Timber Valuation Modeling

By

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Presentation Objectives

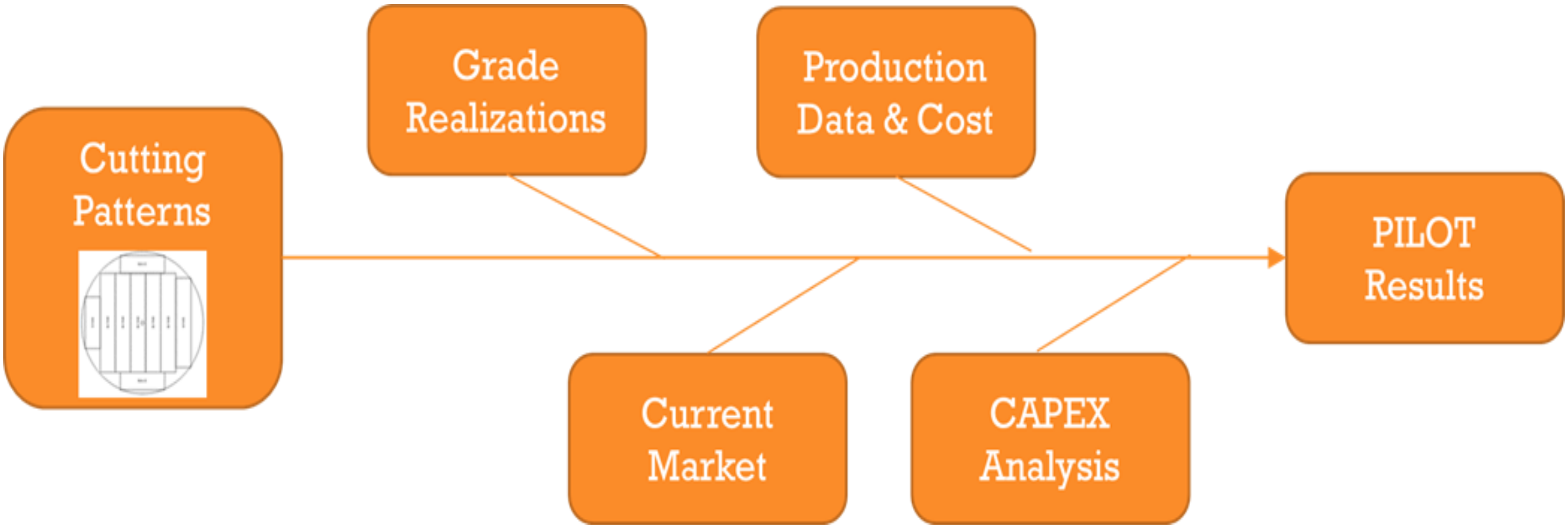
High-Resolution Modeling can be used to evaluate :

- Value of standing timber – based upon lumber market
- Value of standing timber – based upon mill(s) conversion efficiency
- Benefits of a healthy competitive log market
- What size logs make revenue and are profitable
- Variables to consider when evaluating an economic development opportunity.

Gain perspective on lumber market-driven timber valuation:

- Mill upgrades whether in a Tribal-owned mill or in mill(s) off-reservation improve the real value of Tribal-owned commercial timberland.
- Can inform and provide an advantage to guide harvest activities
- Can inform and provide an advantage to guide log marketing efforts
- Can inform and assist when comparing economic development opportunities

Scenario Modeling using PSPR PILOT©



Scenario Modeling using PSPR PILOT©

General Information:

- Diameters in the PILOT Model are 2/10” of an inch increments
- Sales realizations based upon actual sawing patterns & lumber grades
- Manufacturing costs are both variable & fixed cost, variable costs include product specific drying costs & surfacing costs. In the following scenarios, variable manufacturing costs (wages, supplies, fuel, etc.) were not altered
- Overrun (O/R) is the amount of lumber produced greater than the log scale. Both as taper outside small-end cylinder & nominal versus actual sawn size.

  example: 2x4 is actually sized at 1.5”x 3.5”, cut in mill as 1.65”x 3.75”

  2x4 = (2x4)/12 = .667bf/lineal ft. (1.65x3.75)/12 = .515bf/lineal ft.

  .667bf/.515bf = 1.295 ~ 129.5% overrun on product size
- All logging costs by specie and all specie hauling distances are the same
- Scenarios as presented are a “snapshot” in time, not a forecast

Mill Scenario basics

Assumptions:

- Q-2 2016 & Q-2 2018 Random Lengths® print prices FOB Mill
- One Headrig sawing diameters from 11” small-end diameter (SED) to 30” SED
- One Small Log processing line sawing 5” – 10” SED
- Stumpage Value returns calculated using Mill Return to Log (RTL) value
  [RTL - transportation from forest to mill - harvesting cost] = stumpage value
  Log price based upon Mill ability to pay, not open market log pricing
- Overrun (O/R) value is calculated using RTL value x Mill overrun percentage
- Stumpage value “gain/loss” on one billion board feet (BBF) of standing timber
- Mill profit = [Sales – O/R adjusted log cost – Mfg. Cost]

Hem-Fir Mill Scenario

Modeling:

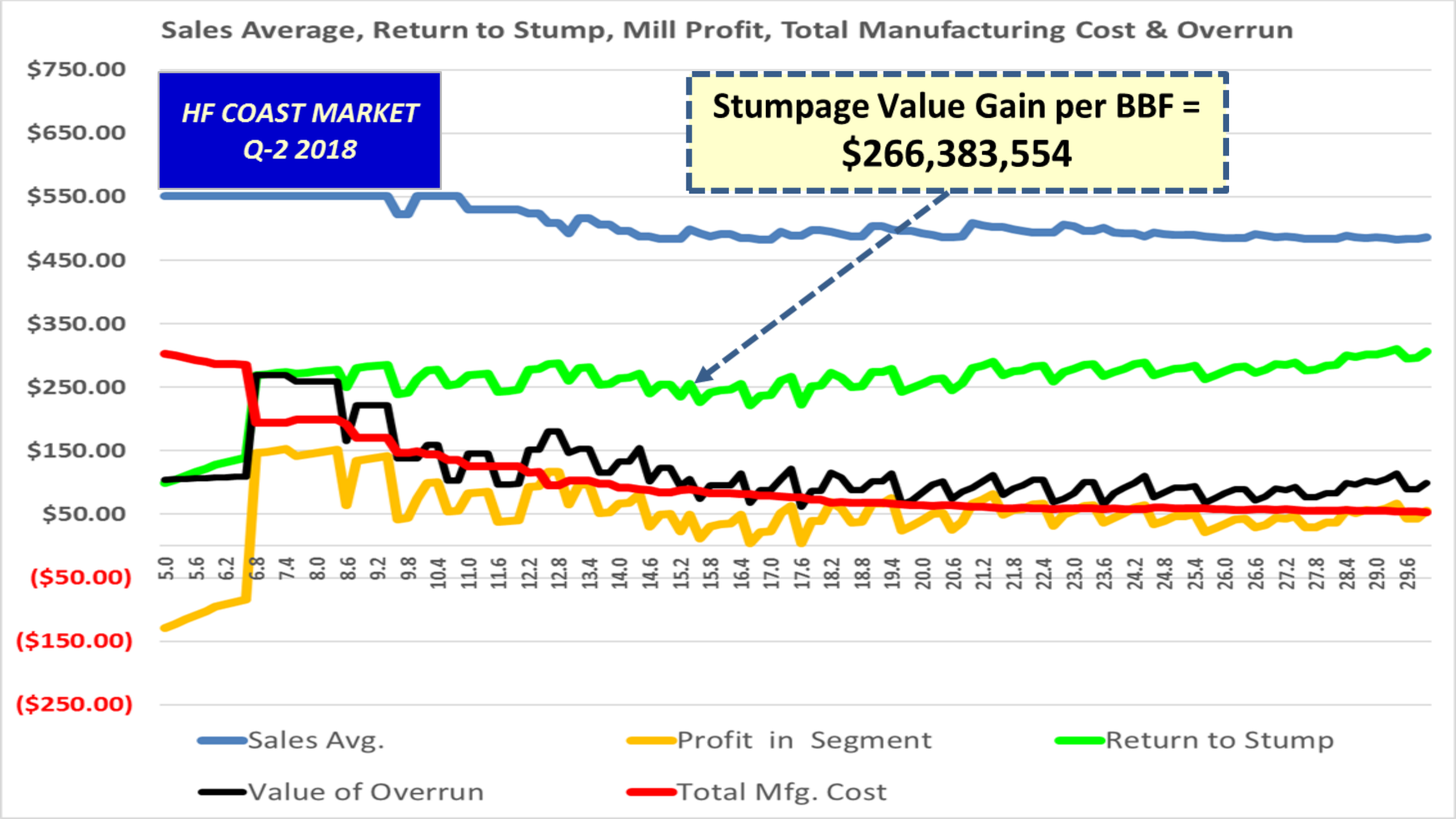
- Products are 2x4, 2x6, 2x8, 2x10, & 2x12 + 4x4 – 4x12, 6’ – 20’
- Kiln-dried, surfaced & association grade-stamped
- Conventional mill with circa 2000 – 2010 technology

Exhibits:

- Slide #7 – Current (Q-2 2018) market prices
- Slide #8 – Historic (Q-2 2016) market prices

Perspective:

- Illustration depicts stumpage values based upon mill ability to pay (not on open-market log prices)
- Survivability of mill at stake and its contribution to log market stability


Sales Average, Return to Stump, Mill Profit, Total Manufacturing Cost & Overrun
HF COAST MARKET
Q-2 2018
Stumpage Value Gain per BBF =
$266,383,554
$750.00
$650.00
$550.00
$450.00
$350.00
$250.00
$150.00
$50.00
($50.00)
($150.00)
($250.00)
5.0
5.6
6.2
6.8
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8.0
8.6
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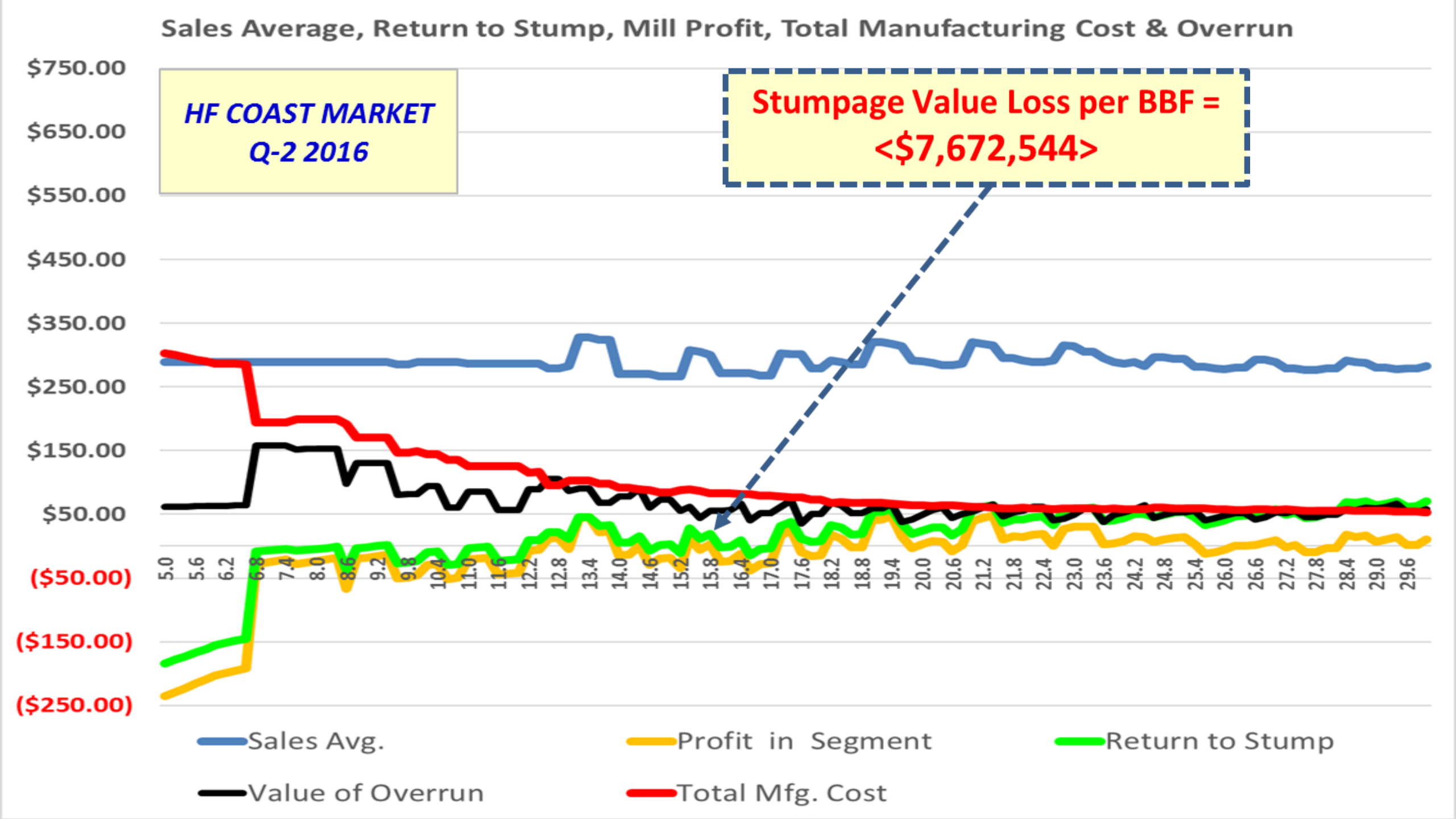
25.4
26.0
26.6
27.2
27.8
28.4
29.0
29.6
Sales Avg.
Profit in Segment
Return to Stump
Value of Overrun
Total Mfg. Cost


Sales Average, Return to Stump, Mill Profit, Total Manufacturing Cost & Overrun
HF COAST MARKET
Q-2 2016
Stumpage Value Loss per BBF =
<$7,672,544>
$750.00
$650.00
$550.00
$450.00
$350.00
$250.00
$150.00
$50.00
($50.00)
($150.00)
($250.00)
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26.0
26.6
27.2
27.8
28.4
29.0
29.6
Sales Avg.
Profit in Segment
Return to Stump
Value of Overrun
Total Mfg. Cost

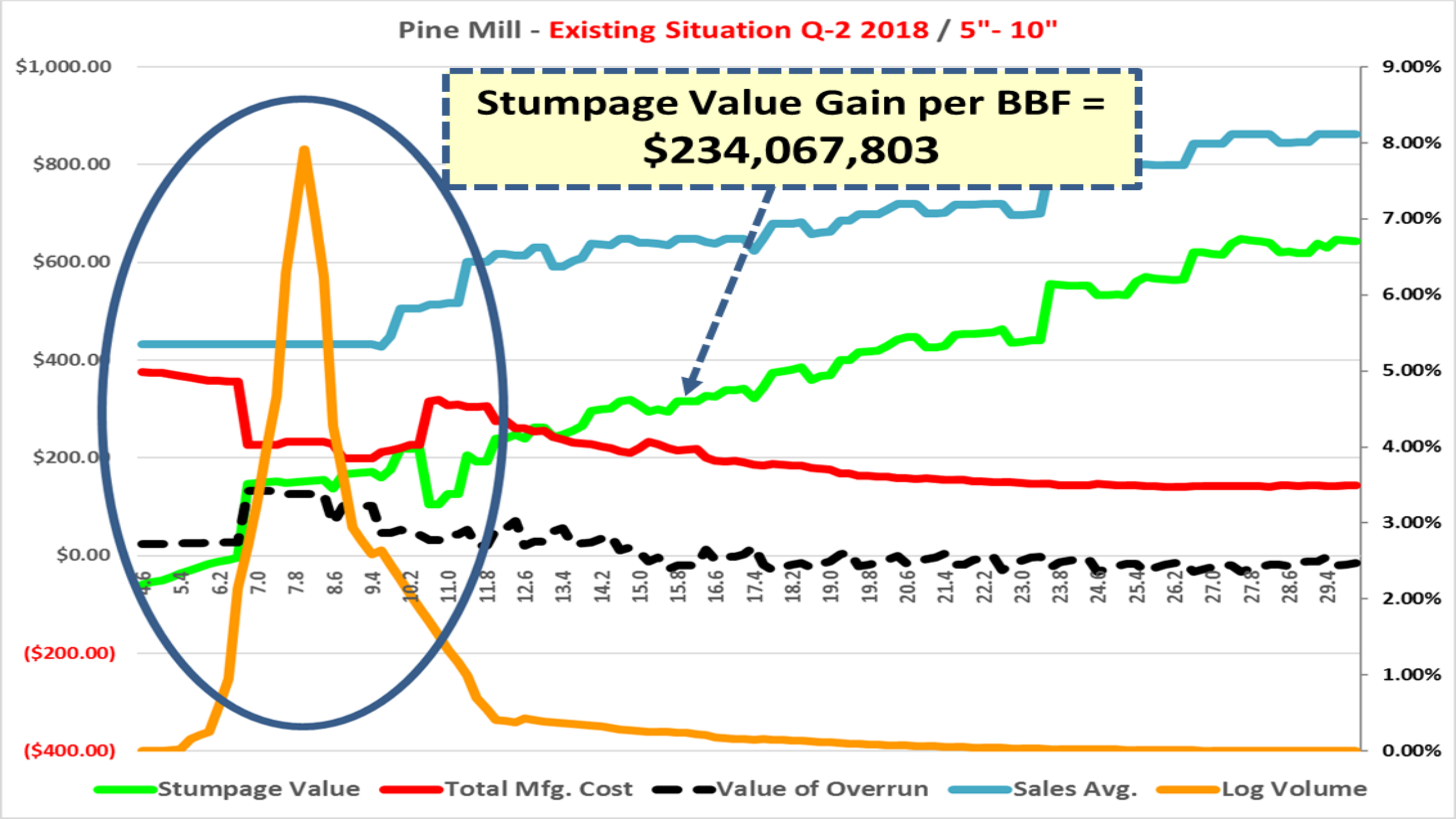
Pine Mill Scenario

Modeling:

- Products are 1x4 – 1x12, 2x4 & 2x6, 6/4RW Industrial Shop grades
- Kiln-dried, surfaced & association grade-stamped
- Conventional mill with circa 2000 – 2010 technology
- Area of interest 5” – 12” diameter logs, ***focus for economic development opportunities***

Exhibits:

- Slide #11 - Current configuration, small logs depicted as **5” – 10”**
- Slide #12 - New Small Log Mill (SLM) **(+40% consumption)**, **logs 5” – 12”**
- Slide #13 - New SLM (+40%), **added optimization +15% yield**
- Slide #14 - New SLM (+40%), +15% yield, **added value to 5” – 12” products**
- Slide #15 - New SLM (+40%), +15% yield, added value plant, **running 2-shifts**


Pine Mill - Existing Situation Q-2 2018 / 5"- 10"
Stumpage Value Gain per BBF = $234,067,803
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
($200.00)
($400.00)
9.00%
8.00%
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
4.6
5.4
6.2
7.0
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15.0
15.8
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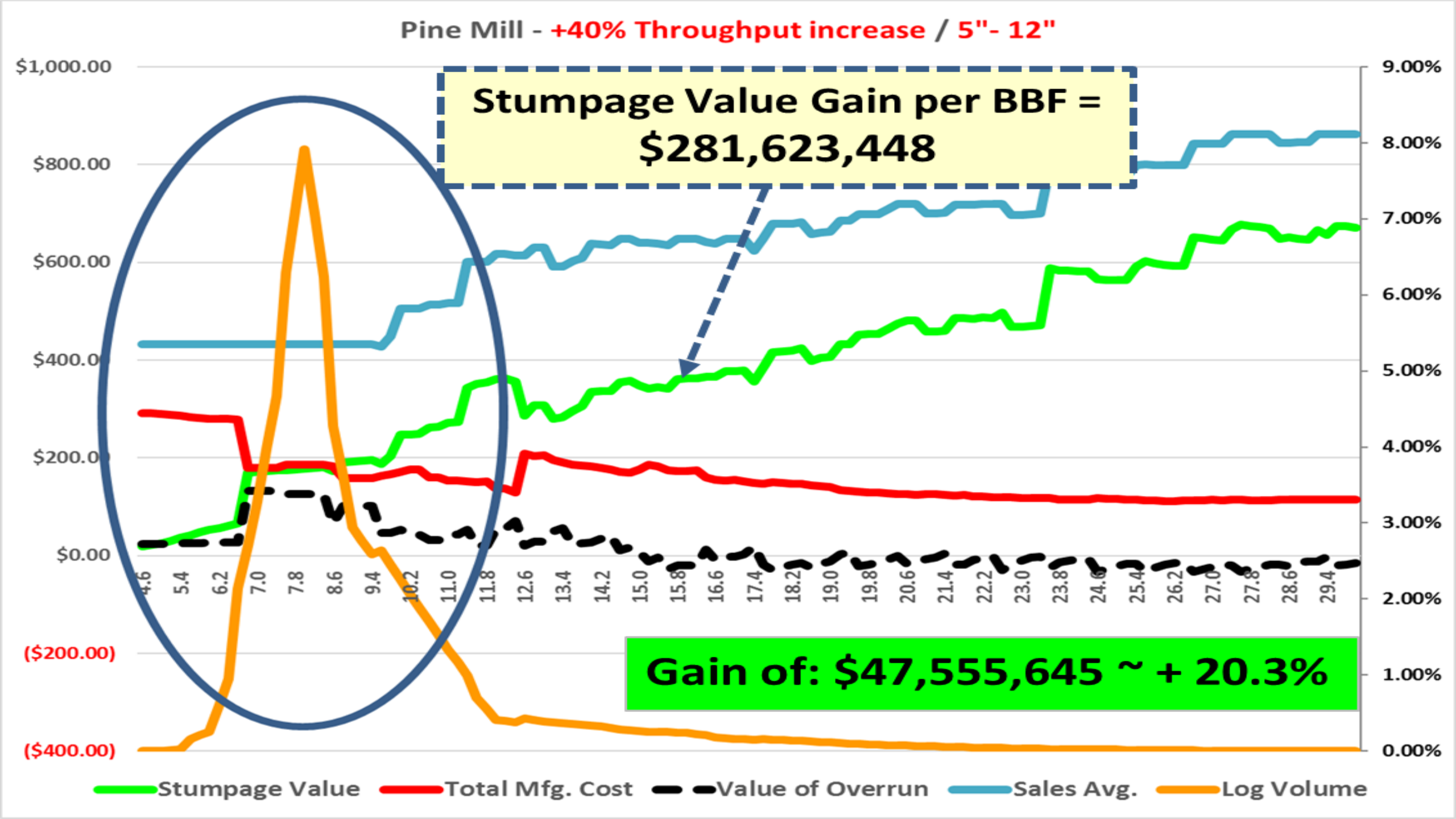
19.0
19.8
20.6
21.4
22.2
23.0
23.8
24.6
25.4
26.2
27.0
27.8
28.6
29.4
Stumpage Value
Total Mfg. Cost
Value of Overrun
Sales Avg.
Log Volume


Pine Mill - +40% Throughput increase / 5"- 12"
Stumpage Value Gain per BBF = $281,623,448
Gain of: $47,555,645 ~ + 20.3%
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
($200.00)
($400.00)
9.00%
8.00%
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
4.6
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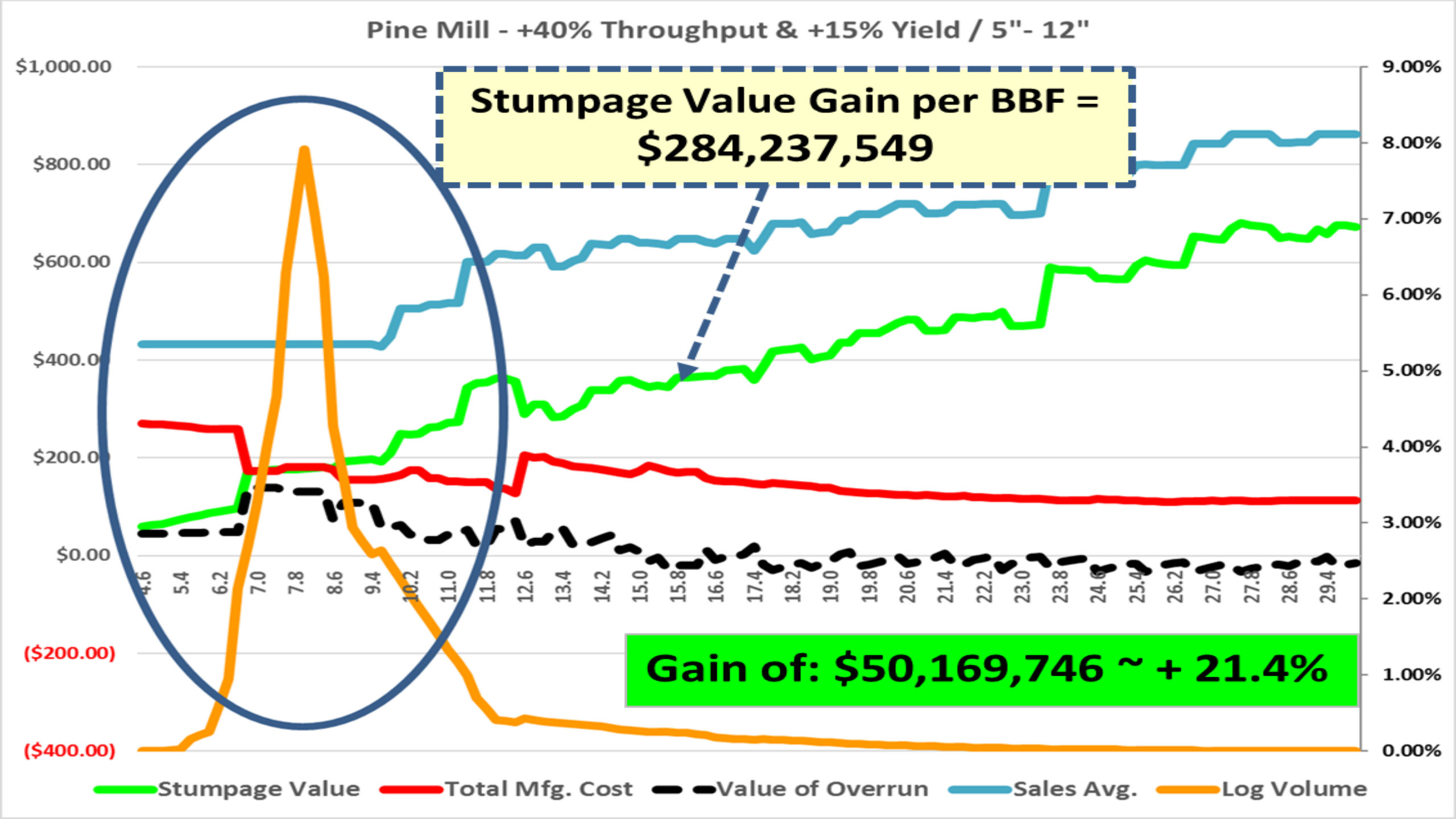
24.6
25.4
26.2
27.0
27.8
28.6
29.4
Stumpage Value
Total Mfg. Cost
Value of Overrun
Sales Avg.
Log Volume


Pine Mill - +40% Throughput & +15% Yield / 5"- 12"
Stumpage Value Gain per BBF = $284,237,549
Gain of: $50,169,746 ~ + 21.4%
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
($200.00)
($400.00)
9.00%
8.00%
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
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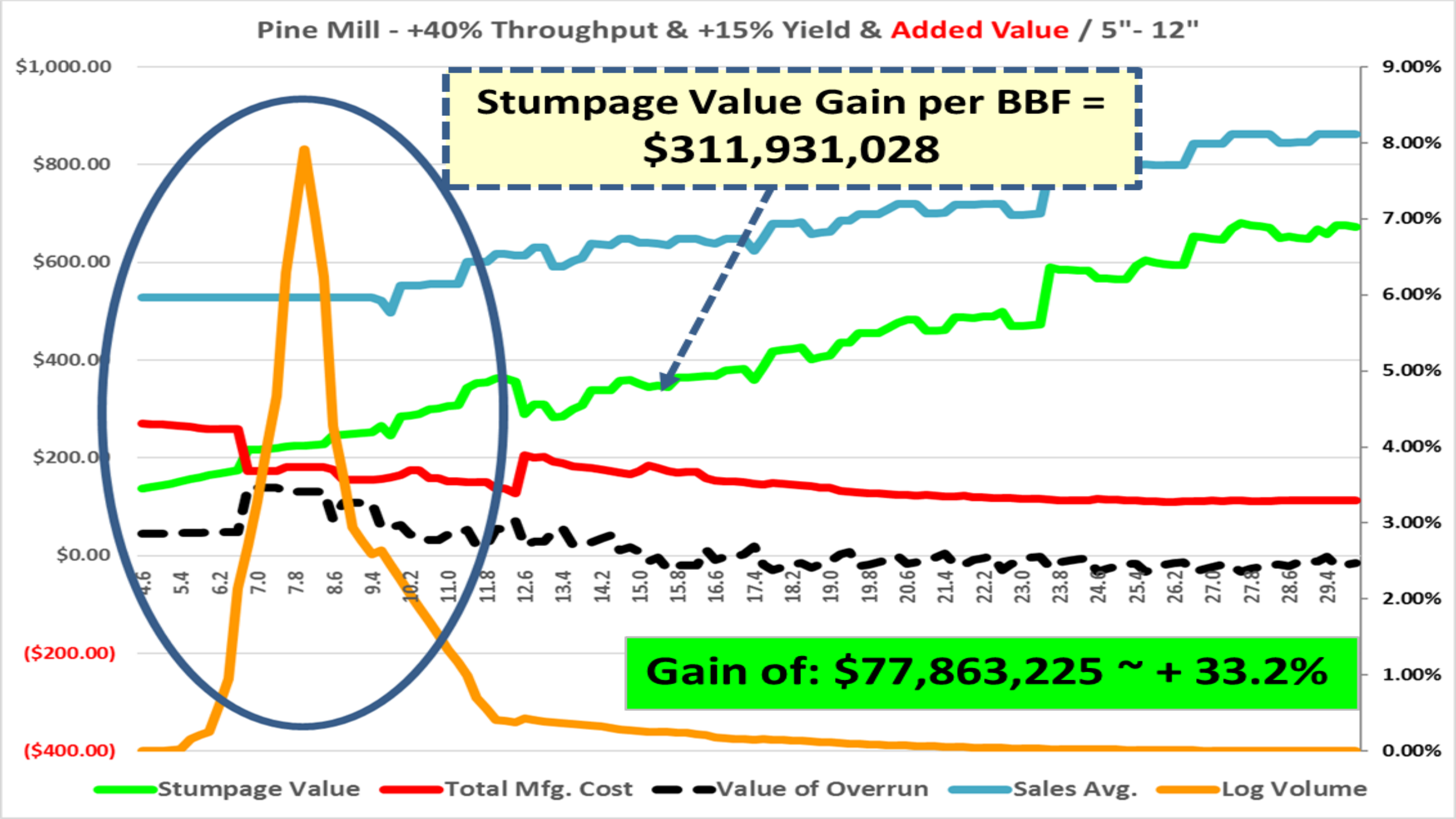
22.2
23.0
23.8
24.6
25.4
26.2
27.0
27.8
28.6
29.4
Stumpage Value
Total Mfg. Cost
Value of Overrun
Sales Avg.
Log Volume


Pine Mill - +40% Throughput & +15% Yield & Added Value / 5"- 12"
Stumpage Value Gain per BBF = $311,931,028
Gain of: $77,863,225 ~ + 33.2%
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
($200.00)
($400.00)
9.00%
8.00%
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
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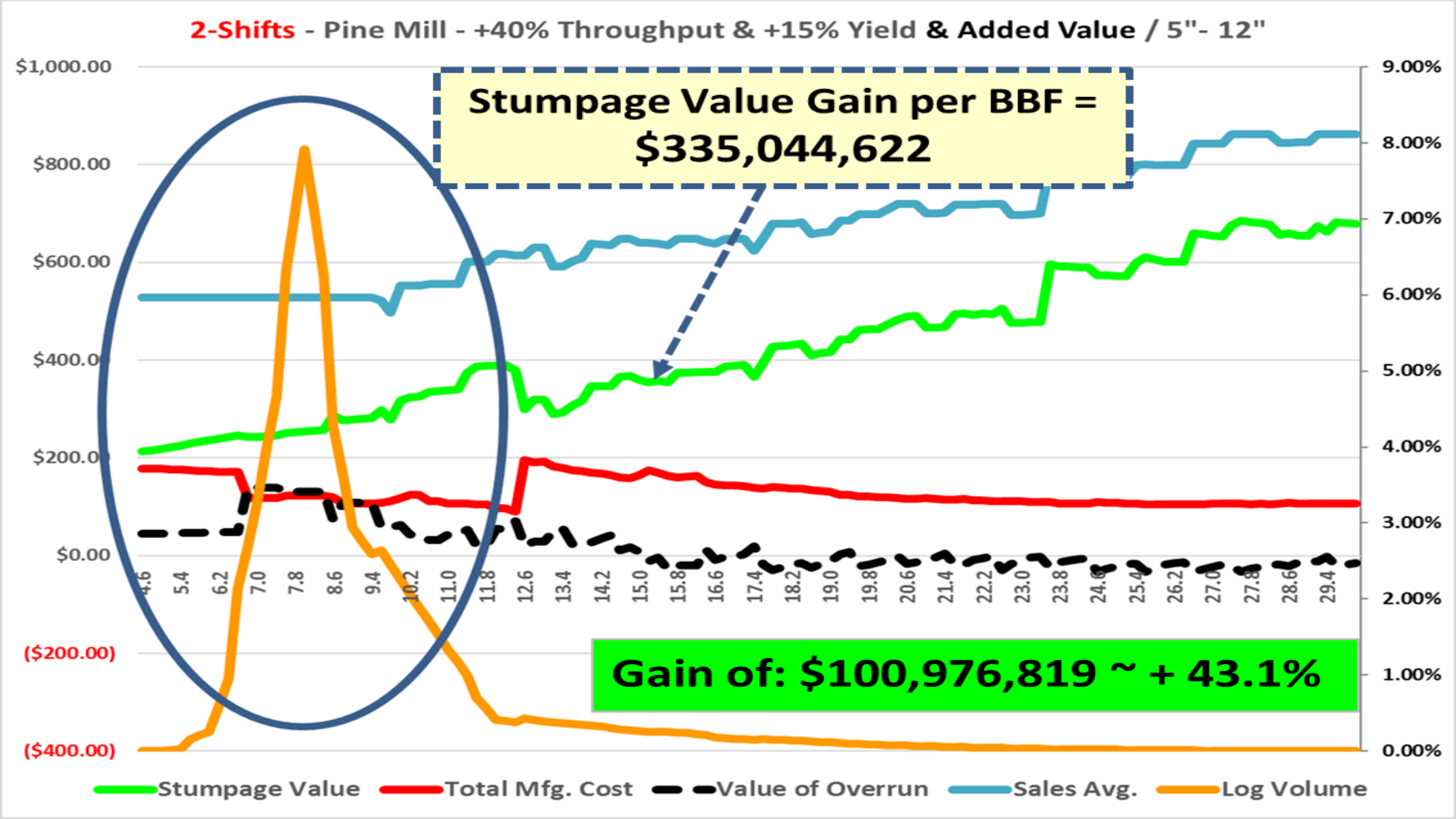
24.6
25.4
26.2
27.0
27.8
28.6
29.4
Stumpage Value
Total Mfg. Cost
Value of Overrun
Sales Avg.
Log Volume


2-Shifts - Pine Mill - +40% Throughput & +15% Yield & Added Value / 5"- 12"
Stumpage Value Gain per BBF = $335,044,622
Gain of: $100,976,819 ~ + 43.1%
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
($200.00)
($400.00)
9.00%
8.00%
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
4.6
5.4
6.2
7.0
7.8
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19.0
19.8
20.6
21.4
22.2
23.0
23.8
24.6
25.4
26.2
27.0
27.8
28.6
29.4
Stumpage Value
Total Mfg. Cost
Value of Overrun
Sales Avg.
Log Volume

Pine Mill Scenario - Salvage

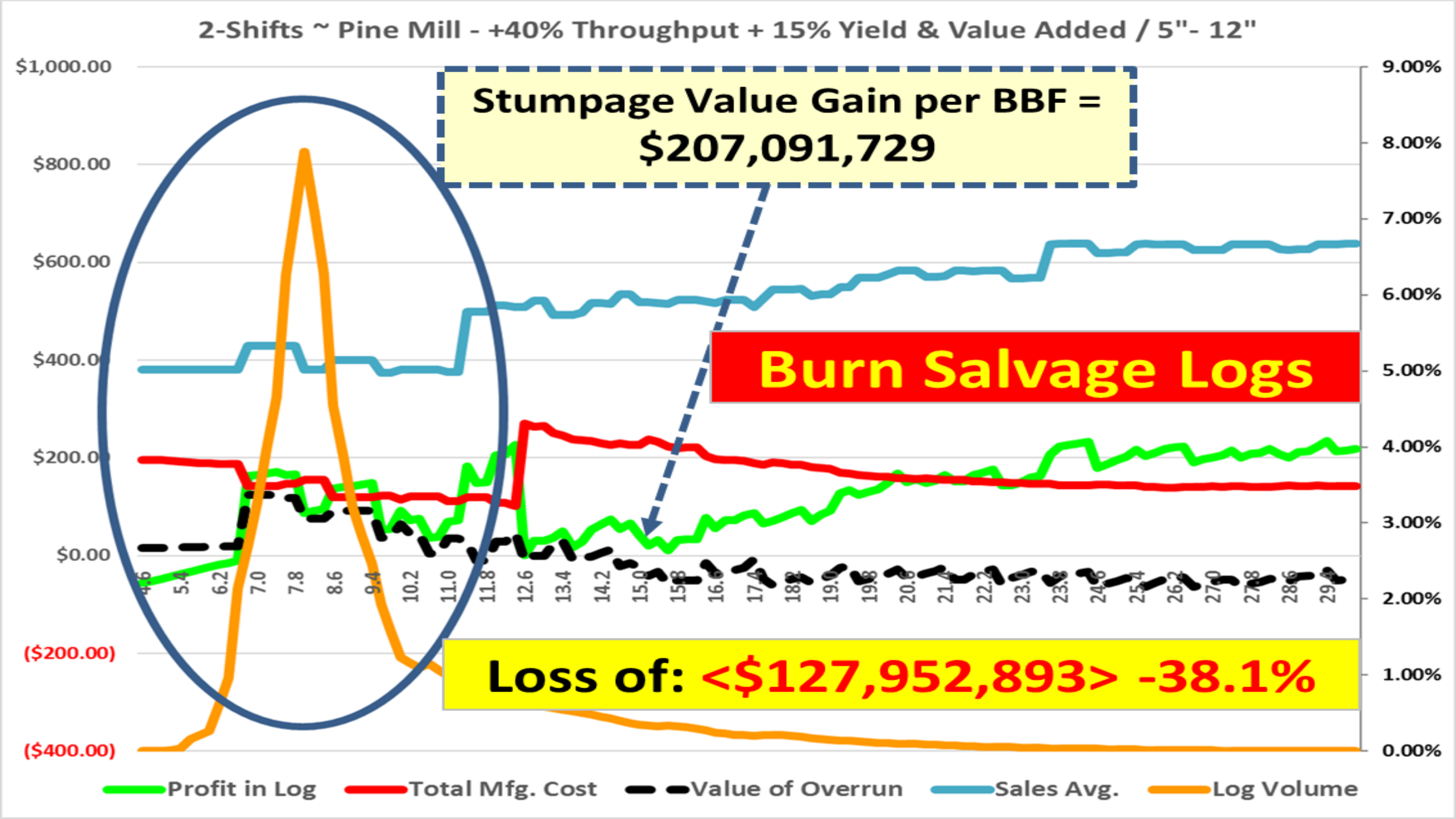
Modeling:

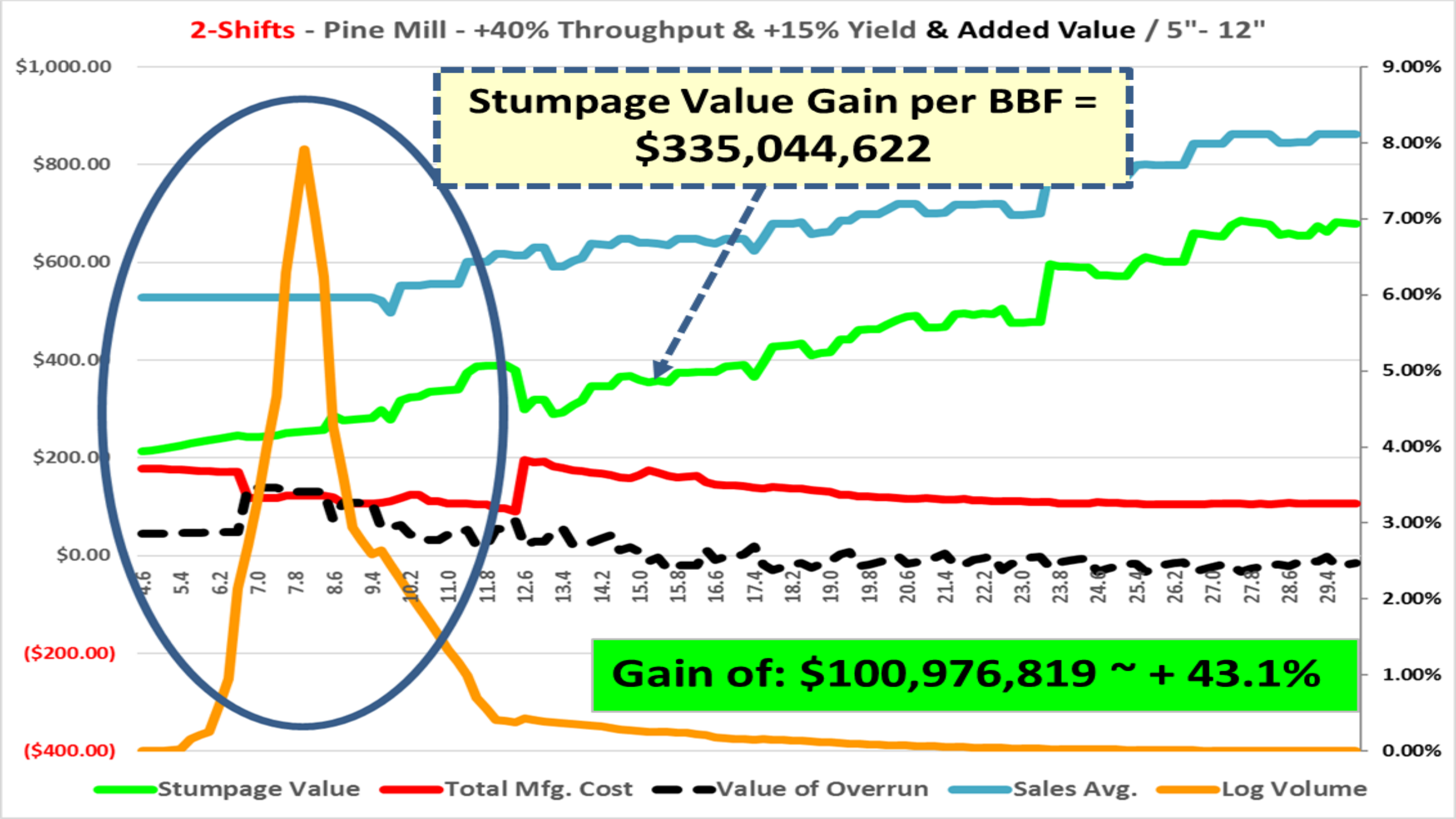
- Products are 1x4 – 1x12, 2x4 & 2x6, 6/4RW Industrial Shop grades
- Kiln-dried, surfaced & association grade-stamped
- Upgraded mill with 2017 technology
- Area of interest 5” – 12” diameter logs, focus for economic development opportunities

Exhibits:

- Slide #16 - New SLM (+40%), +15% yield, added value plant, running 2-shifts, **dynamics of valuation change as a result of catastrophic wildfire**

- **CAUTION – the following slides can be disturbing**


2-Shifts ~ Pine Mill - +40% Throughput + 15% Yield & Value Added / 5"- 12"
Stumpage Value Gain per BBF = $207,091,729
Burn Salvage Logs
Loss of: <$127,952,893> -38.1%
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
($200.00)
($400.00)
9.00%
8.00%
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
Profit in Log
Total Mfg. Cost
Value of Overrun
Sales Avg.
Log Volume


2-Shifts - Pine Mill - +40% Throughput & +15% Yield & Added Value / 5"- 12"
Stumpage Value Gain per BBF = $335,044,622
Gain of: $100,976,819 ~ + 43.1%
$1,000.00
$800.00
$600.00
$400.00
$200.00
$0.00
($200.00)
($400.00)
9.00%
8.00%
7.00%
6.00%
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23.0
23.8
24.6
25.4
26.2
27.0
27.8
28.6
29.4
Stumpage Value
Total Mfg. Cost
Value of Overrun
Sales Avg.
Log Volume

Presentation Objectives - Review

High-Resolution Modeling can be used to evaluate :

- Value of standing timber – based upon lumber market
- Value of standing timber – based upon mill(s) conversion efficiency
- Benefits of a healthy competitive log market
- What size logs make revenue and are profitable
- Variables to consider when evaluating an economic development opportunity.

Gain perspective on lumber market-driven timber valuation:

- **Mill upgrades whether in a Tribal-owned mill or in mill(s) off-reservation improve the real value of Tribal-owned commercial timberland.**
- Can inform and provide an advantage to guide harvest activities
- Can inform and provide an advantage to guide log marketing efforts
- Can inform and assist when comparing economic development opportunities

High-Resolution Modeling

PILOT INPUTS - Timber

Origin - harvest unit [eleven (11) distinct can be saved and accessed per iteration]
Harvest Model - inputs for location & logging method
Transportation Model - inputs for destination, road type, truck type
Segments - requires real world "distributions" of log segments by harvest unit
Segments Size - by 1" small-end diameter
Segment Quality - two (2) categories of log quality features
Segment Bow - amount in inches & frequency in distribution
Segment Length - population weighted avg.
Scaling rules & deductions
Yard Losses & deductions
Conversion of Tons per MBF
Efficiency losses caused by quality variations in segment population - percent
Yield losses caused by quality variations in segment population - percent
Delivered Log Cost (if known) - for comparison with PILOT RTL reporting
Specie factors; specific gravity, high heat value, bark, moisture content

PILOT INPUTS - Operations & Costs

Primary Breakdown - pcs. per min. (net) x diameter
Primary Breakdown - selection (4) available
Mill Operating Schedule - plus scheduled OT
Labor - manpower by department
Wage & Benefit costs - by department
Costs Fixed - by department - multi-categories
Costs Variable - by department - multi-categories
Kilns - throughput by kiln type & product type
Steam - usage
Surfacing - throughput rates by product type

PILOT REPORTS

Profit & Loss Statement with operating & financial statistics
Log Utilization Report by realized product yield
Lumber Margin Analysis by product (thickness x width x grade x length)
Lumber Output Report by product (thickness x width x grade) "Tally Report"
Comparison Report - financial contribution of multiple primary breakdown systems
Custom Reports - client request

- following by 2/10" of small-end diameter;
Breakeven Log Cost
Return to Log
Return to Stump
Breakeven Haul Distance
Timber Sale Breakeven Bid by MBF, CCF, & Ton
Mill Yield & Byproducts Data
Mill Manufacturing Cost
Lumber Drying Cost
Surfacing Cost
Byproduct Yields & Value per MBF net log & net lumber

Cutting Patterns

Grade Realizations

Production Data & Costs

Current Market

CAPEX Analysis

PILOT Results

PILOT INPUTS - Products

Product Dimensions actual - thickness, width
Product Dimensions nominal - as sold (TxW)
Saw Kerf - precise displacement
Lumber Grades - by product type (TxW)
Package Sizes - piececount (HxW)
Trimloss - by product type & grade
Moisture Content - by final product type
Inventories - work-in-process & finished goods
Segment Population - selection
Cutting Pattern - selection
Grade Realizations - by segment grade
Market Prices - by product grade (FOB)

PILOT Iteration (month 1)

PILOT Iteration (month 2)

PILOT Iterations (month 3 – 240)

Timber Harvesting & Transportation

CAPEX Projects (month 1)

CAPEX Projects (month 2)

CAPEX Projects (month 3 – 240)

Timeline

Production Cost Escalation

Log Cost Escalation

Byproducts Market Escalation

Lumber Market Escalation

Oracle Crystal Ball® inputs

SIM Financials
- Profit Loss
- Cash Flow
- Balance Sheet
- Debt Metrics

Risk Analysis

SIM INPUTS - Capital Projects

Projects Available (Scenarios) is currently four (4)
Project Selection Model - month put into service

- for each Project, there is the following;
Project Name: client preference
Budget Component Description
Budget Component Cost
Budget Component Depreciable Life
Budget Component Cost Contingency

RTA INPUTS - Alternate Products RTL's

Return to Log (RTL) inputs for logical alternate uses of Roundwood including;
- oriented strand board (OSB)
- plywood & veneer for engineered products
- peeled poles & posts
- firewood

Return to Log (RTL) inputs for logical alternate uses of Biomass (forest & mill residuals) including;
- pellet production (domestic & industrial)
- particle board
- energy - number of biomass conversion technologies
- landscape & soil amendment

RTA accommodates external log and biomass sales

In addition to RTL inputs, each selected alternate use will have reporting to include key operating metrics, scale of operation, capital requirements, manpower, etc.

PILOT-SIM Iterations Specie 1 (month 1 - 240)

PILOT-SIM Iterations Specie 2 - 5 (month 1 - 240)

Timeline

Roundwood Alt. Uses
OSB
Peeled Poles
Veneer
Eng. Products

Biomass Alt. Uses
Landscape
Particle Board
Energy
Pellets

Geospatial Mapping
Harvest Location
Transport Cost Calculations

Return to Stump Value Calculations

Return to Acre Calculations

POP Analysis (by use & yr.)

RTA Heat Maps

ATICA
Affiliated Timber Investment Conversion Advisors, Inc.

Timber Valuation Modeling

Thank You!