt. C	93	90	93	90	90	87	
Alt. D	93	90	93	90	90	87	
Alt. E	93	90	93	90	90	87	
Alt. F	93	91	93	90	90	87	

Table C-50. 10-decade Net Present Value, Skamania County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	108	107	107	106	105	104
Alt. B	108	107	107	106	105	104
Alt. C	108	107	107	106	105	104
Alt. D	108	107	107	106	105	104
Alt. E	107	107	107	106	105	104
Alt. F	108	107	107	106	105	104

Snohomish County

Table C-51. Planning Decade Volume, Snohomish County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	157	154	157	153	157	151	376
Alt. B	158	154	158	154	158	153	
Alt. C	154	151	154	151	154	149	
Alt. D	155	152	155	152	155	150	
Alt. E	154	151	154	151	154	149	
Alt. F	138	138	138	137	139	136	

Table C-52. 10-decade Net Present Value, Snohomish County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	216	213	216	213	216	212
Alt. B	217	214	217	214	217	213
Alt. C	212	210	212	209	212	209
Alt. D	214	211	214	211	214	210
Alt. E	212	210	212	209	212	209
Alt. F	193	191	193	191	193	190

Thurston County

Table C-53. Planning Decade Volume, Thurston County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	97	96	97	96	98	97	42
Alt. B	101	101	101	101	101	101	
Alt. C	102	102	102	101	101	101	
Alt. D	101	101	101	102	101	101	
Alt. E	101	100	101	100	101	101	
Alt. F	102	100	102	100	101	101	

Table C-54. 10-decade Net Present Value, Thurston County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	102	101	102	101	102	101
Alt. B	104	103	104	103	104	102
Alt. C	104	103	104	102	104	102
Alt. D	104	103	104	103	104	102
Alt. E	104	102	104	102	104	102
Alt. F	103	102	103	102	103	102

Wahkiakum County

Table C-55. Planning Decade Volume, Wahkiakum County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	43	46	43	46	43	42	54
Alt. B	65	62	65	62	65	60	
Alt. C	37	41	37	41	34	35	
Alt. D	37	39	37	39	36	35	
Alt. E	37	41	37	41	34	35	
Alt. F	26	30	26	30	24	24	

Table C-56. 10-decade Net Present Value, Wahkiakum County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	36	35	36	35	36	35
Alt. B	48	47	48	47	48	46
Alt. C	32	31	32	31	32	30
Alt. D	31	30	31	30	30	29
Alt. E	32	31	32	31	32	30
Alt. F	25	24	25	24	25	24

Whatcom County

Table C-57. Planning Decade Volume, Whatcom County (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	69	70	69	70	69	66	123
Alt. B	70	72	70	72	70	67	
Alt. C	64	64	64	64	64	61	
Alt. D	66	68	66	68	66	63	
Alt. E	63	64	63	64	63	60	
Alt. F	56	57	56	57	56	53	

Table C-58. 10-decade Net Present Value, Whatcom County ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	80	79	80	79	80	78
Alt. B	81	80	81	80	81	79
Alt. C	76	75	76	75	76	74
Alt. D	77	76	77	76	77	76
Alt. E	75	74	75	74	75	73
Alt. F	60	60	60	60	60	59

Appendix D. Sustainable Harvest Unit Level Results

This appendix reports the planning decade volume and 10-decade net present value under each scenario for each sustainable harvest unit (Figure D.1). Planning decade volume is compared to the actual harvest volume from the fiscal year 2011 through 2015 planning period.

Figure D.1. Western Washington State Trust Lands Sustainable Harvest Units

(Individual units for State Forest Transfer Lands in each county are not shown separately).
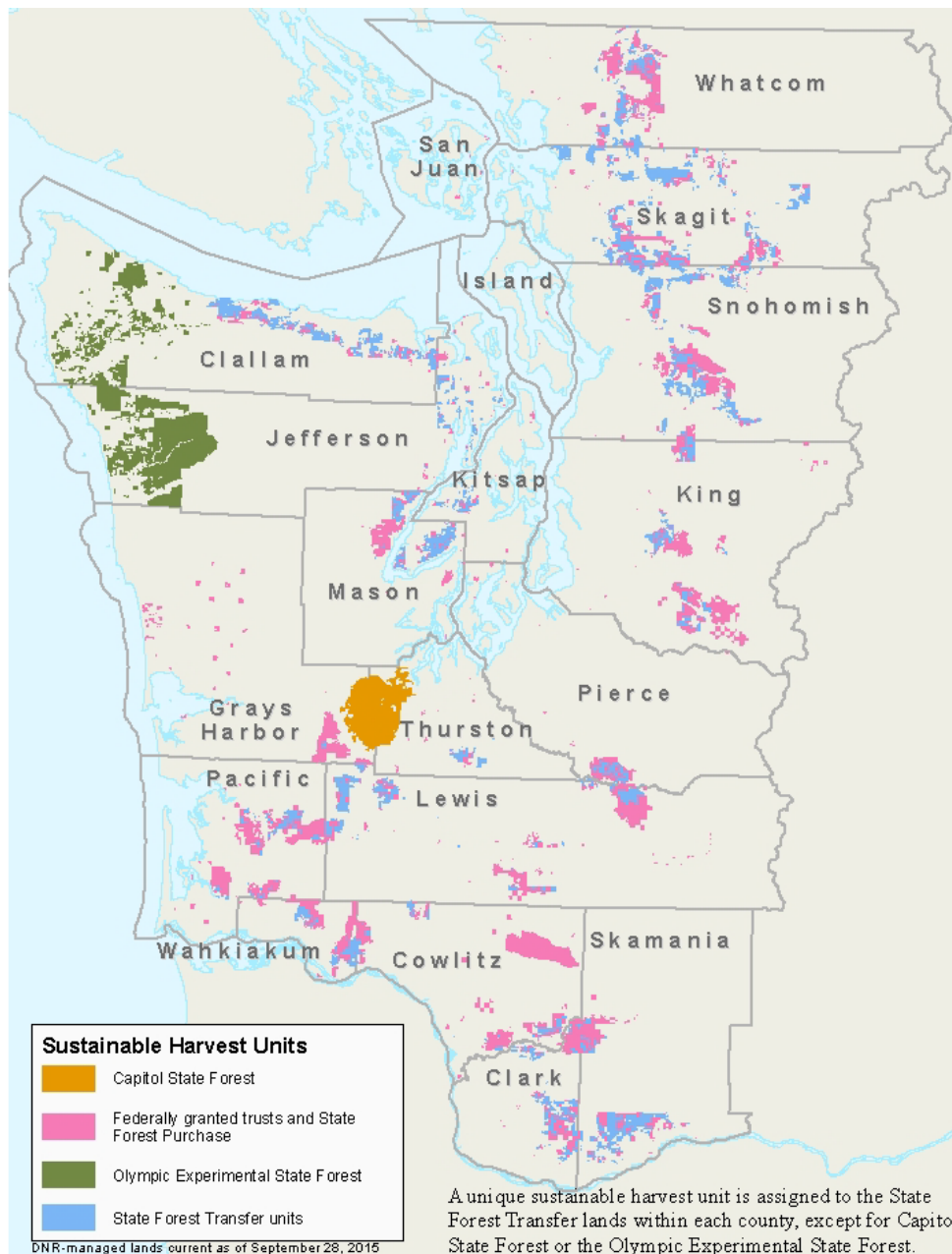
Federal

Table D-1. Planning Decade Volume, Federal Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	2,161	2,190	2,157	2,130	1,982	1,905	1,847
Alt. B	2,315	2,296	2,312	2,235	2,139	2,063	
Alt. C	2,100	2,118	2,094	2,063	1,917	1,847	
Alt. D	2,114	2,119	2,110	2,064	1,933	1,861	
Alt. E	2,086	2,112	2,086	2,057	1,912	1,843	
Alt. F	1,594	1,685	1,591	1,620	1,489	1,411	

Table D-2. 10-decade Net Present Value, Federal Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	2,083	2,049	2,083	2,043	2,071	2,019
Alt. B	2,139	2,104	2,139	2,098	2,126	2,074
Alt. C	2,034	2,001	2,034	1,995	2,022	1,972
Alt. D	2,027	1,995	2,027	1,990	2,015	1,966
Alt. E	2,028	1,995	2,028	1,989	2,016	1,966
Alt. F	1,740	1,712	1,740	1,711	1,734	1,691

OESF

Table D-3. Planning Decade Volume, OESF Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	704	704	704	704	703	703	323
Alt. B	714	714	713	713	713	713	
Alt. C	703	703	703	703	702	702	
Alt. D	710	710	710	710	709	709	
Alt. E	702	702	702	702	701	701	
Alt. F	707	707	707	707	705	705	

Table D-4. 10-decade Net Present Value, OESF Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	630	630	630	630	628	628
Alt. B	654	654	654	654	650	650
Alt. C	622	622	622	622	619	619
Alt. D	628	628	628	628	625	625
Alt. E	617	617	617	617	614	614
Alt. F	627	627	623	623	612	612

Capitol State Forest

Table D-5. Planning Decade Volume, Capitol State Forest Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	489	487	489	487	489	482	397
Alt. B	505	505	505	505	505	499	
Alt. C	505	505	505	505	505	500	
Alt. D	505	505	505	505	505	503	
Alt. E	505	504	505	504	505	500	
Alt. F	505	505	505	505	505	500	

Table D-6. 10-decade Net Present Value, Capitol State Forest Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	546	538	546	538	546	537
Alt. B	553	545	553	545	553	544
Alt. C	553	545	553	545	553	544
Alt. D	553	545	553	545	553	544
Alt. E	553	545	553	545	553	544
Alt. F	553	545	553	545	553	544

Clallam

Table D-7. Planning Decade Volume, Clallam Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	174	175	174	175	169	171	149
Alt. B	227	227	226	225	218	219	
Alt. C	200	200	200	199	199	196	
Alt. D	196	198	196	197	196	193	
Alt. E	194	193	194	193	194	191	
Alt. F	210	210	208	208	206	203	

Table D-8. 10-decade Net Present Value, Clallam Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	163	162	163	162	162	161
Alt. B	193	192	192	191	191	190
Alt. C	177	176	177	176	176	175
Alt. D	175	174	175	174	174	173
Alt. E	172	171	172	171	172	170
Alt. F	183	182	183	182	182	180

Clark

Table D-9. Planning Decade Volume, Clark Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	69	68	69	68	69	67	252
Alt. B	69	68	69	68	69	67	
Alt. C	69	68	69	68	69	67	
Alt. D	69	69	69	69	69	67	
Alt. E	69	68	69	68	69	67	
Alt. F	69	68	69	68	69	68	

Table D-10. 10-decade Net Present Value, Clark Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	88	88	88	88	88	87
Alt. B	88	88	88	88	88	87
Alt. C	88	88	88	88	88	87
Alt. D	88	88	88	88	88	87
Alt. E	88	88	88	88	88	87
Alt. F	88	88	88	88	88	87

Cowlitz

Table D-11. Planning Decade Volume, Cowlitz Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	32	33	32	33	32	32	72
Alt. B	32	33	32	33	32	32	
Alt. C	32	33	32	33	32	32	
Alt. D	32	33	32	33	32	32	
Alt. E	32	33	32	33	32	32	
Alt. F	32	33	32	33	33	32	

Table D-12. 10-decade Net Present Value, Cowlitz Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	37	37	37	37	37	36
Alt. B	37	37	37	37	37	36
Alt. C	37	37	37	37	37	36
Alt. D	37	37	37	37	37	36
Alt. E	37	37	37	37	37	36
Alt. F	37	37	37	37	38	36

Grays Harbor

Table D-13. Planning Decade Volume, Grays Harbor Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	4	4	4	4	4	4	0.4
Alt. B	4	4	4	4	4	4	
Alt. C	4	4	4	4	4	4	
Alt. D	4	4	4	4	4	4	
Alt. E	4	4	4	4	4	4	
Alt. F	3	3	3	3	3	3	

Table D-14. 10-decade Net Present Value, Grays Harbor Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	3	3	3	3	3	3
Alt. B	3	3	3	3	3	3
Alt. C	3	3	3	3	3	3
Alt. D	3	3	3	3	3	3
Alt. E	3	3	3	3	3	3
Alt. F	2	2	2	2	2	2

Jefferson

Table D-15. Planning Decade Volume, Jefferson Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	49	48	49	48	49	48	73
Alt. B	51	50	51	50	51	51	
Alt. C	50	49	50	49	50	50	
Alt. D	51	49	51	49	51	51	
Alt. E	50	49	50	49	50	50	
Alt. F	51	50	51	50	51	50	

Table D-16. 10-decade Net Present Value, Jefferson Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	55	55	55	55	55	55
Alt. B	57	57	57	57	57	57
Alt. C	57	57	57	57	57	57
Alt. D	57	57	57	57	57	57
Alt. E	57	57	57	57	57	57
Alt. F	57	57	57	57	57	57

King

Table D-17. Planning Decade Volume, King Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	49	51	49	51	49	49	60
Alt. B	50	51	50	51	50	49	
Alt. C	47	49	47	50	47	48	
Alt. D	49	51	49	51	49	49	
Alt. E	48	50	48	50	47	48	
Alt. F	38	39	38	38	38	37	

Table D-18. 10-decade Net Present Value, King Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	59	58	59	58	59	58
Alt. B	59	58	59	58	59	58
Alt. C	58	57	58	57	58	57
Alt. D	59	58	59	58	59	58
Alt. E	58	57	58	57	58	57
Alt. F	53	52	53	52	53	52

Kitsap

Table D-19. Planning Decade Volume, Kitsap Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	12	12	12	12	12	12	12
Alt. B	12	12	12	12	12	12	
Alt. C	12	12	12	12	12	12	
Alt. D	12	12	12	12	12	12	
Alt. E	12	12	12	12	12	12	
Alt. F	12	12	12	12	12	12	

Table D-20. 10-decade Net Present Value, Kitsap Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	22	21	22	21	22	21
Alt. B	22	22	22	22	22	22
Alt. C	22	22	22	22	22	22
Alt. D	22	22	22	22	22	22
Alt. E	22	22	22	22	22	22
Alt. F	22	22	22	22	22	22

Lewis

Table D-21. Planning Decade Volume, Lewis Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	185	183	185	184	185	182	254
Alt. B	186	184	186	184	186	182	
Alt. C	184	182	184	182	184	181	
Alt. D	186	184	186	184	186	182	
Alt. E	183	182	183	182	184	180	
Alt. F	152	151	152	150	152	148	

Table D-22. 10-decade Net Present Value, Lewis Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	161	159	161	159	161	158
Alt. B	162	160	162	160	162	159
Alt. C	161	159	161	159	161	158
Alt. D	162	160	162	160	162	159
Alt. E	161	159	161	159	161	158
Alt. F	132	130	132	130	132	130

Mason

Table D-23. Planning Decade Volume, Mason Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	94	94	94	94	94	94	91
Alt. B	95	95	95	95	95	95	
Alt. C	94	94	94	94	94	94	
Alt. D	94	94	94	94	94	95	
Alt. E	94	94	94	94	94	94	
Alt. F	94	94	94	94	94	95	

Table D-24. 10-decade Net Present Value, Mason Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	108	107	108	107	108	107
Alt. B	108	108	108	108	108	108
Alt. C	108	108	108	108	108	108
Alt. D	108	108	108	108	108	108
Alt. E	108	108	108	108	108	108
Alt. F	108	108	108	108	108	108

Pacific

Table D-25. Planning Decade Volume, Pacific Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	55	53	55	53	54	52	60
Alt. B	65	63	65	62	65	61	
Alt. C	52	50	52	50	52	49	
Alt. D	49	48	49	47	48	47	
Alt. E	52	50	52	50	52	49	
Alt. F	44	44	44	43	44	43	

Table D-26. 10-decade Net Present Value, Pacific Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	45	44	45	44	45	44
Alt. B	52	51	52	50	52	50
Alt. C	43	42	43	42	43	41
Alt. D	41	40	41	40	41	40
Alt. E	43	42	43	42	43	41
Alt. F	38	37	38	37	38	37

Pierce

Table D-27. Planning Decade Volume, Pierce Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	24	24	24	24	24	24	14
Alt. B	24	24	24	24	24	24	
Alt. C	24	24	24	24	24	24	
Alt. D	24	24	24	24	24	24	
Alt. E	24	24	24	24	24	24	
Alt. F	11	11	11	11	11	10	

Table D-28. 10-decade Net Present Value, Pierce Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	28	28	28	28	28	28
Alt. B	28	28	28	28	28	28
Alt. C	28	28	28	28	28	28
Alt. D	28	28	28	28	28	28
Alt. E	28	28	28	28	28	28
Alt. F	19	18	19	18	19	18

Skagit

Table D-29. Planning Decade Volume, Skagit Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	206	199	206	199	205	198	317
Alt. B	208	202	208	202	208	200	
Alt. C	204	197	204	197	204	196	
Alt. D	206	200	206	200	206	198	
Alt. E	204	197	204	197	204	196	
Alt. F	172	167	172	167	173	167	

Table D-30. 10-decade Net Present Value, Skagit Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	277	273	277	273	277	273
Alt. B	279	276	279	276	279	275
Alt. C	274	271	274	271	274	270
Alt. D	277	273	277	273	277	273
Alt. E	274	271	274	271	274	270
Alt. F	233	230	233	230	233	230

Skamania

Table D-31. Planning Decade Volume, Skamania Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	93	90	93	90	90	87	55
Alt. B	93	90	93	90	90	87	
Alt. C	93	90	93	90	90	87	
Alt. D	93	90	93	90	90	87	
Alt. E	93	90	93	90	90	87	
Alt. F	93	91	93	90	90	87	

Table D-32. 10-decade Net Present Value, Skamania Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	108	107	107	106	105	104
Alt. B	108	107	107	106	105	104
Alt. C	108	107	107	106	105	104
Alt. D	108	107	107	106	105	104
Alt. E	107	107	107	106	105	104
Alt. F	108	107	107	106	105	104

Snohomish

Table D-33. Planning Decade Volume, Snohomish Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	157	154	157	153	157	151	376
Alt. B	158	154	158	154	158	153	
Alt. C	154	151	154	151	154	149	
Alt. D	155	152	155	152	155	150	
Alt. E	154	151	154	151	154	149	
Alt. F	139	138	139	137	139	136	

Table D-34. 10-decade Net Present Value, Snohomish Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	216	213	216	213	216	212
Alt. B	217	214	217	214	217	213
Alt. C	212	210	212	209	212	209
Alt. D	214	211	214	211	214	210
Alt. E	212	210	212	209	212	209
Alt. F	193	191	193	191	193	190

Thurston

Table D-35. Planning Decade Volume, Thurston Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	17	17	17	17	17	17	31
Alt. B	17	17	17	17	17	17	
Alt. C	17	17	17	17	17	17	
Alt. D	17	17	17	17	17	17	
Alt. E	17	17	17	17	17	17	
Alt. F	17	17	17	17	17	17	

Table D-36. 10-decade Net Present Value, Thurston Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	25	25	25	25	25	25
Alt. B	25	25	25	25	25	25
Alt. C	25	25	25	25	25	25
Alt. D	25	25	25	25	25	25
Alt. E	25	25	25	25	25	25
Alt. F	25	25	25	25	25	24

Wahkiakum

Table D-37. Planning Decade Volume, Wahkiakum Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	43	46	43	46	43	42	54
Alt. B	65	62	65	62	65	60	
Alt. C	37	41	37	41	34	35	
Alt. D	37	39	37	39	36	35	
Alt. E	37	41	37	41	34	35	
Alt. F	26	30	26	30	24	24	

Table D-38. 10-decade Net Present Value, Wahkiakum Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	36	35	36	35	36	35
Alt. B	48	47	48	47	48	46
Alt. C	32	31	32	31	32	30
Alt. D	31	30	31	30	30	29
Alt. E	32	31	32	31	32	30
Alt. F	25	24	25	24	25	24

Whatcom

Table D-39. Planning Decade Volume, Whatcom Sustainable Harvest Unit (MMBF/decade)

Marbled murrelet strategy alternative	Arrearage harvest						Decadal rate based on FY 2011-2015 performance
	702 MMBF		462 MMBF		No specific level		
	Riparian thinning						
	10%	1%	10%	1%	10%	1%	
Alt. A	69	70	69	70	69	66	123
Alt. B	70	72	70	72	70	67	
Alt. C	64	64	64	64	64	61	
Alt. D	66	68	66	68	66	63	
Alt. E	63	64	63	64	63	60	
Alt. F	56	57	56	57	56	53	

Table D-40. 10-decade Net Present Value, Whatcom Sustainable Harvest Unit ($ millions)

Marbled murrelet strategy alternative	Arrearage harvest					
	702 MMBF		462 MMBF		No specific level	
	Riparian thinning					
	10%	1%	10%	1%	10%	1%
Alt. A	80	79	80	79	80	78
Alt. B	81	80	81	80	81	79
Alt. C	76	75	76	75	76	74
Alt. D	77	76	77	76	77	76
Alt. E	75	74	75	74	75	73
Alt. F	60	60	60	60	60	59

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Appendix E. Fiscal Year 2015 Through 2024 Planning Decade Annual Harvest Levels

The graphs in this appendix show the annual harvest levels for western Washington under the four arrearage harvest options when combined with marbled murrelet strategy Alternative A and the 10 percent riparian thinning option. For other scenarios of marbled murrelet strategy alternatives and riparian thinning options, the graphs would look similar, but the sustainable harvest level would be higher or lower, depending on the combination.

Figure E-1. Annual Harvest in the Planning Decade with no Specific Arrearage Harvest Option, Marbled Murrelet Strategy Alternative A, and the 10 Percent Riparian Thinning Option
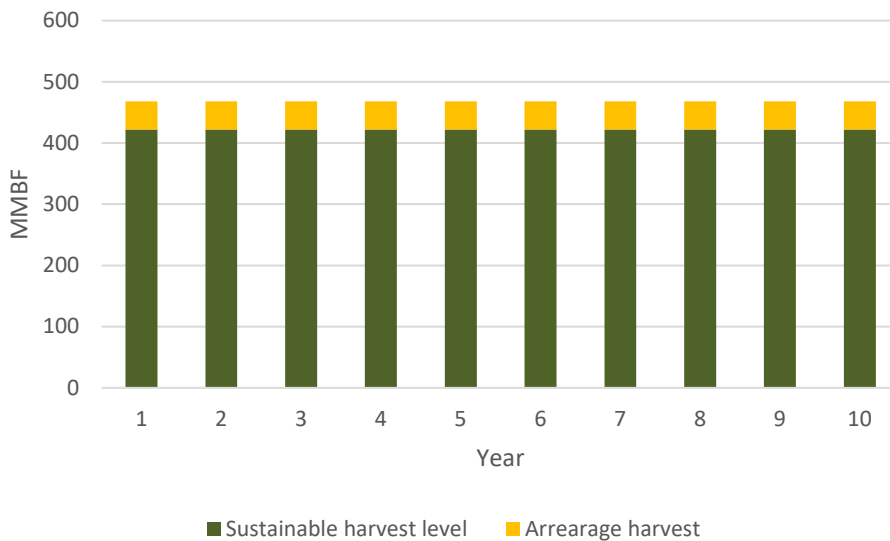
Figure E-2. Annual Harvest in the Planning Decade Under the 462/1 year Arrearage Harvest Option, Marbled Murrelet Strategy Alternative A, and the 10 Percent Riparian Thinning Option
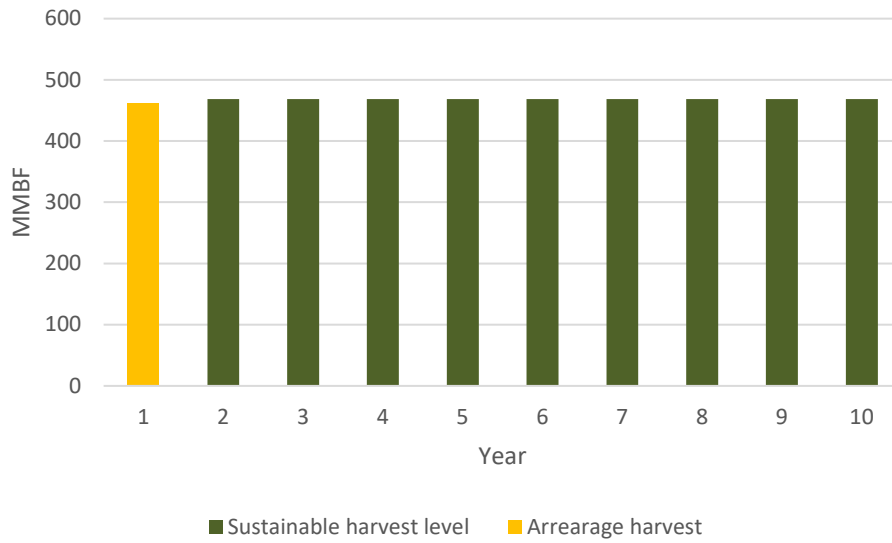

Figure E-3. Annual Harvest in the Planning Decade Under the 462/10 Years Arrearage Harvest Option, Marbled Murrelet Strategy Alternative A, and the 10 Percent Riparian Thinning Option
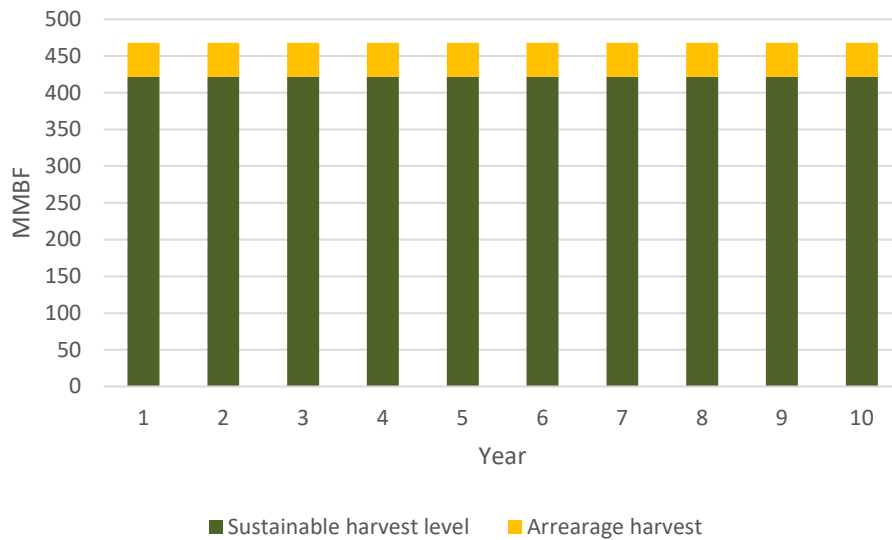
Figure E-4. Annual Harvest in the Planning Decade Under the 702/5 year Option, Marbled Murrelet Strategy Alternative A, and the 10 Percent Riparian Thinning Option