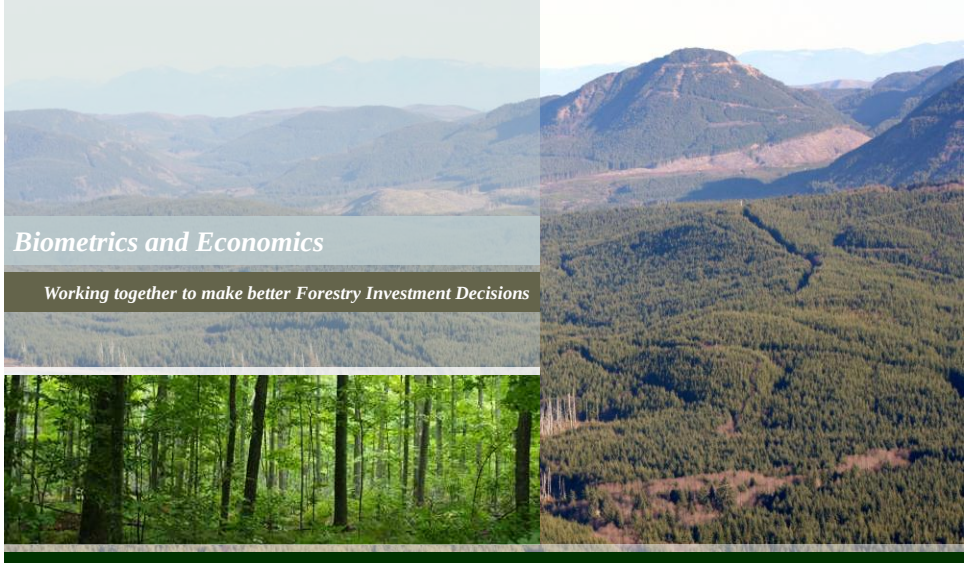

Biometrics and Economics

Working together to make better Forestry Investment Decisions

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Forestry Investment Decisions

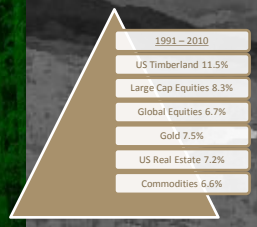
Forestry is a Business and all about Investment Decisions…

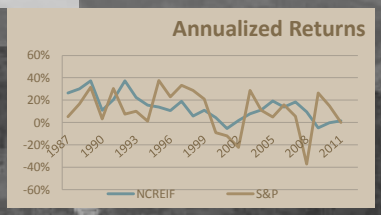
As an investment, timberlands offer

- Value Growth – timberland value has risen faster than S&P 500
- Low volatility - In Great Depression, while stocks fell >70%, timber gained 233% in the same time period. In 2008, when S&P lost 38%, the Timberland Index gained 9.5%
- Portfolio diversification – very low correlation with most other asset classes
- There is a high demand for wood products - Average American uses one 100' tree per year. UN predicting world wood demand to double by 2040.
- Worlds wood supply is shrinking.
- Hedge against inflation
  - ….regardless of the economy, trees grow.

Forestry Investment Decisions

The Forestry Business provides good returns





Timberland Returns come from:

- Biological Tree Growth (60%)
- Land Value (2-5%)
- Timber Price Change (25-30%)

Forestry Investment Decisions

What decisions in forestry are investment decisions….

- Harvest
- Reforestation
- Mid-Rotation
- Harvest
- Acquisition & Disposition
- Management Choices
  - Certification
  - HBU
  - Easements
  - Carbon
  - Intensity

Mature Stand → Harvest Decision → Seed Choice - Genetics → Seedlings → Site Preparation → Planting → Establishment

Harvest Decision → Mature Stand → Fertilization → Density Management → Intermediate Harvest → Fertilization

What's involved in a typical decision…

Biometrics

Economics

Forestry

Operations

Spatial Systems

Integration

- Project Definition
- Data
- Verification Process
- Growth
- Costs & Revenue
- Other
- Assimilation
- Decision

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- Decision

- What's being valued, timeframe, etc.
- Finding it
- Moving it around

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- Does it make sense
- Where is it weak?
- Field work
- What can be done to fix it?

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- Find a model
- Identify assumptions & conditions
- Run
- Run
- Run

- Verify, Evaluate, and Fix

What's involved in a typical decision…

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- **Costs & Revenue**
- Other
- Assimilation
- Decision

- Logging Costs
- Transportation Costs
- Regulatory Costs
- Management Costs
- Taxes
- Etc.

What's involved in a typical decision…

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- **Other**
- Assimilation
- Decision

- Animals
- Birds
- Fish
- Steep slopes
- Disease
- ???

What's involved in a typical decision…

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Integration

- Project Definition
- Data
- Verification Process
- Growth
- Costs & Revenue
- Other
- **Assimilation**
- **Decision**

10-Year Income Statement & ROI					
	Calendar Years				
	2012	2013	2014	2015	2016
Timber Inventory					
Beg. Of Year (MBF)	1,469	1,539	1,633	1,727	918
Harvest Volume	0	0	0	0	463
Growth	70	94	94	94	509
End of Year (MBF)	1,539	1,633	1,727	1,821	964
Sales:					
Douglas-fir	$ -	$ -	$ -	$ -	$237,073
Hem-TF	-	-	-	-	47,979
Other	-	-	-	-	11,995
Total Sales	$ -	$ -	$ -	$ -	$316,662
$ Per M	-	-	-	-	684
Costs:					
Logging Cost	$ -	$ -	$ -	$ -	$114,249
Yield Taxes	-	-	-	-	2,026
Depletion	-	-	-	-	87,910
Road Depreciation	427	1,237	1,113	1,002	756
Silviculture	-	-	15,606	-	-
Admin	663	676	690	704	405
Total Cost	$ 1,090	$ 1,913	$ 17,409	$ 1,706	$205,346
$ Per M	-	-	-	-	443
Operating Income	(1,090)	(1,913)	(17,409)	(1,706)	111,316
Interest Expense	(29,532)	(29,874)	(27,258)	(24,452)	(2,807)
Net (Loss) Income Before Tax	(30,622)	(31,788)	(44,667)	(26,158)	108,509
Income Tax Benefit (Provision)	7,196	7,470	10,497	6,147	(25,500)
Net (Loss) Income After Tax	(23,426)	(24,318)	(34,170)	(20,011)	83,009
Add: Depletion & Depreciation	427	1,237	1,113	1,002	88,666
Add: After-Tax Interest	22,592	22,854	20,852	18,706	2,148
Cash Flow for Investment ROI	$ (407)	$ (227)	$(12,205)	$ (303)	$173,823
NPV, Cash Flows	$ 302,109				
NPV, Residual Value	$ 172,078				
Total Investment	$ 474,187				
After-Tax Payback	9yrs				
After-Tax IRR	7.18%				

Who is Involved?

Many Disciplines and Many Tools

Biometrics

Economics

Forestry

Operations

Spatial Systems

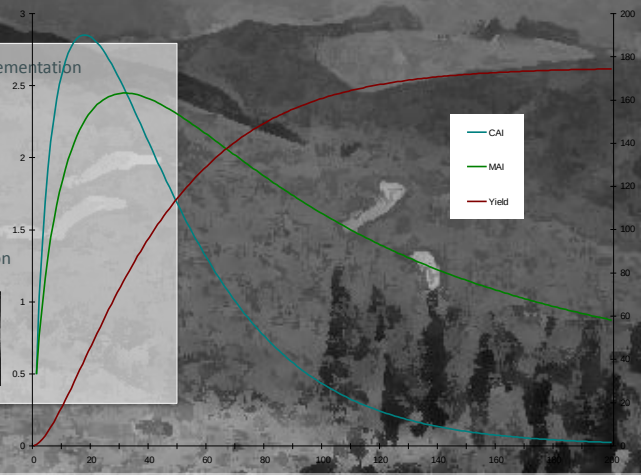
Integration

- Inventory
- Growth & Yield Models
- Product Distribution Models (Species, Grade)
- Price Forecasting
- Cost/Value Models
- Removals & Constraints
- Alternative Uses
- Harvest Planning – Optimization
- Sustained Yield Analysis
- Spatial Analyses of Many Kinds

Biometricians

Expertise or Tools in

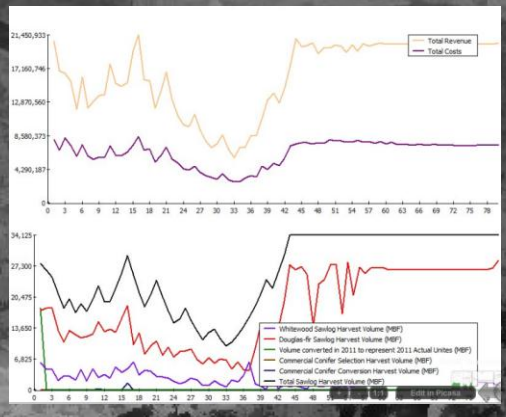
- Inventory Design & Implementation
- Growth Models
- Silvicultural Response
- Product Composition
- Wood Quality Models
- Verification and Validation



and Economist's

Expertise or Tools in

- Financial Analysis
- Price forecasting
- Supply/Demand
- Optimization and Simulation



Biometricians and Economists

Similarities –

Quantitative Skills across a range of topics – mathematics, statistics, computer programming, financial analysis….like our counterparts in other industries.

Qualitative understanding of biology, botany, soil science, and other underlying parts of the forest ecosystem

over-analyze (issues, variables, functions,etc) that have little or no impact on the final outcome

dwell on minute matters…..perhaps to the point that the statistical variance makes their importance trivial, relative to the impact on the final number.

Biometricians and Economists

We deal in long time frames…

Economists often look at 10-50 year DCF models.

Biometricians look at 10-100-year growth models.

From 1989 to 2010, the amount of capital invested in timberland grew from several hundred million $ to ~$55Billion in the US. Since 1992, this investment has expanded to the rest of the globe. One could argue that it is perhaps the most influential ownership types.

Average ownership period for insitutional timberland is 7-10yrs

We effectively taking a 20-year econometric model, marrying it with a 50-year growth and removal model and presenting the highest NPV result to a 5 to 10 year oriented investor?

Forestry Investment Decisions

Sidebar - The motivation for investing in timberland has changed

- Harvest
- Reforestation
- Mid-Rotation
- Harvest
- Acquisition & Disposition
- Management Choices
  - Certification
  - HBU
  - Easements
  - Carbon
  - Intensity

Prior to 1986, most privately held timberland was owned by forest products companies – fiber source which offered strategic and competitive advantages.

1986 – lost of favorable capital gains tax rates on timber harvest revenue.

Advantageous to sell holdings to tax-advantaged investors (pension funds, foundations, endowments).

Additional tax rulings strengthened the view of tax-exempt organizations that owning and managing timberlands was a solid investment.

Forestry Investment Decisions

A good way to look at timberland investing now might be as…

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- Reforestation
- Mid-Rotation
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A portfolio of options contracts -

- Consider an Option Contract – basically, a contract to buy or sell a product/good/service/etc.
- The key here is that you have the right to buy/sell…not that you do either.
- In the financial options markets, something like 6% of all options are exercised, 20% just expire unused, and the remainder are sold.

The traditional theory on diversification "Don't put your eggs in one basket" (Photo courtesy of www.moneywise.co.uk)

Forestry Investment Decisions

The Portfolio?

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- Reforestation
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Merchantable Timber - options often executed

Pre-Merchantable Timber – sometimes executed

Regeneration – rarely executed

The traditional theory on diversification "Don't put your eggs in one basket" (Photo courtesy of www.moneywise.co.uk)

Forestry Investment Decisions

What does this view mean to us?

- Harvest
- Reforestation
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The key to a healthy options market is valuation transparency a

The key to these two ite prediction of future premerch value.

Valuing premerch and younger plantations is exactly what the marriage of economics and biometrics is good at.

Our long term view fits very well.

That all sounds good, what else?

Recap

Investment decisions involve the assimilation of many technical matters over a time scale that we are well suited for.

Each play an important role

Need to be adaptable

Not get overly bogged down in the details

What else can we bring to the table?

Investment Team

Biometricians, Economists

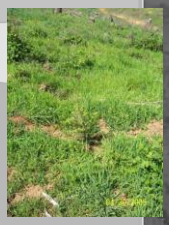
That all sounds good - what else?

The Investment team

Biometricians, Economists

Foresters





That all sounds good - what else?

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That all sounds good - what else?

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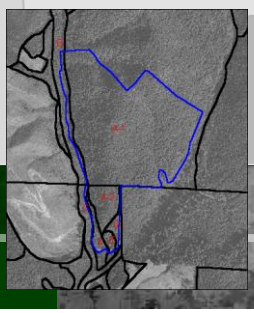
…spatial team



That all sounds good - what else?

The Investment team

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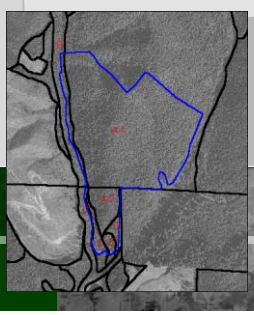
Operations

…spatial team

The "ologists"



We have the team…what else?

Tools!

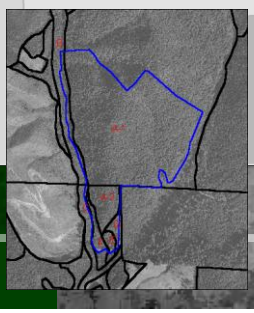
Biometricians, Economists

Foresters

Operations

…spatial team

The "ologists"



State of the Art…comprehensive decision support systems, right!

Well, No

- Spreadsheets
- Complicated Spreadsheets
- Integrated Systems
- Back of the envelope ad hoc

What else does the team need?

Data

professionals

Computer models

A solid marriage of professions

What else does the team need?

leadership

Data

professionals

Computer models

A solid marriage of professions

Need someone to lead and guide the process.

This often isn't "us".

Closing thoughts on how to grow in relevance

Things to do…

Biometrics

Economics

Forestry

Operations

Spatial Systems

Integration

Keep our technical skills but learn to be better

- Communicators
- Integrator's
- Generalists

Produce

- Simple tools that can be used
- Tools that work well together
- Tools that can be explained

Learn…cross-train

– operations, spatial analysis, biology, finance

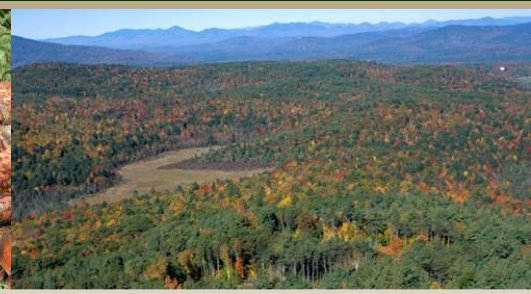
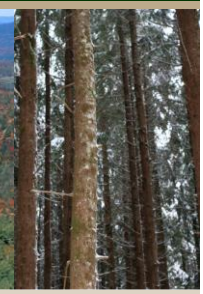
Business Education

Leadership

"Aunque todo lo demás falle, siempre podemos asegurarnos la inmortalidad cometiendo algún error espectacular" John Gailbrath

It is better to be roughly right than precisely wrong….John Keynes

Thank you

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