

# Urban Forestry Economic Analysis in the Northeast and Midwest

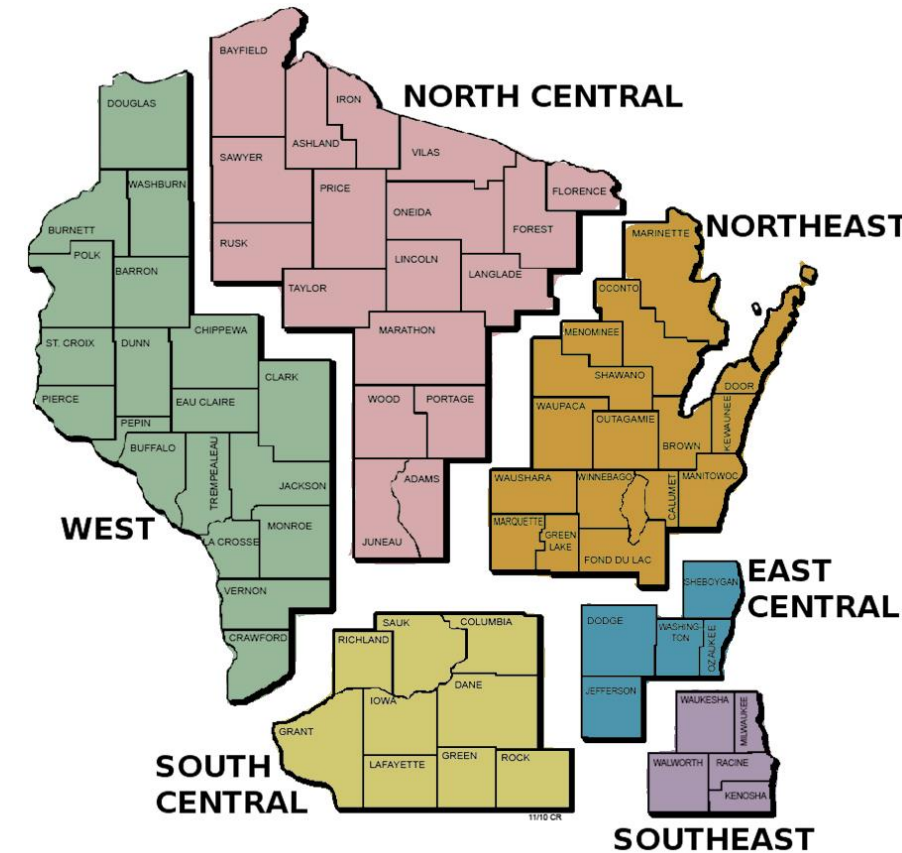
Laura Buntrock and Ram Dahal

Council on Forestry Meeting

September 13, 2022

# DNR Urban & Community Forestry Program

- Primary customer is WI communities, but extends beyond that to non-profits, tribes, industry groups, etc.
- 11 Staff
  - 1 Team Leader
  - 6 Regional UF Coordinators
  - 4 Specialists – UF Assessment, Grants, Council Liaison/Communications, Partnership & Policy
- Program delivery focuses on partnerships, education, training, grants, assessment data
- We are advised by the Wisconsin Urban Forestry Council



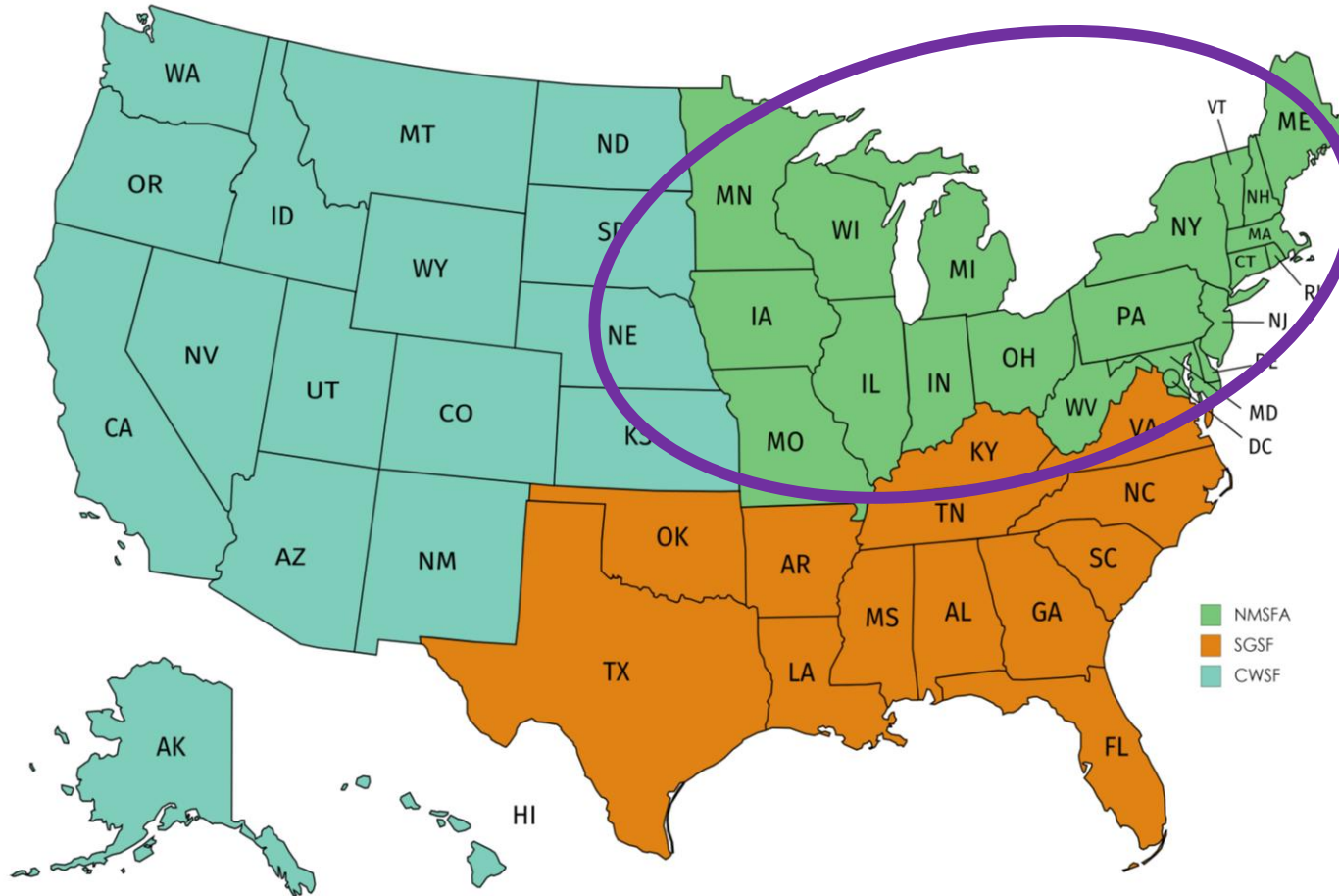
# DNR Urban & Community Forestry Grants

- Communities, tribes and non-profits
- Three types of grants
  - Start-up grants (\$1k-5k)
  - Regular grants (\$1k-25k)
  - Catastrophic storm grants (\$1k-40k)
- 1:1 match required for Start-up and Regular grants, no match for Catastrophic storm grants
- \$524,600 of State funds annually, sometimes supplement with Federal funds

# Regional Economic Study

# Geographic Scope

*20 states of the Midwest and Northeast + Washington, D.C.*



## Funding

*2018 Landscape Scale Restoration (LSR) Grant*

# Project Objectives

1. **Develop a model** that can be applied consistently to each state and across the region to **quantify economic contribution of urban forest industry**;
2. **Apply the model** to each state and the region;
3. **Quantify benefits provided by urban and community forests** using i-Tree Landscape to estimate environmental services and associated monetary valuations;
4. **Incorporate Urban Forest Inventory and Analysis (Urban FIA) field data into i-Tree Landscape**, piloting this work in Wisconsin;
5. **Produce reports and factsheets** detailing the methodology used in this study, and financial contributions of the urban forest industry and resource for each state and the region;
6. **Share results**

# Project Partners and Contractors





# Defining Urban Forestry and Scope of Industry

## Urban forestry

the establishment, conservation, protection and maintenance of trees in cities, suburbs and other developed areas

## Scope of urban forestry industry

1. private businesses
2. county and municipal governments
3. state agencies
4. higher education institutions
5. investor-owned utilities working in tree-line maintenance
6. non-profit organizations

### Private businesses

- Nursery and tree production
- Farm and garden machinery and equipment merchant wholesalers
- Nursery and florists' supplies merchant wholesalers
- Nursery and garden supply stores
- Landscape architectural and design services
- Private landscaping, tree health care and maintenance services, including arborist services



# Primary Survey Work

Contracted with UW Survey Center to develop and implement surveys for each of the 6 groups included in the defined scope of urban forest industry

## Example questions:

- # of employees
- % of sales and revenue for UF related products or services
- % of employees time spent on UF related activities
- Approximate expenditures, sales and revenues
- Year business established
- How much business affected by:
  - Recruiting adequate workforce
  - Retaining employees
  - Inadequate supply chains
  - Public perception of value of trees
- How would you describe the future outlook of UF for your organization

# Primary Survey Work

## *Response Rates*

Group Surveyed	Contacted	Opted out	Non-contact	Survey Responses*	Adjusted response rate
Private Businesses	21,922	636	20,719	630	<b>3.0%</b>
Public (County & Municipal Government)	2,157	38	1,711	408	<b>19.3%</b>
State Agencies	42	0	17	25	<b>59.5%</b>
Higher Education Institutions	252	3	183	66	<b>26.5%</b>
Investor-Owned utility company	172	4	158	10	<b>6.0%</b>
Non-Profit Organizations	335	3	250	82	<b>24.7%</b>

*\*includes partial completes*

# Survey Results - Private Industry Business Outlook

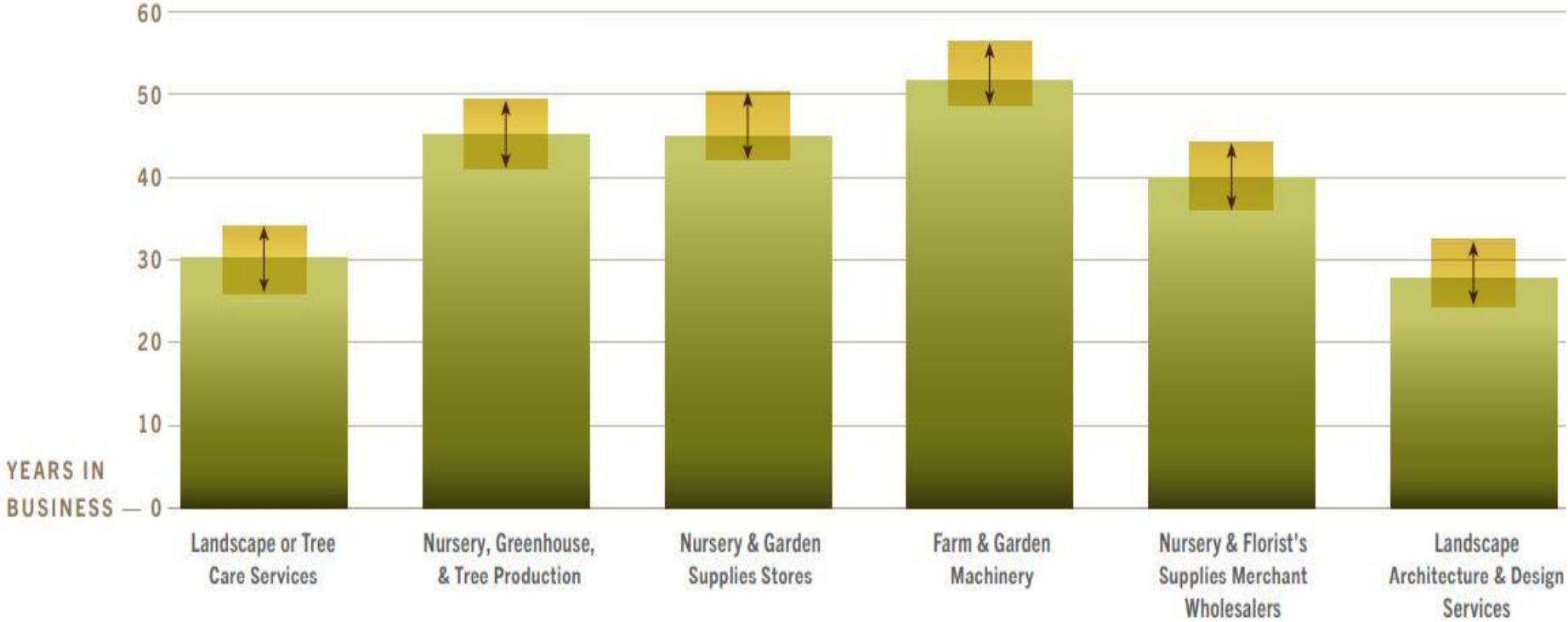
## *Future Outlook*

*How would you describe the future outlook of urban forestry for your organization?*



# Survey Results - Private Industry Business Outlook

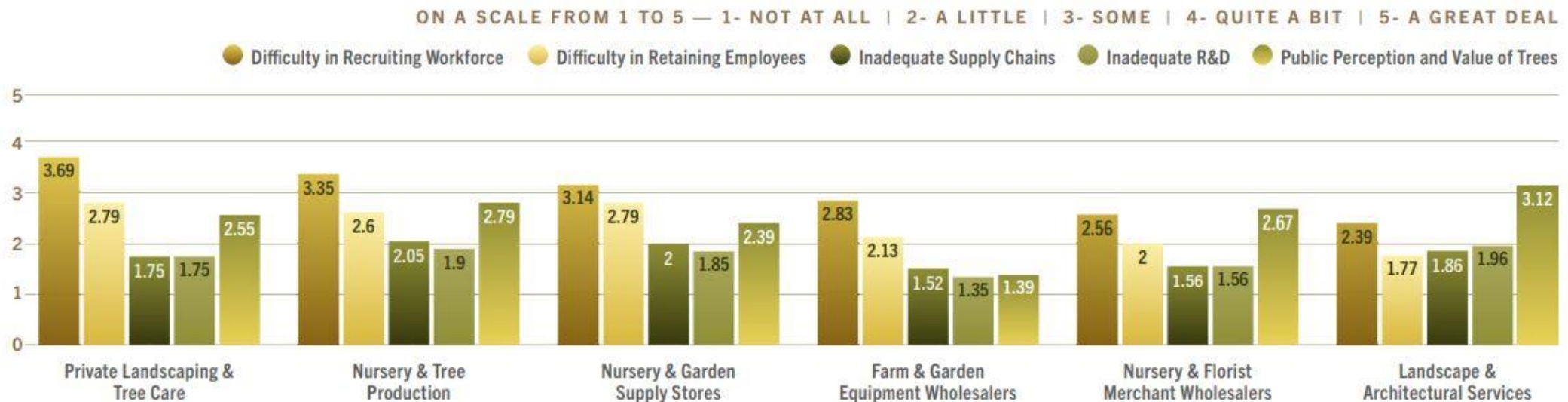
## *Average Years in Business*



# Survey Results - Private Industry Business Outlook

## *Issues Influencing UF Activities*

*How much is your business affected by.....?*



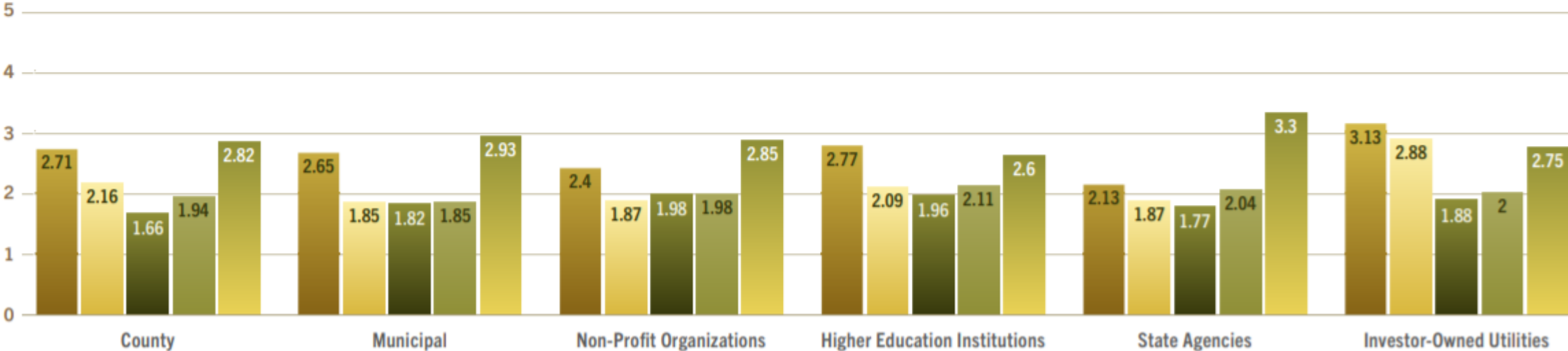
# Survey Results – Public, Higher Ed, and Non-Profit Sectors

## *Issues Influencing UF Activities*

F10 PUBLIC, HIGHER EDUCATION, AND NON-PROFIT SECTORS' OPINIONS ON ISSUES IMPACTING THE FUTURE OUTLOOK OF UF ACTIVITIES

ON A SCALE FROM 1 TO 5 — 1- NOT AT ALL | 2- A LITTLE | 3- SOME | 4- QUITE A BIT | 5- A GREAT DEAL

● Difficulty in Recruiting Workforce ● Difficulty in Retaining Employees ● Inadequate Supply Chains ● Inadequate R&D ● Public Perception and Value of Trees



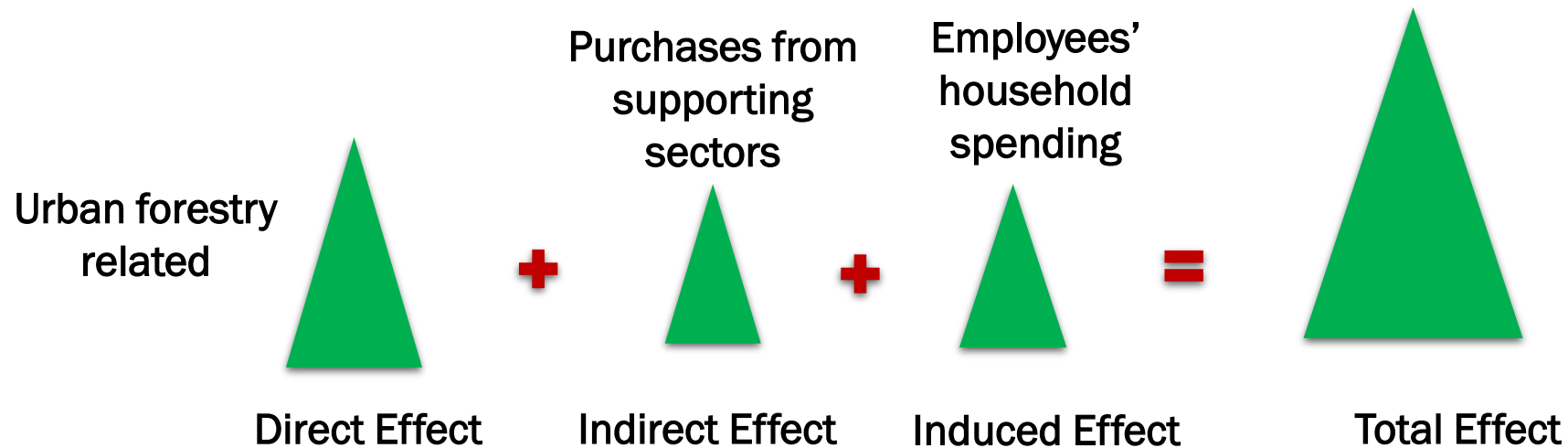
# Economic Analysis

- Estimated ripple effect of urban forestry to rest of the economy using tool called IMPLAN (IMpact Analysis for PLANning)
- Provide quantitative approach in assessing economic impacts/contributions



# IMPLAN

- IMPLAN estimates indirect and induced effects by tracking business to business transactions
- Total effects=direct + indirect + induced effects
- Urban forestry industry contributes to economy in three ways



# Economic Analysis Results

## *Regional Economic Contribution – Direct Effect*

Direct Effect	Employment (jobs)	Labor Income (MM \$)	Value-Added (MM \$)	Industry Output (MM \$)
Private sector	237,454	9,756	12,505	16,167
Investor-owned utilities	5,991	223	275	413
City government	9,591	357	440	661
County government	2,082	78	96	144
State agency	263	10	12	18
Higher education institutions	1,231	46	56	85
Non-profit organization	1,938	88	97	145
<b>Total</b>	<b>258,550</b>	<b>10,377</b>	<b>13,481</b>	<b>17,632</b>
<b>WI</b>	<b>12,517</b>	<b>479</b>	<b>623</b>	<b>966</b>
<b>WI share (%)</b>	<b>4.84%</b>	<b>4.62%</b>	<b>4.62%</b>	<b>5.48%</b>

# Economic Analysis Results

## *Regional Economic Contribution – Total Effect*

Total Effect	Employment (jobs)	Labor Income (MM \$)	Value-Added (MM \$)	Industry Output (MM \$)
Private sector	331,446	14,957	21,897	32,359
Investor-owned utilities	8,205	350	498	800
City government	11,141	459	618	971
County government	2,418	100	134	211
State agency	305	13	17	27
Higher education institutions	1,430	59	79	125
Non-profit organization	2,270	109	132	205
<b>Total</b>	<b>357,215</b>	<b>16,046</b>	<b>23,376</b>	<b>34,696</b>
<b>WI</b>	<b>16,725</b>	<b>672</b>	<b>973</b>	<b>1,572</b>
<b>WI share (%)</b>	<b>4.68%</b>	<b>4.19%</b>	<b>4.16%</b>	<b>4.53%</b>

# Economic Analysis Results

## *Regional Economic Contribution – SAM Multiplier*

<b>SAM Multiplier</b>	<b>Employment (jobs)</b>	<b>Labor Income (MM \$)</b>	<b>Value-Added (MM \$)</b>	<b>Industry Output (MM \$)</b>
Private sector	1.40	1.56	1.75	2.00
Investor-owned utilities	1.37	1.57	1.81	1.94
City government	1.16	1.29	1.41	1.47
County government	1.16	1.29	1.41	1.47
State agency	1.16	1.28	1.40	1.47
Higher education institutions	1.16	1.29	1.41	1.47
Non-profit organization	1.17	1.24	1.36	1.41
<b>Total</b>	<b>1.38</b>	<b>1.55</b>	<b>1.73</b>	<b>1.97</b>
<b>WI</b>	<b>1.34</b>	<b>1.40</b>	<b>1.56</b>	<b>1.63</b>

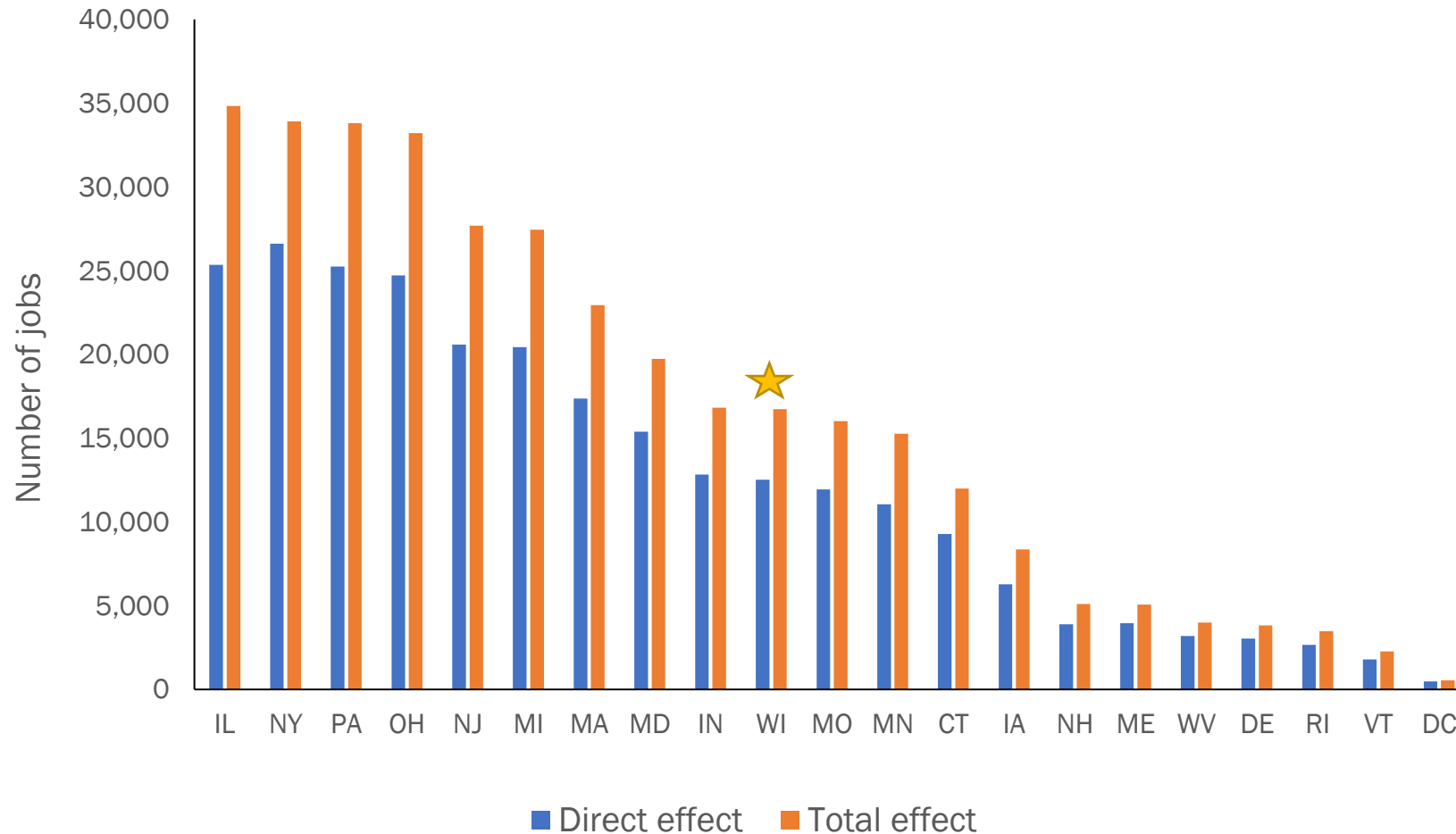
# Economic Analysis Results

## *Regional Tax Contribution*

Category	State/Local tax (MM \$)	Federal tax (MM \$)
Employee compensation	11	962
Proprietor income	0	82
Taxes on production and imports	637	67
Households	311	866
Corporations	30	109
<b>Total</b>	<b>989</b>	<b>2,086</b>
<b>WI</b>	<b>41</b>	<b>96</b>
<b>WI share (%)</b>	<b>4.18</b>	<b>4.60</b>

# Economic Analysis Results

## State Comparisons – Number of Jobs



# Ecosystem Services

## Air pollution reduction

- Removal of CO, NO<sub>2</sub>, O<sub>3</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub>
- Health benefits derived from their removal

## Hydrological

- Intercepted water
- Avoided runoff

## Carbon

- Storage
- Annual sequestration

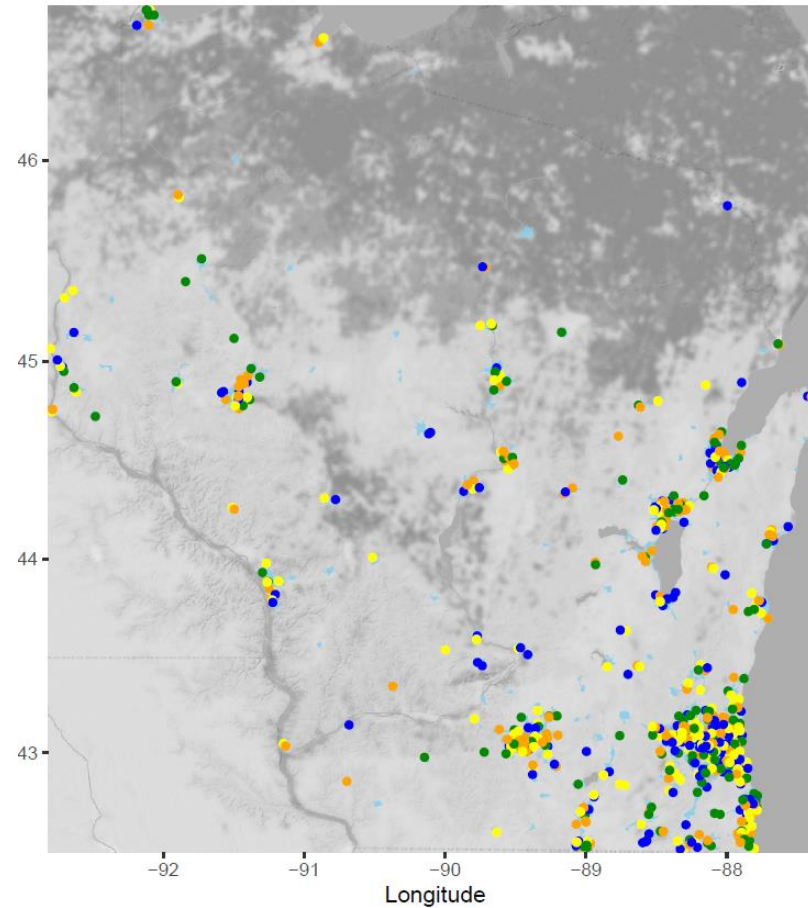




# Integrate UFIA field data into i-Tree Landscape



- Produce finer benefit estimates
- Avoided energy use
- Emission of volatile organic compounds
- Compensatory value of trees



# Ecosystem Services Results

Estimated Monetary Value of Annual Benefits	Regional Value (MM \$)	WI Value (MM \$)	Wisconsin % of Regional Value
Sequestered carbon	\$1,065	\$85	8%
Air pollution	\$1,357	\$111	8%
Avoided runoff	\$635	\$55	9%
Energy use avoidance and carbon reduction*	n/a	\$196	n/a
<b>Total annual benefits</b>	<b>\$3,057</b>	<b>\$447</b>	n/a

*\*currently, estimate only available for WI in i-Tree Landscape as a result of UFIA field data integration*

Monetary Value of Cumulative Benefit	Regional Value (MM \$)	WI Value (MM \$)	Wisconsin % of Regional Value
Stored carbon	\$54,500	\$2,100	4%

# Ecosystem Services Limitations

- Those calculated in this study are just a few pieces of the pie
- There are many other benefits that we couldn't quantify at the regional level
  - Property value increases
  - Mental health benefits
  - Increased walkability
  - Surface cooling
  - Sense of community
  - Runoff water quality improvement
  - Etc, etc, etc
- Canopy distribution (and therefore benefit distribution) – is it equitable?



# Economic Analysis Results

*Comparing WI's Forest Products Industry and Urban Forestry Industry in 2018 dollars*

FOREST PRODUCTS INDUSTRY (FPI)	Employment (jobs)	Labor Income (\$MM)	Gross Output (\$MM)	Value-added (\$MM)
<i>Forestry and logging</i>	5,937	295	480	298
<i>Sawmills and wood furniture</i>	28,156	1,355	6,104	12,116
<i>Pulp and Paper</i>	29,800	2,588	17,952	4,670
<b>Direct effect</b>	<b>63,893</b>	<b>4,238</b>	<b>24,536</b>	<b>7,084</b>
<b>Total effect</b>	<b>142,520</b>	<b>8,586</b>	<b>38,045</b>	<b>14,351</b>
<b>FPI % to state economy</b>	<b>3.82</b>	<b>4.12</b>	<b>5.61</b>	<b>4.23</b>
<b>State economy</b>	<b>3,728,502</b>	<b>208,244</b>	<b>678,240</b>	<b>339,571</b>

URBAN FORESTRY INDUSTRY	Employment (jobs)	Labor Income (\$MM)	Gross Output (\$MM)	Value-added (\$MM)
<b>Direct effect</b>	<b>12,517</b>	<b>479</b>	<b>966</b>	<b>623</b>
<b>Total effect</b>	<b>16,725</b>	<b>672</b>	<b>1,572</b>	<b>973</b>
<b>UF % to state economy</b>	<b>0.45</b>	<b>0.32</b>	<b>0.23</b>	<b>0.29</b>

# Economic Analysis Results

## *How Forestry compares to other WI industries*

- FPI: \$24.5 billion (Ranked 2<sup>nd</sup>)
- UF: \$966 million industry output  
+\$447 million in ecosystem services  
\$1.41 billion total

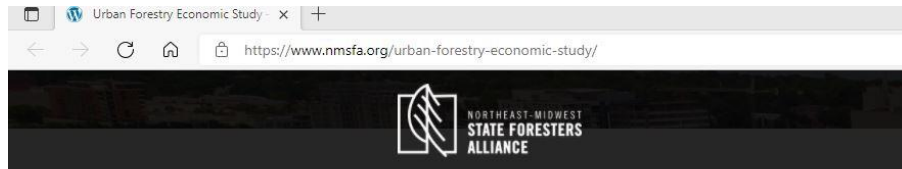
Dog and cat food manufacturing: \$1.42 B

Top ten industries in the state (2018)		
Rank	Industry	Output (\$B)
1	Owner-occupied dwellings	25.91
2	Insurance carriers, except direct life	21.62
3	Hospitals	18.60
4	Other real estate	17.77
5	Management of companies and enterprises	14.08
6	Cheese manufacturing	14.08
7	Employment and payroll of local govt, education Monetary authorities and depository credit	11.80
8	intermediation	11.25
9	Offices of physicians	11.15
10	Tenant-occupied housing	10.50



# Project Deliverables

Available at NMSFA webpage: [www.nmsfa.org/urban-forestry-economic-study/](https://www.nmsfa.org/urban-forestry-economic-study/)

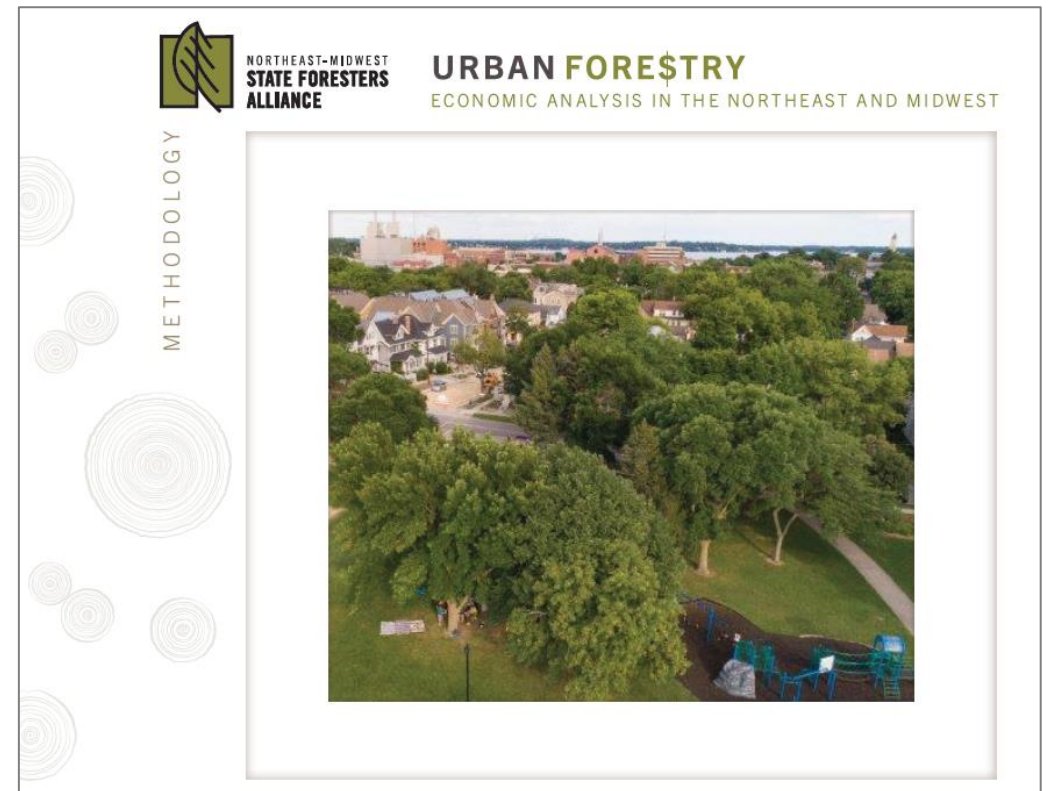


## Urban Forestry Economic Study

### Methodology Report

#### NMSFA Regional – Report | Fact Sheet

- Connecticut – Report | Fact Sheet
- Illinois – Report | Fact Sheet
- Indiana – Report | Fact Sheet
- Iowa – Report | Fact Sheet
- Maine – Report | Fact Sheet
- Maryland – Report | Fact Sheet
- Massachusetts – Report | Fact Sheet
- Michigan – Report | Fact Sheet
- Minnesota – Report | Fact Sheet
- Missouri – Report | Fact Sheet
- New Jersey – Report | Fact Sheet
- New York – Report | Fact Sheet
- Ohio – Report | Fact Sheet
- Pennsylvania – Report | Fact Sheet
- Vermont – Report | Fact Sheet
- Wisconsin – Report | Fact Sheet



# Project Deliverables

## Wisconsin Factsheet





# Sharing Results

- Reports and factsheets are available on the NMSFA website
- Articles in trade association magazines and newsletters
- Presentations to partner groups
- Conference presentations
- Urban Forestry Newsfeed
- And More!

# Sharing Results

## *Peer Reviewed Journal Articles*



Urban Forestry & Urban Greening

Volume 69, March 2022, 127490



### Economic Contribution Analysis of Urban Forestry in the Northeastern and Midwestern States of the United States in 2018

Rajan Parajuli <sup>a</sup> , Stephanie Chizmar <sup>a</sup> , Morgan Hoy <sup>a</sup> , Omkar Joshi <sup>b</sup> , Jason Gordon <sup>c</sup> , Sayeed Mehmood <sup>d</sup> , James E. Henderson <sup>e</sup> , Jagdish Poudel <sup>f</sup> , Olivia Witthun <sup>g</sup> , Laura Buntrock <sup>g</sup>

278

Hoy et al: Business Outlook of Private Urban Forestry in the Northeast-Midwest US



Arboriculture & Urban Forestry 2022, 48(5):278–292  
<https://doi.org/10.48044/jauf.2022.021>



### Business Outlook of Private Urban Forestry in the Northeast-Midwest Region of the United States

By Morgan Hoy, Rajan Parajuli, Stephanie Chizmar, Omkar Joshi, Jason Gordon, James E. Henderson, Sayeed Mehmood, Puskar Khanal, Olivia Witthun, and Laura Buntrock

# What's Next?

- Use results to justify continued and additional investment in urban forestry programs
- Help inform workforce development initiatives and justify further investment in urban forestry career pathways
- Hope to replicate this study in the future and observe trends in industry over time
  - Potentially redo survey and economic analysis every 5 years
- This is the first time we have this data and are just starting to share results. We are excited to see how partners will use it.

# CONNECT WITH US

**Ram Dahal**

Ram.Dahal@wisconsin.gov

**Laura Buntrock**

Laura.Buntrock@wisconsin.gov



/WIDNR



@WIDNR



@WI\_DNR



/WIDNRTV



"WILD WISCONSIN:  
OFF THE RECORD"

# Ecosystem Services Results

## *With benefit estimates*

Annual Benefits	Regional Value	Wisconsin Value	Wisconsin %
Sequestered carbon / year (metric tons)	5,664,000	453,000	8%
<b>Value of sequestered carbon / year</b>	<b>\$1,064,900,000</b>	<b>\$85,300,000</b>	<b>8%</b>
Total air pollution removal / year (kilograms)	258,900,000	13,100,000	5%
<b>Value of air pollution / year</b>	<b>\$1,356,900,000</b>	<b>\$111,300,000</b>	<b>8%</b>
Rainfall interception / year (m3)	2,392,300,000	109,300,000	5%
Avoided runoff / year (m3)	269,000,000	23,300,000	9%
<b>Value of avoided runoff / year</b>	<b>\$635,100,000</b>	<b>\$54,900,000</b>	<b>9%</b>
<b>Total annual benefits</b>	<b>\$3,057,000,000</b>	<b>\$252,000,000</b>	<b>8%</b>
Cumulative Benefit	Regional Value	Wisconsin Value	Wisconsin %
Total carbon stored (metric tons)	290,000,000	11,000,000	4%
<b>Value of carbon stored</b>	<b>\$54,500,000,000</b>	<b>\$2,100,000,000</b>	<b>4%</b>