![Deloitte.]

Source: WA STATE DNR

Chapter 4
Financial Rate of Return

Financial Rate of Return

Selection of the appropriate financial rate of return is an essential part of estimating the Trust Value of each of the asset classes within the trust land portfolio. When applied to trust net incomes, the rate of return helps value the trust assets, and it also serves as a benchmark for evaluation of recent returns.

INTRODUCTION

In this chapter we discuss the relationship of a financial rate of return to the value of the trust land assets, the impact of the restrictions upon the ability to sell[1] trust lands on the financial rate of return selection, the extent to which the financial rate of return used in the 2019 Sustainable Harvest calculation should be used in this Trust Land Performance Assessment ("TLPA") analysis, and the selection of specific rates of return for each of the asset classes.

This includes an extended discussion of the types of investment criteria used in estimating value. They include:

- A basic discussion of the importance of time value of money, ROI (return on and return of investment), capitalization rates, and discount rates;

- The appropriate criteria for valuing the DNR's trust portfolio;

- A discussion of social discount factors (SDF) and private discount factors (PDF), and distinctions between intergenerational equity and intragenerational equity;

- A summary of our extensive surveys of capitalization rates and discount rates, together with our concluded valuation benchmarks.

The comparison of net income from property or a business enterprise with the value of that property or business enterprise is commonly called a "return on investment" rate, or "ROI". This kind of comparison is made at a single point in time and reflects a snapshot view of the price or value of an asset and its ability to generate net income.

For traditional forms of investment real property, like an apartment building or office building, the relationship between expected net operating income and the current market value of the property is referred to as a "capitalization rate," (also known as a "cap rate"). In our earlier chapter, Valuation Methodology, we reported that one of the means of valuing the asset classes within the trust land portfolio is by "capitalizing" the net income from the asset class. This means that one can estimate value by dividing net income by a capitalization rate. For example, if the asset class produced a net operating income of $1,000,000 each year, and if the capitalization rate is 10%, the indicated value of that asset class is then $10,000,000 as shown below:

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[1] See Appendix A.

FIGURE 1

Net Operating Income:	**$1,000,000**
Capitalization Rate:	**10%**
Indicated Value:	**$10,000,000**

We earlier referred to this value indication as a "snapshot" because it reflects this relationship only at a *specific point in time*.

In financial analysis and in real estate valuation, a valuation analysis or an evaluation of returns *over a period of time* can be called a time-series analysis; in real estate valuation and investment analysis, an evaluation of value or of returns over a period of time is most commonly called a "cash flow analysis" or a "discounted cash flow analysis."

The term "discounted cash flow analysis" emphasizes and reveals an important concept in financial analysis and valuation, and that is the idea that a dollar received in the future is worth less than a dollar received today. For example, for the investor hoping to earn a 10% return on investment, and forced to wait one year to receive $100, the "present value" or "net present value" of that future $100 is worth only $90.91, as shown below:

FIGURE 2

Future income:	**$100**
Discount Factor:	**X .0909090**
Indicated Value:	**$90.91**

The discount factor is a function of two factors, including a) the rate of return expectation[2] and b) the time until the

cash payment is assumed to be received. The actual formula for the present value is:

FIGURE 3

$$PV = \frac{C}{(1+i)^n}$$

where "C" is the amount of money to be received, "i" is the interest rate (rate of return) sought by the investor and "n" is the number of periods until the money to be received is actually paid. Thus, our example would be shown as:

FIGURE 4

$$\$90.91 \quad = \quad \frac{\$100}{(1+10\%)^1}$$

If a series of payments are to be received over time, for example, for a period of 3 years, the present value of that stream of cash flows ($100 each in years 1, 2 and 3, would have a total value of $248.69, as shown below:

FIGURE 5

Year	Payment	Discount Factor	Present Value
1	*$100.00*	*0.9090909*	*$90.91*
2	*$100.00*	*0.8264463*	*$82.64*
3	*$100.00*	*0.7513148*	*$75.13*
Total	*$300.00*		*$248.69*

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[2] The rate of return expectation is the rate of return on investment sought by the hypothetical investor, i.e. the individual or entity that will receive the future payment.

The example above clearly illustrates two aspects of this financial analysis: 1) why it is referred to as a "discounted" cash flow analysis, and 2) why the term "flow" is included in the terminology. There is a stream or "flow" of cash from the investment, and the longer the cash flow stream is forecast to continue the greater the discount from the undiscounted or par value of the cash flows.

The example above illustrates another important distinction in financial analysis, which is the weakness of considering only the snapshot or capitalization rate of return in a financial analysis or valuation.

In our example, if we used the snapshot method to value the asset class or describe the return on investment in any one year of the three year projection, the indication would not be mathematically correct, because the snapshot does not specifically reflect or consider the time value of money of the investment (over the three year period).

Discounted cash flow analysis, which takes into account the time value of money, is the appropriate financial analysis method to use in the valuation of most cash flow streams; this is because most cash flow streams change over time. If those cash flows are produced by real property, we have a classic discounted cash flow ("DCF") methodology used to value the real estate that is the subject of analysis. DCF analysis is widely accepted and used by real estate appraisers in the valuation of real property.

Use of a capitalization rate to value real estate is not only a snapshot methodology, but it can be also described as a "short-cut" methodology. Under specific conditions, many of which are common for income producing real estate, capitalization (also known as "direct capitalization") can produce a mathematically reliable indication of value for the property.

The following table is an example comparing direct capitalization with discounted cash flow analysis for an income property investment, with net operating income of $100,000 per year and a capitalization rate assumption of 10%.

We see in the example that the two forms of analysis produce an identical indication of value.

FIGURE 6

Income Capitalization			Discounted Cash Flow Analysis				
		Year	Net Operating Income ("NOI")	Reversion	NOI + Reversion	Discount Factor	Present Value
Net Operating Income	$ 100,000	1	$ 100,000.00		$ 100,000.00	0.9090909	$90,909.09
Capitalization Rate	10%	2	$ 100,000.00		$ 100,000.00	0.8264463	$82,644.63
Indicated Value	$ 1,000,000	3	$ 100,000.00		$ 100,000.00	0.7513148	$75,131.48
		4	$ 100,000.00		$ 100,000.00	0.6830135	$68,301.35
		5	$ 100,000.00		$ 100,000.00	0.6209213	$62,092.13
		6	$ 100,000.00		$ 100,000.00	0.5644739	$56,447.39
		7	$ 100,000.00		$ 100,000.00	0.5131581	$51,315.81
		8	$ 100,000.00		$ 100,000.00	0.4665074	$46,650.74
		9	$ 100,000.00		$ 100,000.00	0.4240976	$42,409.76
		10	$ 100,000.00	$ 1,000,000.00	$ 1,100,000.00	0.3855433	$424,097.62
		Total					$1,000,000.00

There are, however, a number of important assumptions that are explicit and evident in the DCF analysis, but unapparent in the direct capitalization method. In our example, the reader should note that the net incomes do not change from year to year, and that the value of the property does not change over a ten year period ('reversion" is the term used to describe the assumed sale of the property at the end of the investment holding period).

What financial analysts know is that if the net income stream is not expected to change over the holding period, and the asset value is also not expected to change over the holding period, direct capitalization is a financially accurate method of estimating the value of the asset. If net incomes or property value are expected to change or vary, however, discounted cash flow analysis (that can incorporate this change) is the more reliable method of valuation.

In short, both methods have a place in real estate analysis depending upon the character of the asset and how its income and value will change over time, and both methods are employed in this TLPA.

DISCOUNT RATE SELECTION AND DCF ANALYSIS

As discussed in the preceding Valuation Methodology chapter, discounted cash flow analysis consists of forecasting net operating income from a property or (in this case) an asset class and selection of an appropriate discount. The net present value of those future cash flows is then an indication of the value of the property or asset class.

As applied to the asset classes of the trust land portfolio, there are two important additional factors that we discuss below that have a significant impact upon the discount rate that we select as appropriate in this TLPA. These factors are (1) *recognition of the restrictions upon sale of the trust land assets[3]* and (2) *selection of the appropriate basis and/or benchmarks from which we determine the appropriate discount rates* and capitalization rates to be applied to the net incomes from operations of the trust land portfolio.

Impact of the Restrictions upon Sale of Trust Lands and Its Effect Upon Rate of Return Selection

Traditionally, real estate investment, just like investments in stocks and bonds, depends upon the investor receiving a return "on" investment, and a return "of" the investment. For income property investment, return on and return of investment is received in the form of net income and at the time of sale of the property.

When the property sells for more than was paid for it, an investment gain is realized, i.e. the selling price was higher than the purchase price. Regardless of the extent of gain or loss, the sale of the property at the end of an investment holding period is an essential, fundamental and usual part of the real estate investment process. In most respects the sale of the asset represents the return _of_ investment capital and a portion of the return _on_ investment capital. Similarly, the sale of a share of stock or the redemption of a bond at the end of the investment period is also an essential part of the investment process – receiving the return _of_ and return _on_ investment.

The restrictions upon sale of the trust land portfolio has an important impact on our evaluation of the Trust Value and on the investment performance of the trust land portfolio. The effective inability to sell this land makes its ownership, and an evaluation of its value and returns atypical.

For example, in the above discounted cash flow example, we see that the assumed sale of the property at the end of the holding period has a present value of $424,097; this is actually a combination of the 10th year net operating income of $100,000, and the assumed sale of the property for $1,000,000.

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[3] See Appendix A.

If we multiply the discount factor of .3855433 by the assumed sales price, we see that the value of the future sale is worth (today) only $385,543 ($1,000,000 X .3855433). Does this mean that – since we effectively cannot sell the property - it is worth $385,543 less? The answer is "no."

The reader should note that even though the property cannot be sold, the owner of the property will still continue to receive the annual net income of $100,000 in perpetuity. While we do not show the math in this discussion, the present value of these future net operating incomes (years 11 through "n" – a perpetuity) is, in fact, $385,543. Combined with the present value of the cash flows from years 1 – 10, with a present value of $614,456, the present value of the cash flows (years 1 through "n") into perpetuity is $1,000,000. Mathematically, the values are the same.

This discussion and example allow us to see how the restrictions upon sale of the land portfolio does not necessarily reduce or change the present value of the cash flows. It does, however, change how we consider or evaluate market-indicated capitalization rates demonstrated by the sale of land owned or sold by owners *who can sell their land*, without restriction.[4]

To illustrate why this is so, we return to our earlier capitalization rate and discount rate example. While our prior example assumed no change in net operating income and no change in property value, most investors and owners expect to see both growth in net operating income and property value during the holding period of their investment. This, of course, is why real estate is perceived as a good investment. It usually provides growth in income and value over a holding term. If we assume that our example property shows growth in net operating income and value (for example a 3% annual growth in net operating income, and a 3.8% annual increase in property value), our cash flow forecast would look like the following:

FIGURE 7

Discounted Cash Flow Analysis

Year	Net Operating Income ("NOI")	Reversion	NOI + Reversion	Discount Factor	Present Value
1	$ 100,000.00		$ 100,000.00	0.9090909	$90,909.09
2	$ 103,000.00		$ 103,000.00	0.8264463	$85,123.97
3	$ 106,090.00		$ 106,090.00	0.7513148	$79,706.99
4	$ 109,272.70		$ 109,272.70	0.6830135	$74,634.72
5	$ 112,550.88		$ 112,550.88	0.6209213	$69,885.24
6	$ 115,927.41		$ 115,927.41	0.5644739	$65,438.00
7	$ 119,405.23		$ 119,405.23	0.5131581	$61,273.76
8	$ 122,987.39		$ 122,987.39	0.4665074	$57,374.52
9	$ 126,677.01		$ 126,677.01	0.4240976	$53,723.42
10	$ 130,477.32	$ 1,450,000.00	$ 1,580,477.32	0.3855433	$609,342.42

In this example, assuming a property price or value of $1,000,000, the capitalization rate for this investment would still be 10% ($100,000/ $1,000,000) but the return on investment would clearly be higher, because over the investment holding period, the property would have produced much more net operating income (greater by $146,388) and more income or cash flow at the time of sale of the property ($450,000 more).

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[4] The inability to sell land also necessitates an adjustment to the discount rate for liquidity (i.e. the ease or difficulty in bringing an asset to market and successfully completing its sale. Liquidity is an issue to be considered but is not a topic of this discussion.

In our earlier example, the rate of return sought by the investor was 10%, and that investment produced a 10% rate of return. Because there was no change in income or value, the discount rate (also known as the internal rate of return) was 10%. In this second example, however, because of growth in net operating income and value, the discount rate is, in fact, 13.505%.

In other words, an investor who purchased this property for $1,000,000 and who received the cash flows shown above would have earned 13.505% on their investment. Yet the capitalization rate, at the time of the purchase of the property, remained 10%.

This example helps illustrate a very common occurrence in real estate investment; in fact the predominant occurrence, and that is that the capitalization rate is routinely lower than the internal rate of return that the investor hopes to receive over the life of the investment. In our example above, the capitalization rate is 10% and the internal rate of return is 13.505%. This is a difference of 350 basis points between the capitalization rate and the discount rate (one basis point equals 1/100 of a percentage point; 100 basis points = 1%).

The extent to which income growth and property value growth changes from the time of property purchase until sale determines the difference between the capitalization rate and the internal rate of return (aka discount rate). Various surveys of real estate investors suggest that they routinely expect a 200 basis point to 300 basis point difference between capitalization rate and discount rate (e.g. a capitalization rate expectation of 5.5% and a discount rate expectation of 8.0%, equals a difference of 250 basis points).

Property investors expect net operating income to grow and property value to grow over the investment holding period; thus the capitalization rate would be lower than the hoped-for discount rate.[5] Where there is no change in net operating income and property value over the investment holding period, the capitalization rate equals the discount rate (as we saw in our first example). If net operating income and property value both decline during the investment holding period, the capitalization rate will exceed the discount rate.

As Applied to the Trust Lands Valued in the TLPA

With respect to the TLPA then, the above helps illustrate why – as we evaluate the rate of return either sought by or achieved by other owners or operators of lands like those held in the trust land portfolio (but without the restriction upon sales) - we must make a distinction between the rates of return sought or achieved by those private and/or unrestricted buyers or sellers and the restricted lands valued in this TLPA.

That distinction is that the capitalization rates sought by or achieved by private owner/investors most likely include an expectation of the future sale of the property at a gain, causing the capitalization rate to be below the discount rate. *Accordingly, these capitalization rates are a less reliable indication of an appropriate rate of return for land – like the trust land portfolio – that is restricted and effectively cannot be sold*.

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[5] We remind the reader that the terms "internal rate of return" and "discount rate" are synonymous.

It is the discount rate suggested by private market activity, however, that *can* be directly compared and/or applied to the trust land portfolio. This is because it represents the total return sought or achieved by the investor owner – whether or not the property is held in perpetuity or can be sold at the end of an investment holding period. This means, for example, that a sale of timber land that suggests a 5% capitalization rate, likely indicates an internal rate of return expectation that is anywhere from 6% to 7%.

As the TLPA considers transactions that provide an indication of capitalization rate and/or discount rate, we should consider first and foremost the discount rate suggested by that transaction (a measure of total return) and to a lesser extent, the indicated capitalization rate. This is because the restrictions upon sale of the trust lands effectively mean that the trust lands cannot be sold, but only held in perpetuity. Thus, for trust lands, the financial ownership benefits are received only through property operations that produce net operating income and not through sale.

Selection of the Appropriate Basis and/or Benchmarks for Discount Rates and Capitalization rates

In the 2019 Sustainable Harvest Calculation, the DNR's Forest Estate Model incorporates a discount rate to allow the discounting of future cash flows from the harvest of timber for a number of alternative harvest plans. In that analysis, DNR uses net present value among the alternatives studied in order to assist in its decision about the preferred harvest plan. From the Final Environmental Impact Report for the Sustainable Harvest Level analysis:

"A forest estate model is a mathematical computer model that is designed to find the optimal solution to the problem of deciding

where, when, and how many forest management activities, such as harvest and thinning, should be conducted in order to meet DNR's fiduciary responsibilities pursuant to all state and federal laws. In building this model, DNR utilized commercial software, Remsoft Spatial Planning System (Remsoft Inc., Fredericton, Canada), that is based on a mathematical programming technique known as "linear programming.".....

The objective function of DNR's forest estate model is to maximize the "net present value" of revenue derived from forest management activities over 10 planning periods (decades) into the future subject to a set of constraints that reflect operational, ecological, financial, or other policy considerations. Some of the constraints in this model are termed as "hard," meaning such constraints must be met to achieve a feasible solution to the problem. There also "soft" constraints, mostly relating to a set of future desired forest conditions that do not exist today. These soft constraints involve a "slack variable," which assumes a level of shortfall in meeting that particular constraint. Therefore, if the forest condition today is not ready to meet a particular constraint, the expression of soft constraints allows the model to find a feasible solution depicting when such constraints can be met."[6]

The Forest Estate model is, in effect, a benefit-cost analysis ("BCA") applied in a manner generally consistent with the guidelines of the U.S. Environmental Protection Agency ("EPA"). The methodology of a BCA are described more fully in the EPA publication "Guidelines for Preparing Economic Analyses."[7] These guidelines are used by a variety of federal, state and local agencies when they are engaged in the evaluation of public investments, public policies and regulations intended to provide benefits to targeted populations, communities and regions.

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[6] Alternatives for the Establishment of a Sustainable Harvest Level FEIS, Appendix F at page F-1, October 2019
[7] Washington Board of Natural Resources Resolution 1560, December 3, 2019.

The Forest Estate model uses net present value analysis to evaluate the most appropriate harvest plan. In its Draft Environmental Impact Statement, the Forest Estate model utilized a 2% discount rate, which was subsequently amended to 3% in the Final Environmental Impact Statement The recent adoption of the Sustainable Harvest Level by the BNR[8] raises the obvious question "Is the appropriate discount rate for the TLPA Trust Value analysis the same discount rate adopted by the BNR in its sustainable harvest level?"

We have concluded that the answer to this question is "No," and that the discount rate used in the TLPA should be different from that used in the calculation of the sustainable harvest level.

In order to explain our conclusion, we provide relevant background on the basis for selection of the rate of return – a discount rate – and the rationale for our conclusions.

Building on our earlier discussion in this chapter about capitalization rates and discount rates, we see that the discount rate is a necessary part of determining the "time value of money." It allows the evaluation or comparison of the worth of a dollar today versus the worth (today) of a dollar received in the future. Most people will agree that a dollar to be received in the future is worth less than a dollar received today, because the "waiting" represents deferral or delay in the realization of whatever the deferred outcome was or is hoped to be. The "discount" represents the worth or value of the delay.

If we think about the deferral or delay as having a worth or value, we can then begin to ask questions about how valuable (i.e. how costly) is the deferral or delay? In our first capitalization rate and discount rate example, where the wait was one year and a 10% return on investment was sought, the worth or value of the delay was $9.09 ($100.00 - $90.91 = $9.09). The higher the discount rate, the greater the dollar discount; the lower the discount rate, the lower the discount in dollars. Because of the compounding effect of the discount rate, the longer the deferral or delay the greater the discount.

For example, a 10% discount rate applied to a $100 cash flow to be received in 50 years results in a very substantial discount - 99.15%. This means that the present value today of this cash flow to be received in year 50 is only 85¢. Similarly, if the discount rate is 3%, the present value today of that future $100 is worth $22.81 (and the discount is then $77.19). Using these same two examples, we could also say that for the individual whose investment goal is 10%, the worth or cost of delay is $99.15; if that same individual had an investment goal of 3%, the worth or cost of that deferral or delay was then only $77.19. These examples show the sensitivity of value to discount rate, particularly over a long-term projection period.

Earlier in this chapter, the emphasis of our discussion was on the rate of return and the net present value of an investment. In the above examples, we look at the flip side of time value of money concepts, as we evaluate the worth or cost of the delay in receiving a cash flow. Of course, this single cash flow represents both a return _of_ the initial investment and a return _on_ the investment. Ultimately the investor asks, "how much of a discount should I receive or require until I receive cash flows at a future date?"

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[8] Washington Board of Natural Resources Resolution 1560, December 3, 2019.

These ideas around the worth or cost of delay or deferral in receiving a return of and return on investment are central to the concept of **intergenerational equity**, which, in lay terms, is the recognition of the fact that when the investment holding period is very long, the current owner-investor may be making investment decisions today, while the return of and on investment may be received by a subsequent generation. Where the investment holding period is very long, or where the asset that generates the returns cannot be sold, intergenerational equity can and should be considered.

According to Wikipedia, intergenerational equity is:

Intergenerational equity in economic, psychological, and sociological contexts, is the concept or idea of fairness or justice between generations. The concept can be applied to fairness in dynamics between children, youth, adults and seniors, in terms of treatment and interactions. It can also be applied to fairness between generations currently living and generations yet to be born. Conversations about intergenerational equity occur across several fields. It is often discussed in public economics, especially with regard to transition economics, social policy, and government budget-making. Many cite the growing U.S. national debt as an example of intergenerational inequity, as future generations will shoulder the consequences.

Intergenerational equity is also explored in environmental concerns, including sustainable development, global warming and climate change. The continued depletion of natural resources that has occurred in the past century will likely be a significant burden for future generations. Intergenerational equity is also discussed with regard to standards of living, with the focus falling on inequities in the living standards experienced by people of different ages and generations. Intergenerational equity issues also arise in the arenas of elderly care and social justice.

In the context of institutional investment management, intergenerational equity is the principle that an endowed institution's spending rate must not exceed its after-inflation rate of compound return, so that investment gains are spent equally on current and future constituents of the endowed assets. This concept was originally set out in 1974 by economist James Tobin, who wrote that, "The trustees of endowed institutions are the guardians of the future against the claims of the present. Their task in managing the endowment is to preserve equity among generations."[9]

Intergenerational equity is specifically identified as a management consideration by the DNR in its management of trust lands. The 2006 Policy for Sustainable Forests notes ten policy objectives, including #2:

"Balance trust income, environmental protection and other social benefits from four perspectives: the prudent person doctrine, undivided loyalty to and impartiality among the trust beneficiaries, **intergenerational equity***; and not foreclosing future options."*[10] (Our emphasis – Ed.)

The management objective of intergenerational equity is mentioned again in the definition of "sustainability" for the sustainable harvest calculation [11] and again, in the definition of the "trust mandate" (*"DNR's legal duty to produce long-term income for the trust beneficiaries. The trust mandate is grounded in four tenants: the prudent person doctrine, undivided loyalty to the trusts, intergenerational equity versus maximizing current income, and avoiding foreclosing future options."*)

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[9] Wikipedia at https://en.wikipedia.org/wiki/Intergenerational equity
[10] Washington Dept. of Natural Resources, Policy for Sustainable Forests, December 2006, at page 3
[11] Ibid, at page 29

Returning to the question we posed earlier – "Is the appropriate discount rate for the TLPA Trust Value analysis the same discount rate adopted by the BNR in its Sustainable Harvest Calculation?" Our review of the Draft EIS strongly suggest that the Sustainable Harvest Calculations use of a 2% and later a 3% discount rate arise from how the DNR perceives its obligations for intergenerational equity among trust beneficiaries.

The recognition of intergenerational equity is intended to protect future beneficiaries from the actions of current beneficiaries. At its simplest and most illustrative, if *current* beneficiaries sold an asset producing the net income today, and then spent the cash from the sale, *future* beneficiaries would have been short-changed (to say the least). Conversely, if *current* beneficiaries implemented management decisions that reduced current net income to zero, in favor of net operating incomes decades into the future, *current* beneficiaries would be short-changed. The concept of intergenerational equity implies the balancing of management and financial decisions so as to provide the highest present net income for *current* beneficiaries while preserving sufficient asset value and income-producing capabilities so that *future* beneficiaries can also enjoy the same level of net income as did their predecessors.

EPA Guidelines recommend a variety of economic factors that a project sponsor or evaluator should consider in a BCA (benefit-cost-analysis), among them the selection of a discount rate. Where a public policy and/or public investment is contemplated that will have widespread costs and/or benefits, the discount rate is referred to as a "social discount rate" or "SDR." The economic concepts underlying a social discount rate are that (i) costs and benefits of a public investment, expenditure or policy decision are very long term, with (ii) costs and benefits that are spread widely across society. Consequently, according to the Guidelines, a financial analysis for public policy or public

projects should take these factors into account; economic theory suggests that the discount rate should or may be different from discount rates used for private *intra*generational investment.

The topic of social discount rates and their use in public policy and public investment contexts is not without controversy. The concepts that underlie the analysis of a social discount rate include recognition of the social cost of capital, measures of the rate of consumption, the expected recovery of the cost or investment and other factors. Further, there is more than one method for the selection of a social discount rate, and there is some disagreement among economists about which method is more reliable.

Literature on social discount rate typically refers to the alternative perspective as a "private" or "financial" discount rate; that is, a discount rate that is based on competitive investment returns from comparable investments or assets. Traditionally in real estate analysis, including valuation, a "private" discount rate is used. The context around private discount rates is that the investment or expenditure uses private capital and that the investor/beneficiary will be the party to receive the return on and of investment (i.e. it is an *intra*generational investment).

We note that while the EPA Guidelines make a strong case for use of a social discount rate for BCA (benefit-cost-analysis), the Guidelines themselves do not cite a specific amount as the recommended or preferred rate. Other literature does, however. The broad range of recommended social discount rate is from 2% to 7%, with rates from 3% to 3.5% recommended more frequently. We note that the EPA Guidelines incorporate by reference OMB Circular A-4 (September 2003); Circular A-4 recommends the use of 3% and 7% discount rates. From Circular A-4[12]:

"Agencies should provide benefit and cost estimates using both 3 percent and 7 percent annual discount rates expressed as a present value as well as annualized. These are "real" interest rates that should be used to discount benefits and costs measured in constant dollars. Unlike typical market interest rates, real rates exclude the expected rate of future price inflation. The 7 percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy, based on historical data. It is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital. It approximates the opportunity cost of capital, and it is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector. The 3 percent discount rate is based on a recognition that the effects of regulation do not always fall exclusively or primarily on the allocation of capital. When regulation primarily and directly affects private consumption, a lower discount rate is appropriate. The alternative most often used is sometimes called the "social rate of time preference." This term simply means the rate at which "society" discounts future consumption flows to their present value. If one assumes the rate that the average saver uses to discount future consumption is a measure of the social rate of time preference, the real rate of return on long-term government debt may provide a fair approximation. Over the last thirty years, this rate has averaged around 3 percent in real annual terms on a pre-tax basis."

In contrast to the range and/or indications of social discount rate, the relevant indicators of private discount rate range for real estate and timberland range from a low of 5% to as high as 10% depending on source. Our source data for private discount rates is discussed in greater length later in this chapter.

As we consider whether or not it is appropriate to use the same discount rate used in the Sustainable Harvest Calculation in the TLPA, having explained the difference between types of discount rates, there are three reasons that cause us to conclude that use of a private discount rate is the appropriate basis for discount rate selection in the TLPA:

1) The TLPA is a Valuation and not a Benefit Cost Analysis

It is clear from our review of the EPA Guidelines, Circular A-4 and other literature about social discount rates that the intended context for use of SDRs is where public policy or projects are being evaluated (i.e. benefit-cost analysis) and where the benefits of such action are distributed across society and possibly generational groups.

We can contrast that intended use of analyses very clearly with the intended use and users of the TLPA; it is, at its core, a valuation of specific real property assets conducted in a manner generally similar to a real property appraisal process. The benefits of ownership, net operating income and (hopefully) value growth over time inure to specifically defined beneficiaries. In this respect, the TLPA deviates very specifically from the traditional context in which an analyst is comparing alternatives and where the benefits of each alternative are broad, societal-level groups.

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[12] Office of Management & Budget, Circular A-4, September 2003, "Discount Rates".

2) Use of A Private Discount Rate Does Not Necessarily Preclude or Impair Intergenerational Equity

We have described earlier how discounting of future cash flows can be perceived as somehow disfavoring the benefits of an investment to subsequent generations, particularly to the extent that it could shift benefits from the distant future to the present (or at least to earlier years in the investment horizon). Literature concerning social discount rate doesn't spend much time, however, evaluating the concepts and/or best practices for the application of private discount rates.

There is, however, one common management objective in private investment management practice that is both widely implemented, and which has the significant effect of protecting intergenerational equity. That is the investment objective of maintaining the "corpus" of the investment fund as a high priority. The corpus of an investment fund is also sometimes called the "principal dollar balance" of a fund, account, or the trust assets.

In the context of a trust relationship, the idea of prioritizing the maintenance or growth of the trust corpus is, in fact, a practical means of protecting the intergenerational equity of a private trust or fund. So long as the corpus (fund balance or dollar value of the trust assets) do not decline, in all practical respects, intergenerational equity among trust beneficiaries is preserved. Any subsequent generation will enjoy the benefits that flow from the investment performance of the trust corpus, as well as reflecting whatever then current returns on investment are able to be produced.

Intergenerational equity then would only be threatened if the decisions of the current trustee had the effect of reducing the fund corpus so that it could not produce an approximately comparable net income for the future beneficiaries.

It is also fair to note that not all forms of investment increase in value over time. Some types of investments actually decline in value over time, or have a fixed or unchanging payout, including some forms of real estate investment. We can think of these as depreciating assets or declining assets. As land assets, however, the asset classes of the Trusts generally do not have intrinsically declining values, [13] but do, in fact, maintain their productivity over successive generations.[14]

Thus, the renewable resource nature of much of the Trust land portfolio has a natural and inherent form of protection of intergenerational equity insofar as the value of the fund corpus – driven by the productivity of the real property – does not or need not diminish to the disadvantage of future generations. This financial attribute of the trust land portfolio is directly connected to the restrictions upon sale of the trust lands incorporated in the federal land grant; i.e. if the land cannot be sold, the value of the corpus may be maintained, thus protecting future generations.

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[13] We note that Trust mineral rights are or may be subject to depletion, which does represent a permanent loss in value.

[14] We note the roughly 50 year production cycle of forest land; this is different from and is not a form of depletion that gives rise to a permanent loss in value.

3) Prudential Standards Do Not Recognize Intergenerational Equity as a Mandate

Prudential standards are practices and procedures used by financial institutions, investment managers and fiduciaries to manage risk and maintain adequate capital. Prudential standards are generally silent on the topic of intergenerational equity. Clearly, some trusts have a multi-generational character, but so far, the concept of intergenerational equity has not been incorporated into prudential standards. We have confirmed this through our review of the Uniform Prudent Investor Act (1994) and its implementation in Washington State (RCW Chapter 24.55 – Prudent Management of Institutional Funds Act).

Concluding Comments – Selection of the Appropriate Basis and/or Benchmarks for Discount Rates and Capitalization rates (Use of a Social Discount Rate in the TLPA)

Because the TLPA is an *asset specific valuation* completed for a *defined beneficiary group* (i.e. the trust beneficiaries) and in the presence of DNR policy statements that emphasize its duty as a trustee for the beneficiaries, we have concluded that the TLPA should use, as a basis for its valuation analysis and evaluation of returns, discount rate(s) that are reflective of private investment in private assets or their equivalent. Use of private discount rates is not contrary to law but may be considered as inconsistent with DNR policy statements that identify maintenance of intergenerational equity as one of several management objectives for trust lands.

Use of private discount rates in the TLPA does not necessarily diminish or impair intergenerational equity within the trust beneficiary group because the great majority of the value of the trust assets are not subject to depreciation or depletion. The restriction upon sale of much of the trust land assets provides a high degree of assurance that the corpus of the trusts will be maintained through the continuity of capital value among trust lands.

It is also appropriate to note that nothing in this TLPA should be described as critical of, or inconsistent with, the Sustainable Harvest Calculation and its use of discount rate with a numerical value different from the TLPA.

Selection of Discount Rates and Capitalization rates for the TLPA

Having established the appropriate basis for rate of returns (capitalization rates and discount rates) as that coming from and suitable for private investment, we present the data and analysis of rates leading to specific financial rate or return (discount rate and capitalization rate) selections for the several asset classes.

The evaluation and selection of a financial rate of return can be accomplished in a number of ways and from a variety of sources. There are two important concepts that the reader should be aware of as we describe this portion of our investigation and analysis. First, financial rates of return can be evaluated based on *investor* expectation or on the basis of *actual (rate of return) historical performance*. Second, financial rates of return can be evaluated *directly* or *indirectly*.

In a valuation of property, much more frequently, it is the investor expectation indication of rate of return that is given greater weight by the appraiser or analyst because the valuation analysis is completed as of a specific date of valuation. Most analysts agree that it is easier to assess investor expectations as of a date certain than it is to evaluate historical rate of return performance and then make specific adjustments to update or simulate a specific valuation date. Investor expectation data is available through periodic surveys of qualified investors and/or market participants.

Historic performance data is usually available; in the TLPA, varying by asset class, we also present and consider historic rate of return performance as we evaluate our discount rate and capitalization rate selections.

Financial rates of return can be evaluated based on direct evidence – for example, based upon specific property transaction evidence, or based on indirect evidence – where the analysts examine a related source of rate information, and not a direct indication of rate. An example of an indirect source of rate of return information is (i) to analyze the weight average cost of capital of a forest products company and then (ii) apply that weighted average cost of capital to the income stream of timberland. Because the source rate or return data was not explicitly from a timberland transaction or offering, we characterize that source of rate information as indirect.

In this TLPA, we consider financial rate of return information that is based on investor expectation and based on historical performance data, and we use rate of return data that is from both direct and indirect sources.

Finally, we again reference the introductory concepts about capitalization rates and discount rates at the beginning of this chapter.

1. Where the income stream from a property or asset class is level over the investment holding period, and where the property does not appreciate in value, the capitalization rate and the discount rate are equal (page 5).
2. When the income stream and reversionary value do not change, capitalization of net income (as a means of Income Approach valuation) is as reliable as discounted cash flow analysis (page 3).
3. Accordingly, our discussion and source data focusses on discount rates indicated in the marketplace; because the trust land assets cannot be sold, and are

not expected to experience material growth in net income over the long term, the discount rates indicated in the marketplace are then a suitable basis for our discount rate and capitalization rate selections.

In the following sections of this chapter, we present rate of return information from a variety of sources. Most of these sources include rate of return information that follows our valuation date of June 30, 2018. We've chosen to present this post-valuation-date information in the belief that the reader benefits from a broader understanding of how financial returns performed before and after the valuation date. Our selections of discount rate, however, are intended to be appropriate and effective as of the valuation date of June 30, 2018.

Timberland Discount & Capitalization Rates

For the timberland asset class, the primary sources of our discount and capitalization rate information are from rate of return expectation and historical performance surveys. We have reviewed three sources of information:

National Council of Real Estate Investment Fiduciaries ("NCREIF") Timberland Index – 2nd Quarter 2019

James W. Sewall Company

Sewall Investor Survey, Winter-Spring, 2019

Sizemore & Sizemore

Pacific Northwest Timberland Investment Survey Results; as of March 2019

Each of these three sources report the estimated return on investment (total return or internal rate of return) on direct timberland investment. The results and/or indications of total return are summarized in the following tables:

National Council of Real Estate Investment Fiduciaries ("NCREIF") Timberland Index – 2nd Quarter 2019

FIGURE 8

TIMBERLAND TOTAL RETURNS

	NPI	Total Timberland	Property Count	South	Northwest	Northeast	Lake States
2nd Qtr 2019	1.51	1.04	446	1.11	1.15	-0.21	0.40
1st Qtr 2019	1.80	0.11	447	0.04	0.25	-0.42	0.73
One Year	6.51	2.95		1.61	6.35	2.52	0.67
Three Years	6.89	3.29		2.08	6.95	1.46	1.92
Five Years	8.83	4.62		3.83	7.36	2.29	2.96
Ten Years	9.25	3.98		2.52	8.25	1.68	4.35

TIMBERLAND EBITDDA RETURNS

	NPI	Total Timberland	South	Northwest	Northeast	Lake States
2nd Qtr 2019	1.12	0.64	0.65	0.72	0.28	0.25
1st Qtr 2019	1.11	0.71	0.70	0.77	0.60	0.57
One Year	4.53	2.96	2.64	3.77	3.40	2.06
Three Years	4.62	2.91	2.62	3.78	2.99	2.07
Five Years	4.79	2.82	2.65	3.36	2.81	2.23
Ten Years	5.42	2.70	2.41	3.63	2.10	1.32

TIMBERLAND APPRECIATION RETURNS

	NPI	Total Timberland	South	Northwest	Northeast	Lake States
2nd Qtr 2019	0.38	0.40	0.47	0.43	-0.49	0.15
1st Qtr 2019	0.69	-0.59	-0.65	-0.52	-1.02	0.17
One Year	1.91	0.00	-1.01	2.51	-0.85	-1.37
Three Years	2.19	0.37	-0.53	3.09	-1.50	-0.15
Five Years	3.90	1.76	1.16	3.90	-0.50	0.72
Ten Years	3.68	1.25	0.11	4.50	-0.41	3.00

The Timberland Total Returns table provides information for total returns (income returns + appreciation returns) for the reporting properties in the NCREIF Timberland Index. These tables provide indications of both quarterly returns and annuals return. "NPI" is an acronym for the NCREIF Property Index, a national indication of real estate investment returns. Significantly, NCREIF total return

reports are a combination of actual returns (to the extent that they report actual net incomes from timberland operations) and estimated or anticipated appreciation returns (because the NCREIF reporting member also estimates the value of the timberland property at the end of each quarter). We see in the first table that total returns for the preceding one year period are 6.51%, with three year and five year returns reported at 6.89% and 8.83% respectively. The average of the three indications is 7.41%.

The EBITDA returns (earnings before interest, taxes, depreciation and amortization) represent the return on investment from operating income only, and we see income returns of 4.53%, 4.62% and 4.79%, respectively, for one year, three year and five year returns. The average of the three indications is 4.65%

Appreciation returns for the NCREIF portfolio are 1.91%, 2.19% and 3.90% for the one, three and five year investment periods.

Because NCREIF provides the breakout of returns between income returns and appreciation returns, we can see the proportion of total return that is provided by appreciation. Significantly – because the trust land portfolio cannot be sold – we can see the extent to which appreciation in the value of timberland provides a significant share of total return (29.3% of total return at one year; 31.7% and 44.1% for three year and five year periods, respectively). The average of the three indications of appreciation return for the one, three and five year investment periods is 35.0% - meaning that, on average, appreciation in timberland value provides just over one-third of the total return from timberland investment for the private timberland owner/investor. This is important information for the timberland owner that cannot sell their timberland.

How does this information affect our assessments of the suitable rate of return for use in the TLPA? As we have described above, as we value the trust land assets, it is appropriate to apply the total return rate to the timberland net income stream, because the beneficiaries are entitled to a competitive return on investment, even though the timberland cannot be sold.

The following example illustrates the impact on resulting timberland value using the total return rate and the income-only return rate:

Example Net Income from Trust Land	$10,000,000
Capitalization at **Income Return Only**	4.65%
Indicated Trust Land Value	$ 215,208,034
Example Net Income from Trust Land	$10,000,000
Capitalization at **Total Return Rate**	7.41%
Indicated Trust Land Value	$ 134,952,767
Value Difference in Dollars	$ (80,255,268)
Value Difference in Percentage	-37.29%

The appropriate rate to use is the total return rate, and not the income return only rate, regardless of the fact the trust land portfolio effectively cannot be sold. We see above that the resulting value of the timberland with restrictions upon sale is lower than it might otherwise be, precisely because the owner cannot accelerate their return through property sale and must wait for income from subsequent years to provide additional return.

The NCREIF Timberland Index provides a strong indication that the discount rates for timberland investment range from 6.00% to 8.00%, and these discount rates can be applied to trust timberland net incomes to estimate Trust Value of the timberland asset class. These NCREIF rates are non-leveraged and nominal, i.e., inclusive of inflation.

James W. Sewall Company
Sewall Investor Survey, Winter-Spring, 2019

The Sewall Company Investor Survey is a traditional rate of return expectation survey, insofar as it is based upon a periodic survey of knowledgeable market participants, and they report their results by respondent count and for timberland investments in different regions of the United States, including the Pacific Northwest. The Sewall survey is a well-established source of timberland investor expectation data. We see in the following table that the mean (average) discount rate for Pacific Northwest timberland, in their Winter/Spring 2019 survey was 5.00%, within a range from 4.00% to a high of 5.50%.

SEWALL INVESTOR SURVEY WINTER - SPRING 2019© - Regional Breakdown

Respondent	PNW	Inland West	South	Northeast	Lake States	Appalachia	USA[1]	USA[2]
1	4.75%	6.00%	4.75%	5.25%	5.00%	6.00%	5.00%	
2	5.25%							
3	5.50%	6.00%	5.50%	6.00%	6.00%	6.00%	5.50%	
4	5.50%	6.25%	5.50%	5.75%	5.75%	6.00%	5.50%	
5	5.50%	6.50%	5.50%	5.50%	6.50%	6.00%	5.50%	
6	5.25%	5.75%	5.50%	6.00%	6.25%	6.25%	5.50%	
7	5.00%		5.00%				5.00%	
8			6.00%				6.50%	
9	5.00%		5.25%	5.50%			5.25%	
10	4.00%		4.50%				4.25%	
11			4.50%				5.25%	
12	4.75%		5.00%				5.00%	
13	4.50%	5.00%	5.50%	6.50%	6.50%	7.00%	6.00%	
14	5.00%	5.50%	5.00%	5.50%	5.25%	6.00%	5.25%	
MEAN	5.00%	5.86%	5.19%	5.75%	5.89%	6.18%	5.35%	5.07%
MEDIAN	5.00%	6.00%	5.25%	5.63%	6.00%	6.00%	5.25%	5.00%
LOW	4.00%	5.00%	4.50%	5.25%	5.00%	6.00%	4.25%	4.00%
HIGH	5.50%	6.50%	6.00%	6.50%	6.50%	7.00%	6.50%	6.50%
# Responses	12	7	13	8	7	7	13	27

[1] Regional respondents only.
[2] All respondents.
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In the Sewall data table below, we see their presentation of the real discount rate sought by timberland investors over a long period of time, from the late 1990's into 2019. Most striking about this data table is the narrow range of variance across the years, including periods of time such as the Great Recession, when timber prices were adversely affected by a severe decline in housing construction and demand for timber.

Real Discount Rate for Timberland by US Region Since the 1990s
Source: James W. Sewall Company
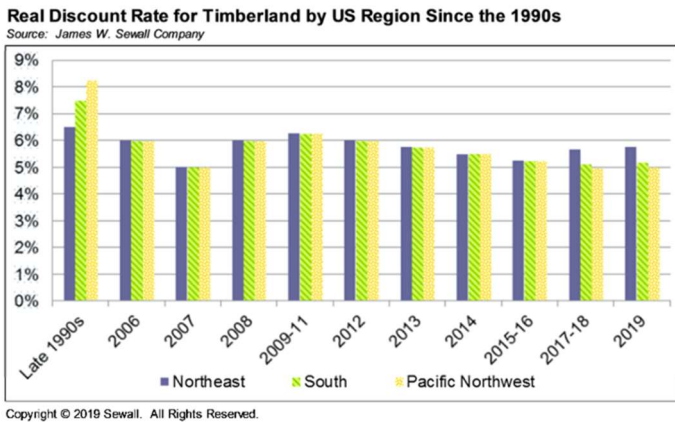
The reader should note that Sewall presents a "real" rate of return, which does not include an assumption of inflation. A rate of return that includes inflation is commonly called a nominal rate of return.

In the following chart, Sewall presents real discount rates for selected geographies, from 2009 to its Winter/Spring 2019 report. In this chart we see how the average discount rates for the United States have changed over time (not much) and how they compare to other nations or regions elsewhere in the world. In this year by year presentation, we see average U.S. discount range ranging from 5.00% to 6.00%.
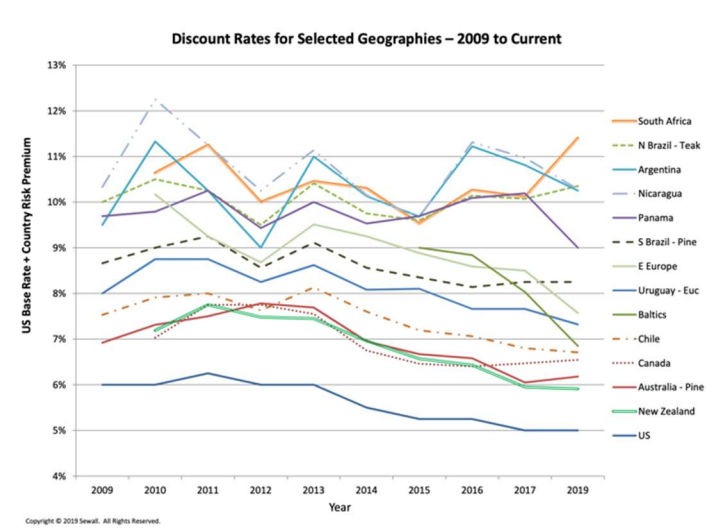
Discount Rates for Selected Geographies – 2009 to Current

Sizemore & Sizemore
Pacific Northwest Timberland Investment Survey Results; as of March 2019

Sizemore and Sizemore is a timberland consulting firm that publishes a discount rate expectation survey; their March 2019 results are shown below. This survey is for Pacific Northwest timberland only, and we see their reported average rate of 5.60% in a range of from 5.29% to a high of 6.21%, similar to our other indicators. Sizemore treats their recognition of timberland management fees slightly differently than our other reporters, and the table reveals this distinction has a slight impact on results. Notably, Sizemore and Sizemore also survey the inflation expectation of market participants, and we see (a) how it influences the survey results and (b) the expectation of the range of inflation expectation. The average inflation expectation of survey participants is 2.37%.

FIGURE 13

SUMMARY	Real				Real w/oFees				Real w/Fees			
	Average	High	Low	#	Average	High	Low	#	Average	High	Low	#
Average	5.60%	6.21%	5.29%	61	5.62%	6.20%	5.32%	58	5.33%	6.33%	4.83%	3
Median	5.50%	6.00%	5.25%	61	5.50%	6.00%	5.25%	58	5.00%	6.00%	4.50%	3
Mode	5.00%	6.00%	6.00%	61	5.50%	5.50%	6.00%	58	5.00%	6.00%	4.50%	3
Max	8.00%	10.00%	7.00%	61	8.00%	10.00%	7.00%	58	6.00%	7.00%	5.50%	3
Min	4.75%	5.00%	4.50%	61	4.75%	5.00%	4.50%	58	5.00%	6.00%	4.50%	3
StdDev	0.67%	0.92%	0.63%	61	0.67%	0.94%	0.63%	58	0.58%	0.58%	0.58%	3

SUMMARY	Inflation	Nominal				Nominal w/oFees			
	Average	Average	High	Low	#	Average	High	Low	#
Average	2.37%	7.67%	8.33%	7.00%	3	7.67%	8.33%	7.00%	3
Median	2.25%	7.50%	8.00%	7.00%	3	7.50%	8.00%	7.00%	3
Mode	2.25%	7.50%	8.00%	7.00%	3	7.50%	8.00%	7.00%	3
Max	3.00%	8.00%	9.00%	7.00%	3	8.00%	9.00%	7.00%	3
Min	2.00%	7.50%	8.00%	7.00%	3	7.50%	8.00%	7.00%	3
StdDev	0.33%	0.29%	0.58%	0.00%	3	0.29%	0.58%	0.00%	3

The reader should appreciate that, while it is helpful to understand the inflation expectations of the survey participants, it is a respondent expectation, that may be influenced by other factors. For example, the respondent's expectation of inflation may be influenced by other indications, such as the Consumer Price Index. This is equally true in other discount rate expectation surveys, such as those for other property types (retail buildings, apartments, etc.).

The three surveys we have described above make a strong case for a discount rate selection (i.e. total return or discount rate) of from 5.00% to 7.00%. We note, however, that the NCREIF survey includes an inflation expectation, while Sewall and Sizemore & Sizemore present discount rates in in real terms. All three are considered credible sources, and we remind the reader that the NCREIF Timberland index is a blend of actual performance and expectation, while the Sewall and Sizemore & Sizemore are yield expectation surveys.

Other Indications of Total Return or Discount Rate

In addition to the surveys summarized above, we have also gathered information on three indirect indictors of rate of return suitable for timberland analysis: 1) the rate of return indicated by publicly-traded forest products companies that own and harvest timberland (among other business activities); 2) the rates of return indicated by real estate investment trusts that own and operate timberland (only) and 3) a unique indication of rate of return from a recent higher education bond offering supported by the net income from our trust land portfolio.

Our first indication is from a study of the weighted average cost of capital of six publicly traded companies that are either integrated forest products companies or timberland-owning real estate investment trusts ("REIT"). As a business sector, the number of public timber products and timberland company is small, so integrated companies are combined with real estate investment trusts. Integrated companies not only own and operate timberland, but also own timber mills and other forest product business lines, so they are somewhat different from companies that only own and harvest timber.

The measurement used to evaluate total return is that of the weighted average cost of capital ("WACC"). The WACC is a widely used financial indicator for the analysis of operating companies and it provides a measure of the total return produced by the company based on a comparison of its income and its asset value. Accordingly, WACC is a "performance" measure and not an "expectation" measure. It is also an indirect measure, for purposes of our analysis, because these indications of return come from the operation of a business enterprise and not of a specific timberland inventory or transaction. Finally, we note that

a WACC calculation also takes into account additional adjustments to reflect the comparative variability of stock price (beta) and it makes an adjustment for corporate tax costs. The return indication is then an after-(corporate) tax rate of return indication.[15]

Our WACC comparison of seven [16] public companies – Weyerhaeuser Company, Rayonier, Inc., PotlatchDeltic Corporation, Catchmark Timber Trust, Inc., Louisiana-Pacific Corporation and Pope Resources, L.P., indicate a weighted average cost of capital ranging from a low of 6.80% to a high of 8.20%, as of November 2019.

Our second source of an indirect indication of rate of return comes from Forisk Consulting, a timber industry consultant. They monitor and publish the Forisk Timber REIT (FTR) Index. Their survey of performance is published monthly. Significantly for this study, the FTR Index reflects the operation of timberland real estate investment trusts, which, generally speaking, are public companies that own timberland and sell timber, but who do not operate other business units (such as timber mills) or sell other forms of forest products. Further, REITs are income tax flow-through entities, so their indicated returns are "pre-tax" to the investor. Accordingly, the timber REITs represent a form of business enterprise that is more similar to our timberland asset class, insofar as they own timberland and sell timber and because their indicated returns are pre-tax. Unlike the trust land portfolio, however, timber REITs can sell their timberland holdings and routinely do so. It is important to note that the returns reported by Forisk are based upon the financial performance of the REIT shares, and not the underlying company. The return calculation is based upon the distributions (dividends) to shareholders and the value

of the REIT share at or over specific periods of time.

According to the Forisk Timber REIT index as of April 9, 2020, the average total return for a three year term is 6.24%, the five year return is 4.38% and the ten year return is 9.91%. The average of the three indications is 6.84%.

Finally, we note as a single indicator of investor return expectation the interest rate reported for the June 2019 sale of revenue bonds by Washington State University ("WSU"). In this bond sale, WSU sold $65,010,000 of refunding bonds, which proceeds are used to retire existing bonds that were used for capital improvement purposes. The source of repayment of these refunding bonds are "(a) building fees, (b) Trust Land Revenues and (c) additional fees and revenues that may in the future be pledged by the University for payment of debt service…" "Trust Land Revenues" are defined as "(a) all moneys received from the lease or rental on account of the trust land set apart by the 1889 Enabling Act of the federal government for a scientific school, all interest or income arising from the proceeds of the sale of such lands or of the timber, fallen timber, stone, gravel or other valuation material thereon…" (i.e. the lands in the trust land portfolio). The interest rates payable on these bonds vary by maturity, as follows: Maturity – 2020 – 5.183%; 2021 – 5.283%; 2029 – 6.314% and 2034 - 6.414%. The weighted average interest rate (arithmetic) is 6.245%.

What is particularly interesting about this bond sale as a single indicator of investor expectation is that its primary, if not sole, source of repayment is precisely the trust land portfolio we are evaluating. While the source of repayment

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[15] The previous indicators of rate expectation (NCREIF, Sewall and Sizemore and Sizemore) are pre-tax indications of rate of return, although the tax impacts are modest because a high percentage of these timberland investments are held in tax-exempt or tax flow-through entities.

[16] Before Rayonier, Inc. announced its plans in January 2020 to acquire Pope Resources.

is from all trust lands, since timberland income represents approximately 79% of all trust income over the past five years, it is, we believe a reliable indication of return expectation for the timberlands within the trust land portfolio.

We should also note that some financial analysts would argue that this indication is a strong lower limit of investor expectation, because the bonds, in and of themselves, are much more liquid than the underlying lands that are the source of repayment. While we don't reject this argument, we note that it is beyond the scope of this study to resolve liquidity adjustments between bonds, whose source of repayment is the trust land portfolio, and the portfolio itself, whose sale or liquidation in default is significantly restricted.

Recap of Timberland Discount Rate Indications

Our research has identified the following indications of discount rate or total return for timberland:

Source:	Range	Point
NCREIF Timberland Index[1]	6.00% to 8.00%	6.50%
Sewall Survey[2]	4.00% to 5.50%	5.00%
Sizemore & Sizemore [2]	5.29% to 6.41%	5.60%
Forest Products WACC[1]	6.80% to 8.20%	NA
Forisk REIT Index[1]	4.38% to 9.91%	4.40%
WSU Bond Sale[1]	5.18% to 6.41%	6.20%

(1) = Reporting nominal rates of return
(2) = Reporting real rates of return

In reaching our conclusion of discount rate or total return rate to be applied to timberland, we place greatest weight on the indications of the NCREIF Timberland Index and of the recent WSU Bond Sale, as they reflect most closely the pattern of income and gain most similar to that of the trust beneficiaries and of the timberland portfolio itself. The range of these indications is also strongly supported by our other indicators, including the Forisk REIT Index. Again,

noting that the timberland portfolio should be valued based upon total returns indicated by competitive investments or investment opportunities, and recognizing the inability to sell the land portfolio, we conclude to a discount rate selection of 6.00% as of our analysis date.

We have cited sources of discount rate information that include presentation of both "real" (i.e. without an inflation component) and "nominal" (i.e. with an inflation component). It is apparent in the reconciling table above that there is substantial overlap between real and nominal sources of discount rate information. While an in-depth analyses of the impact of inflation on our rate selection is beyond the scope of this analysis, we offer the following comments.

Insofar as the incorporation of inflation in our analysis is concerned, as explained in the preceding Valuation Methodology chapter, our fundamental approach to value is use of the Income Approach to value, and we capitalize net operating income, after operating costs and management fees, to an indication of Trust Value. To the extent that inflation is present in, or acting upon, net operating income, our Trust Value estimate should take that net income change into account.

Our review, however, of change in net operating income of timberland reveals that both the long-term trend and the medium-term trend (i.e. the 12 year period of analysis described in our Timberland chapter, strongly suggests that there is little or no net change in net income. Accordingly, as will be discussed in the timberland chapter, there is no inflationary change or growth assumed in net operating income, and no adjustment is made for inflation in the discount rate. We should also note, for the reader's benefit, that the proper treatment or recognition of inflation would have the analyst recognizing the effects of inflation either (a) in the forecast of net operating income or (b) in the discount or capitalization rate applied to net operating

income, but not both (which could lead to double-counting the effects of inflation).

Our review of timberland net operating income for the period 2007-2018 (twelve years) reveals no stable pattern of change that might be translated into an adjustment for net income change in our discount rate selection. For example, with dollar amounts ranging from a low of $91.31 million ((2009) to a high of $134.1 million (2011), the average net operating income for the twelve year period is $114.2 million. In six of twelve years, net income from timberland was below this amount, and for six of twelve years, the annual net income was above this amount. The pattern of change was quite irregular. Accordingly, we find no pattern of net income change that causes us to adjust our discount rate for net income change. In short, we find no evidence of inflation in timberland net operating income.

Accordingly, we make no inflationary adjustment to our discount rate. Therefore, to the extent a distinction is important, we characterize our discount rate as a "nominal" discount rate – because we have considered inflationary change and find no support for such an adjustment.[17]

From A Discount Rate to a Capitalization Rate

Early in this chapter we discussed the relationship between capitalization rates and discount rates; capitalization reflects an income and asset value relationship at a point in time, while a discount rate addresses (or reports) total return over time:

"What financial analysts know is that if the net income stream is not expected to change over the holding period, and the asset value is also not expected to change over the holding period, direct capitalization is a financially accurate method of estimating the value of the asset. If net incomes

or property value are expected to change or vary, however, discounted cash flow analysis (that can incorporate this change) is the more reliable method of valuation." Although there is greater uncertainty in forecasting multiple years in a discounted cash flow than a single year forecast in a direct capitalization calculation.

As described in our preceding Valuation Methodology chapter, our income approach analyses is based upon a stabilized level of net operating income for each asset class. As a stabilized net income forecast, our inherent assumption is that this income forecast will show little change following the valuation date. Further, because the sale of trust land assets is heavily restricted, there is no opportunity for a land sale (reversion) to influence return on investment. The "investment", i.e. the trust land asset class, produces net income in perpetuity. Accordingly, the selected discount rate is *also* the capitalization rate for the asset class, because income is not expected to change materially, and the value of the asset class is similarly not expected to change materially. Our timberland capitalization rate is then also 6.00%, effective as of June 30, 2018.

Agricultural Lands Discount & Capitalization Rates

Evaluating discount rates for agricultural lands is somewhat more difficult and uncertain because the source data of surveys and studies specific to identifying or forecast a land-based rate of return is smaller than for timberland, for example. Our asset classes include grazing lands and agricultural (crop) lands, with four sub-categories of cropland. Conceptually, the types of tools are the same as for timberland – actual performance evaluations, expectation surveys and from indirect sources; in reality

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[17] This is different from characterizing our discount rate as a "real" discount rate (exclusive of inflation) and incorporating inflationary net income change into our cash flow forecast.

however, the structure of farmland investment analysis is much more focused on the planting, harvest and processing of crops, and correspondingly less focused on the investment characteristics of the underlying agricultural land. Fortunately, two very relevant sources of information are available to us – again, the National Council of Real Estate Investment Fiduciaries ("NCREIF"), who gather performance and valuation data on farmland just as they do on timberland (and other real estate investment classes) and from the TIAA Center for Farmland Research at the University of Illinois. We present their data below.

NCREIF Farmland Index

Following is a data table and accompanying chart for the NCREIF Farmland Index. NCREIF presents data for the nation (i.e. farmland properties within the index from across the U.S.) and for regional subsets, including the Pacific Northwest, and they present total return information as well as returns from operating income and from property value appreciation.

From the data table, we see that total returns range broadly, from a low of 2.42% to a high of 11.25% depending upon category of return and the investment duration. We note that longer-duration returns are most likely heavily influenced by the recovery in agricultural land values emerging from the Great Recession, and it appears from some of the data that annual cropland (row crops, etc.) had strong rates of property appreciation in this period. As with our timberland evaluation, we tend to put greatest weight on the indications of one, three and five year returns. We also rely more on the regional Pacific Northwest indicators than on the nation indicators.

FIGURE 14

Investment Duration - Years	1	2	3	4	5	6	7	8	9	10
Total Farmland - Total Return	4.81%	5.77%	5.91%	6.20%	7.02%	7.94%	9.70%	10.77%	11.25%	11.00%
Pacific Northwest - Total Return	2.42%	5.59%	7.85%	8.09%	6.47%	7.12%	8.42%	9.56%	8.83%	8.00%
Total Farmland - 5 Yr Average Return	5.94%	5.94%	5.94%	5.94%	5.94%	NA	NA	NA	NA	NA
Pacific Northwest - 5 Yr Average Return	6.08%	6.08%	6.08%	6.08%	6.08%	NA	NA	NA	NA	NA
Total Farmland - 10 Yr Average Return	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%	8.04%
Pacific Northwest - 10 Yr Average Return	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%	7.24%

The ten year average total return for Pacific Northwest farmland is 7.24% (2010-2019). The five year average is 6.08%. The average of indications at one, three and five year investment durations for the Pacific Northwest is 5.58%. For the national index, ten year average total returns are reported at 8.04%; 5 year total returns averaged 5.94% and the average of the one, three and five year investment durations was 5.91%. We also note that for the national portfolio, the one, three and five year duration appreciation returns averaged 1.28% and the income returns averaged 4.76%. Annual farmland (1/3/5) averaged 4.80% and permanent cropland (1/3/5) averaged 7.50%.

Below are NCREIF Farmland Index returns presented in a chart form:
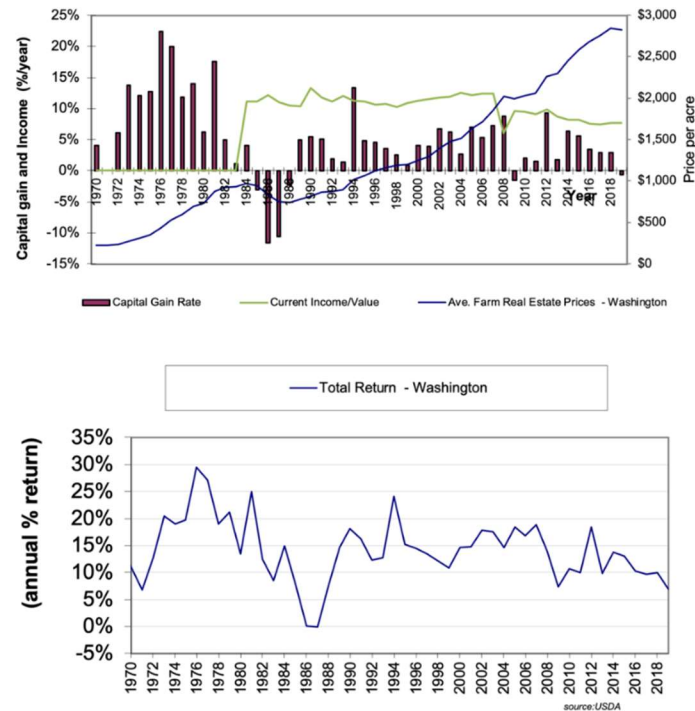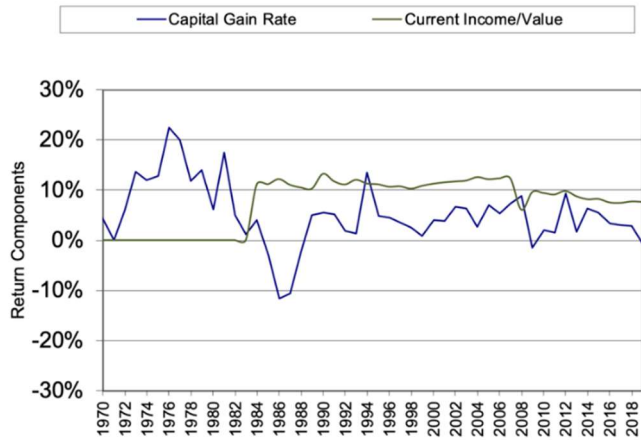
FIGURE 15
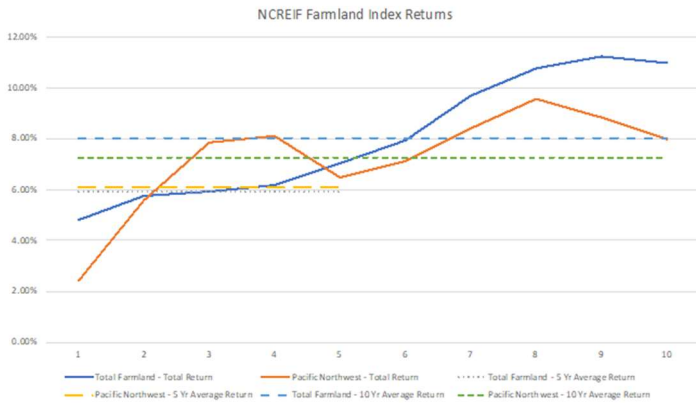
As we evaluate the return indications of the NCREIF index, we place greatest weight and reliance on the indications from investment durations of five years and less, and upon the total returns for the Pacific Northwest regional subset; these are then returns in the 5.00% to 7.00% range.

TIAA Center for Farmland Research at the University of Illinois

The TIAA Center for Farmland Research provides a variety of data, both for farmland investment as well as investment information for different crop types. Among other offerings, they provide an Excel software-based tool that reports total returns, capital gain returns and income returns on a state by state basis. The following charts come from that tool – the Farmland Values and Returns by State Center tool. The following three charts are for Washington State:

FIGURE 16

The following is a data table taken from the charts above for the period 2014-2019:

Calendar Year	2019	2018	2017	2016	2015	2014
Washington State - Total Return	6.94%	9.94%	9.69%	10.22%	13.03%	13.76%
Washington State - Appreciation Return	-0.71%	2.86%	2.94%	3.42%	5.56%	6.32%
Washington State - Income Return	7.64%	7.72%	7.44%	7.53%	8.22%	8.17%

We note that the TIAA Center reports their data source as the U.S. Dept. of Agriculture, and we believe that this dataset, in comparison with NCREIF, is somewhat less reliable. Most importantly, however, it reinforces the comparatively high rates of return suggested by the NCREIF data, and suggests more stability, and at higher rates of return, for income-based returns. Like all surveys and analyses, the quality of the data determines the reliability of the results.

The 1/3/5 returns for Washington State, as reported by the TIAA Center are then an average of 9.89% for total return, 2.60% appreciation return and 7.77% income return. The six year average total return for Washington State is 10.60%. Based on this source (only) the range of total return for the trust land portfolio would be from 7.00% to as much as 10.00%. Although 2014 and 2015 reported returns in excess of 10%, we do not regard those high rates as sustainable, and appropriate for our long-term forecast.

Based upon the two data sources we have evaluated, the range of total return for agricultural land is generally from a low of 6.00% to a high of 9.00%. We place greater reliance upon the NCREIF data source in the belief that (a) the data that comprises the analysis is more timely and reliable, and (b) because of the similarity between the farmland managers that report data to NCREIF and our beneficiaries (i.e. they hold the farmland for investment purposes). That said, the data suggests that a rate of 6.00% is a strong lower limit and is likely too low to be applied to our agricultural trust land asset class. We select a 7.00% total return rate for grazing lands and all four categories of cropland (dryland crops, orchard land, irrigated annual crops and irrigated permanent crops).

We characterize this discount rate conclusion as a nominal discount rate – i.e. inclusive of inflation, however noting that more stable than timberland net operating incomes, the change in income is negative in five of twelve years,

and an increase in net income is present in seven of twelve years. Accordingly, we assume that there is not a solid basis for an assumption of growth and that the inflation assumption is zero.

For the same reasons described in our timberland discount and capitalization rate selection, our capitalization rate selection is also then 7.00%, effective as of June 30, 2018.

Commercial Real Estate Discount & Capitalization Rates

We have relied upon several sources of discount rate and capitalization rate information in order to select an appropriate discount rate and capitalization rate for the commercial property asset class. In the following section we discuss the source data and its indications of discount rate and capitalization rate. For this specific asset class, because of the clear segregation of rate information, our analysis will differentiate between urban and rural properties, and between income from building space rentals (premises leases) and ground leases.

Pricewaterhouse Coopers Investor Survey

Our primary source of discount rate information comes from the Pricewaterhouse Cooper's ("PwC") Investor Survey, one of the most commonly cited sources of real estate investor yield expectation data. Including its predecessor, the survey has been used by real estate analysts and appraisers for over thirty years. The PwC survey provides yield and capitalization rate information by property type, region and center cities. It also segregates urban and suburban locations. Because the survey asks respondents about discount rates and capitalization rates,

we also can form opinions about the impact of property price appreciation on total return. Although less explicit in the PwC survey, total return is the discount rate; the capitalization rate is a general indication of return from operating income, and the difference is a general indication of the return from property appreciation.

The following is a summary of the discount rate and capitalization rate averages taken from the October 1, 2019 PWC Real Estate Investor Survey:

FIGURE 18

	2014	2015	2016	2017	2018	1Q 2019	2Q 2019	3Q 2019	4Q 2019
PwC Yield Indicator	8.11%	7.82%	7.70%	7.65%	7.58%	7.50%	7.45%	7.46%	7.45%
PwC Dividend Indicator	6.66%	6.38%	6.26%	6.21%	6.05%	6.03%	6.01%	6.02%	6.00%
Spread in Basis Points	145	144	144	144	153	147	144	144	145

The reader should note that the PwC Yield Indicator is the indication of discount rate or total return, and the PwC Dividend Indicator is the indication of capitalization rate.

The PwC survey indications are the average for all U.S. locations and for all five property types (office, industrial, retail, and apartments). We see in the table above a very consistent pattern of investor expectation for yield (discount rate or total return). Also very stable are the indications of capitalization rate, and thereby, a very stable spread between discount rate and capitalization rate at about 145 basis points (1.45 percentage points). The discount rate/capitalization rate spread is relevant as we later consider market-derived capitalization rates and then consider what those capitalization rates say about total return expectation.

The five year average discount rate is 7.77%, and the average of 1/3/5 year returns is 7.80%. Shown below is a graph showing the PwC yield indication over a twenty-nine year period (1990 to 2019).

FIGURE 19
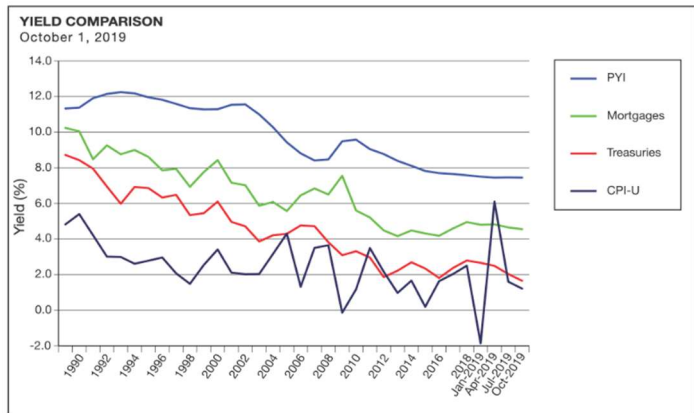
In the chart we see how real estate investment yields have declined over time and we also see the short-term decline and subsequent increase associated with the Great Recession between 2006 and 2012. Also presented are the average returns for commercial mortgages, 10 year treasuries and the consumer price index. Contributing to the stability of investor yield or discount rate expectation is the historically low interest rate environment of the post-Great Recession era. So long as interest rates remain at historic lows, it is likely that closely correlated rates of return – like investment real estate – will also stay at or near historic lows.

The reader should appreciate that imbedded in the averages of the PwC yield rate indications are financially-material differences by property type and by city or region. For example, the average discount rate for central business district office buildings is 6.88%, almost 100 basis points below the five year PwC Yield Indication ("PYI"). The average yield rate for Pacific Northwest Office is 7.22%, about 50 basis points below the national average for all properties. By contrast, the average yield rate for Pacific Region warehouses is 5.85% (very much in demand by investors) and for the national strip shopping center market, a rate of 7.77% (much lower investor demand).[17]

In summary, the PwC Investor Survey sets an expectation of discount rates in the 7.00% range for the commercial real estate asset class – in aggregate – combining the three sub-categories within the asset class; urban buildings, suburban or rural buildings and ground leases. Because the PwC survey reports suburban and central business district office yields, we can infer a 50 basis point to 120 basis point difference for locational differences (central business district versus suburban).

NCREIF Property Index ("NPI")

Because of the wide utilization by analysts and appraisers of yield expectation surveys by PwC and others, for typical income property valuation purposes, somewhat less weight is placed on the actual yield performance indications of the NCREIF index. We report summary aggregate data here.

For the 1st Quarter 2020, the trailing twelve month return for the NPI was 5.28%. This represents all property categories across the entire nation, reflecting a property portfolio with a total market value of $683.5 billion. For contrast, for the same period, retail returns were -1.91%

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[17] Demand for property by investors typically results in a lowering of discount rate. Properties with high investor demand commonly demonstrate a lower discount rate, because prospects for income and value growth are better, while inferior properties have higher discount rates, because expectations for net income and value growth are lower.

and industrial returns were 12.88%. For the Western Region of the U.S., the total returns were 7.12%, with retail returns at -0.56%, and industrial returns at 14.00%. The Western Region includes Washington State and ten other western states.

Three quarters earlier, the NPI reported an annualized return of 6.52%, indicating lagging returns in the subsequent quarters on a national basis. These declining returns are consistent with the late stage of an economic expansion. Returns have been lagging as property capitalization rates have gotten quite low, and property turnover has slowed. These are typical outcomes in the late stages of an economic expansion.

Most notable across the portfolio are the now very poor returns from retail investments – likely due to continued re-alignment of retail shopping by consumers (from on-site traditional store visits to increased on-line shopping), and, on the other side of the equation, the superior returns provided by industrial properties, now the beneficiary of retail's turmoil, as warehouse demand by e-commerce users has continued to grow. The Western Region indication of total return of 7.12%, rounded to 7.00% is relevant for our commercial real estate asset class.

Boulder Group Net Lease Market Report

Because of the presence of ground leases in the commercial real estate asset class, we have included the results of the Boulder Group's Net Lease Market Report. This publication is a survey of the recently indicated capitalization rates of net lease properties such as freestanding retail and drug stores, single tenant office buildings and single tenant industrial buildings. Because ground leases are so infrequently traded, and do not represent a particularly sought-after asset class, the net lease property category is our best analog for ground lease returns. In the chart

shown below, we see indications of net lease cap rates over a fifteen year period:

FIGURE 20
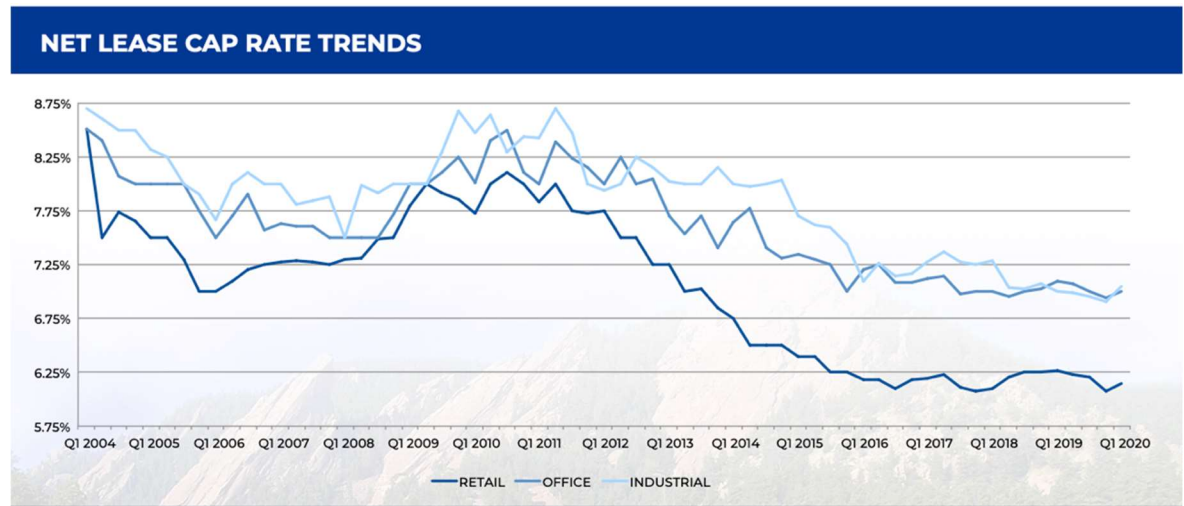
In the chart above, we see a range of capitalization rates ranging from as low as 6.00% to as high as 8.00% over the past five years. If we apply the 145 basis point average spread between capitalization rates and discount rates suggested by the PwC Investor Survey, this suggests discount rates for the ground leases of not less than 7.45% to 9.45%.

Deloitte's Capitalization Rate Research

In order to gather additional information specific to the sub-categories within the commercial real estate asset class, Deloitte examined additional comparable property sale date from Washington State in order to identify market-derived capitalization rates. Once identified, the capitalization rates can be adjusted, as above, by the average spread (discount rate to capitalization rate) to indicate discount rates.

Commercial Properties - Urban

We compiled sales comparables with capitalization rate data from the CoStar database. We looked at more than 60 comparable sales that have sold two years before the date of value within the Seattle/Tacoma metro areas. These comparables represent office, retail, and industrial properties that have similar sizes and ages as the Subject's improved properties. Specifically, the majority of comparables are built from 1980 to 2000 and contain from 20,000 and 100,000 total square feet of building area. The recorded capitalization rates from these transactions are summarized in the table on the following page:

Comparable Sales Summary (Seattle/Tacoma)				
Year	Use Type	Min	Max	Average
2016-2018	Office	4.80%	10.00%	6.81%
2016-2018	Retail	4.50%	10.30%	6.37%
2016-2018	Industrial	3.97%	6.50%	5.53%
			Overall Average	6.24%

Capitalization rates from office transactions ranged from 4.80% to 10.00% with an average of 6.81%. Capitalization rates from retail transactions ranged from 4.50% to 10.30% with an average of 6.37%. Capitalization rates from industrial transactions ranged from 3.97% to 6.50% with an average of 5.53%. The overall average from the sales transactions is a capitalization rate of 6.24%. As such, we have concluded to a capitalization rate of 6.25%

to be applied to the income stream received from improved properties. To this indication, we add the aforementioned spread of 145 basis points, to indicate a discount rate of 7.70%.

Ground Leases

For ground leases, we compiled and analyzed survey data provided in the RealtyRates.com Investor Survey. The survey data compiled includes national capitalization rate data for different uses of leased land. We note that DNR's lands are leased for an array of uses including single family residential uses, resorts, retail centers, restaurants, offices, as well as recreational resorts, lodging and camping. They are also located in both urban and rural settings. As such, we have incorporated the markets of survey data most relevant from the RealtyRates.com investor survey. The survey data ranges are summarized in the following table:

Ground Lease OAR Survey Data (RealtyRates.com)	2Q 2018		
Market	Min	Max	Average
Apartments	3.01%	10.79%	7.02%
Industrial	3.15%	10.76%	7.34%
Lodging	3.15%	16.49%	7.93%
Mobile Home/RV Park	3.15%	13.71%	8.29%
Office	3.15%	10.50%	7.13%
Restaurant	3.15%	15.95%	8.74%
Retail	3.06%	11.87%	7.46%
Self-Storage	3.15%	10.87%	8.44%
Special Purpose	3.55%	16.91%	9.14%
		Overall Average	7.94%

The averages reported above range from 7.02% to 9.14% with an overall average of 7.94%. Again, adding the rate spread of 145 basis points, this survey suggests discount rates of 9.39%.

We also note that we attempted to locate comparable transactions of leased land with uses similar to DNR's land uses; there were, however, insufficient numbers of comparables to warrant inclusion.

Urban/Rural Differences

Next, we performed a search for transactions of single-tenant improved properties throughout the state of Washington with capitalization rate data to address urban versus rural location. Transactions were segregated into different groupings depending on if the property is located in the larger metro areas of Seattle/Tacoma or in more rural locations throughout the state. Nearly 60 transactions occurring within two years prior to the date of value were collected with single tenant uses. The tenants include Rite Aid, Shopko, Big 5, Monroe Business & Professional Center, etc. The summary of the capitalization rates for these transactions are shown in the following table.

FIGURE 23

Comparable Sales Summary (Single Tenant Improved Sales)				
Year	Location	Min	Max	Average
2016-2018	Rural	6.56%	12.17%	8.05%
2016-2018	Urban	4.34%	8.78%	6.27%
		Rural to Urban Spread		-1.78%

Approximately 20 of these sales were found in rural locations and the remainder were pulled from the larger Seattle/Tacoma metro areas. The summary of the capitalization rate reported for these transactions are shown above. The average capitalization rate reported for transactions found in more rural locations is 8.05%.

The transactions found in the Seattle/Tacoma larger metro area report capitalization rates ranging from 4.34% to 8.78% with an overall average of 6.27%. This average falls 178 basis points below the average found in more rural areas.

We therefore expect the discount rates and capitalization rates used for commercial sites leased in more urban areas to be materially lower than sites leased in more rural areas. The difference likely includes the additional risks associated with market size, locating tenants in more rural locations and releasing risk.

Washington State Investment Board Commercial Real Estate Returns

Finally, we note our review of the investment returns of the Washington State Investment Board ("WSIB") taken from its Quarterly Report for the quarter ending December 31, 2019. In its investment policy for real estate, a target total return of 8.00% is set forth. In their quarterly report, for an allocated $20.95 billion in real estate investment, the WSIB reports one year returns of 12.10%, three year returns of 11.02% and five year returns of 11.31%. The average of returns for the 1/3/5 investment durations is then 11.47%. Ten-year average returns are reported at 11.42% and twenty-year average returns are reported at 10.74%.

It is apparent from our review that the WSIB's real estate investment pool has been quite successful. The prior years' quarterly report ending 12/31/18 reported 8.14%, 9.77% and 11.98% for the 1/3/5 year investment durations, for an average of 9.96%; one year later the average of the durations had risen 151 basis points.

Commercial Real Estate Summary

The following are the key indicators we have reviewed in this section:

Source:	Range	Point
PwC Investor Survey[1]	7.40% to 8.00%	7.70%
NCREIF Property Index[1]	5.28% to 12.00%	7.00%
Boulder Group Survey[1]	7.45% to 9.45%	NA
Deloitte Trans. Survey[1]		
Urban	5.50% to 11.50%	7.70%
Rural	7.25% to 13.00%	9.10%
Ground Lease	8.40% to 10.50%	9.50%
Washington State I.B. [1]	8.00% to 12.00%	11.47%

(1) = Reporting nominal rates of return

Insofar as the incorporation of inflation in our analysis is concerned, as explained in the preceding Valuation Methodology chapter, our fundamental approach to value is use of the Income Approach to value, and we capitalize net operating income, after operating costs and management fees, to an indication of Trust Value. To the extent that inflation is present in, or acting upon, net operating income, our Trust Value estimate should take that net income change into account.

Our review, however, of change in net operating income of commercial real estate reveals that both the long-term trend and the medium term trend (i.e. the 12 year period of analysis described in our Commercial Real Estate chapter, strongly suggests that there is little or no net change in net income. Accordingly, as will be discussed in the Commercial Real Estate chapter, there is no inflationary change or growth assumed in net operating income, and no adjustment is made for inflation in the discount rate.

Our review of commercial real estate net operating income for the period 2007-2018 (twelve years) reveals no stable pattern of change that might be translated into an adjustment for net income change in our discount rate selection. For example, with dollar amounts ranging from a low of $5.943 million ((2015) to a high of $7.526 million (2018), the average net operating income for the twelve year period is $6.8 million. In six of twelve years, net income from timberland was below this amount, and for six of twelve years, the annual net income was above this amount. The pattern of change was irregular. Accordingly, we find no pattern of net income change that causes us to adjust our discount rate for net income change. In short, we find no evidence of inflation in Commercial Real Estate net operating income.

Accordingly, we make no inflationary adjustment to our discount rate for Commercial Real Estate. Therefore, to the extent a distinction is important, we characterize our discount rate as a "nominal" discount rate – because we have considered inflationary change, and find no support for such an adjustment

For commercial real estate we conclude to discount rates of 7.50% for improved properties (urban), 7.00% for urban ground leased properties and 9.00% for rural ground leased properties, effective as of June 30, 2018.

For the same reasons described in our timberland discount and capitalization rate selection, our capitalization rate selection for commercial real estate are the same as our discount rate selections.

Remaining Asset Classes – Mining & Aggregates, Communication Sites, Green Energy Land Uses and Other Uses

For our four remaining trust land asset classes, we do not have either actual experience or investor expectation surveys for real properties devoted to these purposes. In the alternative, an indirect method is theoretically available to us, by an examination of public companies that are engaged in business activities that operate in these commercial activities. Our challenge in using an indirect methodology is that (i) not only are the companies engaged in primary business activities that dwarf the revenue volumes available from the scale of the trust land portfolio, but also the industry emphasis of investment and return, and share of capital improvement cost, is on the commodity or service and not upon the land assets that facilitate such activities. Consequently, any return or rate information from the indirect measurement is no more than an inference about rate of return, versus the land asset represent a materials share of total capital cost, and then deserving a material share of investment return.

We also note the very small share of net trust revenues that are derived from these asset classes.

The starting place for our rate selection is our conclusion for timberland, a rate of 6.00%. We select this starting point because of the specialized nature of timberland investment and because each of the land utilization activities for these remaining asset classes also begins with a specialized business investment activity – mineral extraction, construction and operation of communication sites, for alternative (green) energy and leases of DNR-owned rights of way. Each of these investment areas has their own set of specialized needs, skills and other assets, and each is burdened by market and intrinsic costs that burden net income and investment return.

For mining and aggregates, one dominant aspect of investment return is depletion – that is the decline in the amount of recoverable mineral that is associated with the extraction of minerals and aggregates. Once gone, there can be no continuing income from the land associated with the extraction activity; it is customary to add a depletion adjustment to the returns to account for this eventual loss of income and value. Appraisers refer to this form of rate adjustment as recapture, and it is commonly expressed as function of remaining life of the realty asset. We assume – in the absence of any effective estimate of the remaining life of the mineral and aggregate resource – a fifty year life. This corresponds with a 2.00% rate of recapture (100% of value/50 year remaining life). Thus, an 8.00% discount rate is indicated (6.00% + 2.00% = 8.00%) for mining and aggregate lands.

In a manner much similar to the concept of depletion for mineral assets, we believe it is appropriate to make a rate of return adjustment for the rapid loss of value of the communication sites and green energy land uses. This rapid loss of value comes from the shared effect of the rapid depreciation of technology associated with these communication and green energy investments. The rapid pace of improvement in the vertical technology situated on the land (perhaps antennae, solar panels, wind generation turbines, and their associated technologies (hard and soft) burden these investments with a routine loss in utility and value (in other words, depreciation) that likely affects the productivity and net income of the land associated with these communications and green energy activities. Again, the appraisal term for this adjustment is recapture, and we again apply an age/life concept. In this instance, we believe that the life of these technologies is much shorter than for mineral assets, and we assume a 20 year life. The resulting recapture adjustment is then 5.00% (100% of value/20 year life). The resulting discount rate is then 11.00%; 6.00% + 5.00% recapture rate.

We need to note however, that our transaction research suggests a material difference in return requirement between cellular communication sites and other types of communication sites (microwave, radio, etc.). Because of the split in capitalization rates, we believe it is appropriate to segregate the communication rate between cellular and all other communication sites; we conclude to a discount rate of 8.50% for cellular sites and the aforementioned 11.00% for other communication sites.

For communication sites, however, our review of historic net operating income change suggests that an adjustment for growth in net income is warranted.

Over the twelve-year period 2007 to 2018, net operating income has grown at a stable rate, from a low of $2.112 million in 2007 to a high of $3,375 million in 2018. The average rate of annual change has been 1.53% per year, and total growth since 2007 has been 15. 12%. Average net operating income has been $2,873,379, and annual net operating income has been below this average six of twelve years and above for six of twelve years. We believe it is appropriate to assume that net operating income will continue to show growth, and we have deducted this expected growth of 2% per year from our discount rate of 8.5% and 11% for communication sites only, for an indicated 6.5% and 9.0% capitalization rate for communication sites.

Revenues are also received for additional resources which include energy (wind) and miscellaneous uses such as special forest products, rights of way, and other special uses. These other resources comprise a basket of use agreements, physically large and small, for a variety of uses and users, and varying in term. Because of the diversity of uses, users and durations, we believe they should have a comparatively high discount rate, and we select an 11% discount rate.

For the same reasons described in our timberland discount and capitalization rate selection, our capitalization rate selection for mining and aggregates, communication sites and green energy land uses are the same as our discount rate selections.

Summary of Discount and Capitalization Rate Selections

We recap our discount rate and capitalization rate selections by asset class, all effective as of June 30, 2018:

Asset Class	Discount Rate	Cap. Rate
Timberland	6.00%	6.00%
Agricultural Land	7.00%	7.00%
Grazing Land	7.00%	7.00%
Commercial Real Estate		
Improved Properties	7.50%	7.50%
Ground Leases (Urban)	7.00%	7.00%
Ground Leases (Rural)	9.00%	9.00%
Mineral & Aggregates	8.00%	8.00%
Communication Sites		
Cellular Leases	8.50%	6.50%
Radio/TV/Other Leases	11.00%	9.00%
Other Resources	11.00%	11.00%