AN ECOSYSTEM-BASED FORESTRY INVESTMENT STRATEGY FOR THE COASTAL TEMPERATE RAINFORESTS OF NORTH AMERICA[1]

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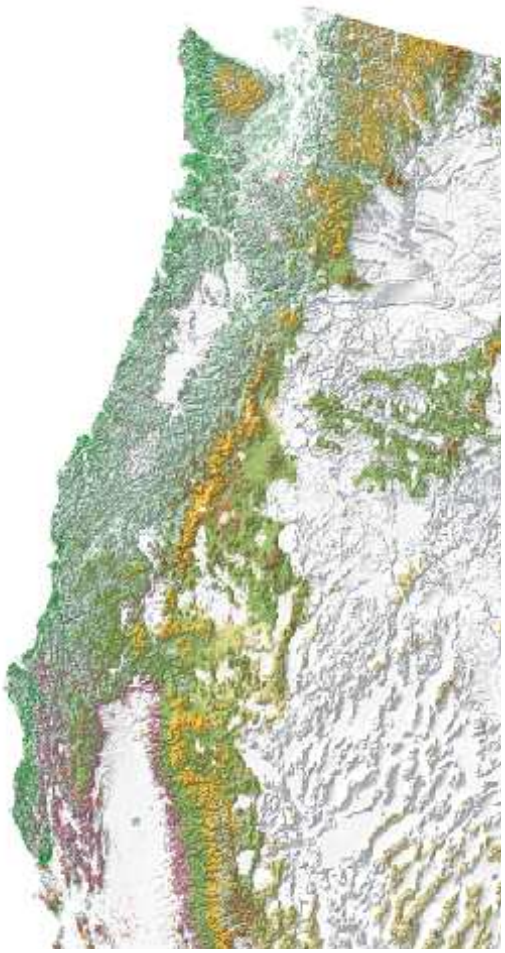
Summary. Timberland investments have found a valuable niche in large, mixed-asset portfolios. Historical returns have been good, volatility comparatively modest, and, importantly, correlations with the returns of other assets have been low. As a result of these factors, timberland has generated strong risk-adjusted returns. But, as the asset class matures, generating good risk-adjusted returns requires new investment strategies. Ecosystem-based approaches offer exposure to higher-valued, non-commodity markets for timber, lower capital expenditures, and the opportunity to capitalize on emerging markets for valuable ecosystem services. Consistent with the longer-term view of forest investment, such an investment strategy requires new forms of liquidity that do not rely wholly on selling land. An ecosystem-based forestry investment strategy in the coastal temperate rainforests of North America may generate better risk-adjusted returns than does the conventional industrial/financial investor approach.

I. INTRODUCTION

The coastal temperate rainforests of North America (broadly, the Pacific Northwest of the United States and the coastal portions of British Columbia and Alaska) grow trees as well as anywhere in the world. Much of the highly productive land is too steep to farm and too distant from population centers to develop. Its "highest and best use" is growing trees, producing high-quality water, creating habitat for numerous interesting and important organisms, and supporting rural communities dependent on a sustainable forest industry. The region's native tree species—Douglas fir, western hemlock, western red cedar, Sitka spruce and a suite of true firs—are long-lived and grow well into comparatively old ages (60 plus years) when many commercial plantation species such as southern pines and eucalypts have long ceased to add volume or value.

The region also enjoys exposure to a diverse set of markets. Manufactured lumber products from mills in the region find buyers locally and throughout the rapidly growing US Southwest. In an economy with rising energy and transportation costs, products manufactured in the Pacific Northwest will enjoy an increasing transportation cost advantage to these very large and growing markets. Japan with its traditional markets for high-quality softwood continues to buy high-end products from the region. And, the most rapidly growing market in the world—China—is readily accessible via the highly advantageous back-haul container logistics that bring the wave of Chinese manufactured goods to the US. The



structure of timber markets in the Pacific Northwest has meant that prices are more volatile than those in other regions of the country. But by increasing the probability of eventually receiving a high timber price, this greater volatility adds to the option value of the asset for a patient, unlevered investor. And, there are emerging markets for such ecosystem services as credits for the carbon sequestered in trees and conservation of biodiversity.

Despite all these natural advantages, all is not well in the region's forest sector. The sharp reductions in federal timber harvests forced an abrupt restructuring of the industry. Many sawmills capable of processing large logs into high-quality products were forced to close as their source of raw material disappeared. The traditional industrial timberland owners in the region and their newer financial-investor counterparts increasingly focus on short-rotation management producing trees suitable mainly for commodity products. Mill capacity in the region has adapted with the construction of high-speed "spaghetti" mills producing comparatively low-value construction lumber from uniform small-diameter logs. The simplification of the production system—from forests to mills to products—gains efficiency but loses diversity, and potentially value.

If the region were a low-cost producer, this tradeoff might be acceptable, both for investors and for residents. But, regrettably, new entrants into the industry have far lower costs. Current timber prices in the Pacific Northwest might average $US 100/cubic meter. Plantation forests in the southern hemisphere can grow softwood saw logs for a cost of perhaps $20. The vast softwood forests of Russia produce saw logs for a comparable cost.[2] It is difficult to see how a cost-minimization commodity focus will be successful in a world where there is abundant commodity timber available from lower-cost competitors.

The region is ripe for a new forestry investment strategy. We call this new strategy "ecosystem forest management" (EFM). EFM is a "triple bottom line" approach to forestry investment that sustains rural communities and nurtures environmental values (indeed, seeks to monetize them) as it generates good risk-adjusted returns for investors.

This paper explains the investment logic of EFM. Our presentation is in three parts. First we distill the investment case for forestry into a few pages. Over the past 20 years, a great deal has been written on this subject, so we present the highlights and provide the signposts for finding the details. Those readers who are knowledgeable about forestry investment can skip this section, and move directly to Section III. This section explains EFM, focuses on its advantages, and describes how it can be implemented. The final section draws these themes together to summarize the case for investing in EFM forestry

II. WHY INVEST IN FORESTLAND?

The modern era of institutional investment in forestland began in about 1980. We now have 25 years of experience on the investment characteristics of the asset class. The key points have recently been summarized by Binkley, Aronow and Washburn (2005)[3]. Just as with any other investment, the case answer to "why invest?" is "good risk-adjusted returns." Let us explore the answer in a bit more detail, first discussing returns, then risk and concluding with some observations on how these general conclusions apply to the coastal temperate rainforests of North America.

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[2] International Wood Markets Research. 2005. Global lumber/sawnwood cost benchmarking report-2004 basis. (Vancouver, BC).

[3] C.S. Binkley, M.E. Aronow and C.L. Washburn. 2005. Timberland: the natural alternative. Chapter 10, pp. 231-246 in, B. Grier, ed. **Handbook of Inflation-Hedging Investments**. (McGraw Hill: Yew York). Much useful information on timberland investment can be found on the following websites: www.ifiallc.com and www.hancocktimber.com.

A. Returns

Although there are other sources, the National Council of Real Estate Fiduciaries (NCREIF) provides the most comprehensive and precise measures of timberland returns.[4] The NCREIF data separate returns into "income" and "capital." Since the inception of the index in 1987, total returns through year-end 2005 have averaged 15.3%[5] with a cash component of about 6.5%. The details of each merit attention.

Income returns reflect cash returns and not "generally accepted accounting practices" (GAAP) net income as recognized under US financial accounting standards. The biggest differences have to do with two factors: the first is forest growth, and the second is "depletion."

Under US GAAP principles, forest growth is recorded neither on balance sheets nor income statements. Readers may perhaps find it remarkable that the fundamental wealth-creating process of forests—tree growth—does not find its way into US accounting standards, but regrettably this is the case. Several more advanced countries—Australia and New Zealand are two examples—have different approaches, as does the proposed International Financial Accounting Standard.

"Depletion" refers to the recovery, for both tax and book purposes, of the capital invested in trees. The capital invested includes both the initial acquisition cost of the timber as well as any capital expenditures made to grow or maintain the forest. Depletion is similar to depreciation of a real-estate asset, and is recorded as the trees are harvested. Unlike buildings, which do, in fact physically deteriorate, timber depletion is recorded even if the forest is adding value. From a book accounting perspective, GAAP income for timberland investments generally understates the true current return; hence NCREIF's reliance on a cash or EBITDA yields. Of course, for a tax-paying investor depletion deductions are a plus because they lead to higher after-tax cash returns. Indeed, in some cases the after-tax returns from timberland investments can be higher than the pre-tax returns.

Capital returns reflect the year-on-year changes in asset values. In the NCREIF database, these are represented primarily by the changes in appraised values from one year to another. While this method of estimating total returns is common and widely accepted, there are shortcomings to this approach. Different contributors to the NCREIF database use different methodologies for estimating asset values. Furthermore, it is likely that appraised values lag market values, and, over time, reflect less volatility than is actually the case.

In general, future returns from timberland investment depend on six key factors:

- the acquisition cost of the asset;
- the innate productivity of the land;
- the location of the land in proximity to strong markets for manufactured forest products;
- the management of the land;
- the operating economics of the land (i.e. harvesting costs, transportation costs); and
- the exit value of the asset.

No single factor is always determinative, and there are no simple-but-meaningful rules of thumb. A slowly growing forest can generate a better return than a fast growing one, depending on the

[4] www.ncreif.com. The NCREIF Timberland Performance Index refers to unlevered, pre-fee property-level returns for fee-simple timberland investments in the United States.

[5] It has become conventional in timberland investment to measure historical returns in *nominal* terms and future, or forward-looking returns on *real* terms. Nominal returns include the effects of inflation, whereas real returns have the effects of inflation removed (generally by using the all-urban CPI). We retain this convention in this paper.

acquisition costs and operating economics. A distant forest can produce better returns than a more proximate one. An expensive forest can produce better returns than a cheap one. In timberland investment, there is no substitute for careful due diligence and consistent valuation via discounted cash-flow methodologies.

Having argued that the details always matter, it will perhaps seem contradictory to ask such a broad question as "what are forward-looking returns for timberland?" Timberland is now widely traded among financially sophisticated investors so there appears to have been some convergence in pricing. A recent study[6] examined the NCREIF data in the U.S. South and in the U.S. West. The authors extended the study to consider other measures of timberland returns. This analysis concluded that, as of the end of 2004 timberland appeared to be trading at about a 7.0% real return, with no discernable trend over the last five years. Yet, returns from commercial real estate and long-term US treasuries have fallen over the past three to four years by about 100 to 200 bps each. To maintain historical spreads, one might expect timberland returns to fall by a comparable amount.[7] This argument suggests that timberland should be currently trading in the range of 5% to 6% in real returns. It appears that real yields on US Treasuries are moving upwards (by perhaps 45 bps over the past six months)[8], so we might favor the higher end of the range for our best estimate of forward looking timberland returns. This estimate is consistent with the recent comments of investment guru Jeremy Grantham:

> "Where managed timber used to be 7% to 9% real return—kept up by investors' dislike of illiquidity and non-traditionality (or career risk)—my guess is that it will often fall well below our assumed equilibrium return for stocks of 5.7%"[9]

B. Measures of Risk

Expected returns alone do not make the investment case for any asset. The key question is "how much risk must be suffered to achieve those returns?" Investment risk is commonly measured by volatility or, more specifically, by the standard deviation of returns. The logic is that, the more volatile returns are the greater the probability of loss at any point in time. A difficulty in measuring volatility is that most investors hold more than one asset, so the risk of an asset depends on that asset's incremental contribution to portfolio volatility. If the returns from an asset are positively correlated with the returns from the other assets held in the portfolio, then that asset increases the volatility of the portfolio, but the increase will be less than additive unless the positive correlation is perfect. In contrast, if the returns from an asset are negatively correlated with those of the other assets held in the portfolio, then that asset will reduce the volatility of the portfolio. As a result of these considerations, it is clear that "risk" depends not only on the variability of returns, but the correlation of those returns with those of other assets.

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[6] Aronow, M.E., C. Washburn and C.S. Binkley. 2004. Explaining timberland values in the United States. **J. Forestry** (January, pp 14-18). More detail is provided in M. E. Aronow, T. J. Starr, M. Mattox, C. L. Washburn and C.S. Binkley. 2004. Are timberland returns falling? Here's what the data say. Unpublished HTRG Research Paper. March, 2005.

[7] Note that the "constant spread" argument is tantamount to an admission that timberland returns are perfectly correlated with other capital-market returns. As we shall see in a moment, *lack* of correlation with other assets has been the cornerstone for the case for timberland investment. One might argue that, if capital markets have adjusted such that timberland is more highly correlated, then its beta should go up and the appropriate risk-adjusted return should be higher than an analysis of historical data would suggest. The recent influx of capital into timberland investment may be driven by relative low returns in other asset classes, giving credence to the idea that forward looking timberland returns are likely to be more highly correlated with returns from other assets, especially forward-looking returns for conventional timberland investments.

[8] http://research.stlouisfed.org/fred2/series/FII10/22.

[9] GMO Quarterly Letter, January 2006. p.4.

Table 1 below provides some common measures of asset risk for timberland and for several other commonly held assets (note that the time period is 1975-2004, and the NCREIF data mentioned at the beginning of this discussion go back just to 1987).

TABLE 1. RETURN CHARACTERISTICS OF TIMBERLAND AND OTHER ASSETS, 1975-2004

ASSET	RETURN	STANDARD DEVIATION	SHARPE RATIO	CAPM β
US Timberland	12.6%	12.9%	0.50	-0.13
US Treasuries	6.2%	3.0%	NA	0.0
S&P 500	13.7%	15.9%	0.48	1.63
Real Estate	9.6%	5.8%	0.60	0.07
Venture Capital	17.9%	35.8%	0.33	0.43

Source: C.S. Binkley, M.E. Aronow and C.L. Washburn. 2005. Timberland: the natural alternative. Chapter 10, pp. 231-246 in, B. Grier, ed. Handbook of Inflation-Hedging Investments. Data for 1975-2004, various primary sources. CAPM β estimated using a world-wealth portfolio.

The Sharpe Ratio measures the amount of additional return above riskless US treasuries per unit of risk—a higher Sharpe Ratio indicates a better risk-adjusted return. Finally, the Capital Asset Pricing Model (CAPM) β measures the systematic risk of an asset. By definition a riskless asset has a β of 0 and the market-weighted return from all assets has a β of 1. The higher an asset's β, the greater systematic risk carried by that asset. By whatever measure, timberland has been a low-risk investment.

Another way to consider the risk of timberland is to calculate the impact of adding timberland to an otherwise well-diversified portfolio. The calculations typically are done using a portfolio optimization model that seeks to choose asset allocations that maximize returns for a given risk budget. Timberland performs well in such trials, with a 10% allocation to timberland adding about 50 bps of expected return, and a 15% allocation adding about 100 bps of expected return, with virtually no increase in portfolio volatility in either case.[10] Of major institutional investors, only Harvard Management Company has publicly disclosed this level of commitment to timberland (before selling their US timberland assets, Harvard had about a 10% allocation to timberland), although observers of the situation believe the Yale University endowment might be at a similar level.

Another way to think about risk is to examine how a particular asset protects returns against specific kinds of macro-economic events. Of particular concern to investors with long-dated liabilities is protection against inflation because, over long periods of time, even small amounts of steady inflation can erode the purchasing power of assets and their returns. Analysts commonly divide inflation into expected and unexpected components. Expected inflation is usually measured by the difference between realized inflation and a time-series model of the returns on short-term U.S. Treasuries. Unexpected inflation is the difference between actual and expected inflation. For obvious reasons, assets that provide a hedge against unexpected inflation are particularly interesting to investors. Timberland, it turns out, tends to be a strong hedge against unexpected inflation.[11]

C. Conclusions

In the past, timberland has generated attractive returns with comparatively little financial risk. Looking forward, timberland markets appear to be transacting at a level that will generate about a 6% real

[10] C.S. Binkley, M.E. Aronow and C.L. Washburn. 2005. op cit.

[11] Binkley, Aronow and Washburn. 2005. ibid.

return for investors (or, about 8.5% nominal return given the inflationary expectations that are built into the spreads between nominal and inflation-adjusted yields on 10-year US Treasuries at the time of writing).[12] An EFM investment strategy can be competitive in these markets through a combination of timber harvests, conservation easements, and sales of other ecosystem services along with higher-than-average appreciation returns due to longer rotations. EFM returns may be less volatile due to the focus on growing larger logs, and may be poorly correlated with other timberland returns due to our focus on non-commodity markets. We explore these factors in the next section.

III. THE EFM VALUE PROPOSITION

Twenty five years of institutional investment in timberland has not only provided reasonably good historical information on risk and returns, but has also highlighted some of the environmental problems related to private-equity ownership of timberland. While not always the case, a typical practice is to acquire a property, increase harvest levels, perhaps add debt (which may create pressure to accelerate harvests still further), sell the property in smaller parcels, and exit upon the termination of a fixed-term fund in 10-15 years. This investment strategy may leave an ecologically simplified forest with a lower volume of older trees. Average annual timber supply as measured by the forest's mean annual increment is lower than would be the case with longer rotations, so, all else equal, such forests will be less capable of sustaining rural communities and traditional land uses over the long term. EFM is an innovation in timberland investment that seeks to provide core timberland returns but with positive, rather than negative social and environmental outcomes. Indeed, part of the EFM investment strategy is to monetize revenue streams from ecosystem services, so protecting functioning ecosystems is central to the EFM approach.

A. The EFM Approach: An Outline

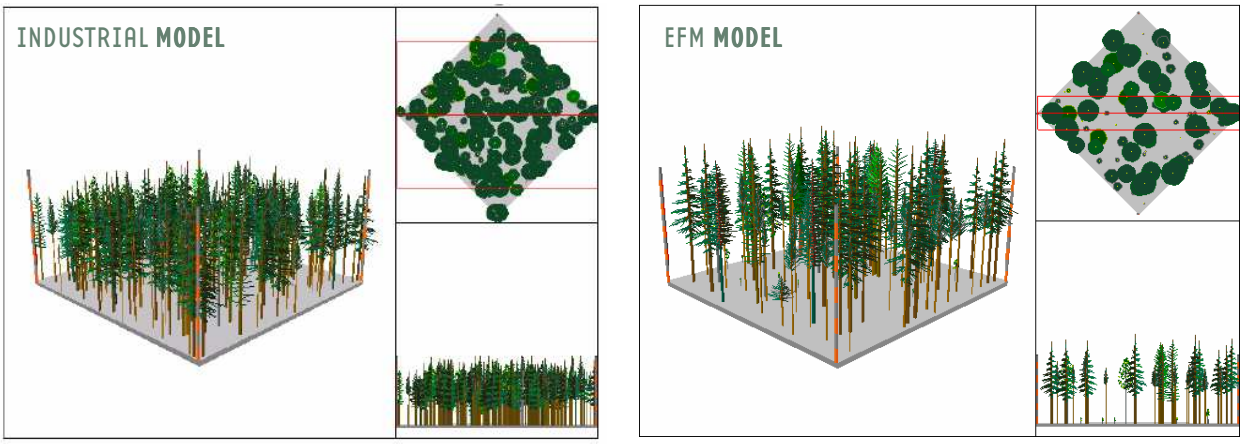
Most timberland investors are familiar with the traditional "industrial" approach to forest management in the Pacific Northwest. Operating under what are seen as "constraints" of the local forest practice regulations, harvest operations are conducted as clearcuts, logging debris may be piled and burned, and the new forest is re-established by planting genetically improved seedlings, usually of a single desired species (typically Douglas fir, regardless of the site conditions). Herbicides may be used to kill competing vegetation and assist early tree growth. The trees are permitted to grow for 35-45 years at which point the cycle starts over with another round of high capital expenditures that are carried for the full rotation. The products removed are generally suitable only for commodity dimension lumber (i.e. 2x4s, 2x6s, 2x8s, etc.) consumed in US markets.

The EFM approach works from a different premise that can be characterized in several different ways: we focus on what is left in the forest rather than what is removed; we are more concerned about building the balance sheet of the firm than squeezing the income statement. The general approach focuses on growing large logs of a variety of natural species with continuous forest cover and regular harvests.[13] There is more (but not exclusive) reliance on natural regeneration. This means that capital expenditures are lower in EFM than in the industrial model, a fact that is especially important in building good time- and dollar-weighted returns. EFM builds higher levels of standing inventory so total returns are weighted more heavily towards capital appreciation—consistent with our "build the

[12] See http://research.stlouisfed.org/fred2/series/FII10/22 and http://research.stlouisfed.org/fred2/series/GS10/22.

[13] Carey, A., B. Lippke, and J. Sessions. 1999. Intentional Ecosystem Management: Managing Forests for Biodiversity. Journal of Sustainable Forestry Vol. 9: 83-125.

balance sheet" approach. EFM naturally operates at a standard of environmental protection that is well above the minimum prescriptions of local forest practice regulations. This means that there is less regulatory risk. This approach also opens avenues for the sale of ecosystem services, sales that generally require "additionality" above statutory minima. EFM forests harbor a greater diversity of timber species (as well as other flora and fauna), age classes and ecological structure. This diversity may reduce both financial risk as well as the risk of insect and disease epidemics. As a result of the focus on maintaining continuous forest cover, certification under the Forest Stewardship (FSC) standard, the international "gold standard" in forest certification, should be readily achievable. FSC certification opens certain markets that might otherwise be unavailable, and further reduces environmental and operating risks.



To illustrate the value proposition associated with EFM, the following section uses data from an actual case study of a large property in the Pacific Northwest.[14] This forest is typical of the kind of asset that may be available to EFM investors. Previously owned by a publicly-traded industrial company, this property has been heavily cut over. Current cash flow is low as EFM nurtures forest recovery. Appreciation returns are comparatively high as the inventory grows. Real timber values may increase as the timber standing in the forest moves from commodity grades to larger log sizes. Because of the emphasis on re-building the underlying forest ecosystem, markets for conservation easements, carbon credits and perhaps other ecosystem services may become available to EFM investors, providing diverse and uncorrelated sources of income. The remainder of this section outlines the elements of the EFM investment strategy in more detail.

B. EFM Comparative Advantage in Acquisitions

Most of the private land available for acquisition in the coastal temperate rainforest region of the northwest has been managed under conventional industrial management systems. EFM is unlikely to be competitive on such properties if there is considerable mature, merchantable timber—these properties can be highly leveraged to produce high (but very risky) equity returns, a practice that is inconsistent with EFM. Furthermore, the high opportunity cost of holding older trees developed in conventional management systems means that EFM's large-log, longer-rotation approach is unlikely to be economic. EFM is most competitive with young forests and/or forests that have been aggressively harvested in the past, have significant ecological characteristics, and require rehabilitation. These forests are less

[14] While we believe that this case study represents the kinds of properties that might be available for investment, there is no guarantee that similar properties can be acquired for prices that produce the returns depicted in this paper. Estimates of forward-looking returns are necessarily based on several models and many assumptions, all of which are material to the results and any one of which may turn out not to comport with actual future conditions. As with any investment, timberland investments carry a risk of loss as well as the opportunity for profit.

desirable to buyers from the forest products industry, timber REITs or leveraged buyers, and tend to be less attractive to conventional financial buyers. Also, scale is important. Acquisitions in the range of 5,000 acres to 50,000 acres are outside the range that is dominated by conventional financial investors at the large end or individual "retail" buyers at the small end. The EFM approach may also appeal to some conservation- and community-minded sellers.

There are interesting within-region market dynamics that help inform EFM acquisitions as well. Some parts of the region appear to have lower-than-average timber prices, and, as a consequence, manufacturing capacity is moving into those locations. Such locations are particularly attractive for acquisitions. Other parts of the region have higher-than-average prices, and manufacturing capacity is closing; those are clearly regions to avoid unless there is some other good reason not to. It may be possible to use advanced remote sensing and image analysis processes to identify the kinds of properties that are most suitable for EFM.

C. Benefits of FSC Certification

As a result of its ecosystem focus, securing FSC certification should be straightforward for lands managed under EFM. Markets for FSC-certified products have been growing rapidly and now total over $5 billion.[15] While large US retail outlets have agreed to give preference to FSC-certified products where they are available, the larger opportunities lie in (i) industrial markets for such items as mouldings, millwork, windows, doors and other remanufactured products, and (ii) in export markets, especially to Europe. In some cases, it may be possible to obtain a price premium for FSC-certified products, but the case for FSC does not rest on price premiums. FSC certification provides access to some markets and will provide preferred access to others.

Furthermore, FSC certification reduces risk. The risk reduction comes in two parts. In the first place, FSC certification is the basis for an environmental management system (EMS). An EMS is well recognized as a valuable mechanism for reducing management risk related to environmental issues and, indeed, is a key element of a "due-diligence" defense if environmental lapses do occur. In the second place, FSC certification has wide support in the environmental community, so achieving such certification will tend to protect EFM investors from political backlash around environmental practices.

Finally, high standards of environmental performance may be reflected in asset valuations. A recent study by Konar and Cohen shows that investors reward firms that have excellent environmental performance with valuation premia.[16] The margin is large in the forestry-related industries (29.7% in "miscellaneous manufacturing", which includes forestry and wood products, and 21.1% in the pulp and paper industry). One publicly-traded firm that is 100% FSC certified, Precious Woods, trades at over 50 times its 2004 EBITDA,[17] whereas other, non-certified publicly traded timber companies trade in the range of 9 to 16 times EBITDA.

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[15] See "Estimated size of the FSC global markets revised to US$ 5 billion. Forest Stewardship Council, Bonn, Germany. 22 April 2005. http://www.fsc.org/en/whats_new/news/news/40.

[16] S. Konar and M.A. Cohen. 2001. Does the market value environmental performance? **Review of Economics and Statistics** 83: 281-289. Their study uses the ratio of market value to the value of tangible assets to measure market premia.

[17] Precious Woods, Annual Report 2004 (CW 06775-848); SWX Swiss Exchange - Swiss Shares, Precious Woods N (PRWN), http://www.swx.com/market/shares/quotes/swiss/table_en.html#P

D. Large-log Strategy

The general EFM approach in Pacific Northwest coastal temperate rainforests involves several light thinnings in order to maintain vigorous trees of a natural mix of species and ages that will grow well and may continue to add economic value up to age 60-70 and beyond. This management strategy produces a range of saw log sizes—smaller ones in the thinnings and larger ones in the "final" harvests. But, the bulk of the value and the main distinction in the timber returns arises from the large, long logs produced at the end of the rotation.

Of course, the coastal temperate rainforests of the Pacific Northwest were once highly valued for their enormous trees producing high quality lumber. As harvests shifted to smaller trees, the manufacturing technology has adapted. The region now produces commodity lumber from commodity trees, much as is done in Canada, the US South, New Zealand, Australia, Brazil, Chile, Russia, the rest of Europe using low-cost Russian logs, and, soon Uruguay.

The difficulty with a commodity log and lumber strategy for Pacific Northwest firms is that competing regions have lower log and labor costs,[18] and access to the same manufacturing technology as is available elsewhere in the world. The main positive for the Pacific Northwest commodity producers is that they are close to markets, and therefore suffer lower transportation costs. But, as timber supplies expand in these other regions, one can imagine a "race to the bottom" as falling costs and expanding market share from lower-cost competitors drive down lumber prices in the US, and eventually timber prices.

An alternative strategy is to produce higher-quality and higher-strength logs that are suitable for producing higher-value engineered wood products and other niche wood products. This strategy has several benefits in addition to avoiding increasingly difficult competition with lower-cost regions.

In the first place, older trees have higher net stumpage values. Holding trees to older ages allows them to produce higher-value saw logs and peelers. Not only does the unit value of a log increase as the forest ages, but the unit cost of extracting that log and delivering it to the market declines. The reduction in unit extraction costs occurs because much of timber harvesting involves handling individual trees or parts of trees, so larger logs have lower extraction costs per unit of volume than small logs. By acquiring cut-over properties stocked with small trees, the EFM investor sees apparent "real" price appreciation over several decades as the trees mature into larger, more valuable age classes. An investor in a managed industrial forest with a less diverse set of age classes cannot achieve this benefit.

Figure 1 below shows the situation for one property in the region. The upper blue line shows the net revenue on a per-thousand boardfeet (MBF) basis for the EFM approach, and the red line shows the same prices for the conventional approach. In both cases prices for an individual log sizes are held constant over time, so the trends reflect an increasingly more valuable product mix in the case of EFM, and a deteriorating product mix for the conventional industrial approach.

[18] International Wood Markets Research. op cit.

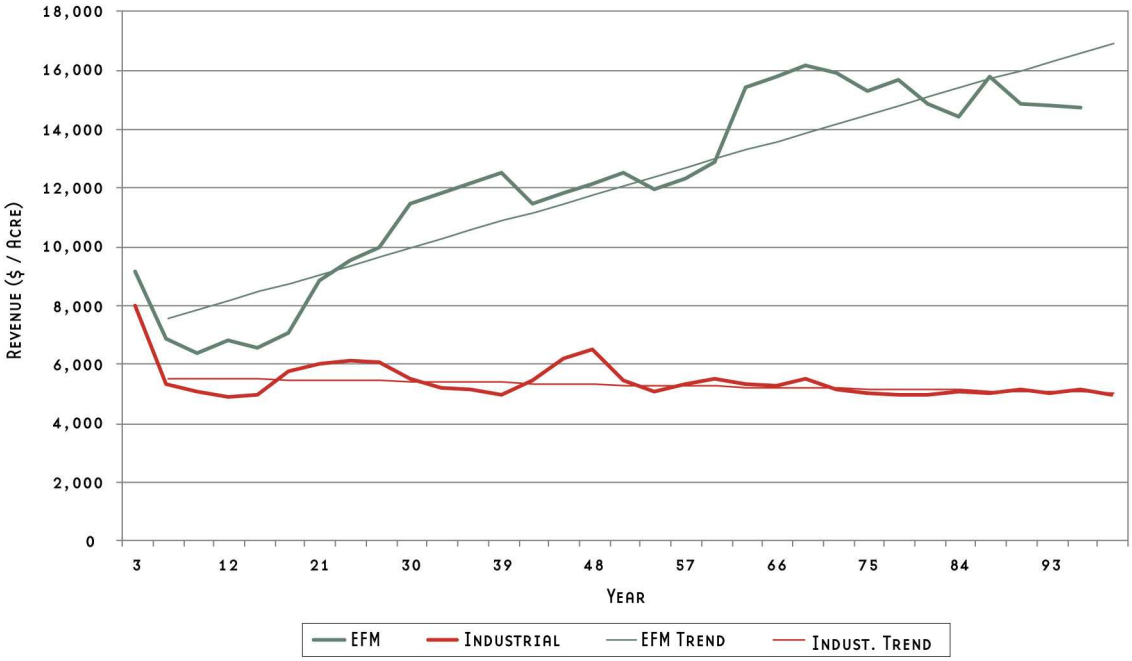
FIGURE 1
FINAL-HARVEST NET STUMPAGE REVENUE

In the second place, the EFM investor is rewarded both for continued forest growth as well as for the increase in the unit value of the products grown. Unlike many short-rotation plantation species, the species characteristic of the Pacific Northwest—Douglas fir, western hemlock, western red cedar, Sitka spruce—naturally continue to grow in height to comparatively old ages. The repeated light thinnings associated with EFM mean that diameter growth will continue as well. The result is a substantially higher stocking of more valuable trees by the time of final harvest.

Figure 2 shows the situation for the case-study forest. Again the blue line refers to the EFM approach, and the red line to the conventional industrial approach. The EFM approach builds final harvest value for about 60 years before the curve begins to flatten. Market value will follow this curve upward, consistent with our "build the balance sheet" approach. In contrast, the value under the conventional regime declines slightly over time as the forest is regulated on a shorter rotation.

The higher net stumpage revenue also means less price risk—as log prices fluctuate, there is more margin to absorb the volatility. As a consequence, for any given demand shock, the price risk suffered by the timberland investor may be considerably lower under the EFM strategy than under the conventional approach to forest management.

FIGURE 2
FINAL-HARVEST NET STUMPAGE REVENUE



The lower risk is a natural consequence of higher net margins even if the volatility of the EFM and industrial logs were the same. However, research has shown that the volatility of prices of larger logs is smaller than that for smaller logs. Table 2 shows the situation for two sample markets in the Pacific Northwest (Region 1 is the Puget Sound market area; Region 5 is the Willamette Valley market area). The price volatility of the higher-quality #2 saw log averages about 2/3^{rds} the volatility of lower-quality #4 saw logs.

TABLE 2. VOLATILITY OF DELIVERED LOG PRICES BY GRADE, 1995-2005.

	#2 SAWLOG	#3 SAWLOG	#4 SAWLOG	PULPWOOD
REGION 1				
Douglas-fir	3.91%	4.06%	4.87%	12.96%
Whitewoods	4.86%	5.84%	6.73%	
REGION 5				
Douglas-fir	2.95%	4.06%	4.58%	12.99%
Whitewoods	3.05%	3.28%	5.30%	

Volatility measured by standard deviation of rates of change in monthly log prices. Source: LogLines, Ecotrust analysis.

Recall that risk is best measured by the incremental contribution to overall portfolio volatility. This contribution depends directly on both the volatility of asset returns, and the correlation of those returns with those of other assets. All else equal, the 2/3^{rds} lower standard deviation of EFM log prices translates into a 2/3^{rds} lower CAPM β and a proportionate reduction in the required rate of return. Hence, if the EFM and conventional timberland investment approaches yield the same expected returns, the risk-adjusted return for EFM will be higher.

The principal risk to the EFM large-log strategy is that the manufacturing sector is moving towards using smaller and smaller logs. This trend has been due in part to a sharp reduction in the availability of larger logs as a result of cutbacks in harvest on public lands. It has also been due in part to technological innovation driven by the need to reduce labor costs in wood processing and wood products. Advanced log scanning and control technology has made it possible to process small logs efficiently. New kinds of engineered wood products—laminated veneer lumber and wooden I-beams—have substituted for the large dimension lumber once manufactured from large logs, but even these products need trees yielding high-strength fiber. The EFM approach counts on either (i) controlling enough land under a single ownership to make establishing a processing facility and marketing channel a possibility, or (ii) recognizing that other public and private land, especially family forest ownerships and community and state forests are also interested in pursuing a similar large-log approach.

E. Sale of Conservation Easements

Conservation easements refer to restrictions placed on the use of land for the purpose of conserving important ecological or social values. The concept of an easement is old in English common law, but generally referred to access rights over adjacent properties. In the late 1970s and early 1980s, the concept was adapted in the U.S. for conservation purposes, and now literally millions of acres carry such restrictions.[19] These easements have either been donated by the owner of the land (who may receive a tax deduction for the fair market value of the donated easement) or purchased through a myriad of private, local, state and federal funding sources.

The federal Forest Legacy Program was created in 1990 to identify and protect environmentally important forestlands that are threatened by conversion to non-forest uses.[20] Priority is given to lands that can be effectively protected and managed to produce and maintain important scenic, recreational, economic and ecological values—precisely the kinds of lands and kinds of management that are consistent with the EFM investment strategy. Funding provided by the Forest Legacy Program totaled $208 million through 2005, resulting in the protection of over one million acres. Purchases of conservation easements through Forest Legacy funding were about $65 million in fiscal 2005, and $80 million in funding is proposed in the 2006 budget.

Another source of federal funding is the Coastal and Estuarine Land Conservation Program (CELCP)[21] designed to protect coastal and estuarine lands that possess important ecological or social values—once again lands well suited to the EFM investment strategy. In 2002, $15.8 million was appropriated for 22 projects, rising to $36.7 million in 2003 for 18 projects.

In addition to these federal programs, numerous states and communities have passed bond issues or authorized expenditures from annual budgets for the purpose of acquiring conservation lands and easements.

The value of a conservation easement depends on many factors, including the nature of the rights that have been conveyed. A forest conservation easement, which restricts development but permits continued forestry operations, may be valued in the range of 20% to 90% of the value of the property. The sale of a conservation easement benefits the timberland investor by reducing the holding cost of the asset while retaining the ongoing cash flows. The sale of a conservation easement strips out some or

[19] http://nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeasements/

[20] http://www.fs.fed.us/spf/coop/programs/loa/flp.shtml

[21] http://coastalmanagement.noaa.gov/landconservation.html

all of the development values, but permits the investor to continue to participate in the ongoing timberland returns at a reduced cost. This enhances the returns from the timberland component of the investment and may also reduce financial risk by reducing the amount of capital at risk.

The value of the forsaken development rights depends, of course, on the development potential of the land. In the Northeast, this might be quite high. In the Pacific Northwest, it tends to be lower. While there is no comprehensive database, a couple of examples provide indicative values:[22]

- Sale of 100,000 acres of development rights on the $185 million Snoqualmie Tree Farm in Washington (near Seattle) to King County for $22.5 million.
- Sale of 53,000 acres of development rights and public access in Montana to the Trust for Public Land for $12 million.
- Sale of 24,000 acres of development rights in Mendocino, CA to The Nature Conservancy for $3.5 million.

While there is still considerable interest in acquiring conservation easements within the environmental community and among funding sources, realizing these values has become more difficult. Buyers have become more experienced and discerning, and seek to allocate their funds in ways that maximize conservation values. This now includes "working forest easements" where the landowner receives compensation for restricting her forest practices to ones that provide far more ecological protection than the statutory minimum forest practice regulations. Supporting an EFM investment would be particularly attractive because the easement will not only limit development, but will also provide a standard of excellence in environmental performance that exceeds the requirements of local forest practice codes. Conventional timberland investors cannot offer this added benefit.

Finally, EFM creates ecological conditions that are attractive to public agencies for public uses, making conservation sales of selected parcels an attractive exit strategy. The primary source for federal funding for such sales is the Land and Water Conservation Fund that has provided more than $9 billion for conservation purchases since its inception in 1965.[23]

F. Sale of Carbon Sequestration Credits

The Kyoto Protocol recognizes the positive role forests can play in removing CO_2 from the atmosphere and sequestering it in trees—the bole, crown and roots. The Protocol establishes two mechanisms for creating carbon sequestration credits based on forests, Article 3.3 and Article 3.4. Most forestry projects to date have been based on the afforestation provisions of Article 3.3, and these are generally not relevant for EFM. Article 3.4 recognizes that appropriate management of natural forests can also sequester CO_2. The key issues to qualify are (i) additionality (that is, does the activity generate additional sequestration of carbon beyond what is required by regulation?), and (ii) permanence (that is, is the carbon permanently sequestered—in practice, for 100 years?). By extending rotations (and, therefore, standing inventory) beyond the statutory minima, by maintaining continuous forest cover, and by dedication to keeping land permanently in forests, EFM should meet these qualifications.

Of course, the US has not ratified the Kyoto agreement, so the international trading mechanisms are not currently available to forest owners in the US. Instead, EFM will rely on the state and regional

[22] Ecotrust research.

[23] http://www.nps.gov/lwcf

programs, as well as the less formal private mechanisms that have been developed in the absence of unified federal action. These include the:

- California Climate Action Registry;[24]
- proposals on reforestation offset under the Regional Greenhouse Gas Initiative of the US northeastern states;[25]
- The Climate Trust;[26] and
- initiatives in other states such as North Carolina and New Mexico.

The Climate Trust is particularly relevant to EFM as they were founded in 2001 to help offset emissions from new power plants in Oregon. The Climate Trust has acquired more than 1.6 million metric tons (tonnes) of CO_2-equivalents to date, and recently issued an RFP to acquire $4.3 million of additional offsets on behalf of Portland General Electric in 2006.

Prices for carbon sequestration credits vary considerably in the unregulated, non-Kyoto market but indicative values do exist.[27] At the time of writing, non-Kyoto carbon credits trade at about $2/ tonne of CO_2-e on the Chicago Climate exchange. The Climate Trust has paid between $4 and $5/ tonne of CO_2-e. Three of their transactions have involved forest-based carbon credits: a 2001 sale by the Lummi Indian Tribe based on forest preservation, a Deschutes (OR) reforestation project, and an Ecuadorian rainforest conservation project. The Australian State of New South Wales has imposed a limited "cap and trade" program market and recent prices in this market were about $10/tonne. While the value of carbon sequestration credits is uncertain, it is clear that, even in the absence of the US adopting the Kyoto Protocol, value can be generated in EFM projects that can demonstrate additionality and permanence.

If the US were to adopt a Kyoto-style "cap and trade" program, either through federal action or through the cumulative effect of state and regional programs (perhaps linked to international markets), the value of carbon sequestration credits could be much higher. As points of reference, at the time of writing the spot price in the Kyoto-based European Trading System was about $25/tonne with 250 million tonnes traded to date. The price of emission cuts required for 2006 and 2007 are more severe, and the investment bank Dresdner Kleinwort Wasserstein estimates that the sequestration credits will trade at $42 or more.[28]

While the value of carbon sequestration credits is uncertain, it is clear that value can be generated in EFM projects that can demonstrate additionality and permanence. To meet these criteria, our case study considers the carbon inventory that would have been in place under a traditional industrial management regime and also computes the carbon inventory that is expected under EFM. The calculations are done over a 100-year period to meet the permanence criterion. We simulate a sale of the additional carbon on an ongoing basis every five years to match the Kyoto commitment periods (2008-2012, 2013-2018, etc.). We valued the carbon at $5/tonne CO_2-e. With these assumptions, the sale of carbon sequestration credits adds about 35 bps of additional return. If the total accumulated

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[24] http://www.climateregistry.org/

[25] http://www.rggi.org

[26] http://www.climatetrust.org/index.php

[27] http://ecosystemmarketplace.com/

[28] "Carbon Emissions", **Financial Times** 16 January 2006, p. 16.

carbon over the 100-year period were sold at one time, the favorable impact on investment returns might be greater. Of course, the actual outcome will differ among properties, and will depend on many factors that must be evaluated on an investment-specific basis.

G. New Markets Tax Credits: Improved Returns and Social Benefits

The New Markets Tax Credits program provides tax credits for investors who make qualifying equity investments in low-income communities.[29] The policy objective is to provide more jobs and more consistent employment opportunities in economically distressed communities. Much of the forest land in coastal temperate rainforests of the US Pacific Northwest lies in low income communities where a sustainable forest industry is a key to long-term economic viability. EFM emphasizes long-term sustainability, and increases employment both through relatively labor-intensive forest practices (e.g. repeated thinnings) and through the value-added opportunities made possible by the production of larger, higher-valued logs. As a result, the New Markets Tax Credits program is highly suitable for supporting EFM acquisitions.

In 2002, Congress authorized $15 billion for the original program and $7 billion remains to be allocated through 2007. Under this program qualified Community Development Enterprises (CDEs)—organizations that represent the interests of specific qualified communities—apply for a tax-credit allocation. The allocations are granted through a competitive process adjudicated on the basis of the CDE's capacity (i) to create and sustain jobs in distressed communities, and (ii) to find and place the required matching equity capital quickly and efficiently. In 2005 (the third year of the program) 208 organizations requested $22.9 billion in tax credits; 41 of these were successful and received a total of $2 billion of credits.

Although the actual mechanics are complicated, the basic effect is to reduce the cost of acquiring a timberland investment. A successful CDE may sell a tax credit of 39% (taken over seven years) of the value of the qualified investment. For example, Ecotrust, a conservation organization in the Pacific Northwest, received $50 million of New Markets Tax Credits in the 2005 competition for the purposes of investing in EFM. This means that Ecotrust's CDE is authorized to sell tax credits worth $19.5 million (39% of the $50 million allocation). Because these tax credits are taken over a seven-year period, the present value of the credits is roughly $12.5 million. These tax credits are coupled with investment capital to purchase forestland in qualified census tracts in open, competitive timberland markets. For example, a $50 million tract could be purchased for an investment of $37.5 million plus $12.5 million of New Markets Tax Credits.

The tax credits increase the investor's return by reducing the purchase price. Although the precise impact depends on many factors, a simple example will suffice to demonstrate the potential effect. Suppose that the original $50 million investment generates a 6% real IRR solely through an annual cash dividend of $3 million/year forever. With the $12.5 million of New Markets Tax Credits, it would cost $37.5 to acquire this cash flow, and the investment would generate an 8% return ($3 million /$37.5 million), or a 200 bps improvement. The actual impact on returns for a specific investment is likely to differ from the example provided here and will depend on numerous factors that must be quantified in each particular case. Furthermore, there is no guarantee that the New Markets Tax Credit program will be reauthorized after the final allocation in 2007. But, the program makes investments in ecologically sustainable forestry supporting economically sustainable communities more attractive to investors.

[29] http://cdfifund.gov/programs/programs.asp?programID=5

H. Open-ended Structure

Most timberland investment funds are organized as fixed-term, closed-ended entities. A typical fund has a life of 10-15 years. At the end of the term, investors achieve liquidity through the sale of the properties. The typical practice is to divide properties into smaller "retail" blocks to take advantage of the negative relationship between property size and price per acre. The smaller parcels may be held as timberland, or they may be developed into house lots, rural residences or other uses that support neither forest ecosystem values nor rural communities dependent on a local forest industry.

It is, of course, unreasonable to expect that any one investor will want to continue to hold *any* investment forever. The negative outcomes from the traditional approaches are partly due to an investment structure that requires asset sales to create liquidity. A solution is to provide liquidity through the sale of securities rather than the sale of assets. In a private-equity setting, open-ended funds provide such a mechanism. New investors can replace existing ones on a continuous basis. This not only obviates the potential negative environmental impacts of asset sales, but offers investors more ready liquidity as they do not have to wait for the terminal date of the fund to cash out their investments. Furthermore, investors may reduce or increase their positions in the fund as the individual circumstances dictate. The risk of this structure is, of course, that many investors wish to exit at the same time, share prices may fall below asset valuations. In such a circumstance, investors wishing to exit face either illiquidity or loss of value.

IV. THE CASE FOR AN EFM INVESTMENT STRATEGY

Nearly 25 years of experience have demonstrated the value of timberland investments in adding returns to, and reducing the risks of mixed-asset portfolios. As the asset class has matured, returns have fallen as more money has flowed in and asset values have been bid up. It is likely that the systematic risk of traditional timberland investments has increased as well with returns becoming more highly correlated with those of other assets. Negative environmental impacts of the traditional timberland investment model have begun to come to light: increased harvest levels, shorter rotations, intensive management to the limits of forest practice codes, fragmentation of forests into smaller parcels, and an increased likelihood of development on sale.[30]

New timberland investment strategies are required to provide competitive ongoing risk-adjusted returns and high standards of environmental performance. These new strategies will see maintaining healthy forest ecosystems as a core investment strategy rather than a constraint on industrial practice. The EFM investment strategy is based on five core activities:

- Acquire properties that need rehabilitation and avoid mature forestland where the markets are more competitive;
- Manage the lands on longer rotations with continuous thinning to "build the balance sheet" with relatively high appreciation returns;
- Focus on larger logs traded in specialty, rather than commodity markets; this market strategy will reduce risk by virtue of larger operating margins and lower volatility;

[30]M. Hagen, L.C. Irland and A.A. Whitman. 2005. Changing timberland ownership in the northern forest and implications for biodiversity. Manamet Center for Conservation Sciences Report MCCS-FCP-2005-01, December (available at http://www.manomet.org/pdf/ForestOwnerChangeReport.pdf) documents these impacts for another region of the country.

- Enhance returns through the sale of ecosystem services and provision of social benefits, as represented by the sale of conservation easements, carbon sequestration credits and New Markets Tax Credits; and
- Provide investors with continuous liquidity not associated with the sale of assets.

While it is not possible to quantify the returns available from this strategy with universal precision, our case study can provide some useful insights. This example is taken from an actual forest with the data adjusted in several ways to highlight the expected performance of the EFM strategy:[31]

a. The purchase price has been adjusted to generate an expected real IRR equal to 6% in a conventional industrial regime on the basis of an assumption that the property would transact at this price, and the investor interested in the EFM approach would have to pay at least this amount to acquire the property. The size of the property was then scaled to $100 million to simplify the presentation.

b. All data and results are presented in real terms, and no general price or cost inflation has been included. Timber prices are held constant at current levels throughout the analysis.

c. The scenario includes the EFM approach to scheduling harvests and conducting forest operations. The regime includes a pre-commercial thinning, two commercial thinnings at year 30 and 45, and an extended final harvest at year 60. Trees are retained at the final harvest to provide seed for natural regeneration and habitat.

The scenario also includes an assumed sale of a conservation easement for $20 million in Year 3, the use of $10 million of New Markets Tax Credits to offset the acquisition cost, and the sale of carbon credits for $5/tonne of CO_2-e every five years based on the excess accumulation of carbon in the forest inventory above that which would occur in the industrial regime.

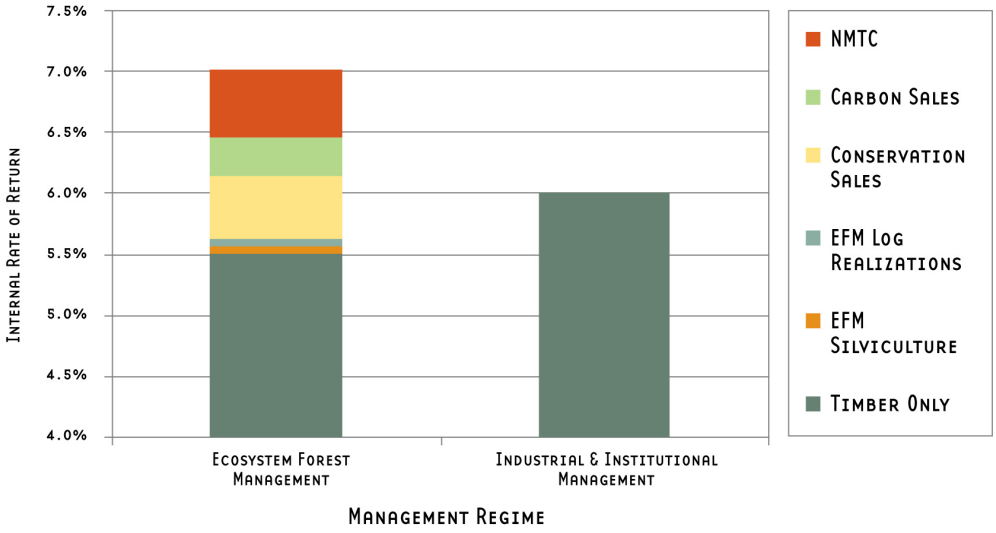
Figure 3 shows the results from this analysis. We believe that the EFM investment strategy responds affirmatively to the economic, ecological and social challenges facing timberland investors today, and can provide excellent ongoing risk-adjusted returns.

In this example, the EFM approach delivers additional value in several ways:

- 51 bps from conservation sales;
- 32 bps from carbon sales; and
- 55 bps from New Markets Tax Credits.

[31] This example is based on data, assumptions and analytical methods all of which may be material to the results and none of which may turn out accurately to characterize actual events of the future. There is no guarantee that such properties would actually be available to investors. The opportunity for loss as well as gain exists. Estimates of returns are not guarantees. The effect of management fees, if any, has not been included in this example.

FIGURE 3
INDICATIVE IRRS FROM EFM AND INDUSTRIAL MANAGEMENT REGIMES



If it is possible to monetize all of theses environmental and social values, the long-term IRRs generated by the EFM approach may be higher than those from the conventional industrial/financial investor model—about 100 bps higher in this example. If it is not possible to realize all of these value-adding strategies, the long-term time- and dollar-weighted returns are about 40 bps lower than those for industrial management. This might still be an acceptable return because the financial risk of EFM may be lower as a result of selling higher-valued products into less volatile markets. While these results derive from just one example, it appears that EFM can produce competitive timberland investment returns while enhancing ecological and social values.

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