

# TIMBERLAND APPRAISALS AND FIRE DAMAGES: MOONLIGHT FIRE CASE STUDY

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# Mason, Bruce & Girard

- Natural resource consulting since 1921
- HQ in Portland, OR. Offices in CA, ID, CO, ME
- 45 natural resource professionals
  - ▣ Foresters, economists, appraisers, planners, fishery and wildlife biologists, GIS
  - ▣ Manage 300,000 acres
- Disclaimers: The usual....

# Objectives

- Overview of timberland appraisal practices
  - US timberland market
  - Approaches to value
  - Appraisal challenges specific to timberland
- Use of timberland appraisal techniques for wildland fire damages
  - Moonlight Fire: Case study
  - Appraisal challenges specific to Fire

# Why timberland valuation?

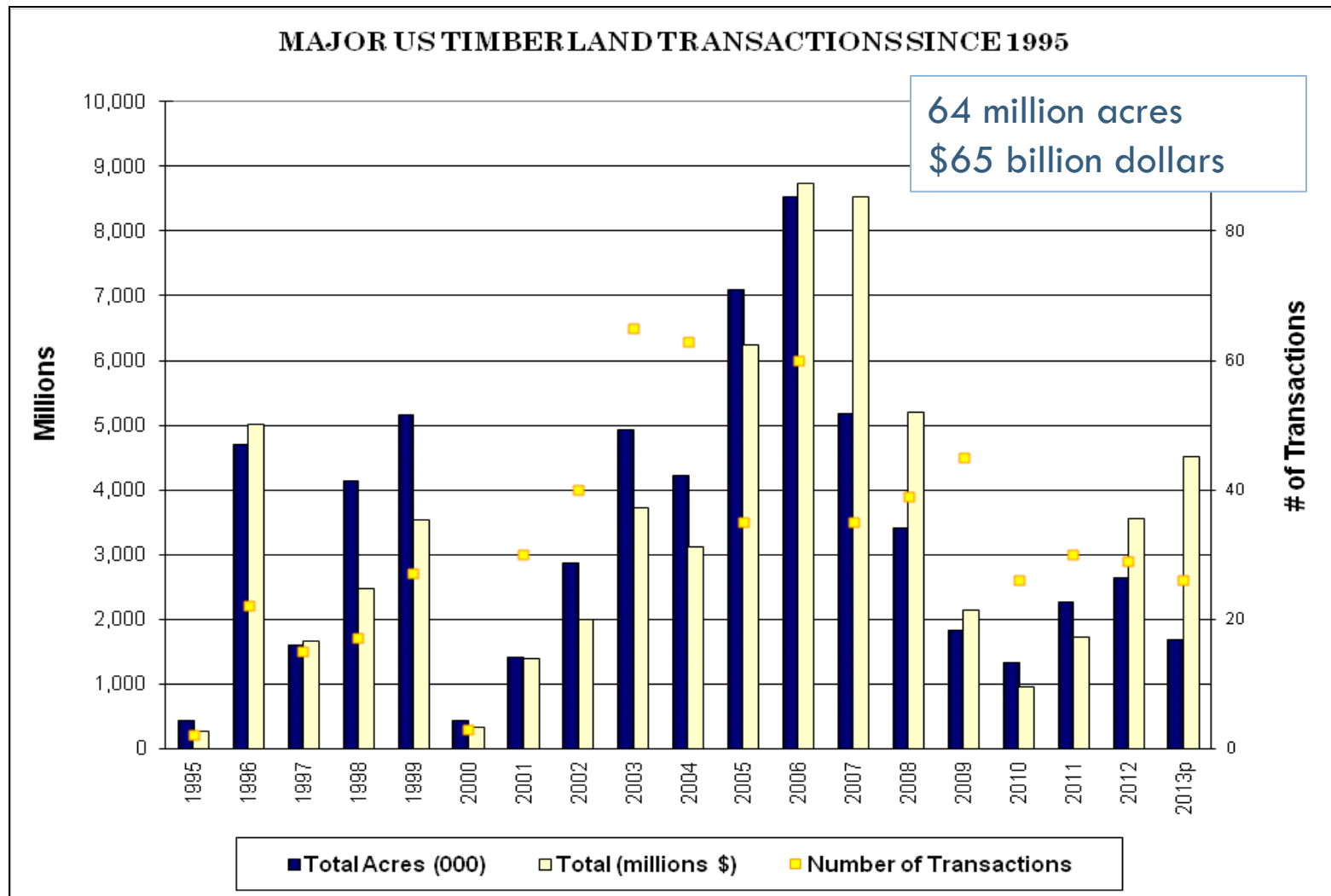
- Change in market value as a measure of damages
- Property value as an upper limit on resource damages – replacement cost
- Avoids the problem of double counting:
  - ▣ Commercial value of timber turned into logs
  - ▣ Habitat value of uncut timber in the woods
- Accounts for *all* of the costs and revenues
- Recognizes time value of cash flows

# There is a market for timberland

<b>US Timberland Ownership</b>	<b>Million Acres</b>
USFS	98
Other public	63
Private, non-coporate	249
Private Coporate -- forest industry	25
Private Corporate -- TIMO & REIT	86
<b>Total</b>	<b>521</b>

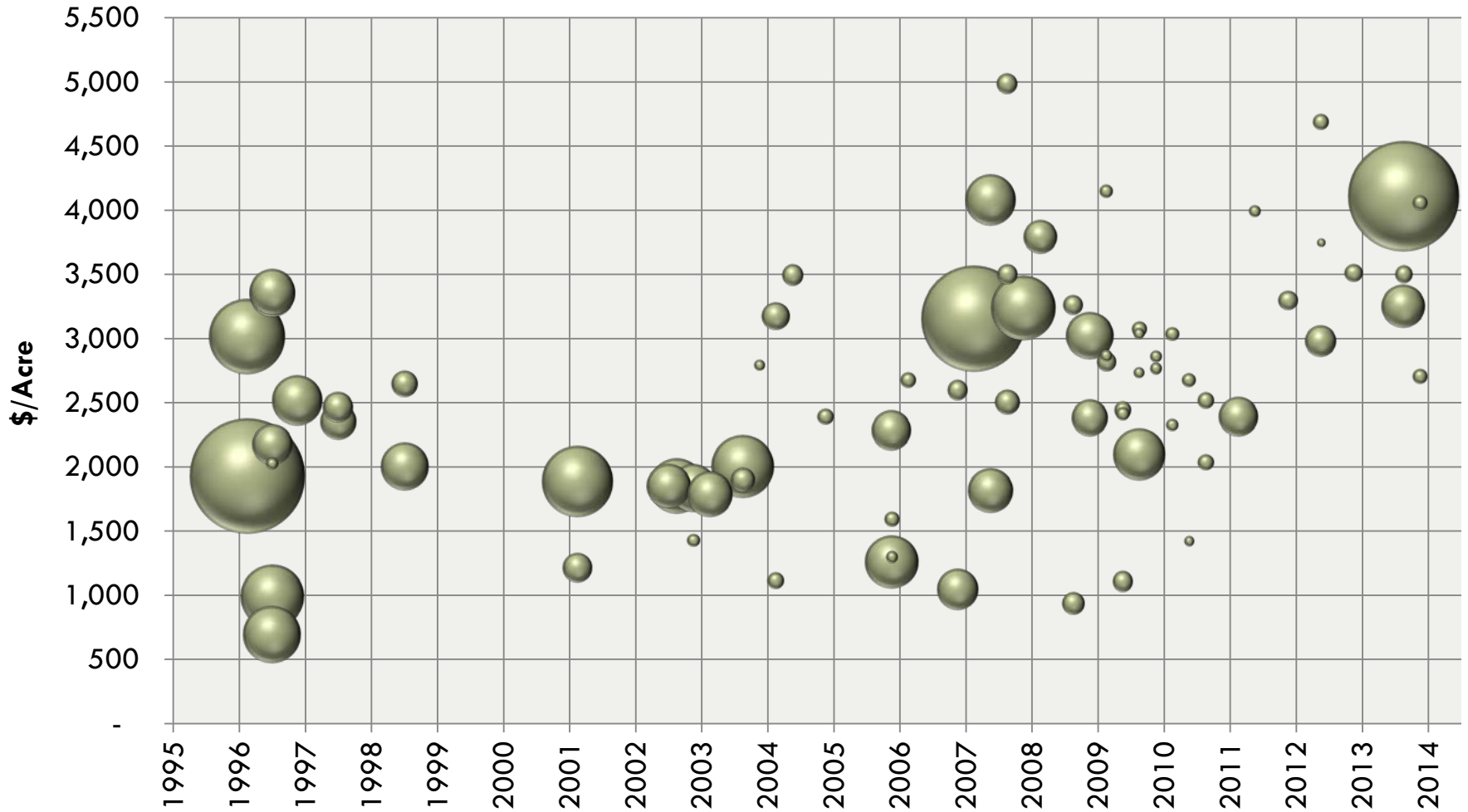
Private Corporate: \$200-350 billion

# Major U.S. Timberland Transactions



# Timberland Sales in Westside Oregon & Washington, 1996 - 2013

Sales > 5,000 acres, size of bubble is proportional to sale acreage



Source RISI, MB&G files.

# Timberland appraisals - common practice

- TIMOs and REITs report portfolio values annually, some quarterly
- Lenders require annual appraisals to evaluate compliance with loan covenants
- Some private partnerships require annual or periodic valuations
- Valuation for due diligence to support transactions
- MBG: 118 appraisals, 9.7 million acres, \$28.3 billion over last 5 years.



# Approaches to value

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- Comparable sales approach
- Income approach
- Cost approach – not used in timberland appraisals

# Comparable sales

- Problems:
  - ▣ Relatively few sales
  - ▣ Properties are not very comparable
  - ▣ Transaction data are held close
  - ▣ Backward looking
  - ▣ Simple metrics are misleading
- As a result:
  - ▣ Reliance on adjustments between subject and comps

**TABLE 5.7 - COMPARABLE SALES ANALYSIS**

*using indexing method*

Line	Subject	Sale 1	Sale 2	Sale 3	Sale 4	Sale 5	Sale 6	
1	Sale Name							
2	Location							
3	Quarter of Sale							
4	Sale Price Per Gross Acre	\$ 4,688	\$ 2,980	\$ 3,300	\$ 3,995	\$ 2,435	\$ 3,509	
5	Terms of Sale Adjustment	0.0%	0.0%	0.0%	-6.0%	0.0%	0.0%	
6	Adjusted Price	\$ 4,688	\$ 2,980	\$ 3,300	\$ 3,755	\$ 2,435	\$ 3,509	
7	Date of Sale Adjustment--Market Conditions	0.0%	1.0%	3.0%	4.0%	6.0%	0.0%	
8	Adjusted Price	\$ 4,688	\$ 3,010	\$ 3,399	\$ 3,905	\$ 2,581	\$ 3,509	
9	Location Adjustment	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	
10	Adjusted Price	\$ 4,688	\$ 3,161	\$ 3,399	\$ 3,905	\$ 2,581	\$ 3,509	
11	Improvements/HBU/Other Assets (\$/ac)	-	-	-	-	-	-	
12	<b>Adjusted Sale Price Per Acre</b>	<b>\$ 4,688</b>	<b>\$ 3,161</b>	<b>\$ 3,399</b>	<b>\$ 3,905</b>	<b>\$ 2,581</b>	<b>\$ 3,509</b>	
13	Bare Land Index (net productive acres)	0.882	0.846	0.785	0.797	0.915	0.850	
14	Extract Estimated Land Value Per Acre	\$ (635)	\$ (609)	\$ (565)	\$ (574)	\$ (651)	\$ (612)	
15	<b>Sale Value Allocated to Timber</b>	<b>\$ 4,079</b>	<b>\$ 2,595</b>	<b>\$ 2,825</b>	<b>\$ 3,254</b>	<b>\$ 1,923</b>	<b>\$ 2,897</b>	
16	Allocated Value of Timber/Pre-Merch Acre		2,541	1,722	2,494	3,218	1,604	2,693
17	Pre-Merch Timber Index	1.536	1.104	0.827	0.987	1.642	0.661	1.099
18	<b>PMTI Index Value</b>	<b>\$ 2,301</b>	<b>\$ 2,082</b>	<b>\$ 2,527</b>	<b>\$ 1,960</b>	<b>\$ 2,425</b>	<b>\$ 2,450</b>	
19	<b>Indicated PMTI Index Value</b>	<b>\$ 2,400</b>						
20	Average Value Per Pre-Merch Acre	\$ 3,687						
21	Acres of Pre-Merch	4,880						
22	Gross Acres	5,802						
23	<b>Indicated Pre-Merch Timber Value Per Acre</b>	<b>\$ 3,101</b>						
24	Extract Est. Pre-Merch Tbr. Value Per Acre	\$ (3,101)	\$ (1,438)	\$ (1,028)	\$ (1,661)	\$ (2,806)	\$ (1,340)	\$ (2,110)
25	<b>Sale Value Allocated to Merch Tbr</b>	<b>\$ 2,641</b>	<b>\$ 1,567</b>	<b>\$ 1,164</b>	<b>\$ 448</b>	<b>\$ 582</b>	<b>\$ 787</b>	
26	Merch Timber Volume Index (mbf/acre)	1.149	8.258	5.922	3.621	0.972	2.561	2.294
27	Tbr Value Ratio = Merch Tbr Sale Value / Merch Timber Index:	\$ 320	\$ 265	\$ 322	\$ 461	\$ 227	\$ 343	
28	<b>Indicated Merch Timber Index (MTI) Value</b>	<b>\$ 325</b>						
<b>SUMMARY:</b>								
29	Indicated Merch Timber Value Per Acre	\$ 373			<b>Statistics</b>	<b>PMTI</b>	<b>TVR</b>	
	Add				Average =	\$ 2,291	\$ 323	
30	+ Bare Land Value Per Acre	\$ 635			Median =	\$ 2,363	\$ 321	
31	+ Indicated Pre-Merch Tbr. Value Per Acre	\$ 3,101			Std Dev =	\$ 225	\$ 80	
32	+ Other Adjustments				Min =	\$ 1,960	\$ 227	
33	<b>Indicated Value Per Acre</b>	<b>\$ 4,110</b>			Max =	\$ 2,527	\$ 461	
					Coeff of Variation =	10%	25%	
34	<b>Subject Indicated Value</b>	<b>\$ 23,844,192</b>						

# Income approach

- Timberland is an income producing asset
- Challenges facing the appraiser
  - ▣ Long planning horizons
  - ▣ Volume growth and changing product mix
  - ▣ Production costs are substantial and complicated
  - ▣ Variability in product prices
  - ▣ Discount rate is an important factor

# Income approach

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- Discounted cash flow models
  - ▣ Trend toward harvest scheduling models built originally for forest planning. Optimization models dominate
  - ▣ Mimics the approach used by more sophisticated institutional investors

# DCF *pro forma*

DISCOUNTED CASH FLOW ANALYSIS								
Finance Report								
Evergreen Phase 1 - North Appraisal 2012								
Final Appraisal Run - 12/03/2012								
Calendar Year >>	2013	2014	2015	2016	2017	2018	2019	2020
Model Year >>	1	2	3	4	5	6	7	8
Gross Acres	5,801.6	5,801.6	5,801.6	5,801.6	5,801.6	5,801.6	5,801.6	5,801.6
Net Available Acres	5,242.2	5,242.2	5,242.2	5,242.2	5,242.2	5,242.2	5,242.2	5,242.2
Harvest Acres	80.2	58.8	50.8	21.4	22.8	27.5	24.0	46.0
Sawtimber Harvest Volume (Mbf)	963	856	904	773	666	683	626	770
Douglas-fir	203	104	204	207	372	342	429	246
Hemlock	8	15	20	168	106	106	43	-
Cedar	0	1	1	18	26	3	1	-
Other Conifer	6	8	13	89	17	1	0	-
Red Alder	664	669	606	267	131	207	129	501
Other Hardwood	83	58	59	25	15	25	24	24
Pulpwood Harvest Volume (Mbf)	317	303	287	173	107	136	102	229
Sawtimber Gross Revenue	508,224	460,952	492,975	433,183	405,927	409,155	387,627	442,979
Revenue Per Mbf	\$ 527	\$ 538	\$ 545	\$ 560	\$ 609	\$ 599	\$ 619	\$ 575
Pulpwood Gross Revenue	76,218	72,765	69,171	42,171	26,045	33,056	24,873	55,254
<b>Total Gross Revenue</b>	<b>584,442</b>	<b>533,717</b>	<b>562,146</b>	<b>475,354</b>	<b>431,972</b>	<b>442,210</b>	<b>412,501</b>	<b>498,232</b>
<b>Cost of Sales</b>								
Overhead - Fixed								
Resource Admin	104,428	104,428	104,428	104,428	104,428	104,428	104,428	104,428
Resource Operations	-	-	-	-	-	-	-	-
Tech Services	-	-	-	-	-	-	-	-
GIS	-	-	-	-	-	-	-	-
Property Tax	25,527	25,527	25,527	25,527	25,527	25,527	25,527	25,527
Fire Patrol	-	-	-	-	-	-	-	-
Overhead - Variable								
Timber Sale Supervision	6,985	6,207	6,554	5,605	4,829	4,955	4,542	5,583
Severance Tax	3,709	3,296	3,481	2,977	2,565	2,631	2,412	2,965
Boundary Line Marking	963	856	904	773	666	683	626	770
Silviculture								
Site Prep	7,615	5,586	4,828	2,031	2,168	2,608	2,281	4,371
Planting	4,753	20,840	15,289	13,213	5,559	5,935	7,138	6,244
Interplanting	-	110	481	353	305	128	137	165
Veg Control	1,932	5,210	4,416	5,908	3,301	3,135	2,479	2,303
Plantation Survey	-	-	-	-	-	-	-	-
Pre-commercial Thinning	10,652	-	-	-	9,905	2,182	684	3,132
Roads								
Road Construction	7,226	6,421	6,780	5,799	4,996	5,126	4,699	5,776
Fixed Road Maintenance	34,809	34,809	34,809	34,809	34,809	34,809	34,809	34,809
Variable Road Maintenance	2,409	2,140	2,260	1,933	1,665	1,709	1,566	1,925
Production								
Logging	160,148	149,558	181,573	122,780	97,824	110,953	93,280	143,153
Hauling	99,581	93,727	95,815	74,218	58,425	62,401	52,892	82,081
Total Costs	470,736	458,717	487,146	400,354	356,972	367,210	337,501	423,232
<b>Net Revenue</b>	<b>113,705</b>	<b>75,000</b>	<b>75,000</b>	<b>75,000</b>	<b>75,000</b>	<b>75,000</b>	<b>75,000</b>	<b>75,000</b>
Real Discount Rate	5.75%							
Present Value of Net Rev.	\$ 107,523	\$ 67,066	\$ 63,419	\$ 59,971	\$ 56,710	\$ 53,626	\$ 50,711	\$ 47,953
<b>NET PRESENT VALUE</b>	% of Total							
Cash Flows @ 5.75%	\$ 24,790,631	98%						
Reversion Value @ 5.75%	\$ 574,310	2%						
<b>TOTAL NET PRESENT VALUE</b>	<b>\$ 25,364,941</b>	100%						
NPV Per Gross Acre:	\$ 4,372							

# Use of appraisal techniques for wildland fire damages

- Change in property value
  - ▣ Should include costs of restoration
- Pre-fire value should serve as upper limit to resource damages
  - ▣ It's the replacement cost!

# What about resources unique to public lands?



- Fish and wildlife habitat
- Public recreation
- Wilderness
- Watershed
  
- Yellowbook standards



# Case Study: Moonlight Fire

- Fire history
- Assessment
- Our work:
  - ▣ Cruise to establish inventory
  - ▣ Delineate stands and burn severity
  - ▣ Collect data about costs and values
  - ▣ Build harvest scheduling model to calculate change in value

# Moonlight Fire

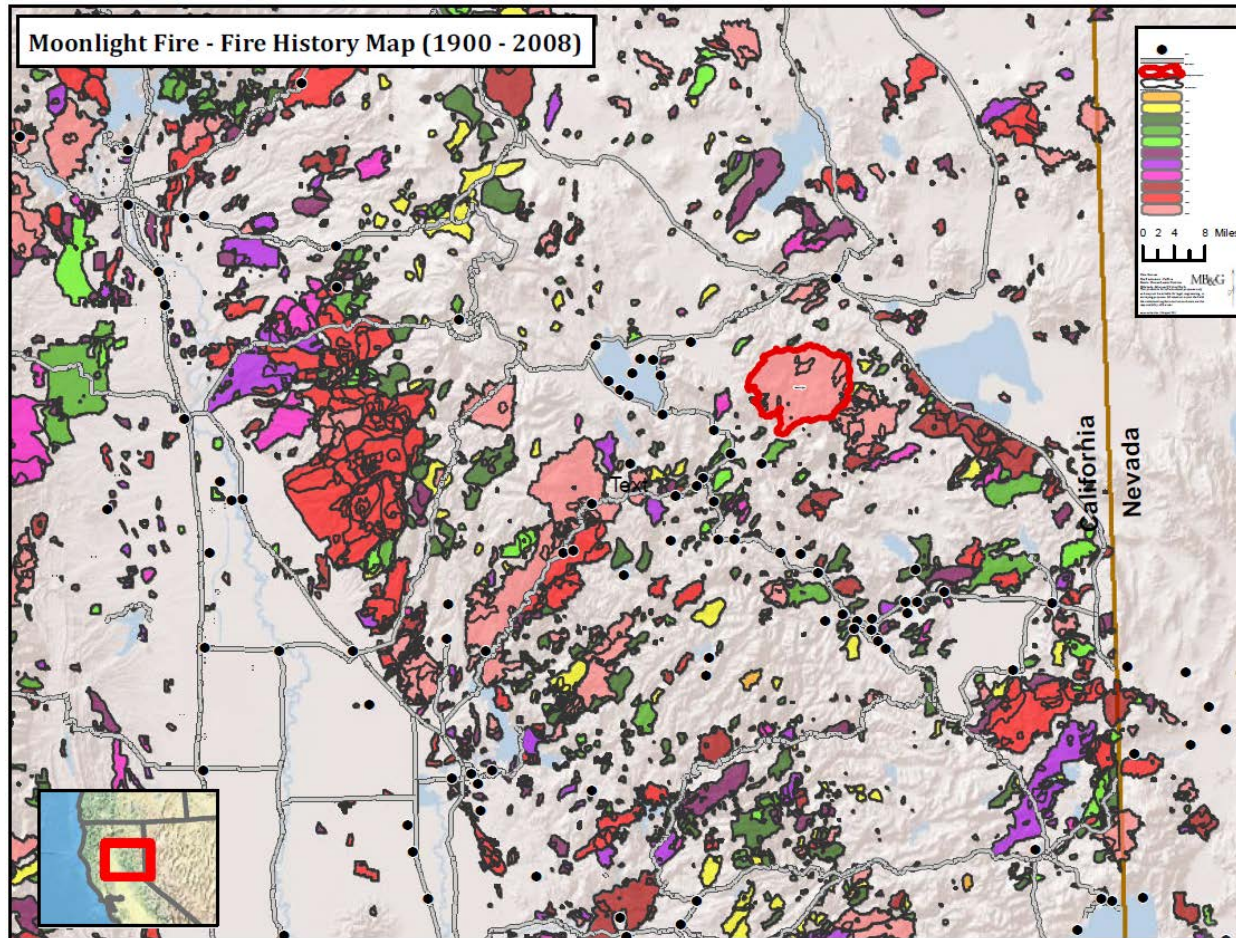
- Began (allegedly) on a timber sale on private land adjacent to Plumas National Forest on the morning of Labor Day, 2007.
- Burned ~65,000 acres
  - ▣ ~45,000 acres USFS
  - ▣ Walker Family trust land (Red River)
  - ▣ Sierra Pacific Industries
  - ▣ Other small in holdings

# Damages: Claim v. Rebuttal

## Claim on 4/15/10

	\$millions	
	<b>Government MBG Rebuttal</b>	
Resource Damages		
Net Lost Timber Value	\$ 86.4	
Double Damages for Timber	\$ 86.4	
Reforestation costs	\$ 68.1	
Habitat, Environmental and Ecological Losses	\$ 470.0	
<b>Subtotal resource damages</b>	<b>\$ 710.9</b>	
<b>Fire Fighting and Administration damages</b>		
	<b>Government MBG Rebuttal</b>	
Fire suppression	\$ 24.1	
Interest on fire suppression	\$ 7.0	
Site Planning, Preparation, Administration	\$ 1.7	
Burden, 13%	\$ 0.2	
Burned Area Emergency Rehabilitation	\$ 1.4	
BAER Assessment	\$ 0.1	
Interest on resource damages	\$ 45.8	
<b>Subtotal FF and Admin</b>	<b>\$ 80.4</b>	
<b>Grand total</b>	<b>\$ 791.4</b>	

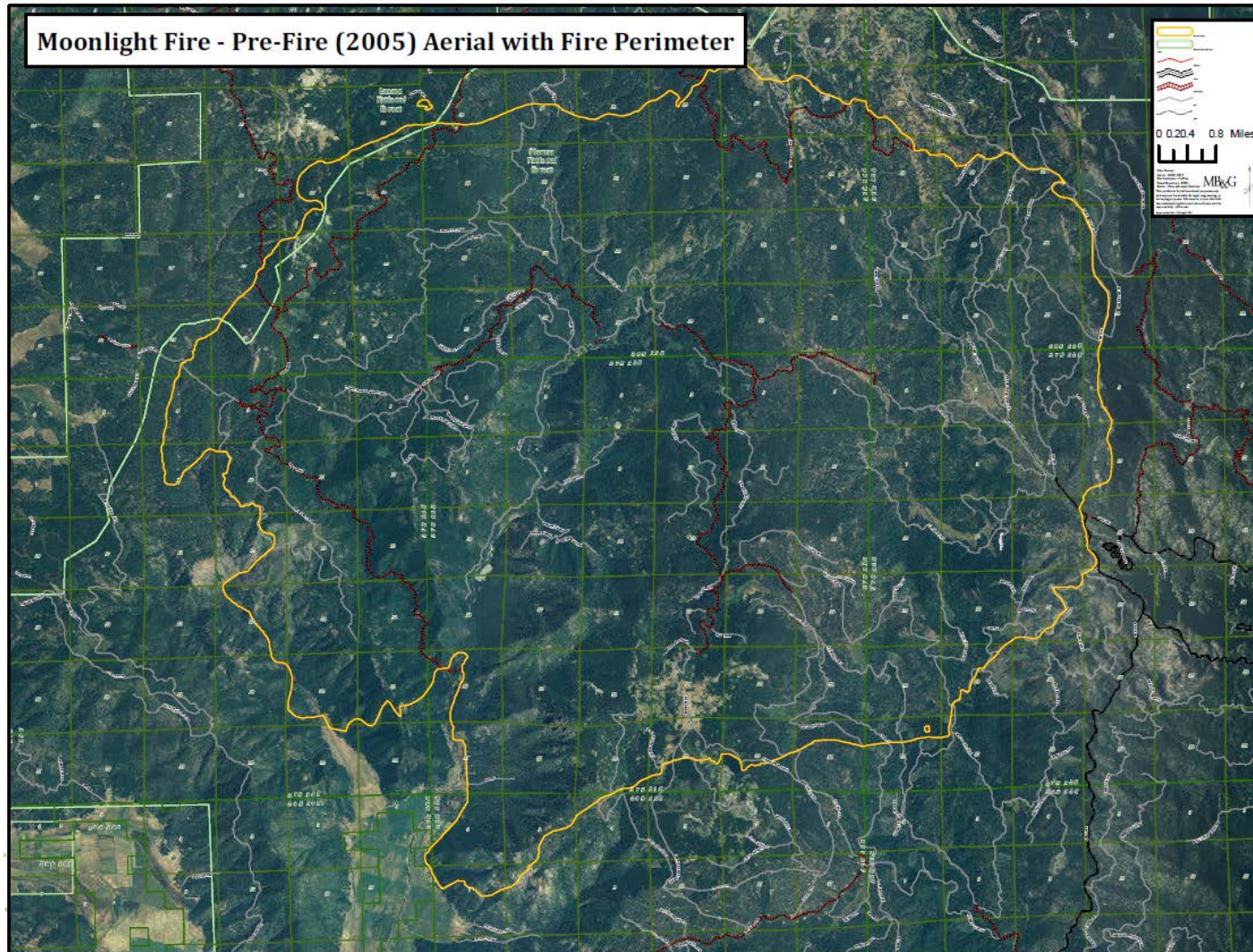
# Fire History



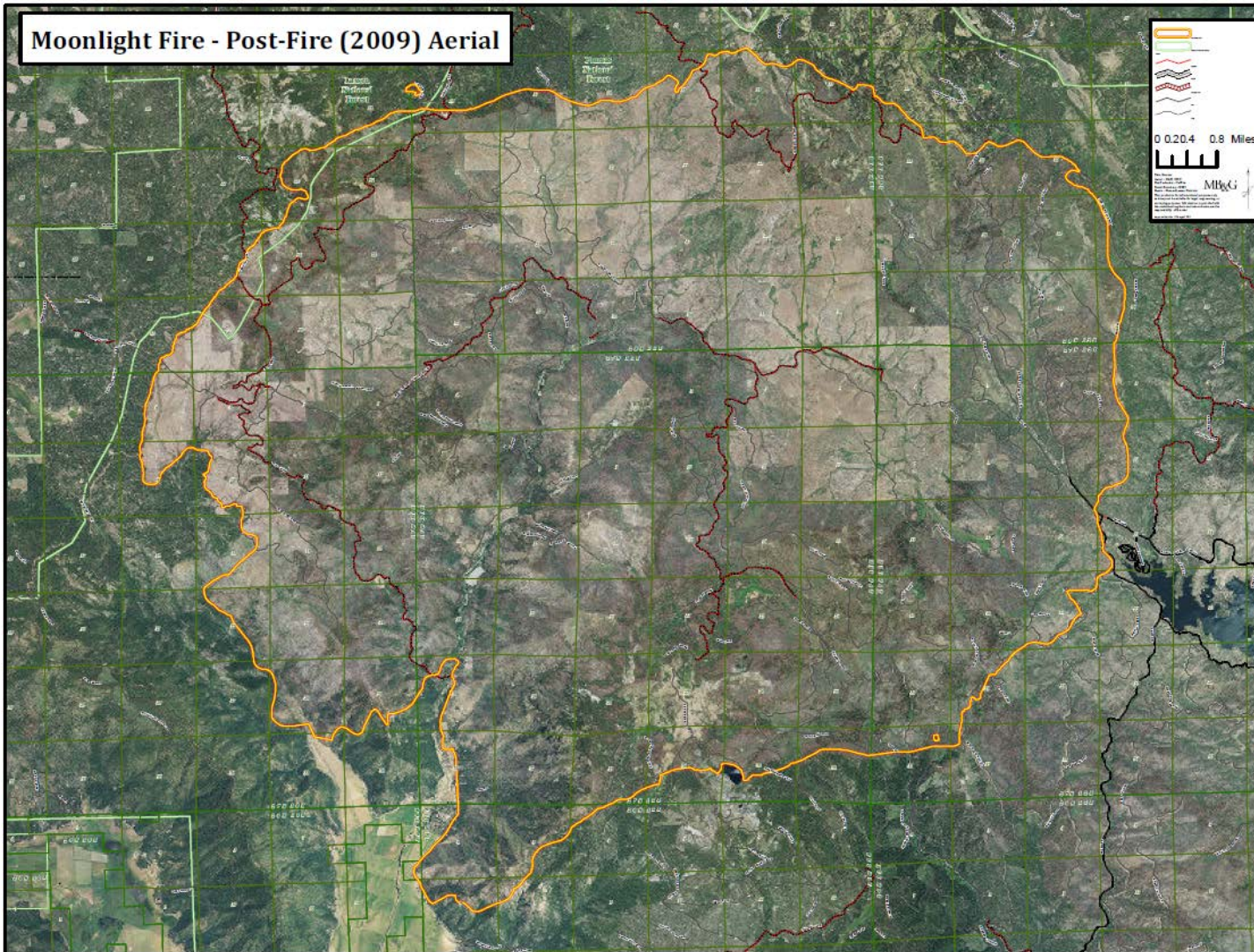
# More Facts

- On 45,000 acres USFS
  - Killed 539 MMbf – 66% of inventory
    - 87 MMbf un-merchantable after fire – 10% of inventory
  - Salvage sales sold August 2009
    - 25 MMbf, 5,300 acres, \$13.73/Mbf
    - Salvage still occurring 2011
  - Reforestation not completed by 2011
  
- On 20,000 acres of Private Land
  - Salvage completed by June 2008 (10 months)
  - Site prep, reforestation, weed control completed

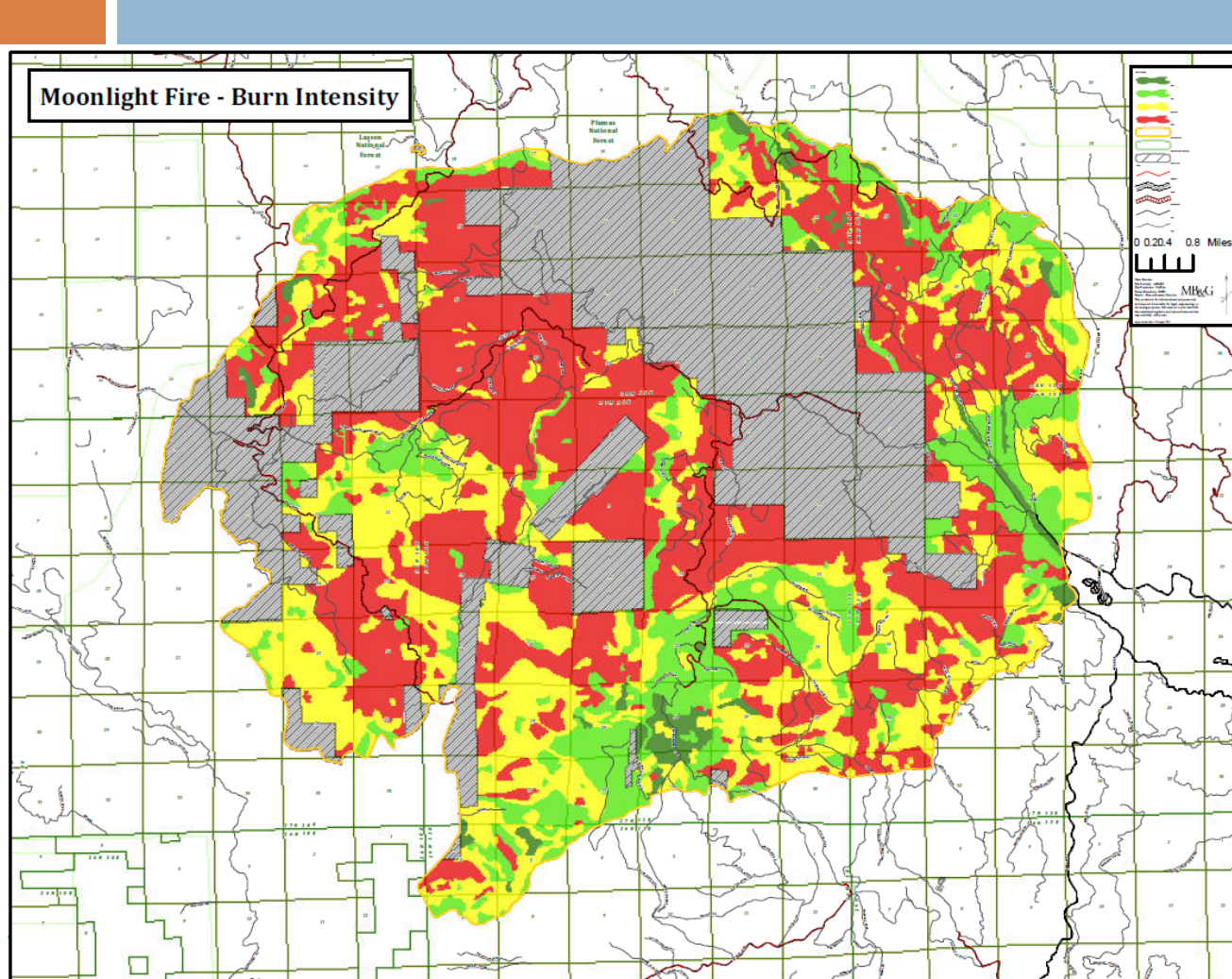
# Pre-Fire



# Post Fire

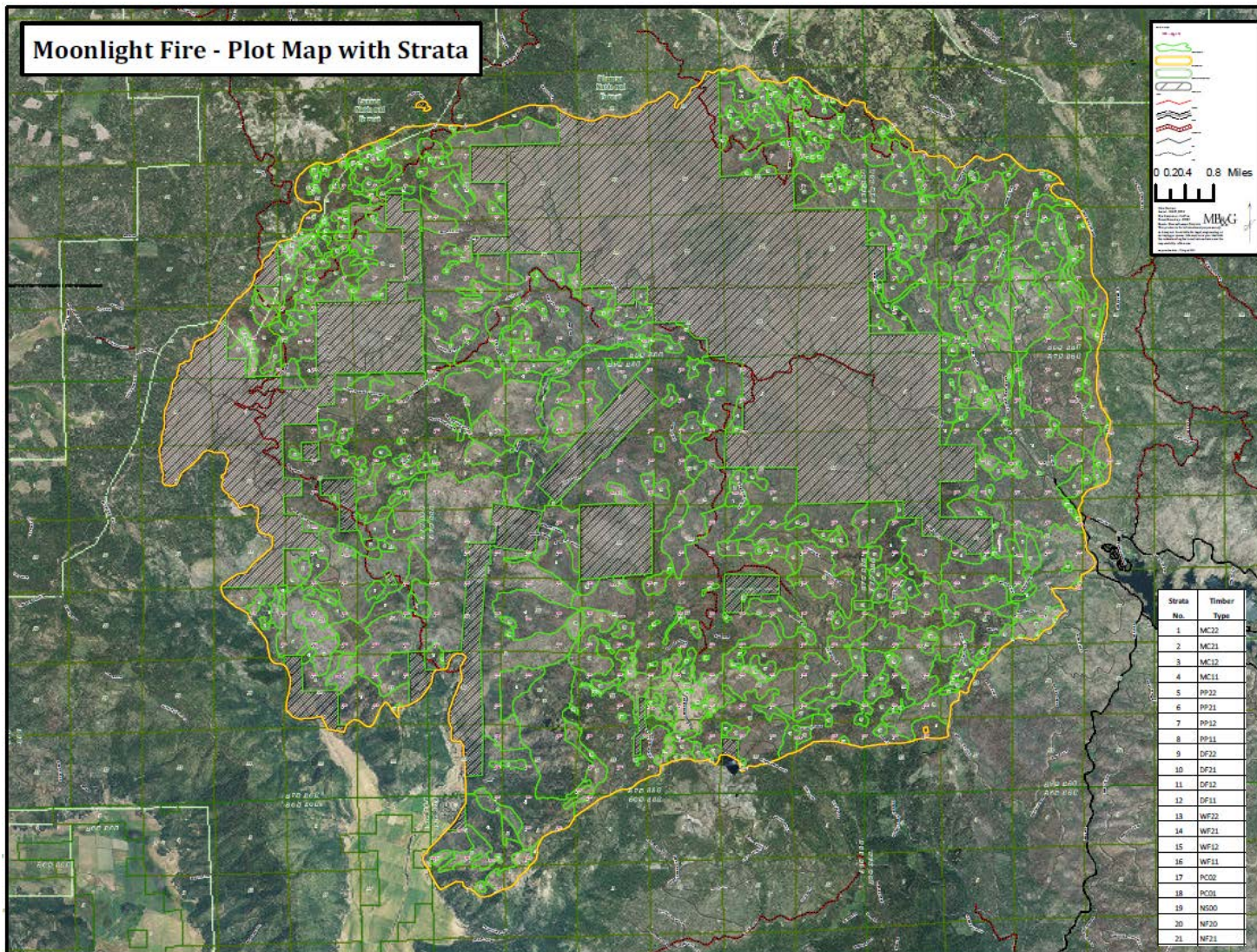


# Burn Intensity





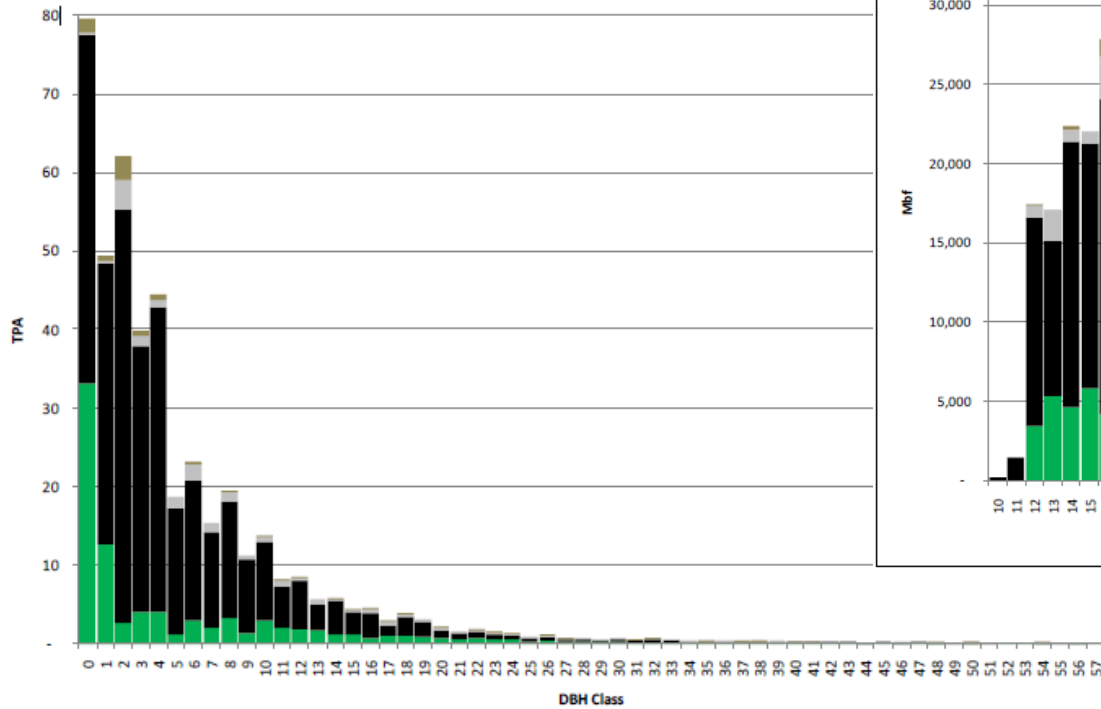
# MBG Typing and Cruise



# Fire Damage

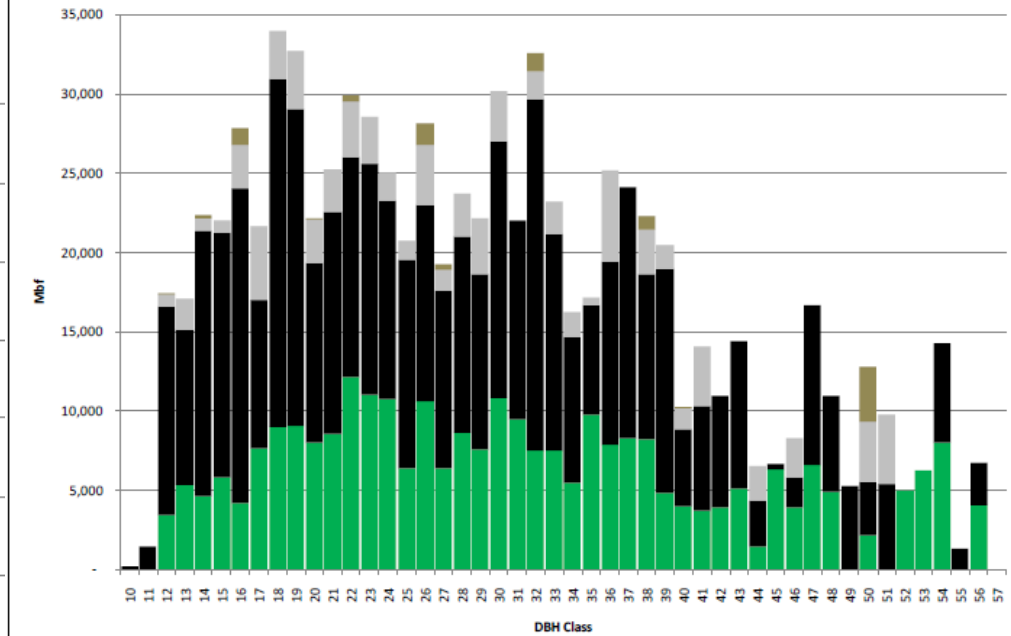
Average TPA by DBH Class and Status

Live Killed By Fire Dead After Fire Dead Before Fire

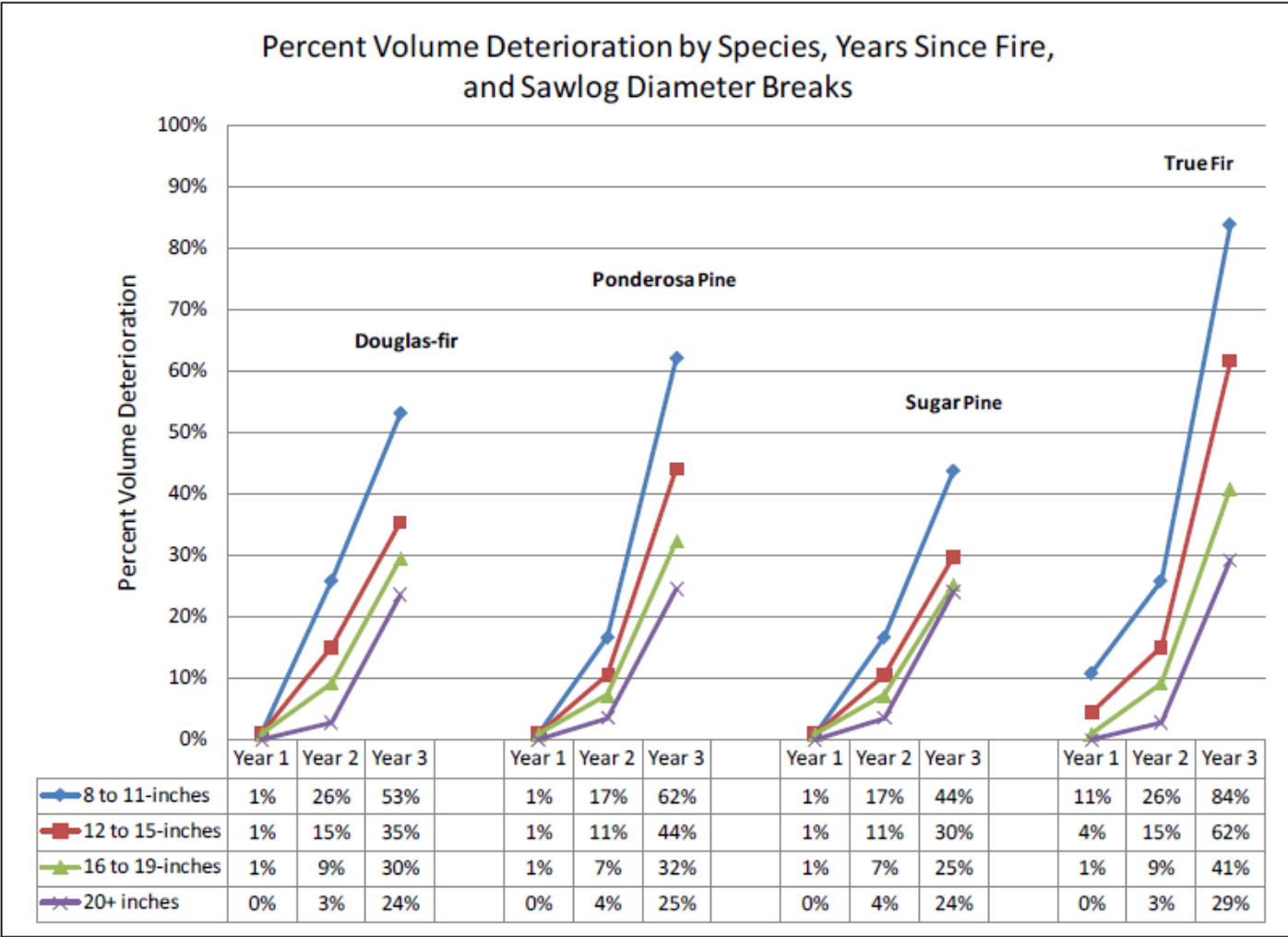


Net Mbf Volume by DBH Class and Status

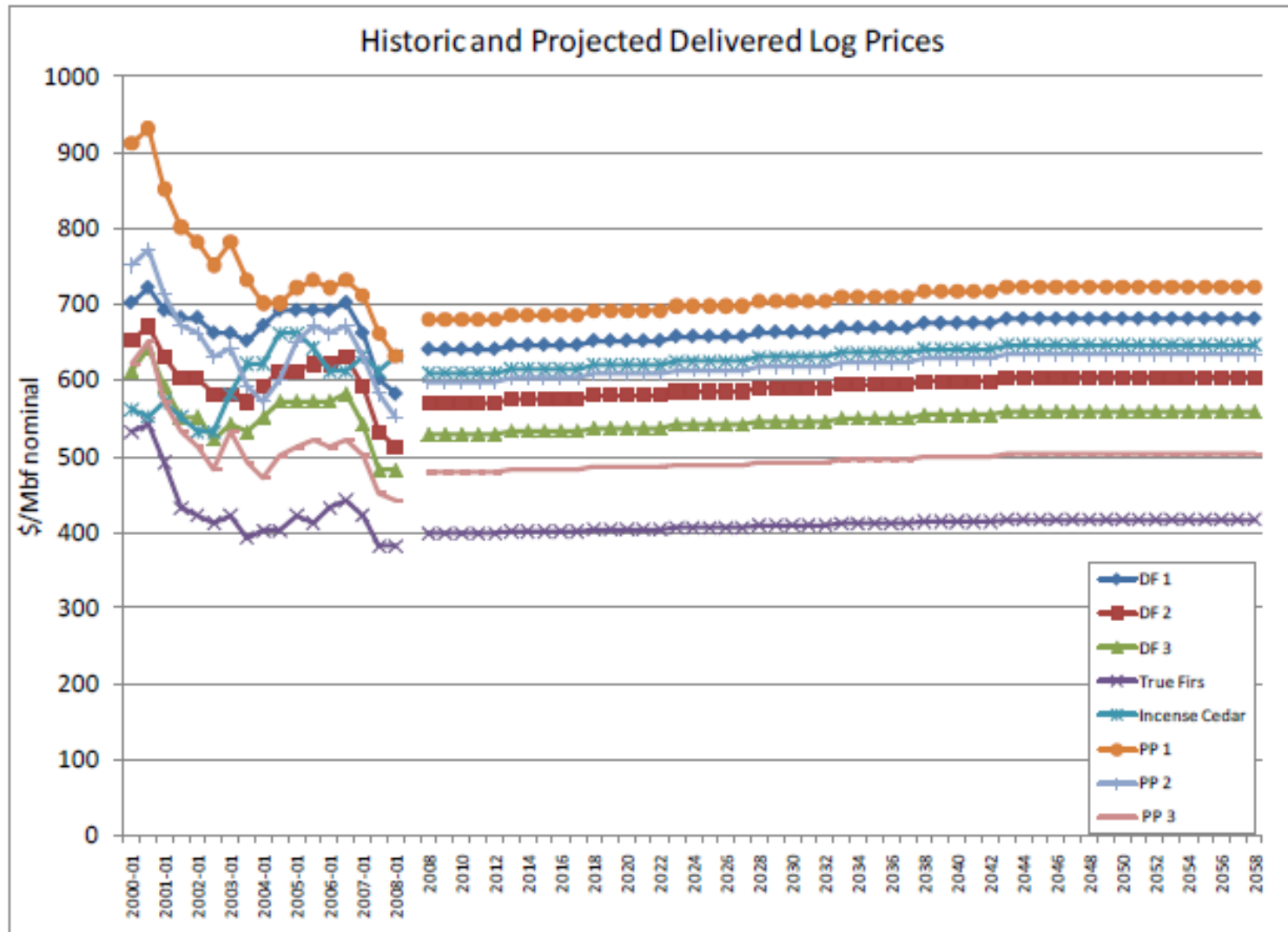
Live Killed By Fire Dead After Fire Dead Before Fire



# Loss of value due to delay in salvage



# Log price projections



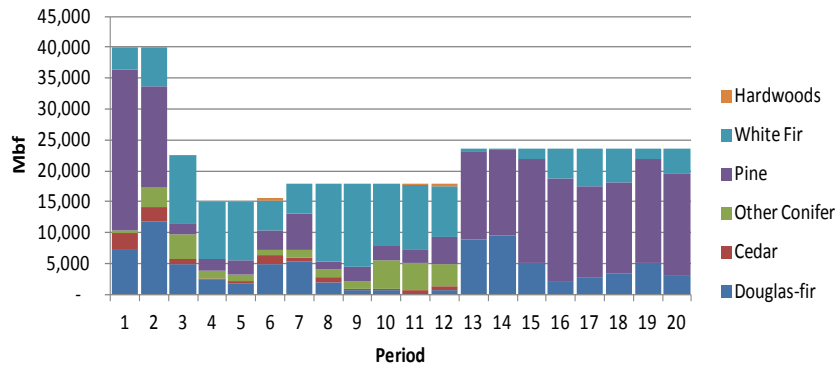
# Damages

## □ DCF analysis:

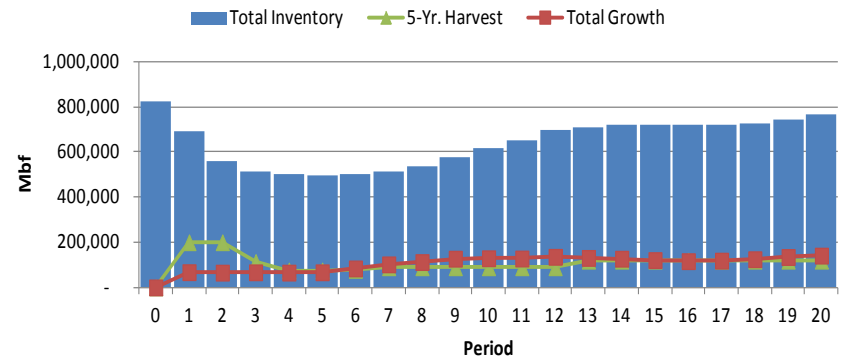
<b>Ownership Scenario</b>	<b>Pre-fire</b>	<b>Post-fire</b>	<b>Pre Minus Post</b>
Private	Managed under CFPA for revenue and long term timber production	Salvage burned timber, replant, manage under CFPA for revenue and long term production	Maximum change in property value
USFS	Managed under current USFS forest plan	Promptly salvage burned timber as allowed by plan, replant and manage under forest plan	Fiscal impacts to USFS as a result of the fire.

# Valuation: As Private Land, Before the Fire

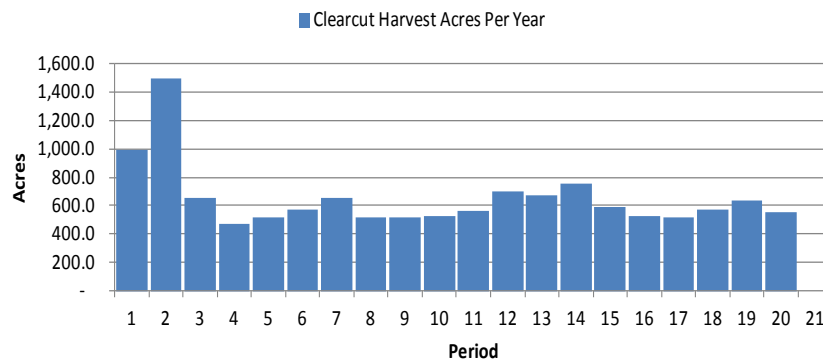
## Annual Harvest by Species



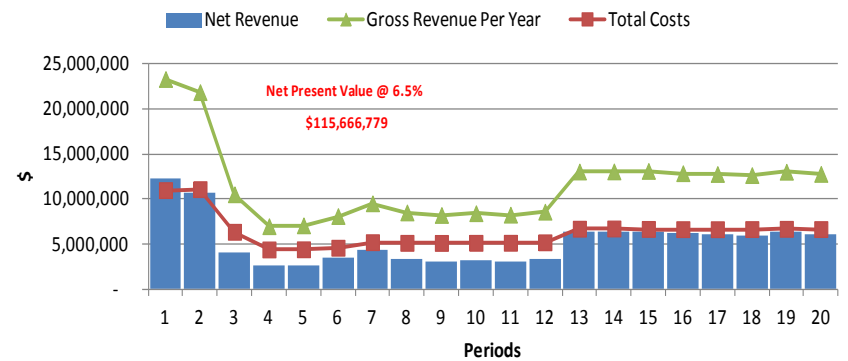
## Total Inventory, Harvest, Growth



## Annual Harvest Area

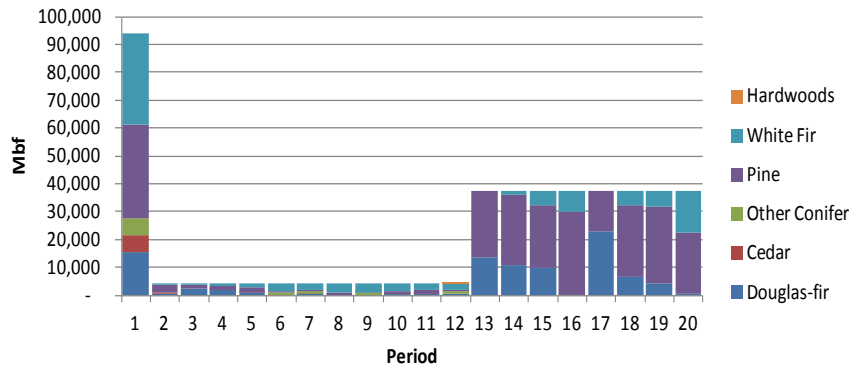


## Annual Revenues and Costs

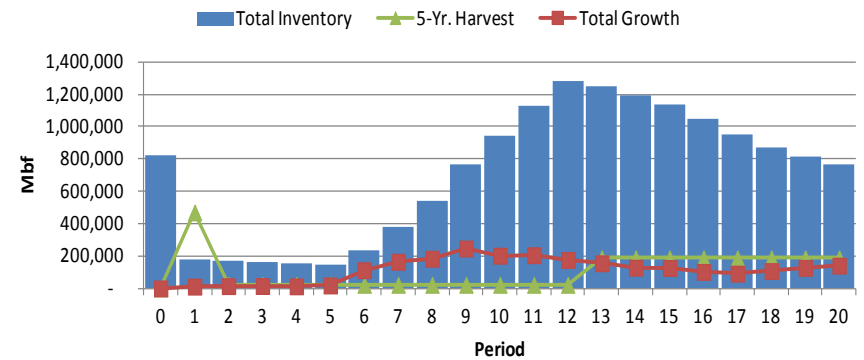


# Valuation: As Private Land, After the Fire

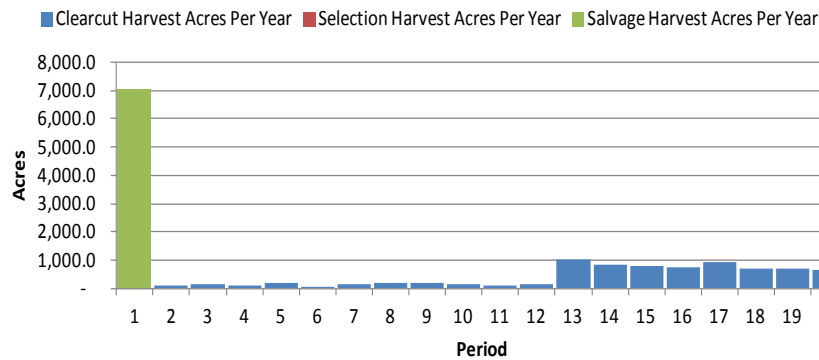
## Annual Harvest by Species



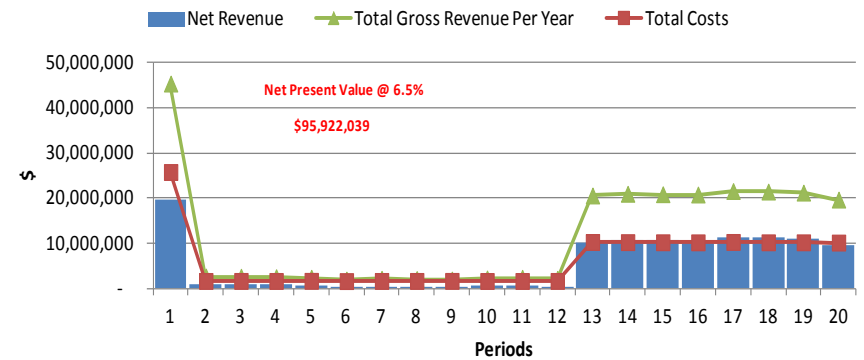
## Total Inventory, Harvest, Growth



## Annual Harvest Area

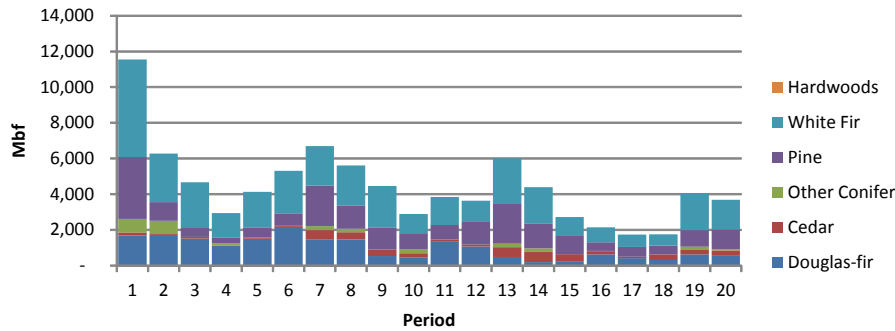


## Annual Revenues and Costs

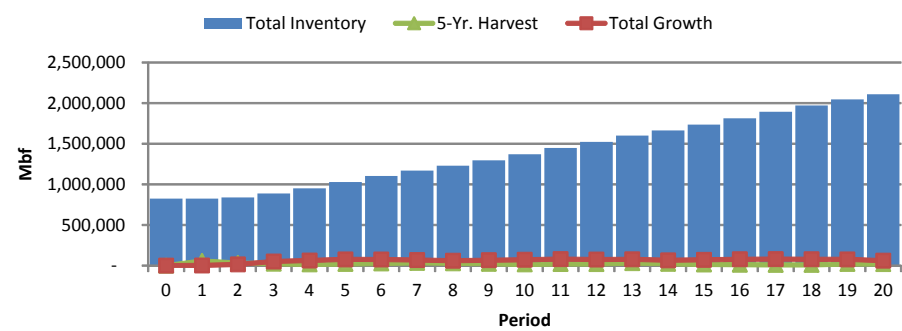


# Valuation: As Public Land, Before the Fire

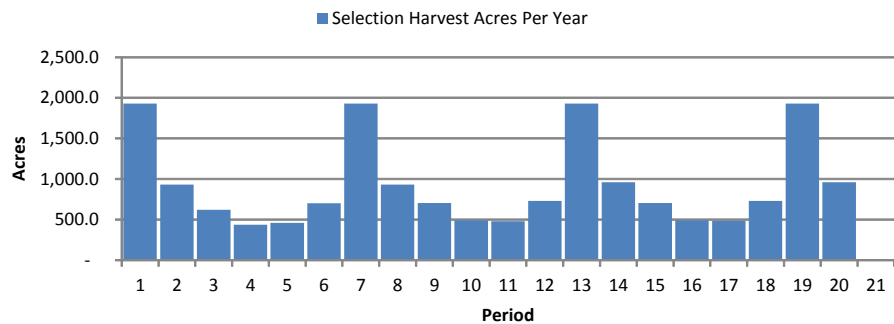
### Annual Harvest by Species



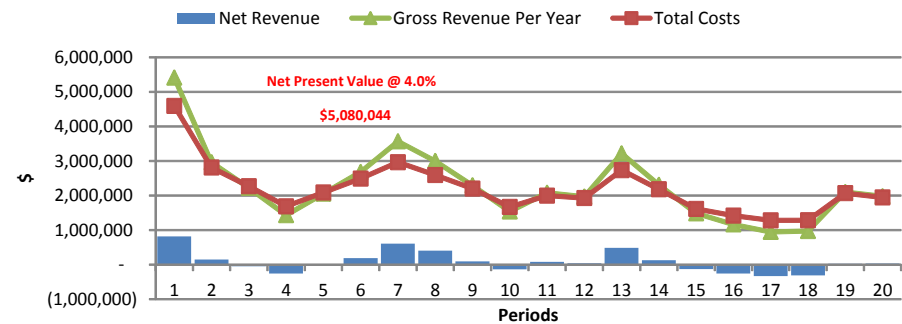
### Total Inventory, Harvest, Growth



### Annual Harvest Area



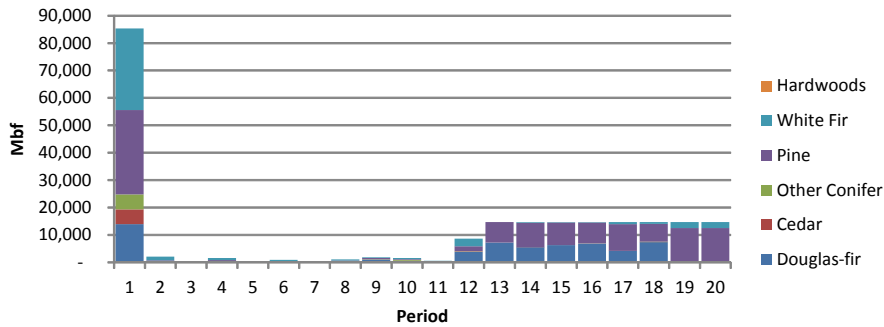
### Annual Revenues and Costs



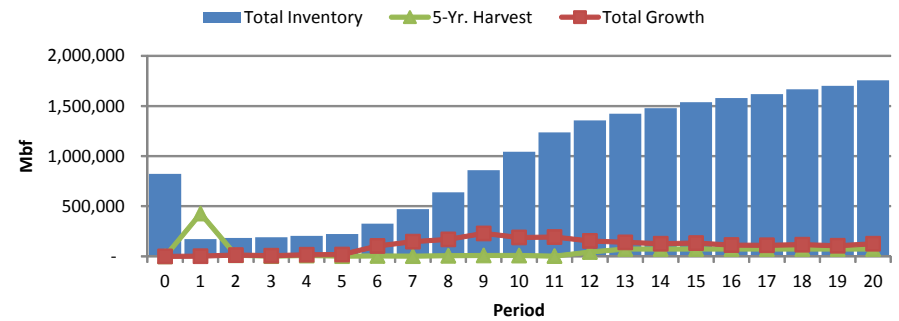


# Valuation: As Public Land, After the Fire

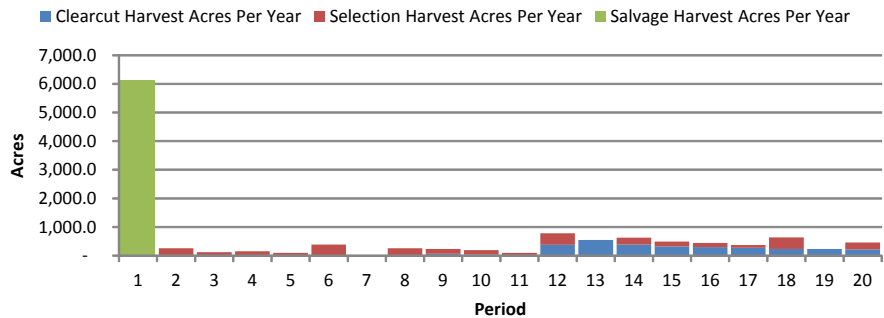
### Annual Harvest by Species



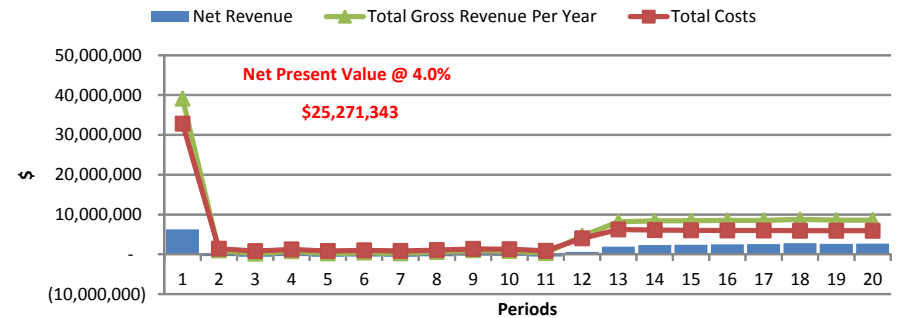
### Total Inventory, Harvest, Growth



### Annual Harvest Area



### Annual Revenues and Costs



# Summary: Discounted Cash Flow analysis

Valuation	Pre-Fire	Post -Fire	Difference	Conclusion
As private land	\$115.7 million	\$96.0 million	\$-19.7 million	Damage
As public land	\$5.0 million	\$25.3 million	\$+20.3 million	Potential change in USFS financial position



# Comp Sale Analysis: Check on values

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## □ Comp Sale analysis

- Problem: No comps for burned timberland

- Comps used to evaluate the reliability of the pre-fire market value from income approach.

- Comp 1 \$1,988/acre for 23,647 acres in Siskiyou/Shasta Counties
- Comp 2 \$1,284/acre for 50,635 acres in Mendocino County
- Comp 3 \$2,002/acre for 13,367 acres in Humboldt/Trinity Counties

- DCF value for pre-fire private land = \$2,555/acre

# Key Valuation Questions

- How to measure timber damage
  - Salvage value
  - Loss of value due to delay
  - Changes in market value
  - Stumpage value or net revenue
  
- How to measure remediation costs
  - Private v. public cost structures
  - Costs of delay, failure to mitigate
  
- How to measure market value for public property
  - Is there a market for USFS timberland?
  
- How to measure non-market values
  - How can you put a price tag on non-market goods and services?
  - Does the government have to propose a value or can the jury decide?
  
- How to avoid double counting when doing piecemeal analysis

# Damages: Claim v. Rebuttal

## Claim on 4/15/10

	\$millions	
	Government	MBG Rebuttal
Resource Damages		
Net Lost Timber Value	\$ 86.4	\$ 7.0
Double Damages for Timber	\$ 86.4	-
Reforestation costs	\$ 68.1	\$ 10.7
Habitat, Environmental and Ecological Losses	\$ 470.0	
<b>Subtotal resource damages</b>	<b>\$ 710.9</b>	
Fire Fighting and Administration damages	Government MBG Rebuttal	
Fire suppression	\$ 24.1	\$ 22.0
Interest on fire suppression	\$ 7.0	
Site Planning, Preparation, Administration	\$ 1.7	
Burden, 13%	\$ 0.2	
Burned Area Emergency Rehabilitation	\$ 1.4	
BAER Assessment	\$ 0.1	
Interest on resource damages	\$ 45.8	
<b>Subtotal FF and Admin</b>	<b>\$ 80.4</b>	
<b>Grand total</b>	<b>\$ 791.4</b>	

## MBG Opinion

	\$millions
Property value before fire	\$ 115.7
Property value after fire	\$ 96.0
<b>Change in property value</b>	<b>\$ 19.7</b>

Resource damages should not exceed \$ 115.7

# Disposition

- Federal Court
  - Settled, July 2012
  - \$135 million
    - \$67.5 million cash
    - \$67.5 million in timberland from SPI (22,500 acres @ \$3000/acre)
  
- State Court - Dismissed

# Since the Moonlight Fire:

- California Assembly Bill 1492
  - ▣ “...pecuniary damages must be quantifiable and not unreasonable in relation to the prefire *fair market value* of the property...”
  
- Oregon: ORS 477.089
  - ▣ “...calculated as the lesser of the *loss in fair market value*, as determined by a State certified appraiser, or the cost to restore the property to its original condition.”