

**Missouri CROP**

***A Summary of CROP Landscape Analyses Results***

**Presented by**

**Catherine M. Mater**

**President — Mater Ltd.**

**Senior Fellow — The Pinchot Institute for Conservation**

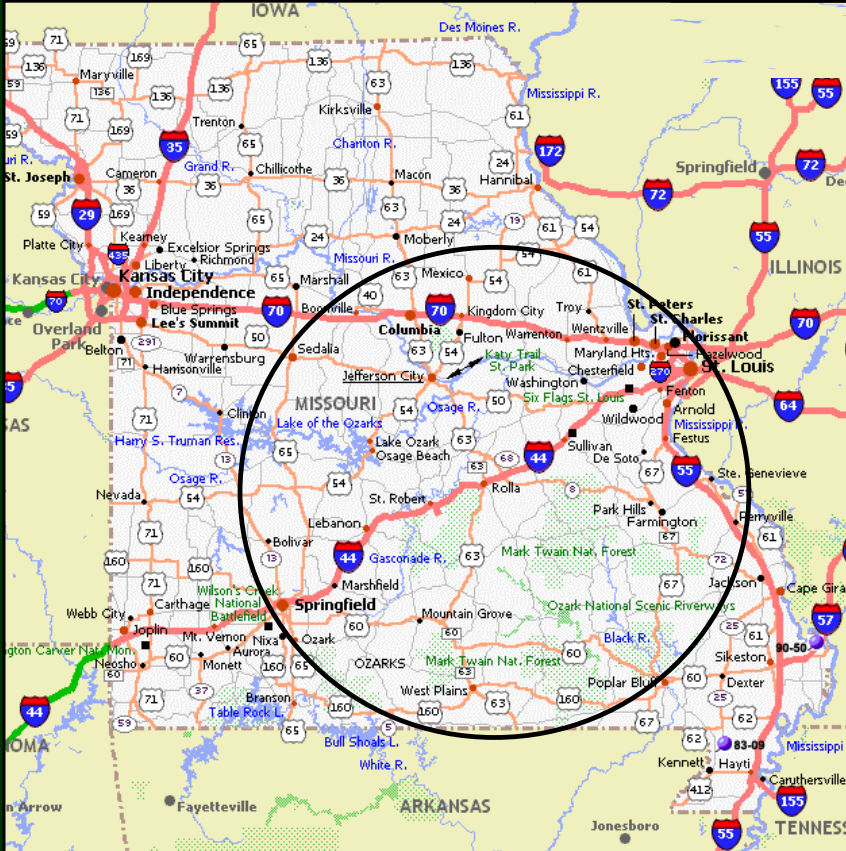
**Corvallis, Oregon; Washington, DC**

***Tel: 541-753-7335 Fx: 541-752-2952***

***E-mail: [catherine@mater.com](mailto:catherine@mater.com)***

**Missouri CROP:**  
**Center Point: Rolla**  
**100-mile radius**

- 1 National Forest
- State lands
- Fort Leonard Wood Army Base
- 60 Counties



*Mark Twain National Forest: Ranger Districts*

Ava/Cassville/Willow Springs

Houston/Rolla/Cedar Creek

Potosi/Fredericktown

Salem

Doniphan/Eleven Point/Poplar Bluff

*Missouri Department of Conservation (MDC):*  
**(Counties with MDC-managed forestland)**

Shannon/Reynolds

Bollinger

Butler

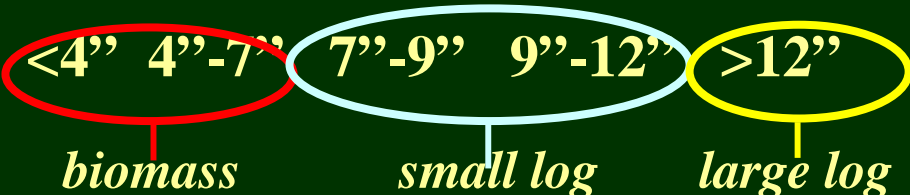
Dent

Wayne

*60 Counties:*

Audrain	Benton	Bollinger	Boone	Butler
Callaway	Camden	Carter	Christian	Cole
Cooper	Crawford	Dallas	Dent	Douglas
Franklin	Gasconade	Greene	Henry	Hickory
Howard	Howell	Iron	Jefferson	Laclede
Lincoln	Madison	Maries	Miller	Montineau
Monroe	Montgomery	Morgan	Oregon	Osage
Ozark	Perry	Pettis	Phelps	Pike
Pulaski	Ralls	Randolph	Reynolds	Ripley
Saline	Shannon	St.Charles	St. Clair	St. Francois
St. Louis	St. Genevieve		Taney	Texas
Warren	Washington	Wayne	Webster	Wright

What we asked for:

- Volume (by mmbf, green tons, ccf, etc.)
- Diameter sizes 

*biomass*      *small log*      *large log*
- Species (17 species evaluated for resource flow)
- Harvest “type”: fuel load reduction, timber sale, etc.
- Location of resource offering
- NEPA Phase      } Federal lands
- Road accessibility



**So, let's take a look at  
the final results . . .**

**Overall:**

Year	Total Biomass (955,074 gT)	% of 5-yr volume
2009	203,097	21%
2010	179,504	19%
2011	189,383	20%
2012	190,143	20%
2013	192,947	20%

*Biomass = 39%*  
*(up to 7" dbh)*

Total Small Log (126.55 mmbf)	% of 5-yr volume
25.61	20%
24.43	19%
25.61	20%
25.00	20%
25.90	20%

*Small Logs = 26%*  
*(>7" – 12" dbh)*

Total Large Log (172.35 mmbf)	% of 5-yr volume
35.27	20%
33.56	19%
35.80	21%
33.67	20%
34.05	20%

*Large Logs = 35%*  
*(>12" dbh)*



*Who's providing what?*

<b>Agency</b>	<b>5-yr total <i>Biomass (gT)</i></b>	<b>5-yr total <i>Small Log (mmbf)</i></b>	<b>5-yr total <i>Large Log (mmbf)</i></b>	<b>% of 5-yr total</b>
<b>Mark Twain NF</b>	<b>727,705</b>	<b>93.49</b>	<b>121.20</b>	<b>73%</b>
<b>MO Dept. of Conservation</b>	<b>216,000</b>	<b>32.0</b>	<b>48.0</b>	<b>25%</b>
<b>Fort Leonard Wood</b>	<b>11,369</b>	<b>1.063</b>	<b>3.148</b>	<b>1%</b>

**Mark Twain NF:** (gT= 727,705; Small log = 93.487 mmbf; Large log = 121.2 mmbf)

<b>Ranger Districts</b>	<b>5-yr total (Biomass = gT)</b>	<b>5-yr total Small log (mmbf)</b>	<b>5-yr total Large log (mmbf)</b>
<b>Ava/Cassville/Willow Springs</b>	<b>111,705</b>	<b>20.387</b>	<b>21.3</b>
<b>Houston/Rolla/Cedar Creek</b>	<b>100,000</b>	<b>9.5</b>	<b>20</b>
<b>Potosi/Fredericktown</b>	<b>160,000</b>	<b>15.5</b>	<b>35</b>
<b>Salem</b>	<b>132,500</b>	<b>7.5</b>	<b>28.5</b>
<b>Doniphan/Eleven Point/ Poplar Bluff</b>	<b>223,500</b>	<b>40.6</b>	<b>16.4</b>

# Missouri CROP

**Dept. of Conservation:** (gT= 216,000; Small log = 32 mmbf; Large log = 48 mmbf)

Counties	5-yr total (Biomass = gT)	5-yr total Small log (mmbf)	5-yr total Large log (mmbf)
Shannon/Reynolds	162,000	24	36
Butler	13,500	2	3
Bollinger	13,500	2	3
Dent	13,500	2	3
Wayne	13,500	2	3

***Fort Leonard Wood:*** (gT= 11,370; Small log = 1.06 mmbf; Large log = 3.15 mmbf)

Fort Leonard Wood	5-yr total (Biomass = gT)	5-yr total Small log (mmbf)	5-yr total Large log (mmbf)
Fort Leonard Wood	11,370	1.06	3.15

**Dept. of Transportation lands:** Will conduct clearing projects on ~500 acres over next 5 years, 90% in 2009-2010. Unable to calculate volumes.

**60 Counties:** All either do not own forest land or plan no removal during the next 5 years.

**Trust lands:** No historical data exists for removal patterns: no data provided for current CROP effort.

**Pioneer Forest lands:** No data provided for current CROP effort.

<i>By Species</i>		<b>5-yr total (Biomass = gT)</b>	<b>5-yr total Small log (mmbf)</b>	<b>5-yr total Large log (mmbf)</b>
<b>Oak species</b>	(77% of 5-yr. total)	597,900	99.48	160.45
<b>Short-leaf pine</b>	(8% of 5-yr. total)	41,325	19.76	11.60
<b>Eastern red cedar</b>	(1% of 5-yr. total)	3,350	5.4	0.3
<b>Oak/pine mix</b>	(13% of 5-yr. total)	312,500	1.9	0
		<i>% of log volume</i>	42%	58%

## Annual biomass perspective: *Encouraging!*

If annual projections for a biomass-to-energy or biomass-to-biofuel production are 187,000 gT and 200,000 gT respectively, then CROP biomass volumes are . . .

- ✓ sufficient to encourage investment in region, *and* . . .
- ✓ open market opportunity for biomass from private forestland owners in region

Year	Total Biomass (955,074 gT)	% of 5-yr volume
2009	203,097	21%
2010	179,504	19%
2011	189,383	20%
2012	190,143	20%
2013	192,947	20%

Lessons learned in other CROP projects:

To make biomass access affordable, must have value-add capability in small log production to increase overall value of resource being removed.

*Do we have?*

*Yes! . . .*

## How does it look for small log processing: *Fairly good!*

- Annual volume sufficient to look at establishing small log processing facility in region (~ 25 mmbf/yr); *and*
- Volume split between >7"-9" and >9"-12" in small log is favorable for pulling more grade out of overall volume:

(% of total volume for diameter class)	>7"-9"	>9"-12"
<i>Oak species</i>	56%	90%
<i>Short-leaf pine</i>	27%	9%
<i>Eastern Red Cedar</i>	12%	<1%
<i>Oak/Pine mix</i>	4%	0%

- 34% of total is >7"-9"
- 66% of total is >9"-12"



## Resource Offering Maps (ROMS):

*Here's what you get for each species . . .*

- ✓ Who will supply?
- ✓ When will supply be offered?
- ✓ How much will be offered?
- ✓ What diameter size will it be offered in?
- ✓ Will supply be consistent and levelized over time to invite purchase and investment?



*For each species:*

- ✓ **Locator map** per specific supplier
- ✓ **Summary sheet**
- ✓ **Detailed supply breakouts** by volume, diameter, and year per supplier

*Let's look at Oak species  
as an example . . .*

# Missouri CROP

**Missouri: *Oak species* CROP offering/removal '09 – '13**  
 (gT = 597,900 / S = 99,484 mmbf / L = 160,448 mmbf)  
 (379.512 total mmbf)

ROM # Oak sp. 1.1

*Oak sp. = Oak species*

## Mark Twain NF:

- A *Ava/Cassville/Willow Springs RD* (gT = 41,530 / S = 14,421 / L = 16)\*
- B *Houston/Rolla/Cedar Creek RD* (gT = 100,000 / S = 2.5 / L = 20)
- C *Potosi/Fredericktown RD* (gT = 25,000 / S = 10 / L = 35)
- D *Salem RD* (gT = 30,000 / S = 7.5 / L = 24.5)
- E *Doniphan/Eleven Pt/Poplar Blf RD* (gT = 174,000 / S = 32 / L = 13.8)

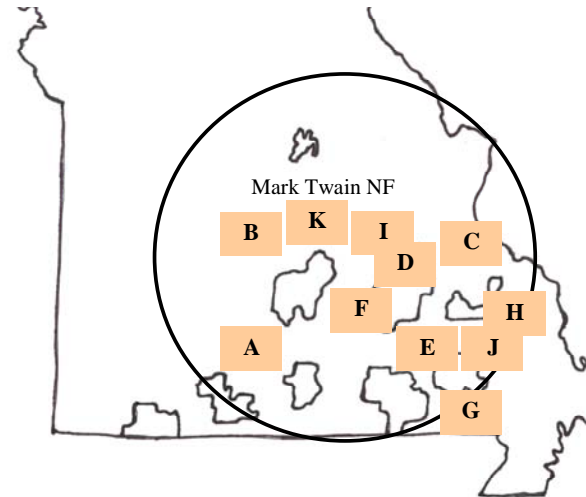
## MO Dept. of Conservation:

- F *Shannon/Reynolds Co.* (gT = 162,000 / S = 24 / L = 36)
- G *Butler Co.* (gT = 13,500 / S = 2 / L = 3)
- H *Bollinger Co.* (gT = 13,500 / S = 2 / L = 3)
- I *Dent Co.* (gT = 13,500 / S = 2 / L = 3)
- J *Wayne Co.* (gT = 13,500 / S = 2 / L = 3)

## Ft. Leonard Wood:

- K *Ft. Leonard Wood* (gT = 11,370 / S = 1.063 / L = 3.148)

\**italics/bold = species offering in CROP*



*Locator map*

# Summary Sheet

# Missouri CROP

Missouri: Oak species CROP offering/removal '09 – '13  
 (gT = 597,900 / S = 99.484 mmbf / L = 160.448 mmbf)  
 (379.512 total mmbf)

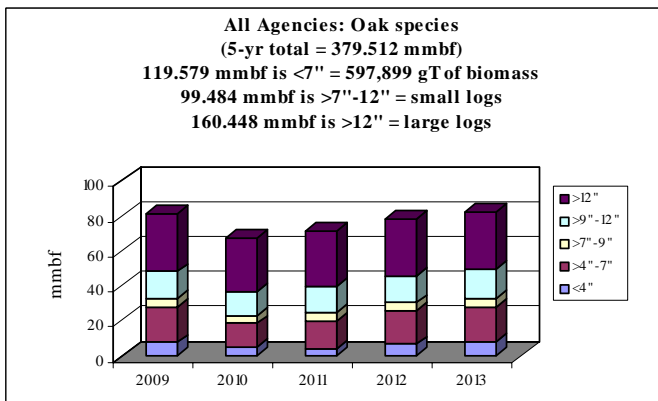
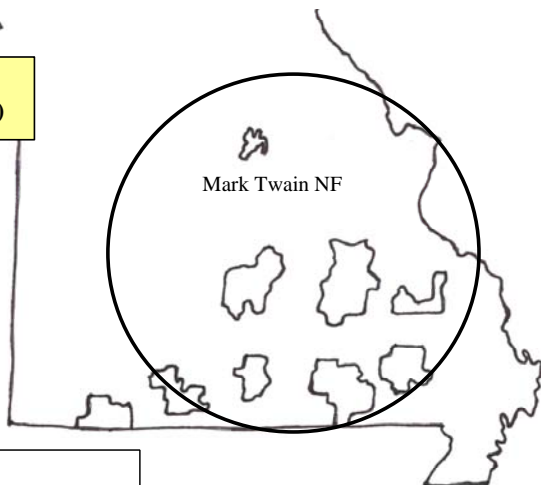
ROM # Oak sp. 1

gT = green tons (up to 7" dbh)  
 S = small log mmbf (>7"-12" dbh)  
 L = large log mmbf (>12" dbh)

Mark Twain NF: 66%  
 (gT = 370,530 / S = 66.421 / L = 109.3)

\*MO Dept. of Conservation: 32%  
 (gT = 216,000 / S = 32 / L = 48)  
 \*some volume not currently accessible by roads

Ft. Leonard Wood: 2%  
 (gT = 11,369 / S = 1.063 / L = 3.148)



Oak species	gT	mmbf	
	Biomass	Small Log	Large Log
2009	137747.2	20.513	32.873
2010	92089.5	18.044	30.762
2011	100972.9	19.232	32.195
2012	127143.2	20.395	32.071
2013	139946.9	21.3	32.547
Totals	597899.7	99.484	160.448
%	32%	26%	42%
mmbf	119.57994		

379.51194

# Missouri CROP

Missouri: Oak species CROP offering/removal '09 – '13  
(by agency)

ROM # Oak sp. 1.3

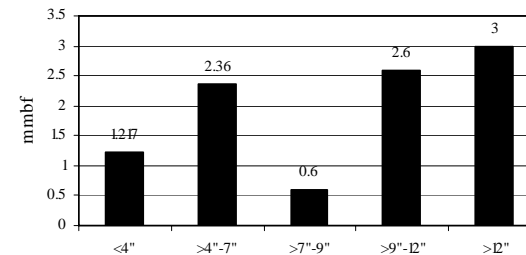
gT = green tons (up to 7" dbh)  
S = small log mmbf (>7"-12" dbh)  
L = large log mmbf (>12" dbh)

## Detailed Breakout by Supplier

<b>Oak species Mark Twain NF: Ava/Cassville/Willow Springs RD</b>	<b>5-yr = 38.727 mmbf</b>
	<ul style="list-style-type: none"> <li>Unlevel supply from year to year</li> </ul>
<b>gT = 41,530</b>	<ul style="list-style-type: none"> <li>&lt;4" = 7% (2.717 mmbf)</li> <li>&gt;4"-7" = 14% (5.589 mmbf)</li> </ul>
<b>S = 14.421</b>	<ul style="list-style-type: none"> <li>&gt;7"-9" = 7% (2.9 mmbf)</li> <li>&gt;9"-12" = 30% (11.521 mmbf)</li> </ul>
<b>L = 16</b>	<ul style="list-style-type: none"> <li>&gt;12" = 41% (16 mmbf)</li> </ul>

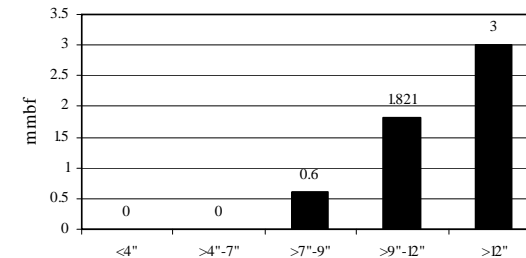
*Example of unlevel supply:  
>4 mmbf drop in one year  
(... opportunity to adjust?)*

Mark Twain NF - Ava/Cassville/Willow Springs RD:  
Oak species 2009 Total Volume by Diameter  
(9.78 mmbf)



*9.78 mmbf*

Mark Twain NF - Ava/Cassville/Willow Springs RD:  
Oak species 2010 Total Volume by Diameter  
(5.42 mmbf)



*5.42 mmbf*

And . . . with CROP, we're able to look at:

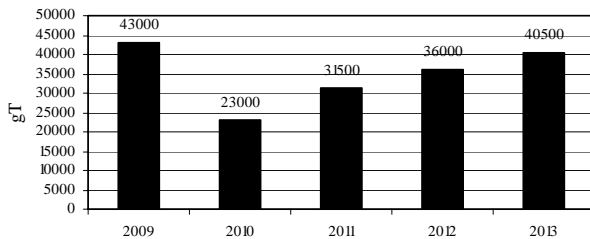
- *performance between different public agencies* to identify needed coordination of supply; *and*
- *performance between ranger districts in a single NF* to see where coordination of supply offering might be needed.

*Let's take a look ...*

**Oak species:** Mark Twain NF - 3 RDs – *biomass offerings*

**Doniphan/Eleven  
Pt/Poplar Bluff RD**

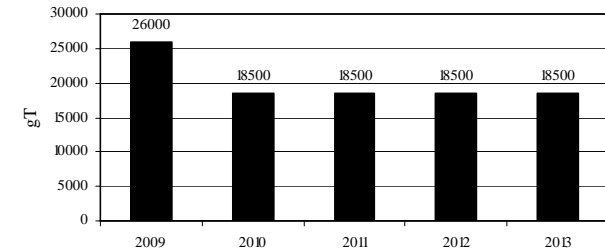
Mark Twain NF - Doniphan/Eleven Pt/Poplar Blf RD:  
Oak Species Total 5-yr Biomass (up to 7" dbh)  
by Specie (174,000 gT)



31%

**Houston/Rolla/ Cedar  
Creek RD**

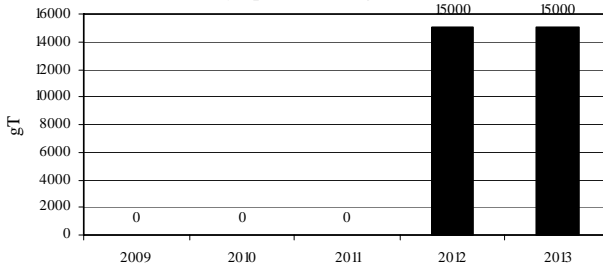
Mark Twain NF - Houston/Rolla/Cedar Creek RD:  
Oak Species Total 5-yr Biomass (up to 7" dbh)  
by Specie (100,000 gT)



14%

**Salem RD**

Mark Twain NF - Salem RD: Oak Species  
Total 5-yr Biomass (up to 7" dbh)  
by Specie (30,000 gT)



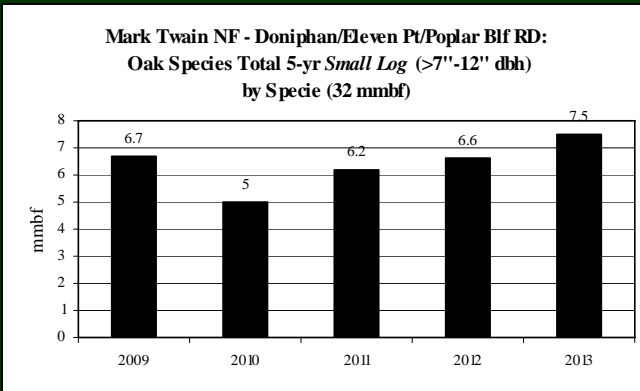
18%

Only Houston/Rolla/Cedar Creek RD biomass <4" has levelized supply; but also supply smallest of 5-yr volume.

**Oak species:** Mark Twain NF – 3 RDs – *small log offerings*

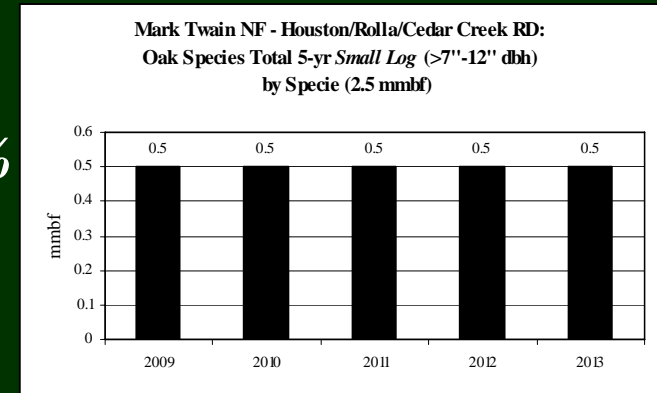
*Doniphan/Eleven  
Pt/Poplar Bluff RD*

43%



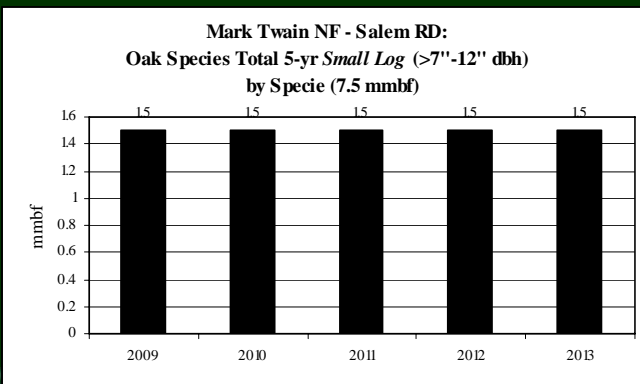
*Houston/Rolla/  
Cedar Creek RD*

10%



*Salem RD*

8%



All these RD's have levelized supply from year to year.

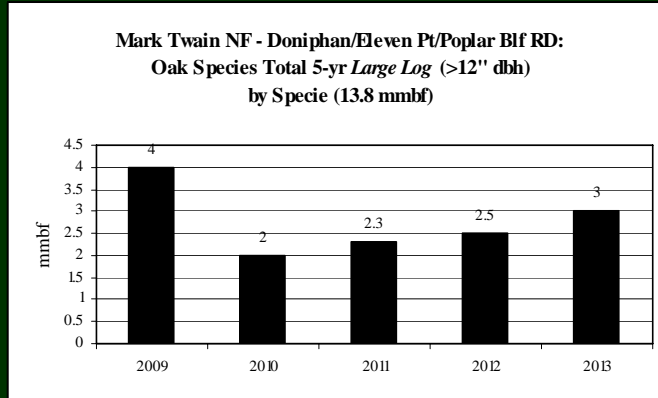


**Oak species:** Mark Twain NF – 3 RDS – *large log offerings*

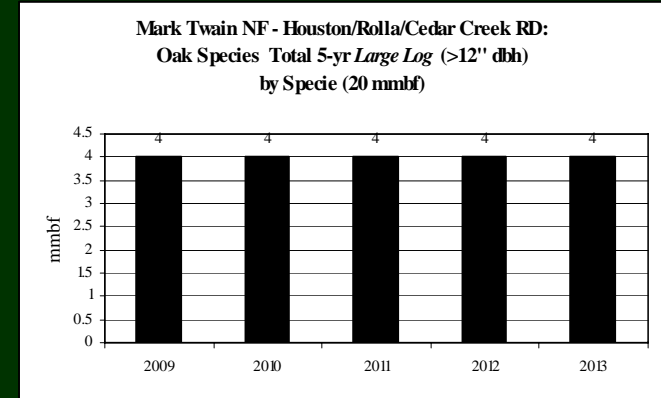
*Doniphan/Eleven  
Pt/Poplar Bluff RD*

*Houston/Rolla/  
Cedar Creek RD*

13%

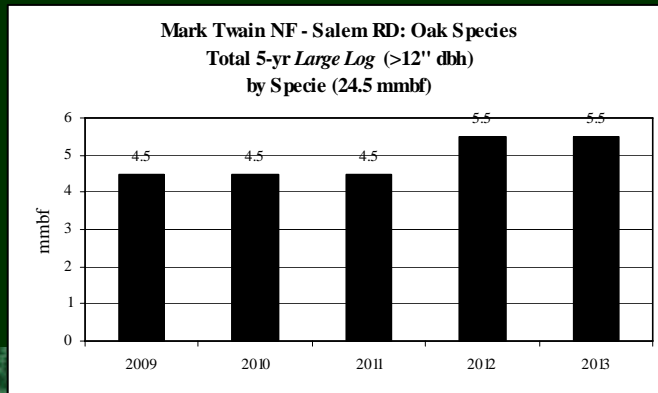


16%



*Salem RD*

23%



Doniphan/Eleven Pt/Poplar Bluff RD has somewhat unlevelized supply.



*Let's look at species Summary Sheets for the other Missouri CROP species . . .*

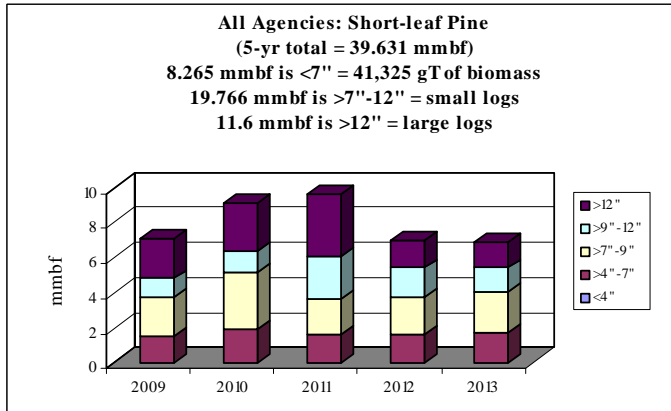
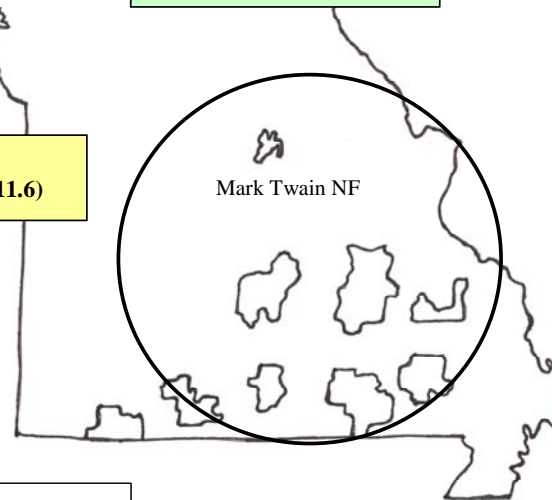
# Missouri CROP

**Missouri: Short-leaf Pine CROP offering/removal '06 - '10**  
 (gT = 41,325 / S = 19.766 mmbf / L = 11.6 mmbf)  
 (39.631 total mmbf)

ROM # SLf P 1

gT = green tons (up to 7" dbh)  
 S = small log mmbf (>7"-12" dbh)  
 L = large log mmbf (>12" dbh)

**Mark Twain NF: 100%**  
 (gT = 41,325 / S = 19.766 / L = 11.6)



Short-leaf Pine	gT	mmbf	
	Biomass	Small Log	Large Log
2009	7500	3.3	2.3
2010	9415	4.483	2.7
2011	7910	4.483	3.5
2012	8000	3.8	1.6
2013	8500	3.7	1.5
Totals	41325	19.766	11.6
%	21%	50%	29%
mmbf	8.265		

39.631

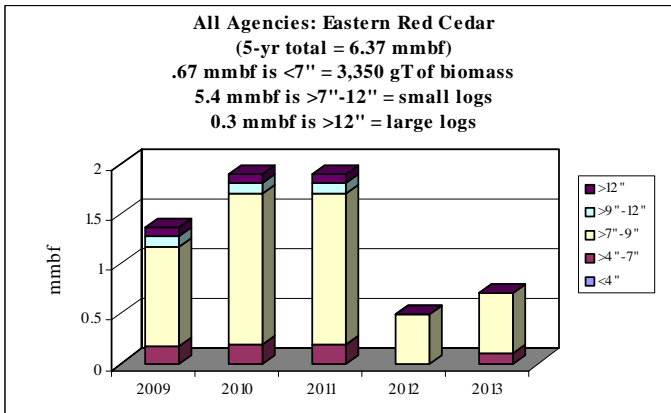
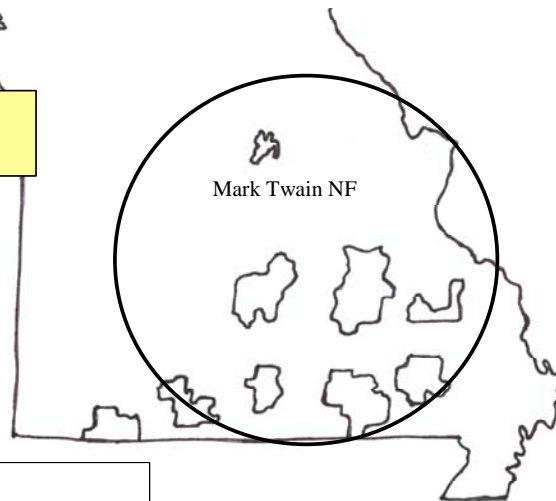
# Missouri CROP

Missouri: Eastern Red Cedar CROP offering/removal '09 - '13  
 (gT = 3,350 / S = 5.4 mmbf / L = .3 mmbf)  
 (6.37 total mmbf)

ROM # ERC 1

gT = green tons (up to 7" dbh)  
 S = small log mmbf (>7"-12" dbh)  
 L = large log mmbf (>12" dbh)

Mark Twain NF: 100%  
 (gT = 3,350 / S = 5.4 / L = .3)



Eastern Red Cedar	gT	mmbf	
	Biomass	Small Log	Large Log
2009	850	1.1	0.1
2010	1000	1.6	0.1
2011	1000	1.6	0.1
2012	0	0.5	0
2013	500	0.6	0
<b>Totals</b>	<b>3350</b>	<b>5.4</b>	<b>0.3</b>
%	11%	85%	5%
mmbf	0.67		

6.37



**Here's how it looks on an  
agency-by-agency basis . . .**

# Missouri CROP

## Levelized Annual Supply?

(Total 5-yr volume)

Room for supply coordination  
between RDs?

		<i>Oak species</i> (379.512 mmbf; includes gT)		
		<i>yes</i>	<i>no</i>	<i>Comments</i>
		<i>R = relatively</i>		
<i>Mark Twain NF</i>	(73% of 5-yr vol.)			
	Ava/Cassville/Willow Springs		✓	From 5.4 mmbf to 9.8 mmbf/yr
	Houston/Rolla/Cedar Creek	R		9.7 mmbf 2009; then 8.2 mmbf/yr
	Potosi/Fredericktown	✓		10 mmbf/yr
	Salem		✓	6 mmbf '09-'11; 10 mmbf '12-'13
	Doniphan/Eleven Pt/Poplar Bluff		✓	From 11.6 mmbf to 19.3 mmbf/yr
<i>Dept. of Conservation</i>	(25% of 5-yr vol.)			
	Shannon/Reynolds	✓		18.48 mmbf/yr
	Butler	✓		1.54 mmbf/yr
	Bollinger	✓		1.54 mmbf/yr
	Dent	✓		1.54 mmbf/yr
	Wayne	✓		1.54 mmbf/yr
<i>Fort Leonard Wood</i>	(1% of 5-yr vol.)			
	Fort Leonard Wood		✓	From .99 mmbf to 1.58 mmbf/yr

Overall . . . *better coordination* of resource offering in *oak* likely preferred to help:

- **Reduce investor risk**
- **Increase purchaser confidence**
- **Achieve fuel load reduction goals**
- **Achieve forest restoration goals**



**What about NEPA?**  
**It's important to know!**

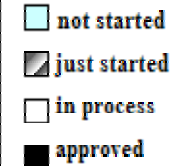
*... here's how it looks*



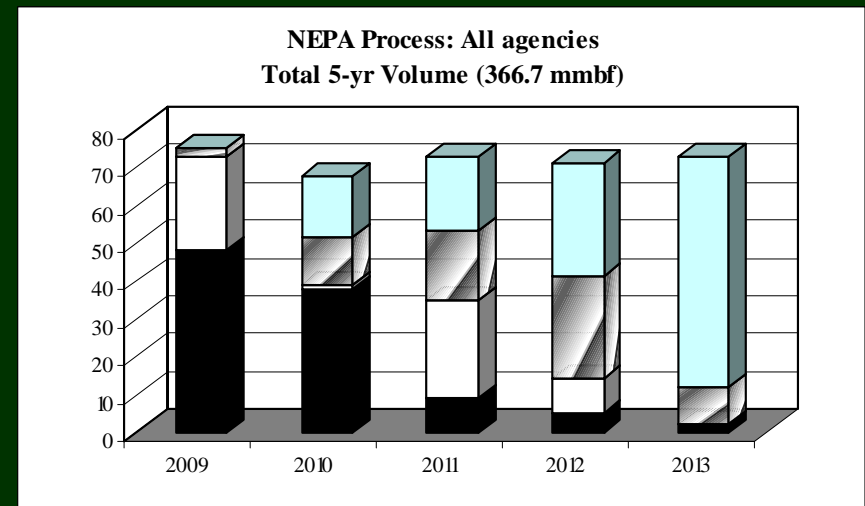
# Missouri CROP

## NEPA Picture for CROP Landscape

All NF & Dept. of Defense lands:  
75% of 5-yr total = (366.713 mmbf; includes gT as mmbf)



	<i>mmbf</i>	<i>% of total</i>
<i>Approved</i>	101.716	28%
<i>In process</i>	60.40	16%
<i>Just started</i>	70.852	19%
<i>Not started</i>	133.745	36%



44% of CROP resource offering either NEPA approved or in-process; but little approved in 2011 & 2012 and over a third has not started NEPA process.



*. . . but story best told on agency-by-agency basis.*

## NEPA Risk Rating

<b>1</b> Lowest	<b>2</b> Low	<b>3</b> Medium	<b>4</b> <i>High</i>	<b>5</b> <i>Highest</i>
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### For low risk rating, 3 key desired attributes:

- ✓ Volume *approved* in first 2 years, followed by *in-process*.
- ✓ Consistency in supply; no dramatic gaps from year to year (eg: *approved/not started/in-process*).
- ✓ Overall – no major emphasis on *just started* or *not started*.



NEPA Risk Rating Summary:

Mark Twain NF	Total 5-yr volume	NEPA Risk Rating
Ava/Cassville/ Willow Springs	64 mmbf	3
Houston/Rolla/ Cedar Creek	49.5 mmbf	2
Potosi/Fredericktown	82.5 mmbf	2
Salem	62.5 mmbf	1
Doniphan/Eleven Pt/ Poplar Bluff	101.7 mmbf	5

Ft. L. Wood	Total 5-yr volume	NEPA Risk Rating
Ft. Leonard Wood	6.485 mmbf	5

<b>1</b> Lowest	<b>2</b> Low	<b>3</b> Medium	<b>4</b> High	<b>5</b> Highest
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*What about road access to supply?*    *Here's how it looks . . .*

Agency	5-yr total volume	Affected by No Current Road Access		
	mmbf	mmbf	% of total volume with no road access	Species affected
Mark Twain NF	360.228	0	0%	
Dept. of Conservation	123.2	11.088	9%	oak species
Fort Leonard Wood	6.485	0	0%	
Total	489.913	11.088	2%	

## Conclusions for Missouri CROP . . . A fairly good picture . . .

- ✓ For log processing (resource >7" dbh), volume outlook appears sufficient to support existing large log processing and encourage investment in new small log processing center. Annual volume for small log processing would be ~ 25 mmbf, with over 60% in the larger diameter (9"-12") size where more grade can be captured.

- ✓ Volume available per year in biomass (<7" dbh) appears sufficient to encourage investment in a biomass-to-energy facility in the CROP landscape and open up biomass markets for private family forest landowners in the region.

*but . . .*

- ✓ Over one-third of five-year federal volume not started in NEPA process yet and another 20% just started. **May present higher risk factor for investors.**

*For more information:*

**Catherine M. Mater:**

President—Mater Ltd.

Senior Fellow – The Pinchot Institute for Conservation

Corvallis, Oregon; Washington, DC

tel: (541) 753-7335 fax: (541) 752-2952; cell: (541) 760-5526

*E-mail: catherine@mater.com*

**Edmund Gee:**

Nat'l Woody Biomass Utilization Team Leader

Nat'l Partnership Coordinator USFS

Washington DC

tel: (202) 205-1787 fax: (202) 205-1045 cell: (202) 236-5153

*E-mail: eagee@fs.fed.us*