California's Regulatory Carbon Market: Panacea or Pandora's Box for Forest Landowners?

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Presentation outline

- Spatial Informatics Group LLC background
- California's compliance market
- Improved Forest Management project example
- Factors driving project viability
- Lessons learned

Spatial Informatics Group LLC (SIG)

- Founded in 1998, SIG is an eco-think tank that uses high-end forestry and geographic analysis to answer questions related to the environmental field

- Three areas of focus:
  - 1) natural hazards assessment, planning and mitigation;
  - 2) ecosystem service quantification and management.
  - 3) forest carbon
    - Expertise in project assessment, project analytics, protocol development, monitoring and project documentation.

Forest carbon experience

- 6.8 million carbon offset credits on 485,000 acres under the Climate Action Reserve (CAR), Air Resources Board (ARB) and Verified Carbon Standard (VCS)
- Our role is to work on behalf of the landowner
- Team includes: Thomas Bucholz, PhD; Charles Kerchner, MS; Nancy Budge, MBA; William Keeton, PhD; and Timothy Robards, PhD.

California market

- 2006 Governor Schwarzeneggar signed AB 32 to reduce California's GHG emissions to 1990 levels by 2020
- Capped entities can meet 8% of compliance obligation with offsets from uncapped sector
- Demand for offsets are expected to range from $2 to $8 billion by 2020
  - On par with USDA Farm Bill conservation payments for 2012
- Current value is $10-$12 per California Compliance Offset. Price will increase as the cap decreases

Case study: Howland forest carbon project

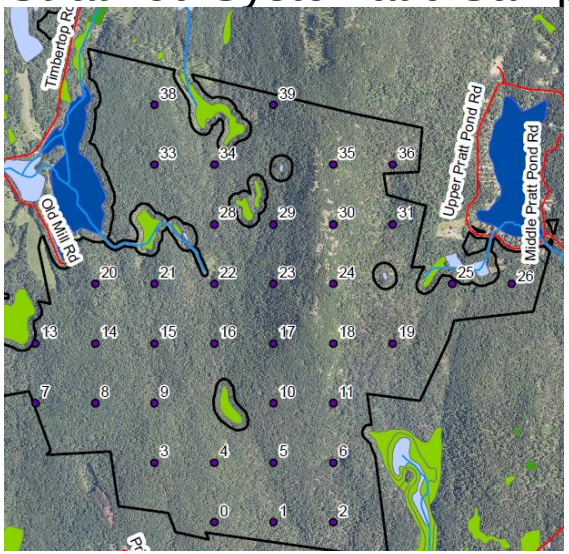
- Improved Forest Management project type
- 557 acre mature, lowland Spruce-Fir forest located in Central Maine
- Escaped mechanized logging typical of northern forest s in Maine
- Tremendous ecological value
- Some parts have not been harvested since the Civil War
- Start date: 2007 purchased by Northeast Wilderness Trust

Landowner commitment

- Forest owners must monitor and verify a Forest Project for 100 years
- Initial site verification
- Site-visit verification every six years
- Monitoring - annual reports
- Can harvest

Inventory Methods

Stratified Systematic Sampling

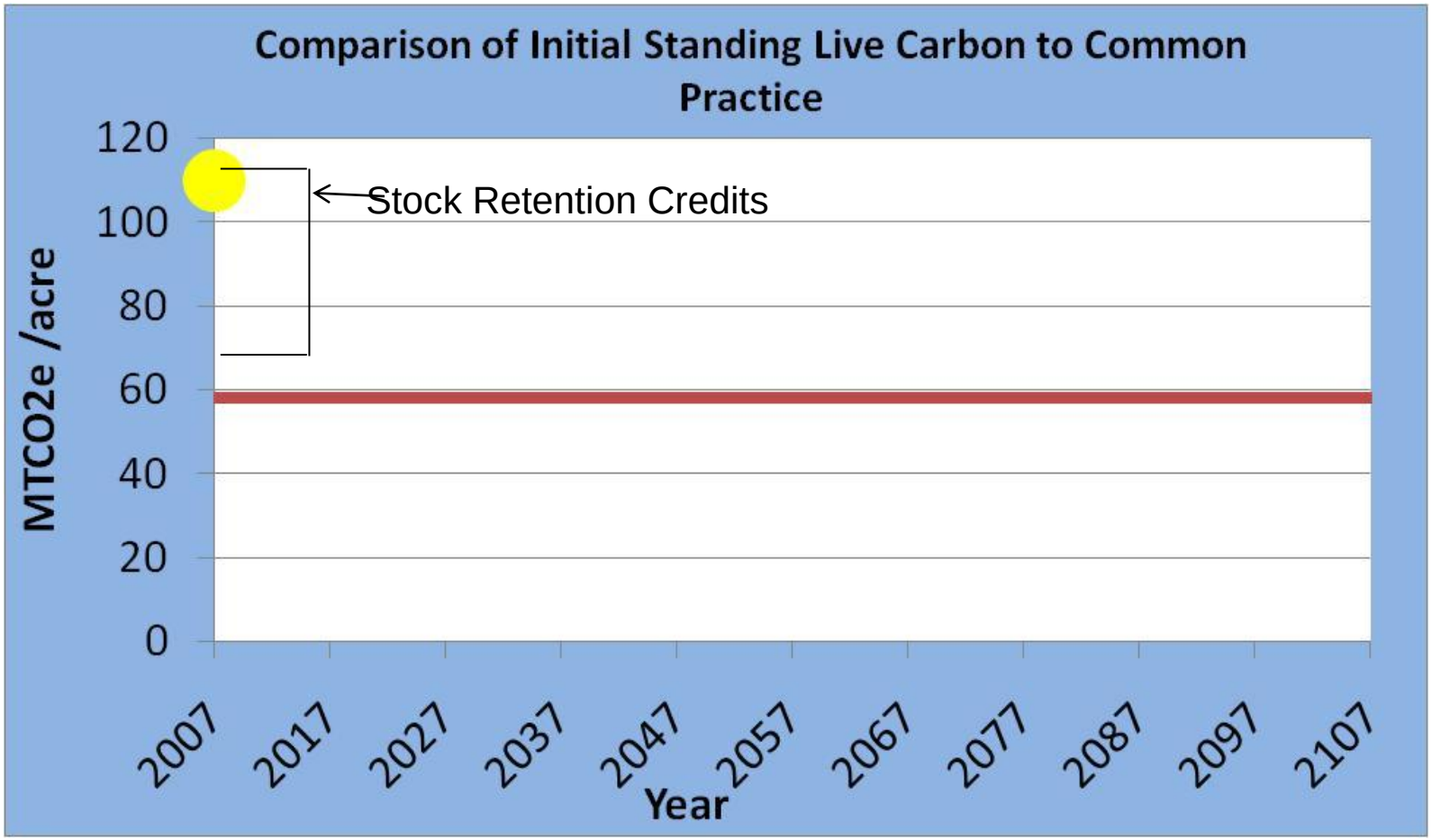


Plots

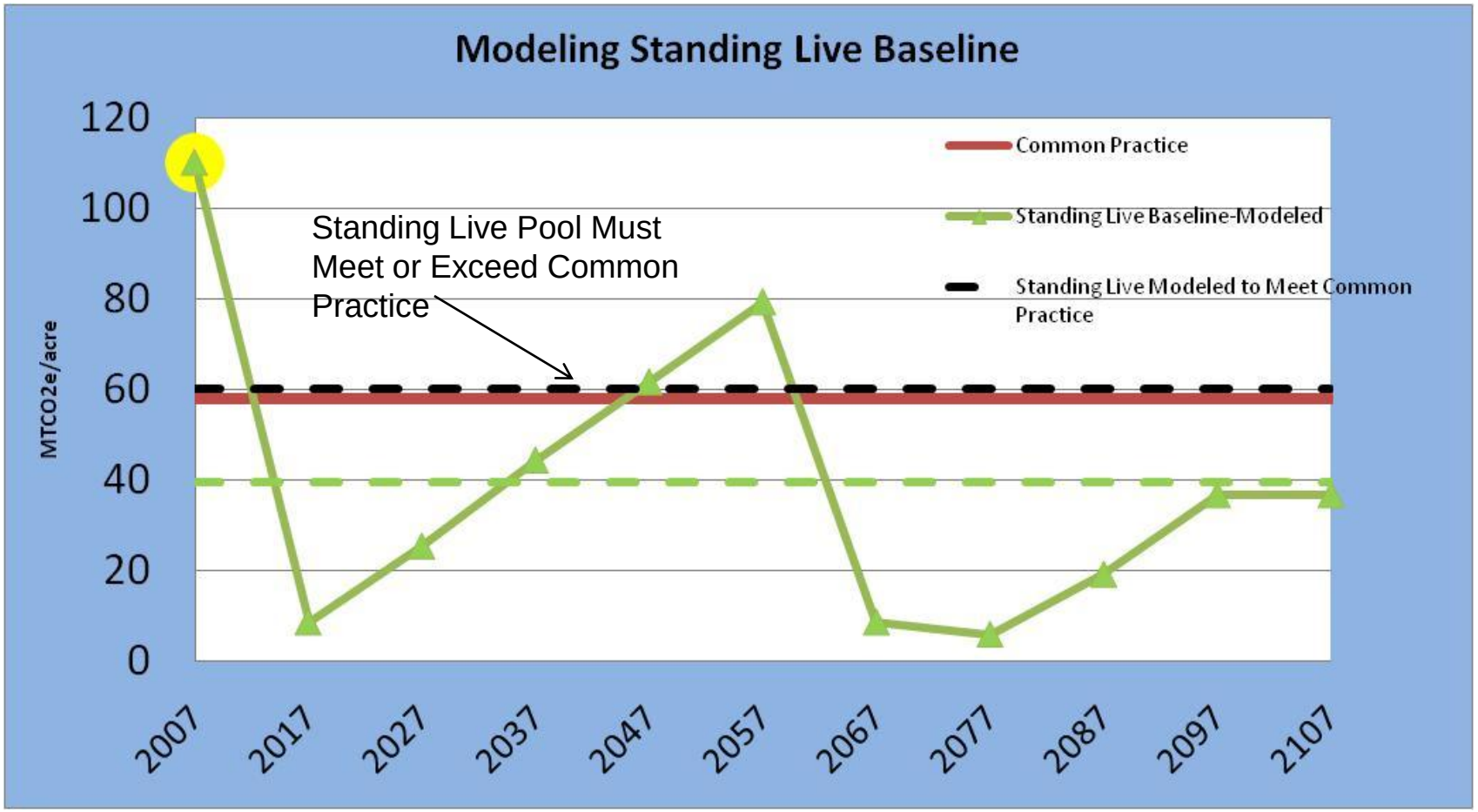
Carbon Pools

QA/QC

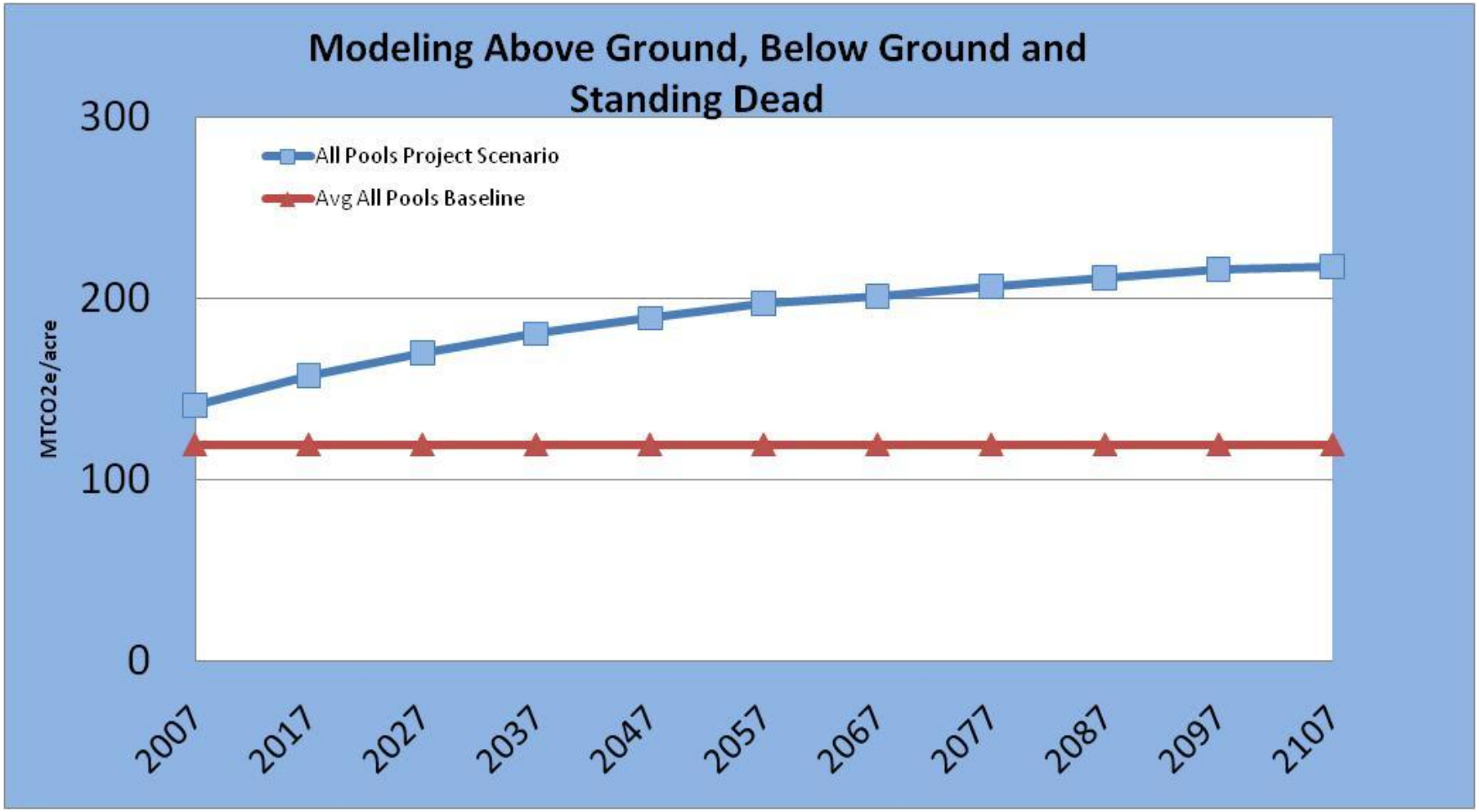
Comparing Initial Standing Live Carbon to Common Practice



Modeling (Forest Vegetation Simulator) Standing Live Baseline



Growth Credits:
Modeling All Required Carbon Pools

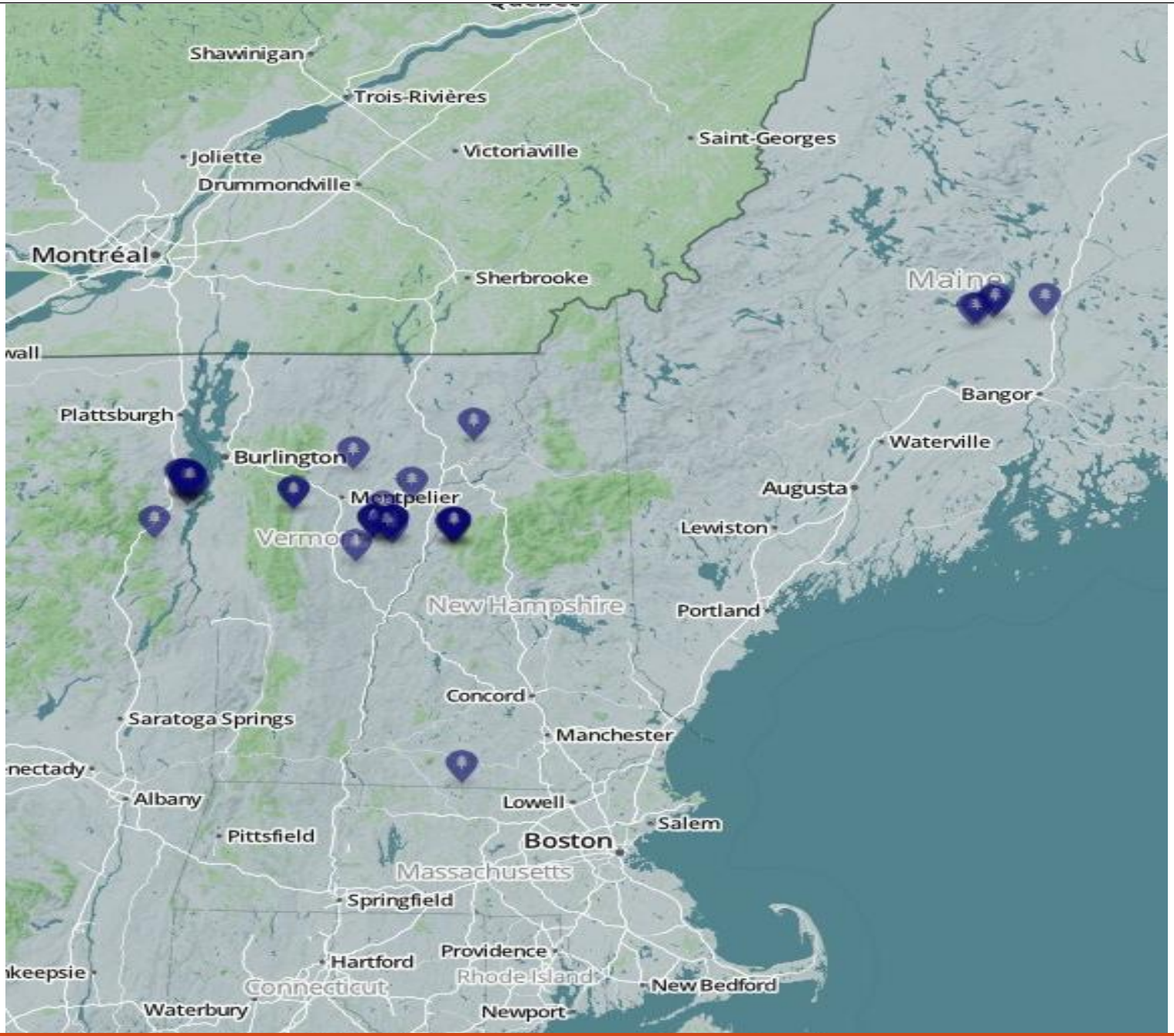


Typical project finances

Initial development costs	Cost	Frequency
Registry opening account fee	$500	Once
Registry project listing fee	$500	Once
Labor for account opening and project listing	$1,500	Once
GIS stratification & inventory	$15,000	Once
Growth and yield modeling and C quantification	$30,000	Once
Travels costs and lodging for inventory	$3,500	Once
Project Design Document	$29,000	Once
Third-party verification and verification management	$25,000	Once
Total initial development costs	$100,000 - $150,000	Once
Monitoring Costs		
Desk review verification	$3,000	Annual
Registry fee	$500	Annual
Annual carbon accounting, modeling, monitoring & reporting	$5,000	Annual
Inventory	$12,000	Every 12 years
Onsite third-party verification	$15,000	Every 6 years
Other fees		
Brokerage fee	3%	
Registry credit issuance fee (cents/credit)	0.02	

Project viability

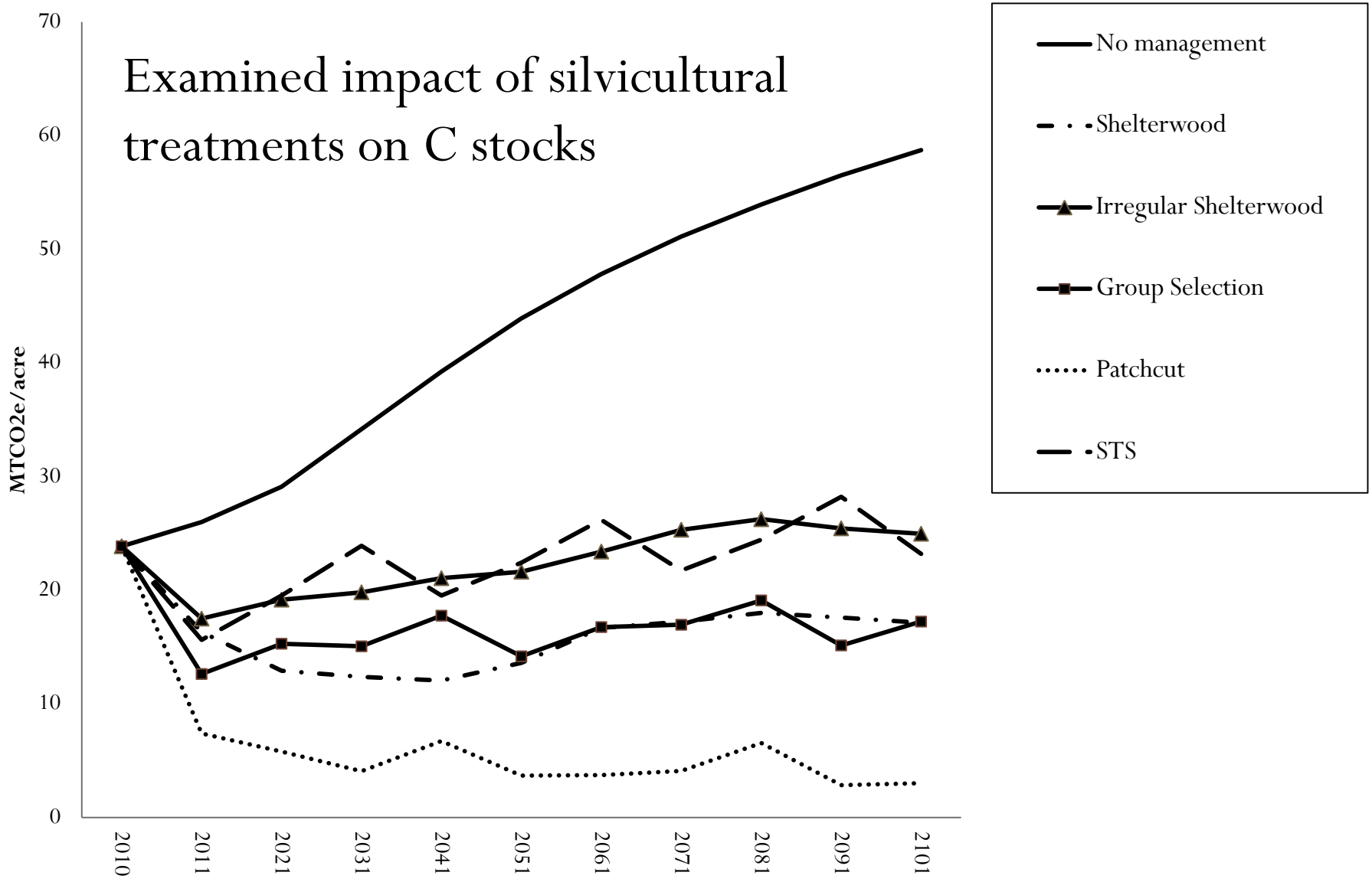
- What are the factors that affect forest carbon offset profitability ?
  - 1. Property characteristics (i.e. size, forest stocking, forest type etc.);
  - 2. Silvicultural treatments;
  - 3. Protocol and legislative requirements and policy assumptions
- From a landscape perspective, where in the Northeast is the highest carbon sequestration potential at the lowest marginal costs?
- Funded by the Northeast States Research Cooperative. Conducted by the University of Vermont Carbon Dynamics Lab


Shawinigan
Trois-Rivières
Joliette
Victoriaville
Saint-Georges
Drummondville
Montréal
Sherbrooke
Maine
Plattsburgh
Bangor
Burlington
Waterville
Montpelier
Augusta
Lewiston
Vermont
New Hampshire
Portland
Concord
Saratoga Springs
Manchester
Albany
Lowell
Salem
Pittsfield
Boston
Massachusetts
Springfield
Hartford
Providence
Connecticut
Rhode Island
New Bedford
Waterbury
Newport

Methods

- Phase 1: Conduct inventory for 25 Non-industrial private landowners
  - Collect site specific data
  - Identify true costs and benefits
- Phase 2:Conduct growth and yield modeling and quantify C using California Air Resources Board forest carbon protocol
- Phase 3: Classified and Regression Tree (CART) analysis to identify predictors of financial return
- Phase 4. Sensitivity analysis to examine how the interaction of variables influence the financial attractiveness of a project

Examined impact of silvicultural treatments on C stocks



Examined policy assumptions

- 1. AB 32 is renewed post 2020 and 100 year monitoring is required.
  - Continues with 25 year crediting period
  - $200,000 Reserve Fund for long-term monitoring

- 2. AB 32 is not renewed post 2020, but there is a mandate to monitor for 100 years.
  - Project "buys its way out"

- 3. AB 32 is not renewed post 2020
  - No obligation to monitor

Classified and Regression Tree (CART) analysis to identify predictors of financial return

- Identifies predictors of financial return
- Robust model
- Dependent variable: Modified Internal Rate of Return (MIRR)
- Independent variables; % conifer, site class, hectares, % C above common practice, silvicultural treatments, certification, conservation easement, current use, type of landowner and policy assumption

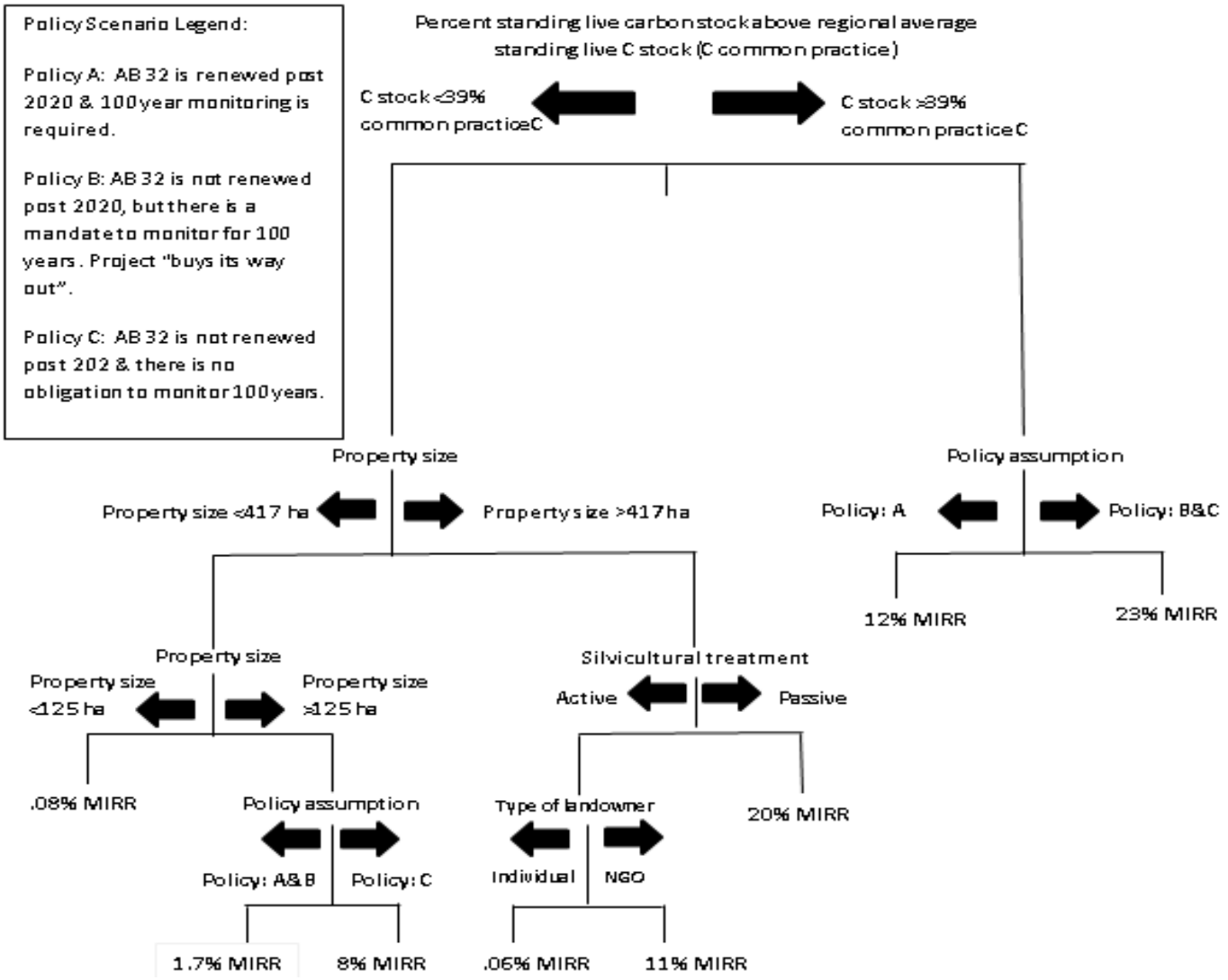
Results - testing hypotheses

- Hypothesis 1: Financial attractiveness is directly related to property characteristics, particularly initial C stocking level above C practice and property size

- Hypothesis 2: Policy assumptions have a significant effect on the financial viability of a project

- Analysis tells a more nuanced story: Profitable projects ranged from 1,500 – 12,000 acres

Results


Policy Scenario Legend:
Policy A: AB 32 is renewed post 2020 & 100 year monitoring is required.
Policy B: AB 32 is not renewed post 2020, but there is a mandate to monitor for 100 years. Project "buys its way out".
Policy C: AB 32 is not renewed post 202 & there is no obligation to monitor 100 years.
Percent standing live carbon stock above regional average standing live C stock (C common practice)
C stock <39% common practice C
C stock ≥39% common practice C
Property size
Property size <417 ha
Property size >417 ha
Policy assumption
Policy: A
Policy: B&C
12% MIRR
23% MIRR
Property size
Property size <125 ha
Property size ≥125 ha
.08% MIRR
Policy assumption
Policy: A&B
Policy: C
1.7% MIRR
8% MIRR
Silvicultural treatment
Active
Passive
Type of landowner
Individual
NGO
20% MIRR
.06% MIRR
11% MIRR

Sensitivity analysis

- We chose 120 hypothetical scenarios combining a spectrum of: a) property sizes; b) stocking levels; c) policy assumptions impacting long-term monitoring costs; and d) management scenarios

- A fifth variable of whether it is self-financed by a landowner or third-party investor

- 25% MIRR break-even point

- Financial indicators –NPV and MIRR

Sensitivity analysis results

- 53 scenarios out of 120 scenarios were financially viable

- Spectrum:
  - One end: Smallest property was 1,500 acres with high initial C stocking, passive forest management and self-financed by a landowner.

  - Other end: Below common practice, active forest management and financed by a project developer was not financially viable at the largest size property (>12,000 acres)

- Most profitable project had C stocking >40% above Common practice, was 12,000 acres, and assumed reduced long-term monitoring cost as a policy option.

Below C common practice

			Acres				
Scenario			500	1,500	3,000	6,000	12,000
1.	Stocking: below Common Practice Management: passive management Policy A	NPV	-$255,251	-$112,319	$102,078	$530,874	$1,388,465
	Landowner finance	MIRR	-21%	1%	13%	24%	36%
		Financially viable	N	N	N	N	Y
	Project developer finance	MIRR	-35%	-11%	9%	19%	30%
		Financially viable	N	N	N	N	Y

Stocking >40% above C common practice

			Acres			
		500	1,500	3,000	6,000	12,000
Stocking: >40% above Common Practice Management: passive management Policy A	NPV	-$95,723	$366,266	$1,059,249	$2,445,216	$5,217,149
Landowner finance	MIRR	-11%	33%	49%	64%	80%
	Financially viable	N	Y	Y	Y	Y
Project developer finance	MIRR	-23	17%	28%	40%	53%
	Financially viable	N	N	Y	Y	Y

>20% above C common practice with harvesting

			Acres			
		500	1,500	3,000	6,000	12,000
Stocking: >20% above common practice Management: harvesting Policy A	NPV	-$185,096	$98,146	$523,008	$1,372,734	$3,072,186
Landowner finance	MIRR	-100%	17%	32%	46%	61%
	Financially viable	N	N	Y	Y	Y
Project developer finance	MIRR	-100%	-10%	20%	31%	42%
	Financially viable	N	N	N	Y	Y

Research - take home message

- 1. Main predictors of project profitability
  - A. % project C stocking above the regional C stocking("common practice")
  - B. Property size
  - C. Policy assumption
  - D. Silvicultural treatment

- 3. Interaction of predictors that estimate project offset profitability
  - 2,000 acre 'no management' scenario that is 40% above common practice
  - >12,000 acre project that is below common practice may not be profitable
  - Much of it depends on the policy assumption

Panacea or pandora's box?

- California's regulatory market is not for everyone
- Until an aggregation protocol is accepted by ARB, it will be difficult for small-scale landowners to participate
- However, it can provide substantial revenue for some landowners
- It works for landowners:
  - With larger size properties (>1,500 acres)
  - Are well stocked compared to the regional average
  - Conservation oriented management
  - Willing to make a long-term commitment

Thank you

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