



# Ecological Restoration Institute

*Economic Monitoring Report*

November 2015



## 2013–2014 White Mountain Stewardship Project Economic Assessment

***Prepared for:***

USDA Forest Service  
Apache-Sitgreaves National Forest  
Award #14-CR-11030121-019 (Yeon-Su Kim), Task #1

***Prepared by:***

Yeon-Su Kim, PhD  
School of Forestry and Ecological Restoration Institute  
Northern Arizona University  
Flagstaff, AZ 86011

Anne Mottek Lucas  
Mottek Consulting  
PO Box 22511  
Flagstaff, AZ 86002



*NAU is an equal opportunity provider.  
This research was funded by a grant from the USDA Forest Service.*

# Table of Contents

- Highlights** .....2
- Introduction** .....3
  - Background*.....3
  - Scope of Analysis*.....5
- Methodology** .....7
  - Questionnaire Format* .....7
  - Economic Impacts Estimation*.....7
- Findings: General Information**.....8
  - Summary of the Firms Supplied by the WMSP*.....8
  - Workforce Description*.....10
  - Employment and Cross-Commuting*.....12
- Findings: Economic Contributions of the WMSP** .....15
  - Economic Base Theory*.....15
  - Local Expenditures*.....19
  - Input-Output Modeling*.....22
- Conclusion** .....24
- Appendix A** .....25
- Appendix B** .....27
- Appendix C – Methodologies for Economic Impact Analysis**.....35
  - Economic Base Theory*.....35
  - Input-Output Modeling*.....35
- Appendix D – State and Local Taxes**.....37

## Highlights

- Changes brought about by ecological restoration treatments can enhance the delivery of many “ecosystem services,” which are positive benefits that contribute to the quality of human life and the economy in the region. Thus, the overall economic impacts of the White Mountain Stewardship Project (WMSP) may be much more substantial than those presented in this report.
- In the final years of the WMSP, the number of firms directly utilizing woody biomass from the WMSP had declined to six. All six firms provided data for this report (100 percent response rate). In total, 24 different businesses were engaged in woody biomass utilization from the WMSP throughout the life of the project (2004–2014).
- For the WMSP-related firms, most employees have been full-time, year-round employees. Cross-commuting within the region has been common.
- The six WMSP-related firms employed total of 123.8 full-time equivalents (FTEs) in 2013 and 128.3 FTEs in 2014.
- The economic contributions of the WMSP in 2013 and 2014 were analyzed using two different methodologies. Results of the two analyses are presented in this report, which should be viewed as a range of economic contributions from the WMSP.
- According to the economic base theory, the overall impact of the six firms are 197 FTEs in 2013 and 204 FTEs in 2014 and close to half of the total FTEs generated can be attributed to the WMSP.
- According to the input-output modeling approach using IMPLAN, the WMSP-related businesses in the region generated more than 242 local jobs in 2013 and 292 local jobs in 2014. If we assume their economic contribution is directly proportional to their purchase ratio from Future Forest, LLC, close to half of their employment and wages can be assigned as direct contributions of the WMSP.

Types of Impacts	<b>Economic Base Theory</b>				<b>Input-Output Modeling</b>			
	2013		2014		2013		2014	
	Total	With WMSP	Total	With WMSP	Total	With WMSP	Total	With WMSP
Direct	123.8	51	128.3	62.2	111	47	116	58
Indirect	73.3	29.2	75.7	37.4	107.2	63.2	140.8	51.1
Induced	-	-	-	-	24.4	12.7	35.1	11.5
<b>Total</b>	<b>197.1</b>	<b>80.2</b>	<b>204.0</b>	<b>99.6</b>	<b>242.6</b>	<b>122.9</b>	<b>291.9</b>	<b>120.6</b>

Estimated employment impacts of forest industries in the region.

## Introduction

Since its inception in August 2004, the White Mountain Stewardship Project (WMSP) has assisted in reviving active forest management and has been a primary source of forest-related economic activity in the region. Economic assessments of the WMSP began in 2006 for the 2005 calendar year and continued annually until its conclusion in August 2014. The WMSP Multi-Party Monitoring Board (Board) seeks to provide a quantitative economic evaluation based on primary data. The goal was to provide objective evaluation of the regional economic impacts of stewardship-driven timber harvesting.

Economic monitoring reports were prepared by Lay James Gibson of the University of Arizona from 2006–2007, then by McClure Consulting, LLC from 2008 to 2012. This report was prepared by Yeon-Su Kim and Anne Mottek for the years of 2013 and 2014. To ensure comparability of results over the years, we employed the same questionnaires and followed the methodology used in previous analyses. In the 2013/2014 analysis, we applied additional secondary data and economic modeling methodology to present a more comprehensive picture of the final years of the WMSP and its economic contribution.

### *Background*

The study area is an informally defined economic area within two eastern Arizona counties — Navajo and Apache. There is no census-designated metro area within the study area. These counties together represent about 2 percent of the state’s population. The economic condition of these two counties shows slow population and economic growth with persistent high unemployment and poverty (compared to national and Arizona state averages). These counties contain many small, remote communities and several Indian reservations. Most of the towns are far from urban centers, limiting availability of resources, access to transportation and market distribution channels.

Following the reduction in harvesting on regional national forests in the mid-1990s, most forest industry disappeared from the area along with its timber-related workforce, equipment, and associated industries. For example, timber harvest and production from Arizona’s national forests in 1996 dropped to about one-tenth of the harvest in 1990 and was mostly fuel wood, not industrial timber products.<sup>1</sup> The timber-related infrastructure in eastern Arizona that did remain was relatively close to wood fiber sources on private and tribal forested land. By 2002, the

---

<sup>1</sup>Morgan, T.A., T. Dillon, C.E. Keegan III, A.L. Chase, and M.T. Thompson. *The Four Corners Timber Harvest and Forest Products Industry, 2002*. 2006. Resource Bulletin. RMRS-RB-7. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 64p.

timber processing capability of the region rebounded briefly due to the availability of salvage sales, especially from the 2002 Rodeo-Chediski Fire.<sup>1</sup>

The Apache-Sitgreaves National Forest awarded and administered the WMSP on this forest. This forest consists of one million acres of ponderosa pine and mixed conifer forests and has both dry and semi-arid climates. It lies within the White Mountains range, a transition zone south of the Colorado Plateau and north of the Arizona Basin. This area has experienced overgrazing, logging, and fire suppression since the late 1800s, which has increased the risk of uncharacteristically severe wildfires.

Stakeholders and community members came together around forest health and economic development concerns beginning in 1997. At that time, a diverse group of stakeholders formed the Natural Resources Working Group in an effort to build consensus on forest restoration issues. Trade associations and nonprofit organizations such as Northern Arizona Wood Products Association, Little Colorado River Plateau Resource Conservation and Development (RC&D), and the Arizona Sustainable Forest Partnership have also been involved in supporting the redevelopment of a regional forest products industry.

Two of the largest wildfires in Arizona's history — the Rodeo-Chediski Fire (2002) and the Wallow Fire (2011) — burned about half a million acres each in the White Mountains. The Rodeo-Chediski Fire also spurred the Apache-Sitgreaves National Forest and stakeholders to take a new approach to forest health challenges.

In August 2004, the Apache-Sitgreaves awarded a 10-year stewardship contract with the initial target of treating 150,000 acres of primarily small diameter ponderosa pine,<sup>2</sup> with an emphasis on treating wildland-urban interface areas. The WMSP was the first 10-year stewardship contract in the nation. The contract was awarded to a single contractor, Future Forest, LLC, and they were paid on a per acre basis to perform fuels reduction and remove woody biomass from the national forest. The WMSP's Board formed to monitor the impacts of the project.

The WMSP has played an important role in reviving active forest management, providing a primary source of forest-related economic activity, and diversifying timber-processors in the region.<sup>3</sup> The WMSP contractor provided four types of materials through the contract: 1) clean

---

<sup>1</sup> Morgan, T.A., T. Dillon, C.E. Keegan III, A.L. Chase, and M.T. Thompson. *The Four Corners Timber Harvest and Forest Products Industry, 2002*. 2006. Resource Bulletin. RMRS-RB-7. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 64p.

<sup>2</sup> Total acre treated during the project duration is approximately 70,000 acres (See Table 3 for more detail).

<sup>3</sup> Sorenson, C.B.; Hayes, S.W.; Morgan, T.A.; McLver, C.P.; Thompson, M.T. 2015. The Four Corners timber harvest and forest products industry, 2012. Resour. Bull. RMRS-RB-XXX. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. (Ahead of Print).

chips (pellets), 2) dirty chips (commercial-grade pellets, biomass); 3) round wood (5 to 9-inch diameter trees); and 4) saw timber (9-inch and greater diameter trees.)<sup>4</sup>

### *Scope of Analysis*

The Board defined three goals for the economic assessment:

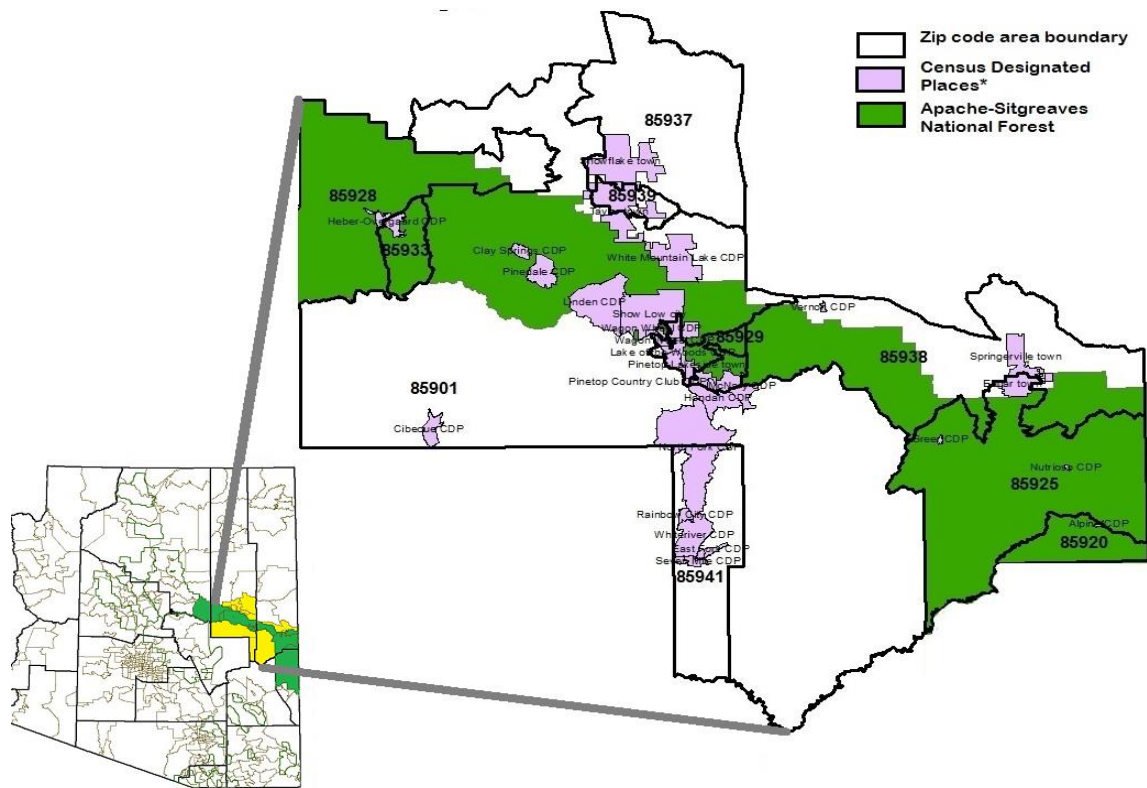
1. Identify firms that are directly involved in harvesting and processing forest products from the Future Forest, LLC contract.
2. Better understand the nature and extent of these firms in general, their stewardship-related work in particular, and the implications for the White Mountain region's economic system.
3. Determine ways that the impacts of the stewardship project might be enhanced and identify the economic development strategies that will be needed to assure that the White Mountain region realizes sustained economic benefit in the long term.

To achieve these goals, the assessments over the years have focused exclusively on economic activities directly supported by the WMSP through the Future Forest, LLC contract. This assessment does not address the full range of economic and social benefits from the WMSP. For example, forests provide important services such as: 1) sequestration of carbon that would otherwise contribute to climate change; 2) watershed, recreation, and cultural values; 3) nutrient cycling; and 4) increased economic value of real estate from scenic properties. Changes brought about by ecological restoration treatments can enhance the delivery of these “ecosystem services,” which contribute to the quality of human life and the economy in the region. Considering these economic contributions have not been quantified in this analysis, the economic impacts of the WMSP may be much more substantial than those presented in this report.

The economic area for this study is conservatively defined to focus on localized economic contributions of the WMSP. As in the previous economic assessments, the White Mountain region is defined as the contiguous area anchored on the east by Springerville/Eagar/Alpine, on the south by Whiteriver, on the west by Heber/Overgaard and on the northwest by Snowflake/Taylor. Ten zip codes were included in the economic model (Figure 1). All six firms that directly utilized woody biomass from the WMSP were surveyed for this report. All six firms provided data for this report (100 percent response rate).

---

<sup>4</sup> Sitko, S. and Hurteau, S. 2010. *Evaluating the Impacts of Forest Treatments: The First Five Years of the White Mountain Stewardship Project*. The Nature Conservancy, Phoenix, Arizona. Available at: [http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5362084.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5362084.pdf).



**Figure 1.** Study Area (Zip codes: 85920, 85925, 85938 within Apache County and 85901, 85928, 85929, 85933, 85937, 85939, 85941 within Navajo County)<sup>5</sup>

<sup>5</sup> A census designated place (CDP) is a concentration of population identified by the United States Census Bureau for statistical purposes. CDPs are delineated for each decennial census as the statistical counterparts of incorporated places, such as cities, towns, and villages.

## Methodology

### *Questionnaire Format*

We developed the recruitment script (Appendix A) and questionnaire (Appendix B) for the 2013–2014 survey. The questionnaire used to collect primary data was initially developed in the fall of 2005 (revised in 2006; expanded 2009 and 2013/14). The questions were originally designed to provide:

- Full contact information for all firms included in the study;
- Detailed data on employment;
- Economic base bifurcation data to support multiplier analysis based on economic base theory;
- Data on dependence on Future Forest, LLC for material inputs;
- Data on geographic markets for outputs; and
- Data on major expenditures for goods and services by specific type.

The data provided in the surveys were best estimates of ranking company officials. To assure comparability of data, most questions remained the same over the years. This provided data to assess long-term changes in the economic activities as the WMSP evolved. However, categories for expenditures reported by firms have been revised in 2006 and additional categories were added in 2009 and 2013/14. For this report, the latest expanded expenditure categories have been used.

### *Economic Impacts Estimation*

To analyze economic impacts of the WMSP, we applied two different methodologies to estimate economic contributions originating from the WMSP. As explained in previous reports, economic assessments from 2005–2012 were based on the simple-export model developed according to the economic base theory. In this approach, total employment is divided into two groups: 1) “basic” employment is for producing goods to export, which means sales out of the predefined region; and 2) “non-basic” employment is for producing goods that are purchased locally. The multiplier of 1.63 was applied based on the most recent figure used in the 2011 and 2012 reports, which translates to 100 “basic” jobs in export created 63 additional jobs (indirect impacts) within the region.

First, we applied this same methodology to ensure comparability with previous reports. Second, we employed additional methodology based on input-output modeling. We used the economic impact modeling software IMPLAN 3.0 to describe the contributions of the WMSP to the local economy. An input-output model measures how any individual change in the economy ripples



through the rest of the economy. Input-output models represent the complex set of inter-industry exchanges that occur in the production and consumption of that economy’s goods and services. With input-output models, we can track three different types of economic impacts: 1) “direct impacts” are those economic activities of the firms directly utilizing woody biomass from the WMSP; 2) “indirect impacts” are the subsequent economic activities stimulated by firms’ expenditures; and 3) “induced impacts” represent the household consumption created by wages paid to employees in the sectors impacted by “direct” and “indirect” impacts. We estimated the direct impacts based on the number of employees who are local residents. To be conservative, we only applied those local expenditures reported by the surveyed businesses to estimate indirect and induced impacts. If we used the IMPLAN default values based on the number of employees, the indirect and induced impacts would have been substantially higher.

Results of the two analyses are presented in this report. There are fundamental differences in how we view the “economic growth” of a region in the economic base theory and input-output modeling, thus different results should be viewed as a range of economic contributions from the WMSP. Appendix C contains a detailed description of the economic methodologies.

## Findings: General Information

### *Summary of the Firms Supplied by the WMSP*

In the final years of the WMSP, the number of firms that directly utilized woody biomass from the WMSP had declined to six. All six firms provided data for this report (100 percent response rate). Table 1 provides the list of the firms and the type of woody biomass utilized.

**Table 1.** Firms engaged in woody biomass products delivered by/to Future Forest, LLC (2013–2014).

Purchasing Firms	Woody Biomass Inputs/Outputs					
	Clean chips	Dirty chips	Round-wood	Saw Timber	Harvesting Woody Biomass	Bioenergy
APC Lumber (Eager)			X	X		
Arizona Log & Timberworks (Eagar)			X	X		
Forest Energy Corp. (Show Low)	X	X	X			
Future Forest (Pinetop)					X	
Novo Biopower (Snowflake)						X
Reidhead Bros. Lumber (Nutrioso)			X	X		

Table 2 provides a list of all firms that used the materials from the WSMP throughout the life of the WSMP. In total, 24 different businesses were engaged in woody biomass utilization from the WSMP from 2005–2014.

**Table 2.** Firms engaged in woody biomass products delivered by/to Future Forest, LLC (2005–2014).

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total # of businesses (# responded)	13 (13)	15 (15)	15 (15)	13 (13)	14 (13)	14 (14)	12 (12)	13 (6)	6 (6)*	6 (6)
<u>Pinetop-Lakeside</u>										
Canyon Creek Logging					X	X	X	X		
Future Forest	X	X	X	X	X	X	X	X	X	X
Show Low										
Forest Energy Corp.	X	X	X	X	X	X	X	X	X	X
<u>Snowflake/Taylor/Clay Springs</u>										
Mountain Top Wood Products		X	X							
Moulding Accents			X	X						
Novo Biopower									X	X
Snowflake Power LLC						X	X			
Snowflake Lumber Moulding	X	X	X							
Reenergy	X	X	X	X	X		X			
TriStar Logging, Inc.	X	X	X	X	X	X	X			
Western Molding		X								
Winner’s Circle Soils, Inc.	X	X	X	X	X					
<u>Heber/Overgaard</u>										
Cooley Forest Products				X	X	X				
<u>Alpine/Nutriosio</u>										
R&J Eco-Challenge West, Inc/Holiday Timber					X	X	X	X		
Nutriosio Logging		X	X	X	X	X				
Reidhead Bros. Lumber	X	X	X	X		X			X	X
<u>Springerville/Eagar</u>										
APC Lumber				X	X	X	X		X	X
Arizona Log & Timberworks	X	X	X	X	X	X	X		X	X
Reidhead Bros. Re-manufacturing	X	X	X							
Round Valley Wholesale Lumber	X	X	X	X	X	X	X	X		
WB Contracting	X	X	X	X	X	X	X	X		
Western Renewable Energy	X	X								
<u>Phoenix</u>										
APC Pallets			X			X				
Southwest Forest Products, Inc.	X									

Green X represents the first year entry as the WSMP related business for the firm.

\*This includes one business that did get raw material from the Future Forest, LLC in 2014, but not in 2013.

## Workforce Description

Since 2005, employment data have been collected annually by gender and job status (full-time, part-time, and seasonal). These data were converted to a FTE or full-time equivalent value to facilitate comparisons between firms. To be consistent with the previous reports, our definition of an employee includes owners, family members, managers, and hourly workers, including both part-time and seasonal.

For the WMSP-related firms, most employees have been full-time, year-round employees, thus the differences between the number of employees and FTEs have been minimal. Employment structure has been male-dominated, which accounts for 89 percent of full and part-time employees in 2013 and 2014 (more than 82 percent of the project's duration).

**Table 3.** Number of employees and FTEs with biomass removed and acres treated by the WMSP (2005–2014).

	2005 <sup>1</sup>	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Number of Responded Firms</b>	13	15	15	13	13	14	12	6	6	6
Full time	414	222	195	226	184	272	279	92	121	124
Part time	6	13	13	11	7	14	7	10	4	4
% male <sup>2</sup>	86	82	85	88	86	88	91	88	89	89
% female	14	18	15	12	14	12	9	12	11	11
Seasonal	44	28	39	21	40	53	32	11	2	5
<b>Total employees</b>	<b>464</b>	<b>263</b>	<b>247</b>	<b>258</b>	<b>231</b>	<b>339</b>	<b>318</b>	<b>113</b>	<b>127</b>	<b>133</b>
FTE Value	449.9	245.5	228	246.1	213.3	316.6	308	105.3	123.8	128.3
FTE/Firm	34.61	16.37	15.20	18.93	16.41	22.61	25.67	17.55	20.63	21.38
<b>Local WMSP FTE only<sup>3</sup></b>	<b>80.6</b>	<b>90.2</b>	<b>128</b>	<b>146</b>	<b>158</b>	<b>253</b>	<b>186</b>	<b>88</b>	<b>51</b>	<b>62</b>
Businesses in AZ <sup>4</sup>	222	233	243	236	200	193	192	186	180	182
Employment in AZ <sup>4</sup>	9,768	9,673	7,660	5,683	3,812	3,187	3,155	3,196	3,613	3,883
1,000 green tons removed <sup>5</sup>	73.1	182.5	152.3	179.1	169.8	251.7	254.4	224.1	184.3	149.0
Acres treated <sup>5</sup>	3,105	8,221	8,871	8,802	6,213	9,446	8,562	5,955	6,807	4,620

<sup>1</sup> 2005 figure is skewed by one time contribution of a business with 200 employees located in Phoenix.

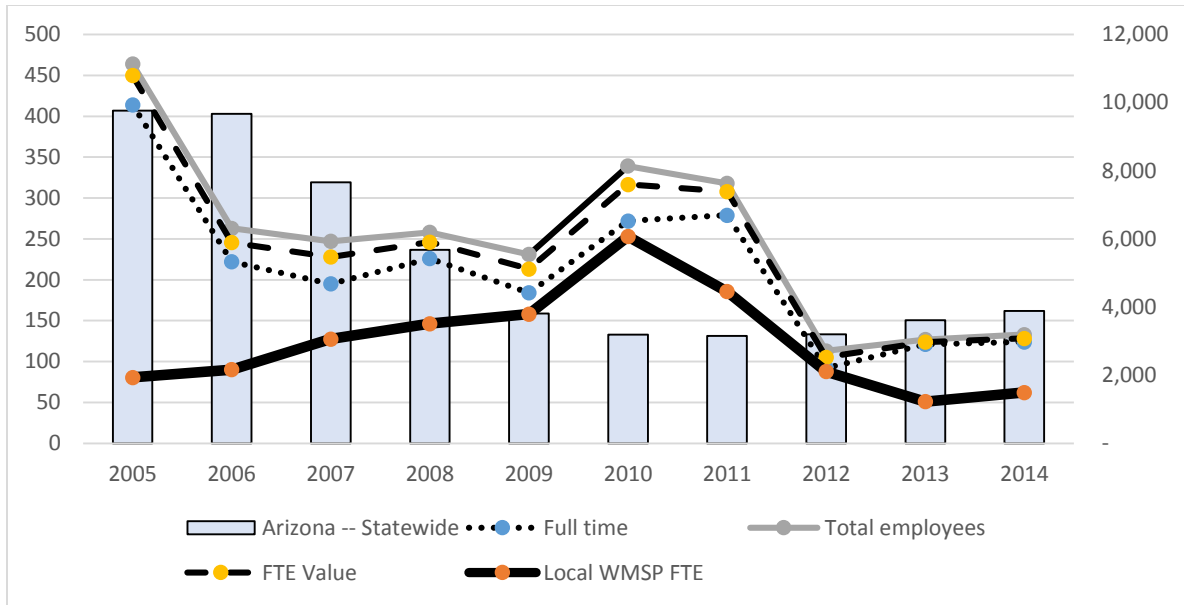
<sup>2</sup> Percent (%) male employees among full and part time employees. Most seasonal employees were male.

<sup>3</sup> Local WMSP FTE represent the number of employments that are directly supported by materials from the WMSP and those local employees that reside in the economic area.

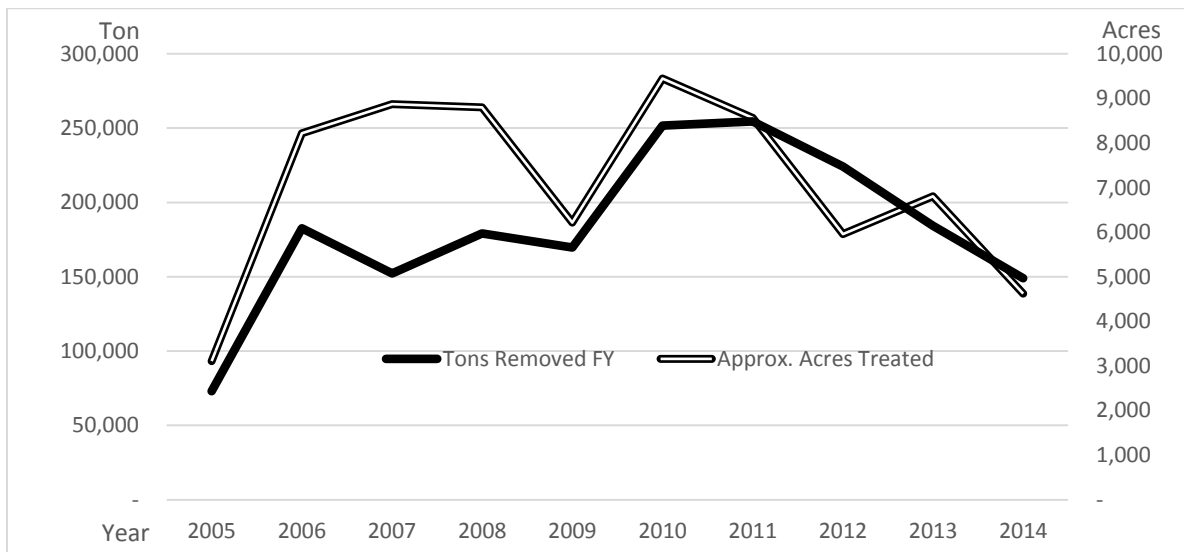
<sup>4</sup> These are the total number of establishments and total employees in all the subsectors in the Forestry and Logging sector (NAICS=113) and Wood Product Manufacturing sector (NAICS=321) in Arizona (Source: Bureau of Labor Statistics).

<sup>5</sup> These are biomass removed (green tons) and approximate acres treated by the WMSP reported in fiscal year.

The acres treated by WMSP and the biomass removed, as well as WMSP-supported employment, peaked in 2010–2011, and then declined to the lowest point for the final three years of the project (Figures 2 and 3).



**Figure 2.** Number of Employees and FTEs (2005–2014).



**Figure 3.** Biomass (Green Tons) removed and Approximate Acres treated during the WMSP.

## *Employment and Cross-Commuting*

Information about the places of work and residence is useful in understanding the distribution of economic impacts within the study area. The information was organized to allow comparisons with previous years' reports. For a comparison, Table 4 presents the data on cross-commuting from an early year (2006) of the WMSP.<sup>6</sup>

The pattern of employee distribution did not change much over the years. The areas of Snowflake/Taylor/Clay Springs, Show Low, and Alpine/Nutriosio have been the place of work for residents of the broader area. Most of the employees in the area of Springerville/Eager reside in the same area, while the area of Heber/Overgaard has received economic benefits from the workers who reside in the area but are employed elsewhere.

The data on cross-commuting in 2013 and 2014 present similar patterns (Table 5 and Table 6), which show the areas of Snowflake/Taylor/Clay Springs, Show Low, and Alpine/Nutriosio as the place of work.

---

<sup>6</sup> 2005 is the first year of the WSMP economic monitoring. However, the places were defined differently and the information is difficult to compare with the latter reports.

**Table 4.** Cross-commuting: Estimated number of FTE employees by place of work and place of residence (2006) (n=15).

Place of Residence →									Total
Place of Work ↓	Pinetop-Lakeside	Show Low	Snowflake/Taylor/Clay Springs	Heber/Overgaard	Springerville/Eagar	Alpine/Nutriosio	Whiteriver/Fort Apache	Outside Region	(% local residents)
Pinetop-Lakeside		1			1				<b>2(0)</b>
Show Low	9	<b>16</b>			1	1	1	8	<b>36(44)</b>
Snowflake/Taylor/Clay Springs	4	6.15	<b>59.28</b>	29.88			1	18.15	<b>118.46 (50)</b>
Heber/Overgaard									<b>0</b>
Springerville/Eagar					<b>62.73</b>		0.75		<b>63.48 (99)</b>
Alpine/Nutriosio					19.98	<b>4.5</b>		2	<b>26.48 (17)</b>
Whiteriver/Fort Apache									<b>0</b>
Outside Region									<b>0</b>
<b>Total</b>	<b>13</b>	<b>23.15</b>	<b>59.28</b>	<b>29.88</b>	<b>84.71</b>	<b>5.5</b>	<b>2.75</b>	<b>28.15</b>	<b>246.42 (88.6)</b>

**Table 5.** Cross-commuting: Estimated number of FTE employees by place of work and place of residence (2013) (n=6).

Place of Residence →									Total
Place of Work ↓	Pinetop-Lakeside	Show Low	Snowflake/Taylor/Clay Springs	Heber/Overgaard	Springerville/Eagar	Alpine/Nutriosio	Whiteriver/Fort Apache	Outside Region	(% local residents)
Pinetop-Lakeside		1			1.67				<b>2.67(0)</b>
Show Low	13	<b>14.7</b>	9				1	2	<b>39.7 (37)</b>
Snowflake/Taylor/Clay Springs	2	3	<b>20</b>	3				7	<b>35 (57)</b>
Heber/Overgaard									<b>0</b>
Springerville/Eagar					<b>18.41</b>			3	<b>21.41 (86)</b>
Alpine/Nutriosio		2			20	<b>3</b>			<b>25 (12)</b>
Whiteriver/Fort Apache									<b>0</b>
Outside Region									<b>0</b>
<b>Total</b>	<b>15</b>	<b>20.7</b>	<b>29</b>	<b>3</b>	<b>40.08</b>	<b>3</b>	<b>1</b>	<b>12</b>	<b>123.78 (90)</b>

**Table 6.** Cross-commuting: Estimated number of FTE employees by place of work and place of residence (2014) (n=6).

Place of Residence →	Pinetop-Lakeside	Show Low	Snowflake/Taylor/Clay Springs	Heber/Overgaard	Springerville/Eagar	Alpine/Nutriosio	Whiteriver/Fort Apache	Outside Region	Total (% local residents)
Place of Work ↓									
Pinetop-Lakeside		1			1.67				<b>2.67 (0)</b>
Show Low	13	<b>14.7</b>	9				1	2	<b>39.7 (37)</b>
Snowflake/Taylor/Clay Springs	2	3	<b>20</b>	3				7	<b>35 (57)</b>
Heber/Overgaard									<b>0</b>
Springerville/Eagar					<b>22.92</b>			3	<b>25.92 (88)</b>
Alpine/Nutriosio		2			20	3			<b>25 (12)</b>
Whiteriver/Fort Apache									<b>0</b>
Outside Region									<b>0</b>
<b>Total</b>	<b>15</b>	<b>20.7</b>	<b>29</b>	<b>3</b>	<b>43.92</b>	<b>3</b>	<b>1</b>	<b>12</b>	<b>128.29 (90)</b>

## Findings: Economic Contributions of the WMSP

### *Economic Base Theory*

To be consistent with previous reports (2005–2012), a simple export-based model was employed here. The number of total employment was estimated as a fixed ratio of the number of jobs referred to as “basic” jobs for producing goods that are “exported” (i.e. goods shipped out of the local region).

The information collected for 2013 and 2014 is organized here by dividing basic employment from local serving, non-basic employment (Table 7). The six WMSP-related firms employed a total of 123.8 FTEs in 2013 and 128.3 FTEs in 2014. Of these, 7.4 FTEs in 2013 and 8.1 FTEs in 2014 are local serving (non-basic); and a substantially greater proportion, 116.4 FTEs in 2013 and 120.2 FTEs in 2014 are basic (export) employment with a multiplier impact.

**Table 7.** Estimated basic and non-basic FTE employees living and working in the White Mountain region and employed by firms conducting business with Future Forest, LLC (2013–2014) (n=6).

Place of Work ↓	2013			2014		
	Basic	Non-basic	<b>Total</b>	Basic	Non-basic	<b>Total</b>
Pinetop-Lakeside	2.7	0.0	<b>2.7</b>	2.7	0.0	<b>2.7</b>
Show Low	35.1	4.6	<b>39.7</b>	34.6	5.1	<b>39.7</b>
Snowflake/Taylor/Clay Springs	33.7	1.3	<b>35.0</b>	33.1	1.9	<b>35.0</b>
Heber/Overgaard	0.0	0.0	<b>0.0</b>	0.0	0.0	<b>0.0</b>
Springerville/Eagar	19.9	1.5	<b>21.4</b>	24.8	1.1	<b>25.9</b>
Alpine/Nutrioso	25.0	0.0	<b>25.0</b>	25.0	0.0	<b>25.0</b>
Total employment within the region	116.4	7.4	<b>123.8</b>	120.2	8.1	<b>128.3</b>

We separated the employment that can be traced back directly to the WMSP, using the reported proposition of the firms’ total production linked to inputs purchased from/by Future Forest, LLC. The raw material supplied by Future Forest, LLC generated 51 FTEs (41 percent) out of 123.8 FTEs in 2013 and 62.2 FTEs (48 percent) out of 128.3 FTEs in 2014 (Table 8).



**Table 8.** Estimated basic and non-basic FTE employees living and working in White Mountain region who are directly supported by material harvested by Future Forest, LLC (2013–2014) (n=6).

Place of Work ↓	2013			2014		
	Basic	Non-basic	<b>Total</b>	Basic	Non-basic	<b>Total</b>
Pinetop-Lakeside	2.7	0.0	<b>2.7</b>	2.7	0.0	<b>2.7</b>
Show Low	25.6	3.3	<b>29.0</b>	14.2	2.1	<b>16.3</b>
Snowflake/Taylor/Clay Springs	3.2	0.1	<b>3.3</b>	2.6	0.1	<b>2.7</b>
Heber/Overgaard	0.0	0.0	<b>0.0</b>	0.0	0.0	<b>0.0</b>
Springerville/Eagar	15.0	1.1	<b>16.1</b>	14.9	0.7	<b>15.6</b>
Alpine/Nutrioso	0.0	0.0	<b>0.0</b>	25.0	0.0	<b>25.0</b>
Total employment within the region	46.4	4.6	<b>51.0</b>	59.3	3.0	<b>62.2</b>

Based on previous reports, the multiplier used is 1.63, meaning every 100 basic export jobs generates additional 63 jobs indirectly in the region. Table 9 presents the employment generated by the WMSP in 2013 and 2014, which includes direct employment (A), and indirect employment ( $C = B \times \text{Multiplier}$ ) generated by basic employment (B). Total employment created by the raw materials supplied by the WMSP are 197 FTEs in 2013 and 204 FTEs in 2014. These are the overall contribution of the six firms conducting business with Future Forest, LLC in 2013/14. Close to 50 percent of the total FTEs generated can be attributed to the WMSP.

As noted above, this methodology (for detailed description of the methodology, see Appendix C) emphasizes the role of export in regional economic growth, thus providing raw material to a business that exports 100 percent (e.g. Novo BioPower) would generate more local jobs. However, processed round wood and saw timber can be supplied to secondary processors within the region that export their final products. Thus, the need for building more forestry infrastructure and supporting industries within the region can be underemphasized using this methodology.

Total numbers of employment generated in previous years of the WMSP are organized in Tables 10–12.

**Table 9.** Estimated employment impact of forest industries in the White Mountain region with and without Future Forest, LLC.

Employment Type	2013			2014		
	Total	With FF	Without FF	Total	With FF	Without FF
Direct (A)	<b>123.8</b>	51	72.8	<b>128.3</b>	62.2	66.1
Basic (B)	<b>116.4</b>	46.4	70.0	<b>120.2</b>	59.3	60.9
Indirect (C= B * multiplier)	<b>73.3</b>	29.2	44.1	<b>75.7</b>	37.4	38.4
Total Direct and Indirect (A+C)	<b>197.1</b>	80.2	116.9	<b>204.0</b>	99.6	104.5

**Table 10.** Estimated basic and non-basic FTE employees living and working in the White Mountain region and employed by firms with the Future Forest, LLC connection (2005–2012).

Place of Work ↓	2005		2006		2007		2008		2009		2010		2011		2012	
	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total
Pinetop-Lakeside	0.0	2.0	0	2.0	0.03	3.0	1.96	4.0	3.04	5.8	5.98	10.0	7.4	12.4	8.3	8.3
Show Low	26.6	28.3	26.32	28.0	34.78	37.0	35.40	36.3	43.47	46.3	39.9	42.0	37.1	39.1	36.3	36.3
Snowflake/Taylor /Clay Springs	95.1	116.7	92.24	100.3	84.27	107.9	93.63	106.8	53.7	63.3	50.69	64.5	70.9	80.7		
Heber/Overgaard	0.0	0.0	0.0	0.0	0.0	0.0	17.50	17.5	14.72	16.0	80.54	94.8	47.1	47.2		
Springerville/Eagar	30.0	81.2	17.4	63.5	14	51.7	36.64	58.9	38.01	66.5	47.54	69.9	51.7	70.0	38.6	38.6
Alpine/Nutriosio	0.0	0.0	8.5	23.6	7.81	13.4	5.05	21.6	3.73	15.5	10.5	17.5	3.0	5.0	5.1	5.1
<b>Total employment within the region</b>	<b>151.7</b>	<b>228.2</b>	<b>144.5</b>	<b>217.4</b>	<b>140.9</b>	<b>213.0</b>	<b>190.2</b>	<b>245.1</b>	<b>156.7</b>	<b>213.3</b>	<b>235.2</b>	<b>298.6</b>	<b>217.2</b>	<b>254.4</b>	<b>88.3</b>	<b>105.4</b>

**Table 11.** Estimated basic and non-basic FTE employees living and working in White Mountain region who are directly supported by material harvested by Future Forest, LLC (2005–2012).

Place of Work ↓	2005		2006		2007		2008		2009		2010		2011		2012	
	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total	Basic	Total
Pinetop-Lakeside	0.0	2.0	0	2.0	0.03	3.0	1.96	4.0	3.04	5.8	5.98	10.0	7.4	12.4	8.3	13.8
Show Low	15.4	16.4	13.69	14.6	24.34	25.9	23.1	24.3	33.91	36.1	38.7	40.7	30.9	32.5	32.3	35.1
Snowflake/Taylor /Clay Springs	17.9	20.3	9.8	15.2	42.6	52.8	34.0	43.4	30.22	38.6	39.71	53.4	36	45.8		
Heber/Overgaard	0.0	0.0	0.0	0.0	0.0	0.0	7.18	7.2	6.77	7.4	57.99	68.2	23.6	23.7		
Springerville/Eagar	5.2	41.9	17.16	43.3	13.53	37.9	35.2	51.7	35.36	59.2	45.26	64.9	50.8	68.0	28.1	33.1
Alpine/Nutriosio	0.0	0.0	4.25	15.1	3.9	8.0	4.5	15.6	1.49	11.0	9.47	15.8	2.0	3.3	3.4	5.7
<b>Total employment within the region</b>	<b>38.5</b>	<b>80.6</b>	<b>44.9</b>	<b>90.2</b>	<b>84.4</b>	<b>127.5</b>	<b>105.9</b>	<b>146.3</b>	<b>110.8</b>	<b>158.0</b>	<b>197.1</b>	<b>253.0</b>	<b>150.7</b>	<b>185.7</b>	<b>72.1</b>	<b>87.7</b>

**Table 12.** Estimated employment impact of forest industries on the White Mountain region with Future Forest, LLC (2005–2012).

Employment Type	2005		2006		2007		2008		2009		2010		2011		2012	
	Total	FF	Total	FF	Total	FF	Total	FF	Total	FF	Total	FF	Total	FF	Total	FF
Direct (A)	228.2	80.6	217.4	90.2	213.0	127.5	246.1	146.3	213.3	158.0	316.6	271.0	308.1	212.6	105.3	87.6
Basic (B)	151.7	38.5	144.5	44.9	140.9	84.4	190.2	105.9	156.7	110.8	253.3	213.5	217.2	150.8	88.3	72.1
Indirect (C= B * multiplier)	89.6	22.8	85.4	26.5	83.3	49.9	112.4	62.6	92.6	65.5	149.7	126.2	136.9	95.0	55.6	45.4
<b>Total Direct and Indirect (A+C)</b>	<b>317.8</b>	<b>103.4</b>	<b>302.8</b>	<b>116.7</b>	<b>296.3</b>	<b>177.4</b>	<b>358.5</b>	<b>208.9</b>	<b>305.9</b>	<b>223.5</b>	<b>466.3</b>	<b>397.2</b>	<b>444.9</b>	<b>307.6</b>	<b>160.9</b>	<b>133.1</b>

## *Local Expenditures*

Expenditure categories have been expanded over the years to capture additional expenditures for goods and services within the White Mountain region. This information assists in understanding the WMSP firm's access to critical supplies within the region and provides policy recommendations for increasing the proportion of locally purchased production inputs.

The key local expenditure item is raw material (clean and dirty chips, round wood, and saw timber). Raw materials were harvested by a number of entities — including, but not limited to, Future Forest, LLC. Following this are outsourced hauling, petroleum products, heavy equipment, mill equipment, heavy equipment parts, and electricity. Other substantial expenditures are for mill parts, vehicle parts and tires, and transportation equipment. The 20 categories account for estimated expenditures of more than \$21 million in 2013 and \$25 million in 2014, including more than 65 percent in local spending. Utilities (e.g. electricity, petroleum products, water/sewer) were entirely local expenditures. The proportion of local purchases in raw materials and hauling were also high. Mill equipment, mill parts, heavy equipment, and heavy equipment parts, on the other hand, often are purchased outside the region. Previous reports treated employment and expenditures as mutually exclusive categories. To be consistent with previously reported figures, we have removed employee compensation reported by two firms in “other” expenditure category for 2013 and 2014. Table 13 presents the estimated total and local expenditures of the WMSP-related firms for selected goods in 2013 and 2014.

For economic development of the WMSP region, increases in local expenditures for goods and services would provide greater economic benefits to the region. However, not all industries can purchase their inputs locally. For example, petroleum products were exclusively (100 percent) bought locally, but without a refinery in the region, the only expenditure retained in the region would be the profit margins from sales. On the other hand, raw material for the forestry industry can be supplied sustainably within the region. Local expenditures for forest products can be retained and multiplied within the region as the profit margins from both production and sales. Therefore, increased expenditures for locally produced goods and services translates to increased local economic impact. Table 14 presents the local expenditure spending patterns from 2005–2012.

**Table 13.** Estimated total and local (White Mountain region) expenditures of the WMSP-related firms for selected goods in 2013 and 2014 (n=6).

	<b>2013</b>		<b>2014</b>	
	Total Expenditure (\$)	% local	Total Expenditure (\$)	% local
Raw Material	\$6,796,504	74%	\$11,554,197	74%
Hauling (outsourced)	\$3,203,494	88%	\$2,590,451	88%
Electricity	\$1,933,217	100%	\$3,666,826	100%
Mill Equipment	\$5,489,955	44%	\$2,319,000	44%
Mill Parts	\$1,038,034	49%	\$1,604,843	44%
Transport Equipment	\$30,000	0%	\$28,000	0%
Petroleum Products	\$496,873	100%	\$622,497	100%
Vehicle Parts, Tires	\$39,125	100%	\$49,135	100%
Heavy Equipment	\$20,000	0%	\$29,500	0%
Heavy Equipment Parts	\$11,436	70%	\$55,375	70%
Water/Sewer	\$17,324	100%	\$25,951	100%
Gas	\$33,967	0%	\$57,000	0%
Insurance	\$633,454	25%	\$986,161	42%
Major product inputs not listed above	\$954,571	100%	\$1,106,494	100%
Facility Rental	\$196,672	100%	\$164,866	100%
Property Taxes	\$253,729	100%	\$232,331	100%
Repairs				
Others	\$48,260		\$48,260	
<b>Total</b>	<b>\$21,196,615</b>	<b>66.6%</b>	<b>\$25,140,887</b>	<b>66.3%</b>
		(\$14 M)		(\$16.7M)

**Table 14.** Estimated total and local (White Mountain Region) expenditures of the WMSP-related firms for selected goods (2005–2012).

	2005			2006			2007			2008			2009			2010			2011			2012		
	Total in	Total in	%	Total in	%	Total in	%	Total in	%	Total in	%	Total in	%	Total in	%	Total in	%	Total in	%	Total in	%	Total in	%	
	\$1,000	\$1,000	local	\$1,000	local	\$1,000	local	\$1,000	local	\$1,000	local	\$1,000	local	\$1,000	local	\$1,000	local	\$1,000	local	\$1,000	local	\$1,000	local	
Raw Material	\$4,655	\$8,255	93	\$7,627	59	\$4,864	84	\$5,064	89	\$9,159	91	\$4,266	100	\$3,010	99									
Hauling (outsourced)	\$1,677	\$3,024	66	\$2,930	76	\$4,891	82	\$4,094	86	\$5,558	83	\$9,107	98	\$7,600	98									
Electricity	\$921	\$1,041	100	\$976	100	\$1,132	98	\$1,148	100	\$2,176	43	\$2,419	38	-										
Mill Equipment	\$1,097	\$2,264	0	\$2,271	24	\$1,239	68	\$357	87	\$918	67	\$100	25	-										
Mill Parts	\$1,133	\$639	39	\$486	18	\$719	33	\$689	34	\$687	27	\$640	25	\$689	27									
Transport Equipment		\$306	75	\$331	42	\$193	53	\$243	11	\$339	1	\$11	100	-										
Petroleum Products	\$2,014	\$2,519	100	\$2,896	48	\$2,817	75	\$1,657	100	\$2,618	72	\$2,434	86	\$1,504	78									
Vehicle Parts, Tires	\$381	\$468	88	\$364	86	\$438	86	\$169	93	\$506	81	\$492	87	\$176	90									
Heavy Equipment		\$2,393	32	\$1,134	16	\$1,028	30	\$1,521	32	\$3,150	17	\$1,139	30	\$851	82									
Heavy Equipment Parts		\$1,703	62	\$1,011	0	\$1,171	77	\$931	44	\$1,197	66	\$1,194	57	\$595	63									
Water/Sewer	-	-		-		-		-		-		\$14		\$17										
Gas	-	-		-		-		-		-		\$112		-										
Insurance	\$142	-		-		-		-		-		\$1,170		\$784										
Major product inputs not listed above	-	-		-		-		-		-		\$913		\$940										
Facility Rental	-	-		-		-		-		-		\$154		\$171										
Property Taxes	-	-		-		-		-		-		\$263		\$72										
Repairs	\$105	-		-		-		-		-		-		-										
Others	-	-		-		-		\$1,506		\$1,130		\$112		-										
<b>Total</b>	<b>\$12,125</b>	<b>\$22,612</b>	<b>70.6</b>	<b>\$20,026</b>	<b>52.0</b>	<b>\$18,492</b>	<b>76.3</b>	<b>\$17,379</b>	<b>74.3</b>	<b>\$27,438</b>	<b>67.2</b>	<b>\$24,542</b>	<b>76.1</b>	<b>\$16,410</b>	<b>82.5</b>									

## *Input-Output Modeling*

We applied the input-output modeling approach using IMPLAN to estimate the economic contribution of the WMSP to the regional economy. The direct impacts were estimated by applying the surveyed number of employees who are local residents. This approach focuses more on the employee places of residence, which allows us to estimate subsequent economic impacts of wages and personal taxes paid by local residents. To be conservative, we only applied those expenditures reported by the surveyed businesses<sup>7</sup> to estimate indirect and induced impacts, which are the subsequent economic activities stimulated by firm's expenditures and the household consumption created by wages paid to employees in the affected sectors.

In 2013, the WMSP-related businesses in the region generated more than 242 local jobs, \$13 million in wages (labor income), \$106 million in economic output (value of production), and \$13 million in state and local tax revenues, including personal taxes and taxes on production and import, such as sales and property taxes, motor vehicle licenses, severance taxes, and others (Table 15). These are total economic contributions of the six firms still conducting business with Future Forest, LLC in 2013. If we assume their economic contribution is directly proportional to their purchase ratio from the Future Forest, LLC, the total firm's contribution to the WMSP is: 1) about half of jobs and wages, 2) one-quarter of economic output, and 3) 13 percent of total state and local taxes paid by the businesses and their employees.

In 2014, the WMSP-related businesses in the region generated about 292 local jobs, \$17 million in wages, \$118 million in economic output, and \$16 million in state and local tax revenues (Table 16). The contribution of the WMSP to the economic output of the six businesses were lower in 2014 than in 2013, but still substantial. These firms accounted for: 1) over one-third of jobs and wages, 2) one-fifth of economic output, and 3) 11 percent of state and local taxes paid by these business and their employees. See Appendix D for the breakdown of all state and local tax revenues.

---

<sup>7</sup> We have removed employee compensation directly reported by two firms in "other" expenditure category. IMPLAN estimates total wages paid by a firm based on the FTE reported and average wage of the industry sector in the region.

**Table 15.** Estimated economic impact of the WMSP forest industries on the White Mountain region (2013) with IMPLAN (n=6).

Economic Contribution (2013 unadjusted \$)		Industry Total	With the WMSP	% with the WMSP
Jobs	Direct Effect	111	47	42%
	Indirect Effect	107.2	63.2	59%
	Induced Effect	24.4	12.7	52%
	<b>Total Effect</b>	<b>242.6</b>	<b>122.9</b>	<b>51%</b>
Wages	Direct Effect	\$6,266,523	\$2,322,266	37%
	Indirect Effect	\$6,223,178	\$3,241,372	52%
	Induced Effect	\$756,509	\$392,051	52%
	<b>Total Effect</b>	<b>\$13,246,210</b>	<b>\$5,955,689</b>	<b>45%</b>
Economic Output	Direct Effect	\$90,275,268	\$16,434,046	18%
	Indirect Effect	\$13,630,087	\$7,251,924	53%
	Induced Effect	\$2,697,428	\$1,397,910	52%
	<b>Total Effect</b>	<b>\$106,602,783</b>	<b>\$25,083,880</b>	<b>24%</b>
State and Local Taxes		<b>\$15,736,187</b>	<b>\$2,005,736</b>	<b>13%</b>

**Table 16.** Estimated economic impact of the WMSP forest industries on the White Mountain region (2014) with IMPLAN (n=6).

Economic Contribution (2014 unadjusted \$)		Industry Total	With the WMSP	% with the WMSP
Jobs	Direct Effect	116	58	50%
	Indirect Effect	140.8	51.1	36%
	Induced Effect	35.1	11.5	33%
	<b>Total Effect</b>	<b>291.9</b>	<b>120.6</b>	<b>41%</b>
Wages	Direct Effect	\$6,746,623	\$2,318,614	34%
	Indirect Effect	\$9,085,987	\$2,997,067	33%
	Induced Effect	\$1,107,725	\$363,743	33%
	<b>Total Effect</b>	<b>\$16,940,335</b>	<b>\$5,679,424</b>	<b>34%</b>
Economic Output	Direct Effect	\$93,969,733	\$17,217,831	18%
	Indirect Effect	\$20,289,626	\$6,580,709	32%
	Induced Effect	\$3,956,599	\$1,299,228	33%
	<b>Total Effect</b>	<b>\$118,215,958</b>	<b>\$25,097,768</b>	<b>21%</b>
State and Local Taxes		<b>\$16,122,323</b>	<b>\$1,733,681</b>	<b>11%</b>



## Conclusion

The economic monitoring that was administered annually since 2005 continued to show that the WMSP has been supporting a number of forest harvesting and processing industries in the White Mountains of Arizona. The results reveal the WMSP has played a significant role in supporting the industry cluster and diversifying the forestry sector, despite the economic recession.

The methodology based on the economic base theory focused on the role of export in regional economic growth and the economic contribution of the WMSP measured this way should be considered a conservative estimate. We should recognize the contribution of the WMSP in expanding forestry infrastructures and supporting industries within the region by supplying secondary inputs (multiplier effect) to other businesses that did not directly purchase raw material from the WMSP.

The input-output modeling approach using IMPLAN shows a more comprehensive picture of the overall economic contribution of the WMSP. This model provides economic impacts of wages and personal taxes paid by local residents and the economic output of the WMSP-related firms.

This report focused on the economic activities generated by utilizing woody biomass from the WMSP only. Forest restoration treatments enhance a range of ecosystem services and provide the benefit of “insurance” from disturbances such as wildfire. Forest restoration can also act as an agent of economic stimulus by creating jobs in economically depressed areas. These benefits have been unaccounted, but should be considered part of the legacy of the WMSP.

## Appendix A

### E-mail recruitment for interviews with business owners

#### Subject line: Request Your Participation in WMSP Final X0-Year Report

Dear \_\_\_\_\_,

I would like to invite you to participate in a project to provide information for the *White Mountain Stewardship Project's Final 10-Year Report*. It is our hope that the information we collect from you will benefit the wood products industry as well as local and regional communities.

The School of Forestry at Northern Arizona University is conducting this research. The goal is to better understand the economic impacts the WMSP had through two phases: X) written economic survey (this is a similar survey that has been administered to businesses involved with the WMSP since 2005), and 2) a personal interview that will provide additional in-depth information.

We will be conducting interviews with businesses, Forest Service personnel and other relevant stakeholders who have been involved in the WMSP. We would like to invite you to participate in completing the economic survey as well as a one-hour interview to speak with you about the impact the WMSP had on your business. Results are anonymous and confidential and will be reported as a group response.

We plan to conduct interviews the weeks of **Nov. 10-14 and Nov. 17-21**. If there are any dates that do not work for you during this time, or if you do not believe you should be included in this project, please let me know. I will call shortly to set up an appointment.

If you have further questions about this project, please respond to this email or you can call me at (928) 310-8102.

Thank you for your consideration and I look forward to speaking with you soon.

Best wishes,  
*Anne Mottek Lucas*

## **Telephone follow up**

*(The exact wording of this conversation will vary based on the flow of the conversation).*

Hello, may I speak with \_\_\_\_\_.

Hello, my name is Anne Mottek. I wanted to follow up on an email I sent you recently. The School of Forestry at Northern Arizona University is conducting the economic portion of the **White Mountain Stewardship Project's Final 10-Year Report**. Are you the best person to speak with about this project?

If yes → Continue

If no → Ask for best person

The goal of this project is to better understand the impacts the WMSP had through two phases: a written economic survey (this is a similar survey that has been administered to businesses involved with the WMSP since 2005), and through a personal interview that will provide additional in-depth information.

We will be conducting interviews with businesses in the White Mountains during the weeks of **Nov. 10-14 and Nov. 17-21**. Would you be willing to talk with me for about an hour during the week of XXX? Can we schedule a time to talk? Where would you like to meet?

At the time of the interview, I'd like to collect the written economic survey. Would you prefer to receive this as an attachment to an e-mail or should I mail it to you? [Confirm e-mail, mailing address]. It's very important that we receive the complete written economic surveys at this time. This information will provide important economic data, such as jobs created, that we can report to politicians, the Forest Service and stakeholders to further support the White Mountains' forest products industry.

Thank you, as the date approaches, I will call to confirm our appointment. I look forward to meeting with you.

## Appendix B

The White Mountain Stewardship Project Economic Assessment, which began in 2005, provides a factual and critical base of information that quantifies the changes in the group of firms that harvest and process forest products. This baseline data in turn are used to measure the economic impacts of forest industries on the White Mountain region communities.

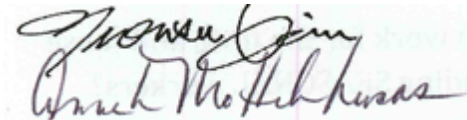
By filling out and returning the survey, you help us better understand the impacts of the WSMP and help improve future projects. Information about individual firms provided in this survey will be considered confidential.

With your permission, we will be contacting you to schedule an in-person interview also to better understand the overall impacts of the WMSP. ***Please have the survey complete and ready to submit at the time of the interview.***

This project is administered by Ecological Restoration Institute/ School of Forestry, Northern Arizona University, under contract to Apache-Sitgreaves National Forest. If you have any questions related to this survey, please contact Yeonsu Kim OR Anne Mottek at (928) 523-6643.

Thank you for your time and consideration in helping us answer the important questions!

Sincerely,

A photograph of two handwritten signatures in black ink on a light-colored background. The top signature is 'Yeonsu Kim' and the bottom signature is 'Anne Mottek Lucas'.

Yeonsu Kim and Anne Mottek Lucas

Date completed: \_\_\_\_\_

**A. GENERAL**

1. What is the formal name of this establishment?

\_\_\_\_\_

2. What is the street address?

\_\_\_\_\_

City: \_\_\_\_\_ Zip code: \_\_\_\_\_

3. P.O. Box (if applicable): \_\_\_\_\_ City: \_\_\_\_\_

Zip code: \_\_\_\_\_

Phone: \_\_\_\_\_

If the principal operations, or major operations, of this establishment occur at a place other than the above address (city), please indicate the city where operations occur:

\_\_\_\_\_

(If this separately located operation can be accounted for as a distinct establishment listed in (X.) above, please complete a separate questionnaire for that business.)

4. Who is the principal local official and what is his/her title and e-mail?

Name: \_\_\_\_\_

Title: \_\_\_\_\_

E-mail: \_\_\_\_\_

4a. Who is the primary contact person for the data in this form? (Complete this section if different from 4. above)

Name: \_\_\_\_\_

Title: \_\_\_\_\_

E-mail: \_\_\_\_\_

Phone: \_\_\_\_\_

5. What is the principal function of this establishment (primary product or service)?

NAICS Code: \_\_\_\_\_ OR SIC Code: \_\_\_\_\_

Please describe the primary product or service:

\_\_\_\_\_

6. Is the firm:

- a) \_\_\_ a **user** of materials from Future Forest, or
- b) \_\_\_ a **supplier** of raw material to Future Forest
- c) \_\_\_ **both** user and supplier of raw material from/to Future Forest

**Please Note: The following questions are asking for reporting on two calendar years 2013 AND 2014.**

7. Including the firm's owner/principal, family members who work for the firm, and those on salary, how many employees (full and part-time) does the firm have, **NOT** including SEASONAL workers?

\_\_\_\_\_ in 2013

\_\_\_\_\_ in 2014

**B. WORK FORCE DESCRIPTION**

8. How many employees are:

a. Year-round FULL-TIME male employees: \_\_\_\_\_ in 2013 \_\_\_\_\_ in 2014

b. Year-round FULL-TIME female employees: \_\_\_\_\_ in 2013 \_\_\_\_\_ in 2014

c. Year-round PART-TIME male employees: \_\_\_\_\_ in 2013 \_\_\_\_\_ in 2014

d. Year-round PART-TIME female employees: \_\_\_\_\_ in 2013 \_\_\_\_\_ in 2014

**\*TOTALS: \_\_\_\_\_ in 2013 \_\_\_\_\_ in 2014**

**(\* TOTAL for 2013/2014 should = totals in Question 7)**

e. SEASONAL employees (hired each year): \_\_\_\_\_ in 2013 \_\_\_\_\_ in 2014

9. On the average, how many hours per week do these PART-TIME employees work? (per employee): \_\_\_\_\_

10. How many weeks (on average for all seasonal workers) did you employ SEASONAL workers?): \_\_\_\_\_ in 2013 \_\_\_\_\_ in 2014

11. Of your year-round FULL-TIME employees, how many live in each of the White Mountain Region communities listed below:

Pinetop-Lakeside	_____ in 2013	_____ in 2014
Show Low	_____ in 2013	_____ in 2014
Snowflake/Taylor/Clay Springs	_____ in 2013	_____ in 2014
Heber/Overgaard	_____ in 2013	_____ in 2014
Springerville/Eagar	_____ in 2013	_____ in 2014
Alpine/Nutrioso	_____ in 2013	_____ in 2014
Whiteriver/Fort Apache	_____ in 2013	_____ in 2014
Outside the Region	_____ in 2013	_____ in 2014
<b>Total (Should = 8a + 8b Total/Yr.)</b>	<b>_____ in 2013</b>	<b>_____ in 2014</b>

12. Of your year-round PART-TIME employees, how many live in each of the White Mountain Region communities listed below:

Pinetop-Lakeside	_____ in 2013	_____ in 2014
Show Low	_____ in 2013	_____ in 2014
Snowflake/Taylor/Clay Springs	_____ in 2013	_____ in 2014
Heber/Overgaard	_____ in 2013	_____ in 2014
Springerville/Eagar	_____ in 2013	_____ in 2014
Alpine/Nutrioso	_____ in 2013	_____ in 2014
Whiteriver/Fort Apache	_____ in 2013	_____ in 2014
Outside the Region	_____ in 2013	_____ in 2014
<b>Total (Should = 8c + 8d Total/Yr.)</b>	<b>_____ in 2013</b>	<b>_____ in 2014</b>

13. Of your SEASONAL employees, how many live in each of the White Mountain Region communities listed below:

Pinetop-Lakeside	_____ in 2013	_____ in 2014
Show Low	_____ in 2013	_____ in 2014
Snowflake/Taylor/Clay Springs	_____ in 2013	_____ in 2014
Heber/Overgaard	_____ in 2013	_____ in 2014
Springerville/Eagar	_____ in 2013	_____ in 2014
Alpine/Nutrioso	_____ in 2013	_____ in 2014
Whiteriver/Fort Apache	_____ in 2013	_____ in 2014
Outside the Region	_____ in 2013	_____ in 2014
<b>Total (Should equal 8e/yr.)</b>	<b>_____ in 2013</b>	<b>_____ in 2014</b>

**\*\* Continue to next page \*\***

**C. ECONOMIC BASE**

**Please Note: The following questions are asking for reporting on two calendar years 2013 AND 2014.**

14. Approximately what **percent** of your sales are made to individuals or firms in the White Mountain communities (or elsewhere) listed below:

Pinetop-Lakeside	_____	in 2013	_____	in 2014
Show Low	_____	in 2013	_____	in 2014
Snowflake/Taylor/Clay Springs	_____	in 2013	_____	in 2014
Heber/Overgaard	_____	in 2013	_____	in 2014
Springerville/Eagar	_____	in 2013	_____	in 2014
Alpine/Nutrioso	_____	in 2013	_____	in 2014
Whiteriver/Fort Apache	_____	in 2013	_____	in 2014
Outside the Region	_____	in 2013	_____	in 2014
<b>Total (Should = X00%/yr.)</b>	_____	<b>in 2013</b>	_____	<b>in 2014</b>

**\*\* Continue to next page \*\***



15. We have listed below a number of, but not all, expenditure categories (*note additional categories added in 20XX/20X2*). In completing the table below, please answer the following questions:

- a. What were your total expenditures for each category in **2013 only**?
- b. What portion (%) of each expenditure was made in the White Mountain Region?
- c. Did any of these expenditures involve the use of grant funds that the business received (see last column)? If so, enter the amount.
- d. If there are other significant expenditures that are not included in the list below, please describe in the “Other” designation.

Major Expenditure Categories	Total Dollars Spent in Calendar <u>Yr 2013</u>	Percent Purchased in White Mountains	Amount Spent from Federal/State Grant Fun (if any)
<b>Base Expenditures</b>			
Raw Material	_____	_____	_____
Hauling (Outsourced)	_____	_____	_____
Mill Equipment	_____	_____	_____
Mill Parts	_____	_____	_____
Transport Equipment	_____	_____	_____
Petroleum Products	_____	_____	_____
Vehicle Parts, Tires	_____	_____	_____
Heavy Equipment	_____	_____	_____
Heavy Equipment Parts	_____	_____	_____
Electricity	_____	_____	_____
<b>Added categories</b>			
Water/sewer	_____	_____	_____
Natural Gas	_____	_____	_____
Insurance	_____	_____	_____
Major product inputs not listed above (e.g. packaging)	_____	_____	_____
Facility rental	_____	_____	_____
Real Estate (if owner of _____ property) & Business Personal Property taxes (for White Mtn facilities only)	_____	_____	_____
Other: _____	_____	_____	_____
(Please describe “Other”): _____	_____	_____	_____

16. What portion of your total production is based on inputs purchased from/by the “Future Forest” (FF) company in **2013**?

% Purchased FROM FF: \_\_\_\_\_  
 % Purchased BY FF: \_\_\_\_\_

**\*\* Continue to next page \*\***

17. We have listed below a number of, but not all, expenditure categories (*note additional categories added in 20XX/20X2*). In completing the table below, please answer the following questions:

- a. What were your total expenditures for each category in **2014 only**?
- b. What portion (%) of each expenditure was made in the White Mountain Region?
- c. Did any of these expenditures involve the use of grant funds that the business received (see last column)? If so, enter the amount.
- d. If there are other significant expenditures that are not included in the list below, please describe in the “Other” designation.

<b>Major Expenditure Categories</b>	<b>Total Dollars Spent in Calendar <u>Yr 2014</u></b>	<b>Percent Purchased in White Mountains</b>	<b>Amount Spent from Federal/State Grant Funds (if any)</b>
<b>Base Expenditures</b>			
Raw Material	_____	_____	_____
Hauling (Outsourced)	_____	_____	_____
Mill Equipment	_____	_____	_____
Mill Parts	_____	_____	_____
Transport Equipment	_____	_____	_____
Petroleum Products	_____	_____	_____
Vehicle Parts, Tires	_____	_____	_____
Heavy Equipment	_____	_____	_____
Heavy Equipment Parts	_____	_____	_____
Electricity	_____	_____	_____
<b>Added categories</b>			
Water/sewer	_____	_____	_____
Natural Gas	_____	_____	_____
Insurance	_____	_____	_____
Major product inputs not listed above (e.g. packaging)	_____	_____	_____
Facility rental	_____	_____	_____
Real Estate(if owner of property) & Business Personal Property taxes (for White Mtn facilities only)	_____	_____	_____
Other:	_____	_____	_____
(Please describe “Other”):	_____	_____	_____

18. What portion of your total production is based on inputs purchased from/by the “Future Forest” (FF) company in **2014**?

% Purchased FROM FF: \_\_\_\_\_

% Purchased BY FF: \_\_\_\_\_

19. Do your employees have a benefit package? If yes, please describe.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

20. Do you have an established on the job training and safety program for your employees? If yes, please describe.

---

---

---

---

---

---

Thank you for completing the survey.

## Appendix C — Methodologies for Economic Impact Analysis

### Economic Base Theory

As explained in previous reports, economic assessments from 2005–2012 were based on the economic base theory and assumes “export,” i.e. sales out of the pre-defined region as the only source of economic growth. “Basic employment” is defined as those that produce goods “exported” out of the region. Non-basic employment is the jobs for serving local demands. The multiplier in this case was defined as the ratio between total and basic employment. The multiplier applied to employment figures in this report remained static until 2010 (1.59), and was updated for the 2011 and 2012 reports (1.63) to acknowledge increases in population and per capita income. Another feature of the previous methodology is the treatment of “expenditures” and “employment” as two mutually exclusive forms of reporting impacts (for further details in the adjustment and rationale for separating the two, see the 2012 report.)<sup>8</sup>

This methodology offers several advantages. Economic impacts were estimated based on primary data specific to those firms supported by the WMSP and focus the attention to understanding the nature and extent of those firms. The proportion of export in production and business expenditure spent within the region were tailored to those with specific connection to the WMSP. However, this methodology is not without disadvantages. The discussion here is limited to those related to achieving the goals of economic assessment, and not intended as general critiques of the economic base theory. First, by limiting the source of economic growth to export only by the WMSP related firms, the simple export-based model does underestimate the economic contributions generated by the secondary processors of the WMSP provided materials. For example, sawmills may provide production inputs to other local businesses that “export” finished products. Second, the multiplier is set as a static ratio, which does not reflect the structural changes that might have occurred as the WMSP evolved. The adjustment in 2011 and 2012 reflect changes in population and income, but not the changes in industrial linkages. Third, economic impacts were only reported in limited terms. Although employment is perhaps the most important information, changes in output, labor income, and state and local taxes can assist in understanding a broader economic contribution of the WMSP. These factors are hard to estimate based on the simple export-based model. Also by treating “expenditures” and “employment” as two mutually exclusive categories, the economic impacts generated by household consumption created by wages paid to employees (i.e. induced impacts) were not included in the analysis. Finally, even with the exhaustive list of expenditure categories, not all expenditures were reported by all respondents. Therefore, the overall estimated economic impact, using the simple export-based model, should be considered conservative.

### Input-Output Modeling

According to the U.S. Bureau of Economic Analysis (BEA),<sup>9</sup> input-output analysis is “a type of applied economic analysis that tracks the interdependence among various producing and

---

<sup>8</sup> All White Mountain Stewardship Monitoring Reports are available at:  
<http://www.fs.usda.gov/detail/asnf/workingtogether/partnerships/?cid=stelprdb5361967>

<sup>9</sup> Horowitz, K.J. and Planting, M.A. 2006 (updated 2009). Concepts and Methods of the Input-Output Accounts. US Department of Commerce Bureau of Economic Analysis. Washington D.C.

consuming sectors of an economy. More particularly, it measures the relationship between a given set of demands for final goods and services and the inputs required to satisfy those demands.” An input-output model measures how any individual change in the economy ripples through the rest of the economy. Input-output models represent the complex set of inter-industry exchanges that occurs in the production and consumption of that economy’s goods and services. Changes in one sector of the economy cause industries to respond by changing their production levels and adjusting their consumption of intermediary products purchased from other industries. Input-output analysis defines how inter-industry transactions between different components of regional production are translated into various components of regional income.

We used the economic impact modeling software IMPLAN 3.0 to describe the impacts from the WMSP. We used 2013 data for Navajo and Apache counties with zip-code level disaggregation from the IMPLAN Group.<sup>10</sup> IMPLAN data are calibrated to national and local data from a number of sources. The BEA develops national input-output matrices every five years using data collected from the U.S. Census Bureau’s Economic Census and other programs. The IMPLAN Group estimates local and state level input-output matrices by calibrating the BEA national input-output matrices with data from the Bureau of Labor Statistics, the U.S. Census Bureau, and the BEA. All national and local data is classified according to IMPLAN’s industrial sectoring scheme, which has its origins in the North American Industrial Classification System sectoring scheme. We reported all results from IMPLAN to the survey year dollars.

The surveyed expenditure profiles, including the amount spent locally under each category, were used as an input to IMPLAN 3.0 to estimate the employment, economic output, and tax impacts of the WMSP. We present the results of our impact analyses in several ways. First, we disaggregate impacts to direct, indirect, and induced impacts within the region. We define direct impacts as the economic output of the six firms surveyed based on the number of employees who are local residents. To be conservative, we estimated indirect and induced impacts as only those expenditures that the firms reported, rather than the average spending estimates from IMPLAN. Indirect impacts come out of the patterns of trade in the directly affected sectors, as they demand goods and services from other businesses, government entities, and households. Induced impacts represent the household consumption created by wages paid to employees in the sectors impacted by direct and indirect impacts. Induced impacts are often considered somewhat differently than direct and indirect impacts because increased sales often do not directly result in increases in wages depending on macroeconomic conditions. To caution against exaggerated induced impacts, we also limited our discussions on the induced impacts of expenditure reported. Also interpreting total employment impacts should be done carefully. Here, we reported all impacts in annual terms, not accumulative. For example, a total employment impact of 100 jobs over project duration, is equal to 10 jobs for 10 years or 50 jobs for 2 years.

---

<sup>10</sup> IMPLAN Group, LLC, IMPLAN System (data and software), 16740 Birkdale Commons Parkway, Suite 206, Huntersville, NC 28078 [www.IMPLAN.com](http://www.IMPLAN.com)

## Appendix D — State and Local Taxes

Description	2013		2014	
	Total	With WMSP	Total	With WMSP
Dividends	17,271	2,118	17,682	1,685
Social Ins Tax- Employee Contribution	19,760	5,626	21,052	6,681
Social Ins Tax- Employer Contribution	38,203	10,877	40,701	12,917
Tax on Production and Imports: Sales Tax	8,807,568	1,093,539	9,017,173	926,516
Tax on Production and Imports: Property Tax	5,620,429	697,827	5,754,185	591,244
Tax on Production and Imports: Motor Vehicle Lic	78,924	9,799	80,802	8,302
Tax on Production and Imports: Severance Tax	36,635	4,549	37,507	3,854
Tax on Production and Imports: Other Taxes	460,078	57,123	471,027	48,398
Tax on Production and Imports: S/L Non Taxes	105,906	13,149	108,426	11,141
Corporate Profits Tax	259,979	31,888	266,165	25,362
Personal Tax: Income Tax	182,002	49,486	192,098	60,939
Personal Tax: Non Taxes (Fines-Fees)	89,965	24,461	94,955	30,123
Personal Tax: Motor Vehicle License	8,732	2,374	9,216	2,924
Personal Tax: Property Taxes	5,945	1,616	6,275	1,991
Personal Tax: Other Tax (Fish/Hunt)	4,792	1,303	5,058	1,604
<b>Total State and Local Tax</b>	<b>15,736,187</b>	<b>2,005,736</b>	<b>16,122,323</b>	<b>1,733,681</b>