Chasing Forest Carbon Credits
Does it pencil out?

Mark Rasmussen
Mason, Bruce & Girard
(503) 225-3445
mras@masonbruce.com
www.masonbruce.com

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Objective

- Forest carbon credits:

  At what CO2 price does it pay to change management strategy on a commercial forest property?

- Case studies
  - Single stand
  - Forest level

At what CO2 price does it pay…

- Answer: It depends!
  - The nature of the carbon “product”
  - Current forest resource
  - Current forest management strategy
  - Cash flow requirements
  - Risk

Carbon “product”

- What carbon counts?
  - Baseline: “Base Year” v. “Business as Usual”
  - In the woods, long-lived wood products
  - Deductions
- The “contract”
  - Transaction details
  - Contract length
  - Ability to exit
  - Encumbrance on sale of property

Current forest resource

- Age class distribution
- Productivity

Current forest management strategies

- Periodic harvest flow policies
- Cash flow requirements
- Rotation ages
- Etc.

Single stand case: forest resource

- Well-stocked stand (DF, WH, RC)
- Site 130
  - MAI @ 40 = 660 bf/ac/yr
  - MAI @ 65 = 840 bf/ac/yr

Simplifications

- $450/Mbf net stumpage

* Biomass equation:

$$bm = \mathrm{Exp}(\beta_0 + \beta_1 \ln dbh)$$

where

bm = total aboveground biomass (kg) for trees 2.5cm dbh and larger

dbh = diameter at breast height (cm)

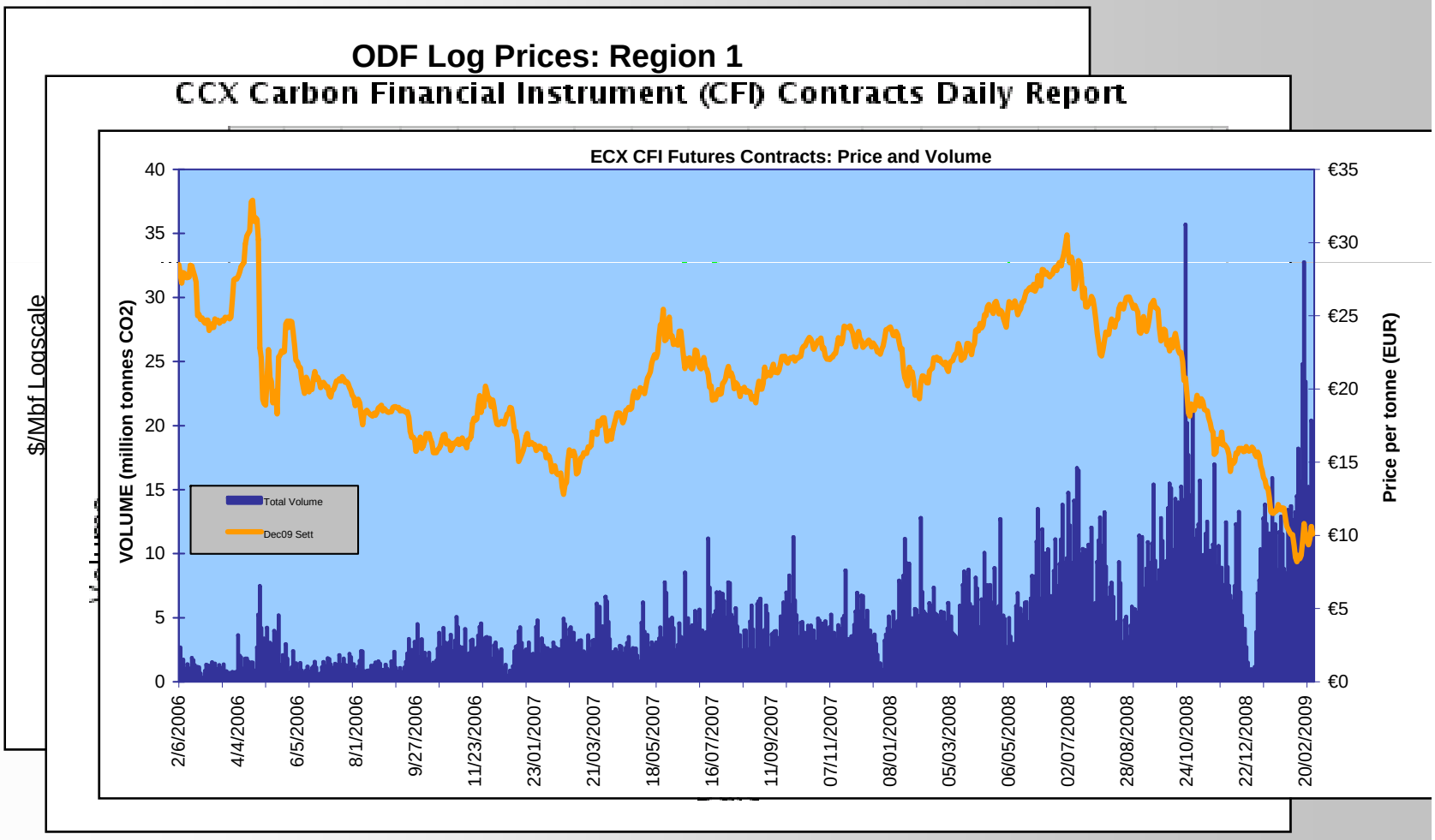
Exp = exponential function

ln = natural log base "e" (2.718282)

Single Stand Case Study: Carbon "product"

- Carbon greater than beginning
- Fixed C-Credit price
- Deductions for inventory and banking (40%)

Prices


ODF Log Prices: Region 1
$/Mbf Logscale
CCX Carbon Financial Instrument (CFI) Contracts Daily Report
ECX CFI Futures Contracts: Price and Volume
VOLUME (million tonnes CO2)
Price per tonne (EUR)
Total Volume
Dec09 Sett
0
5
10
15
20
25
30
35
40
€0
€5
€10
€15
€20
€25
€30
€35
2/6/2006
4/4/2006
6/5/2006
8/1/2006
9/27/2006
11/23/2006
23/01/2007
21/03/2007
18/05/2007
16/07/2007
11/09/2007
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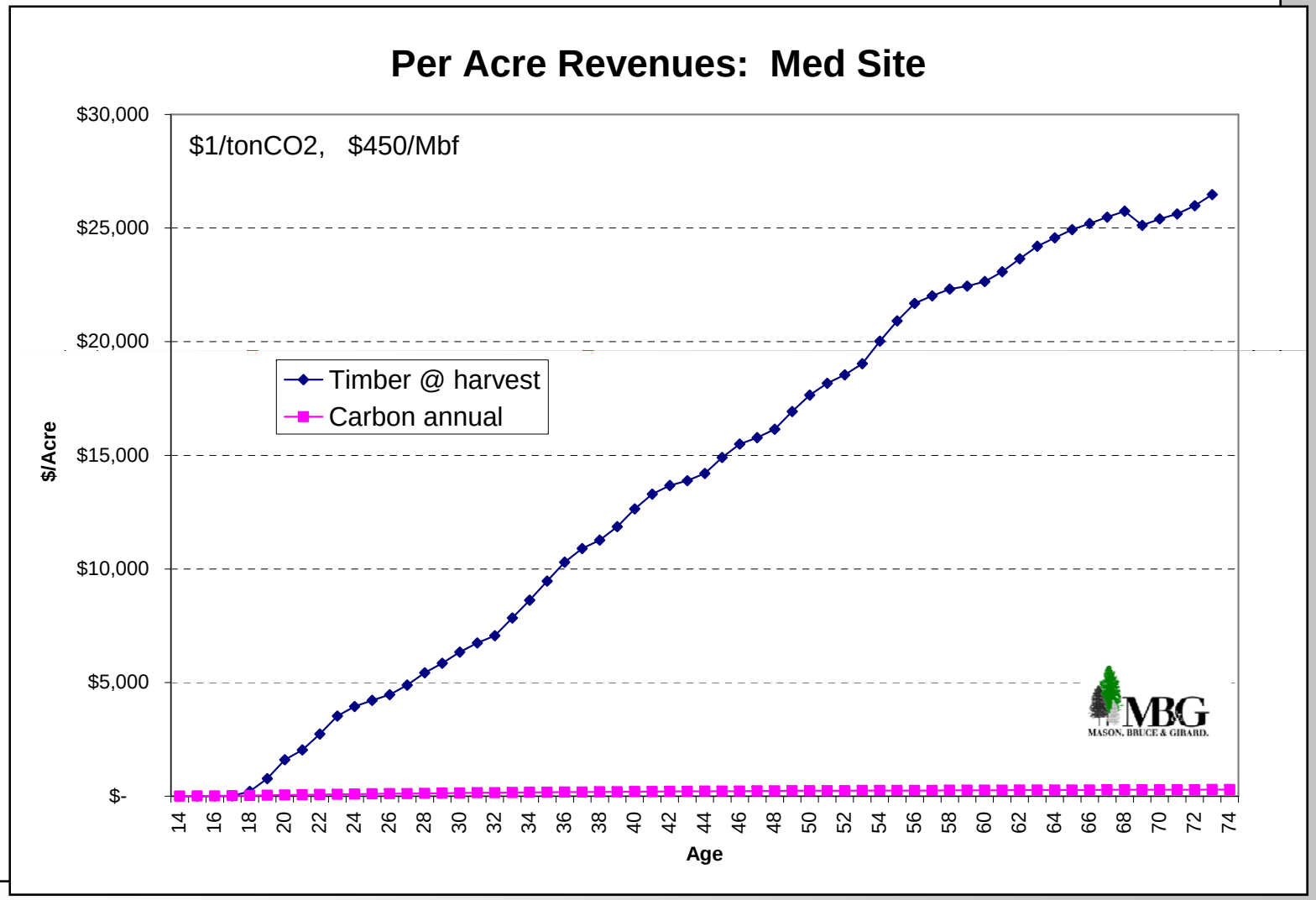
28/08/2008
24/10/2008
22/12/2008
20/02/2009

Single stand



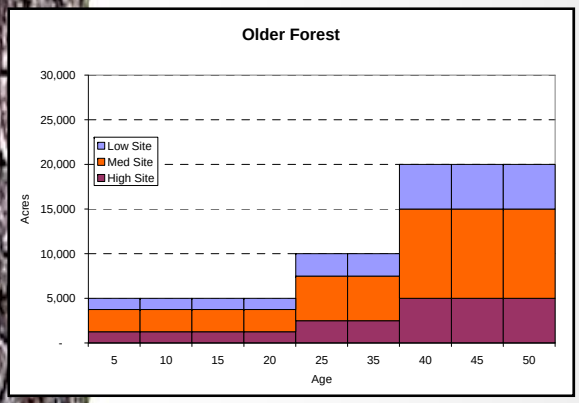
General Relationships

- 1 Mbf = ~2-3 tons Carbon
- 1 Mbf = ~7-9 tons CO2
- Deductions = ~20-40% of CO2
- Fees
  - CCX, Verifier = ~$0.30/tonCO2
  - Aggregator = ~5-10%

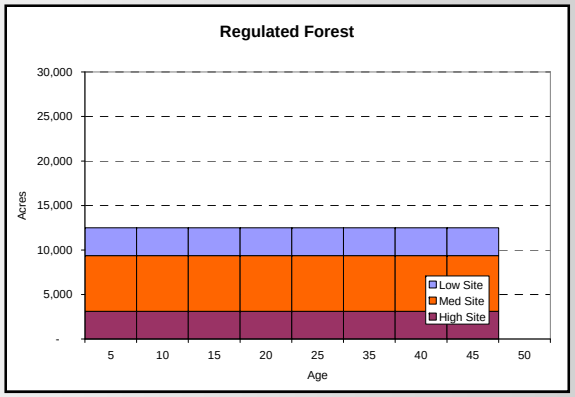
- 1 Mbf = ~$300-$500 stumpage

Case Study: Current forest resource

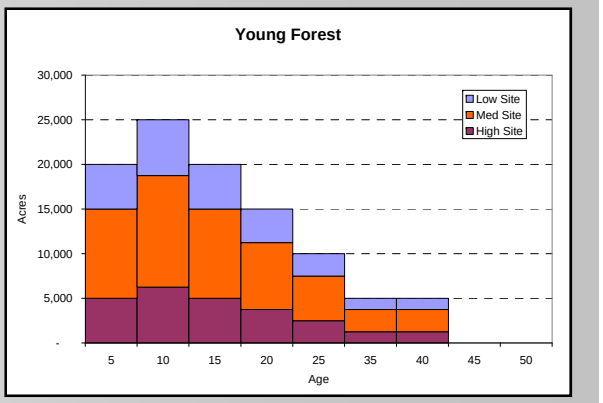
- Three well-stocked stands (DF, WH, RC)
- Site 122 / 130 / 155
- Economics
  - Log prices for 5 size classes
  - Logging costs vary
  - Mgmt costs, taxes, etc.



24.3 Mbf/ac



12.1 Mbf/ac



2.5 Mbf/ac

Forest Case Study: Carbon "product"

- Product:
  - Carbon stored above "Business as Usual"
  - Long lived wood products
  - Deductions for inventory and banking
- Economics
  - Fixed CO2 price
  - C-Fees (Verifier, CCX, no Aggregator)
- Long term commitment - No exit

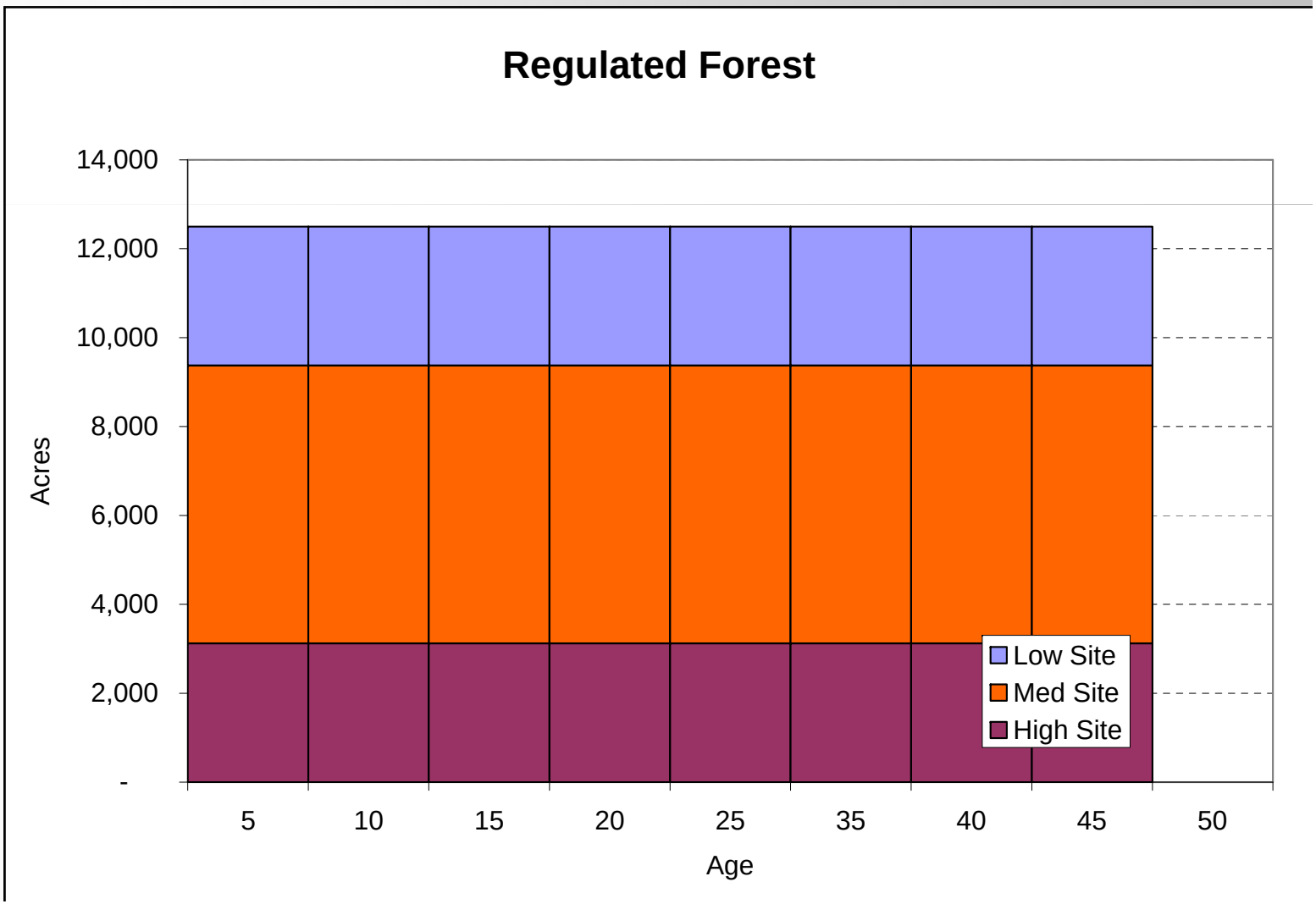
Forest Level Case Study: Analysis Strategy

- Timber only scenario
  - Max Net Present Value over 75 years @ 6%
  - Harvest flow:
    - Non-declining flow
    - No flow constraints

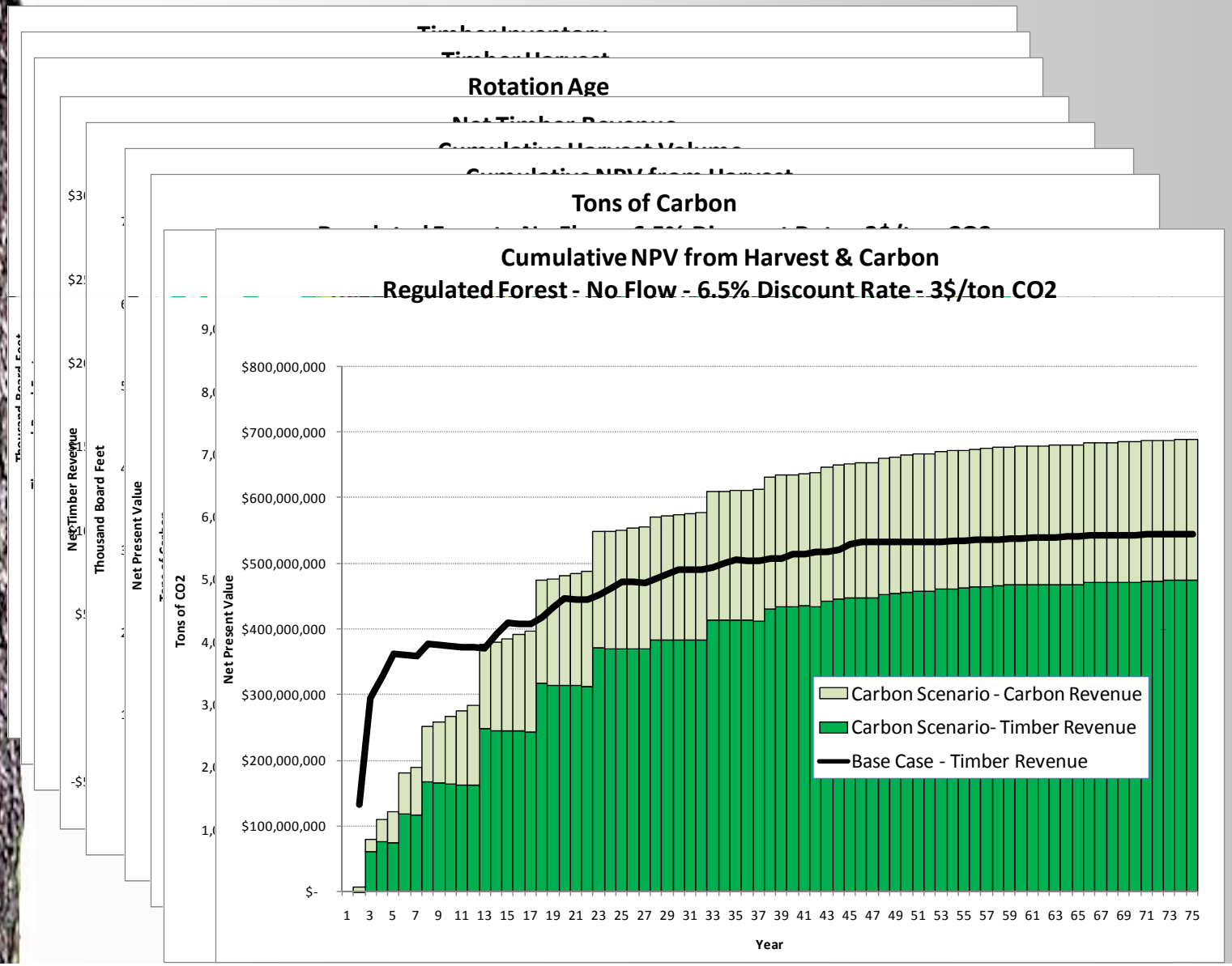
Forest Level Case Study: Analysis Strategy

- C-Credit scenario
  - Maintain initial timber inventory
  - C-Credits for Carbon over beginning level
  - C-Credits for long-lived wood products
  - Annual C-Fees (CCX, verifier)
- Find **$/tonCO2** that results in NPV equal to Timber Only NPV

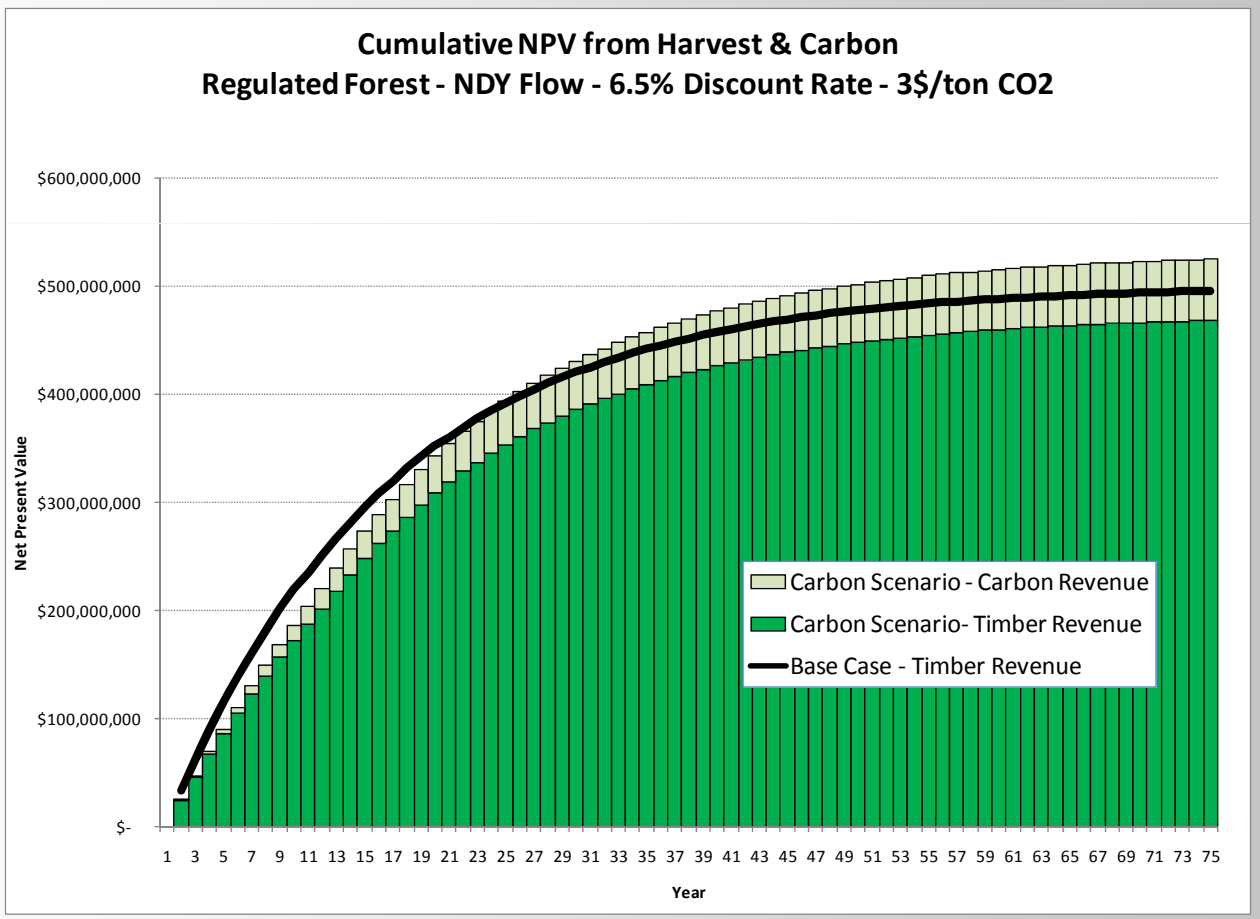
Regulated forest



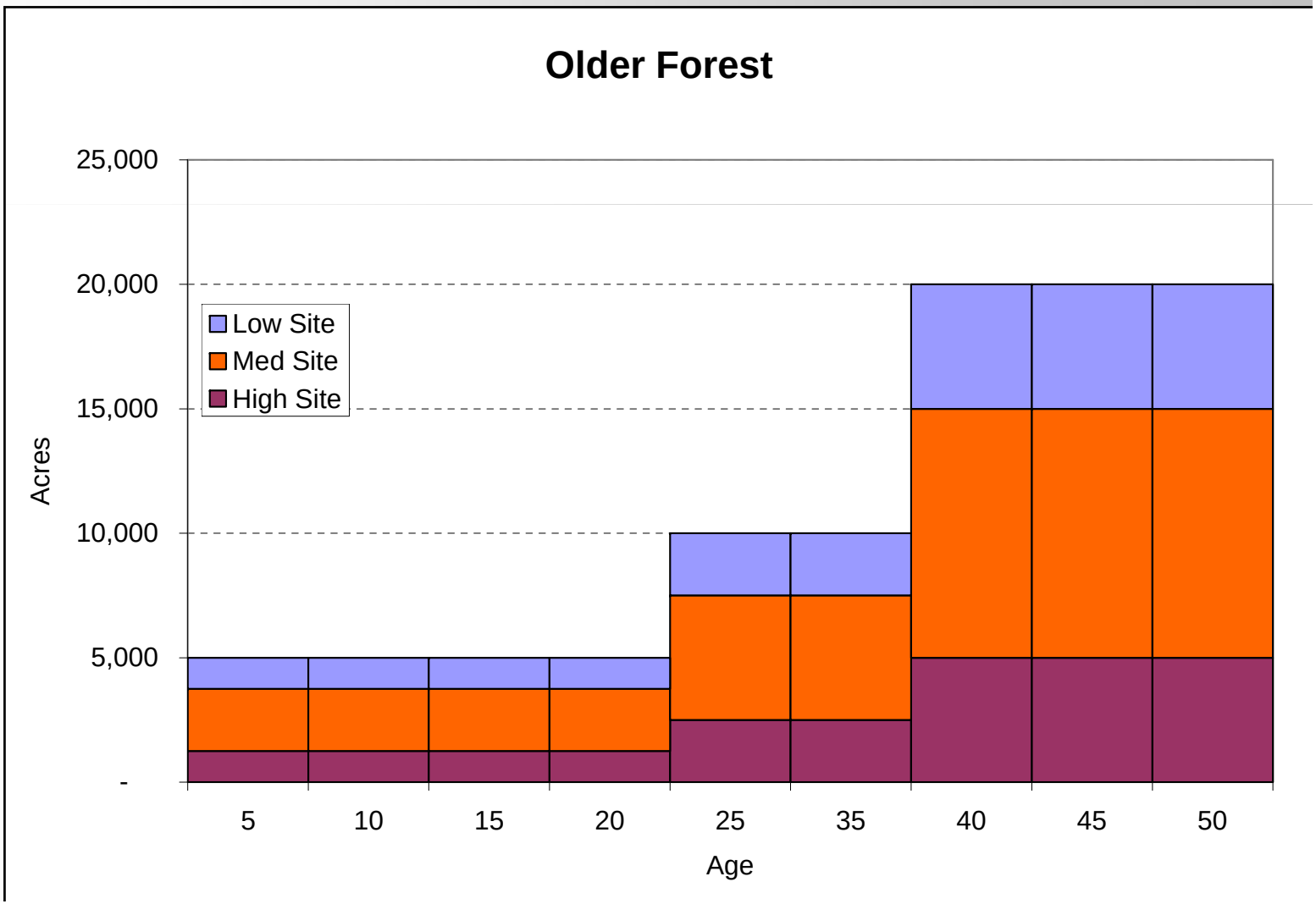
Regulated Forest: No Flow Constraints



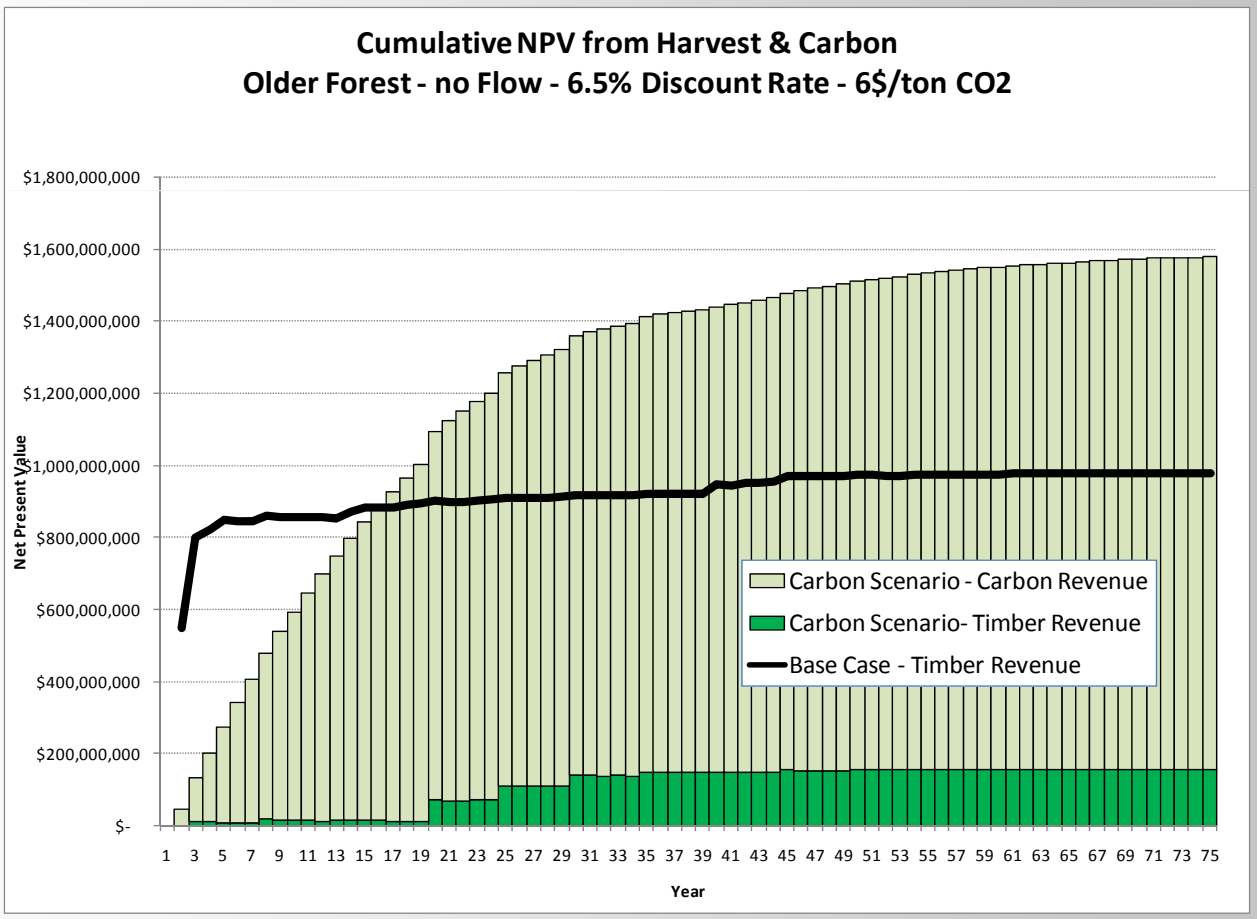
Regulated Forest, NDY



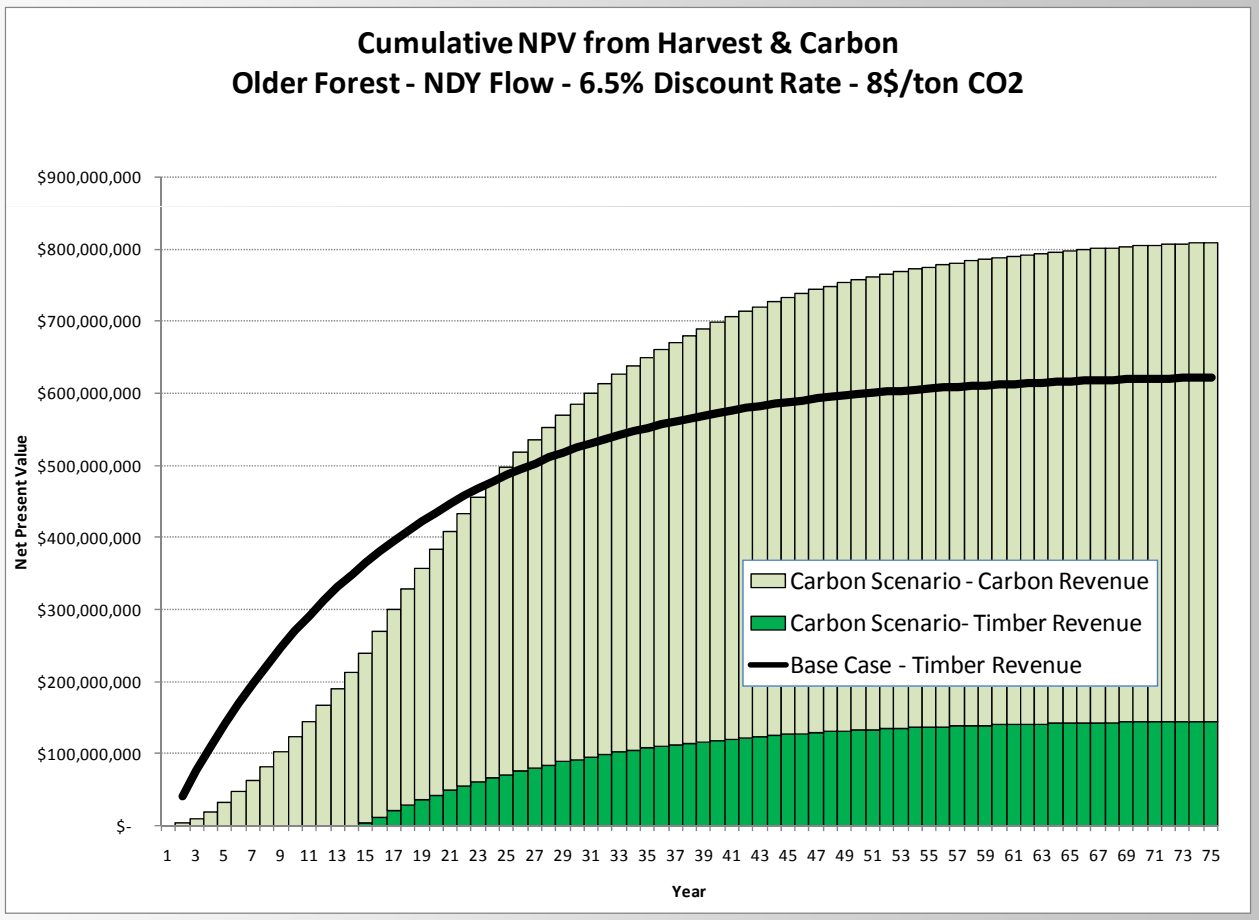
Older forest



Older Forest, No Flow



Older Forest, NDY



Other factors - Risk

- Price volatility – timber and carbon
- Uncertainty and volatility in C-regulations
- Carrying more inventory
  - Portfolio balance
  - Environmental risks
  - Regulatory risks
- Encumbrance at sale

Summary

- The value of C-Credits depends on:
  - The carbon “product”
  - Your forest
  - Cash flow requirements
  - Tolerance for risk