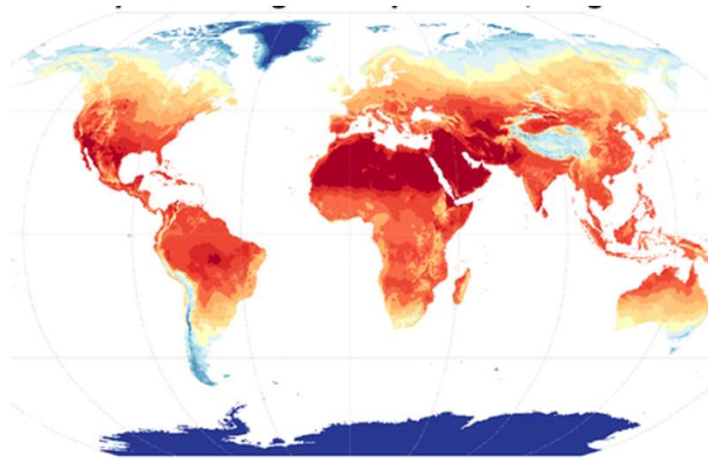


# Contribution Analysis Using BEA Outdoor Recreation Satellite Accounts



University  
of Idaho

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# Contribution Analysis Using BEA Outdoor Recreation Satellite Accounts

## ***Abstract***

BEA periodically publishes Outdoor Recreation Satellite Accounts (ORSA) for the U.S. and States. ORSA augment the US National Income and Product Accounts (NIPA) with extremely useful information about how State industries are structured to produce goods and services for the outdoor recreation market. However, the ORSA are not organized using the same accounting conventions as regional Input-Output (I-O) accounts, which are commonly used for contribution studies. BEA's documentation for ORSA states: *"Outdoor recreation is measured by place of production, not residence of consumer. The value of manufactured goods, such as boats, is assigned to the state where they are produced, even if the goods are not ultimately used there."* While ORSA accounting stance conforms to NIPA conventions, regional I-O accounts explicitly measure both "place of production" and "place of residence of the consumer". This paper applies a method called "Theory-Directed Semantic Decomposition" (TDSD) to demonstrate the relationship between NIPA-based ORSA and regional I-O accounts. By using the TDSD method, state-level studies of outdoor recreation economic contribution using I-O can conform to information reported in BEA's ORSA.

# BEA Outdoor Recreation Satellite Accounts (ORSA)

- ORSA are periodically published for the U.S. and States
- ORSA show, from producers' point of view, how much of their product or service is consumed by persons while participating in outdoor recreation activities
- In economic accounting terms, ORSA describe producers' use of primary inputs (VA) and labor (jobs) to make goods & services for the outdoor recreation market

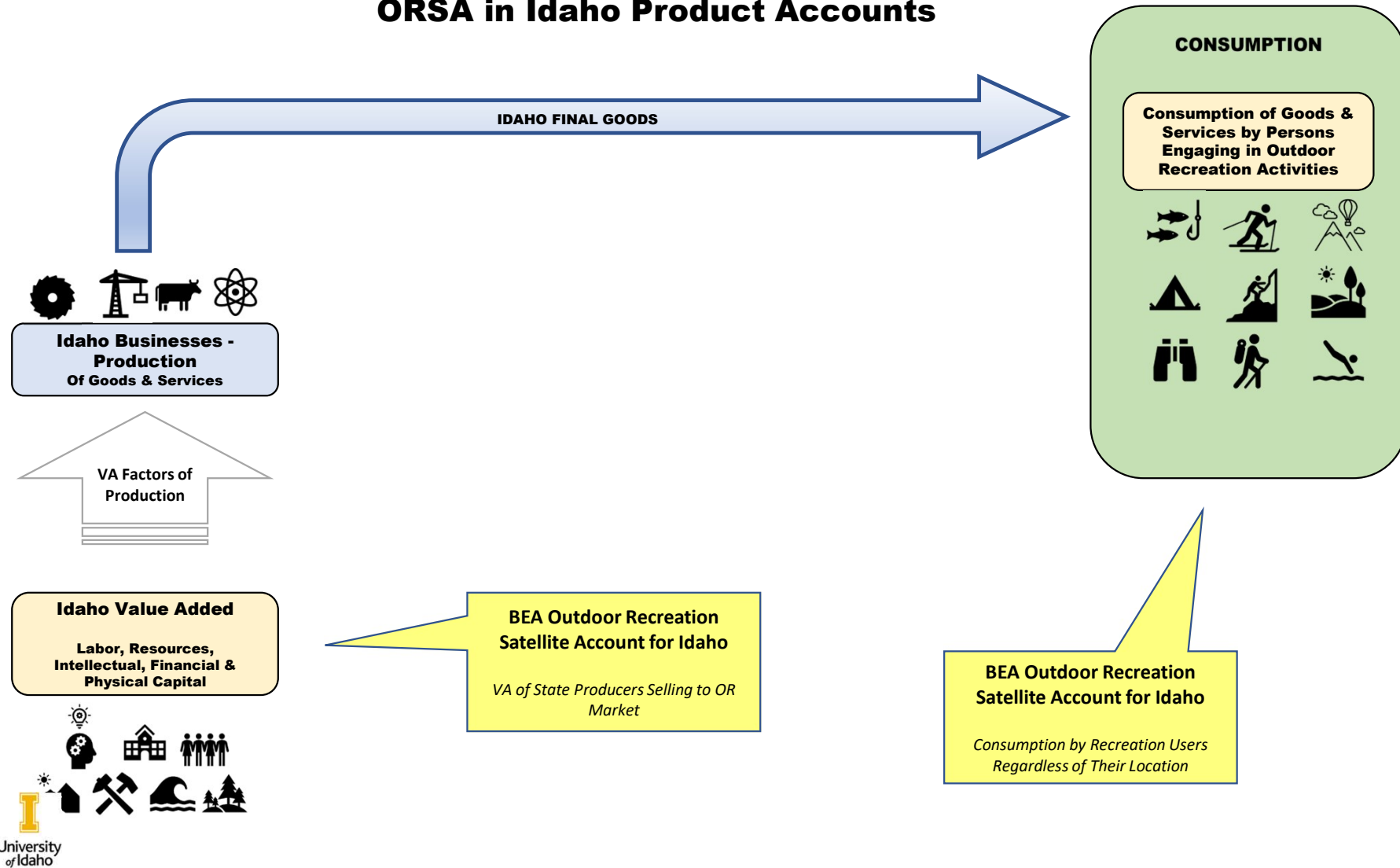
# Regional Contribution Analysis

- Contribution analysis uses information from Social Accounts along with relationships derived from Economic Base Theory to depict how a region's industries use the region's endowment of primary inputs (VA factors) to make final products which are sold to consumers.
- In short, contribution analysis is about connecting the incomes earned by owners of factors to final products delivered to consumers.

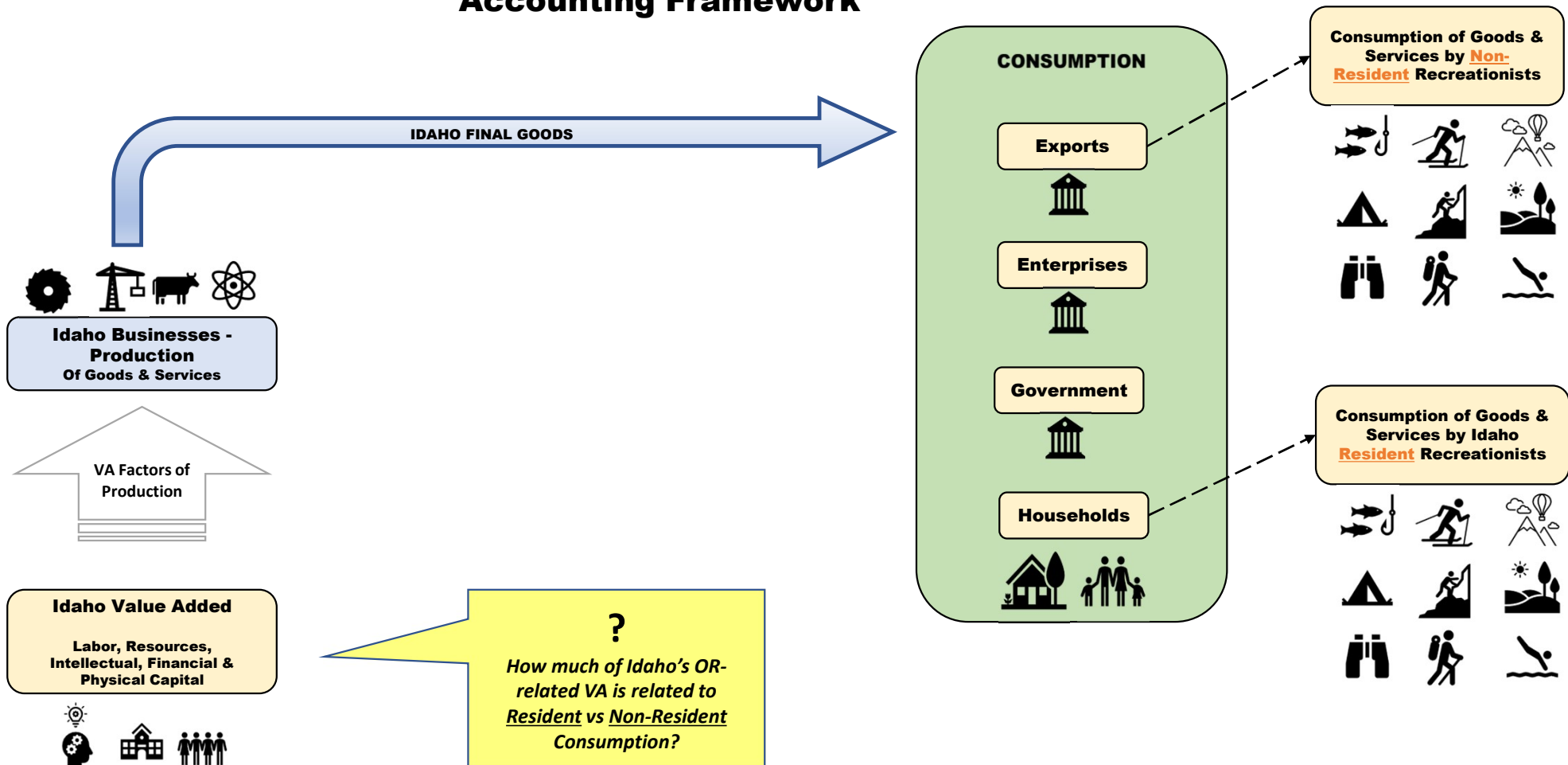
# ORSA and Contribution Analysis

- ORSA Documentation: “*Outdoor recreation is measured by place of production, not residence of consumer. The value of manufactured goods, such as boats, is assigned to the state where they are produced, even if the goods are not ultimately used there.*”
- **Contribution analysis**, using a regional Social Accounting framework, **measures both** “*place of production*” (VA of producers in a State) and “*place of residence of the consumer*” (resident recreationists and out-of-state visitors)
- Challenge: Integrate ORSA into Contribution Analysis

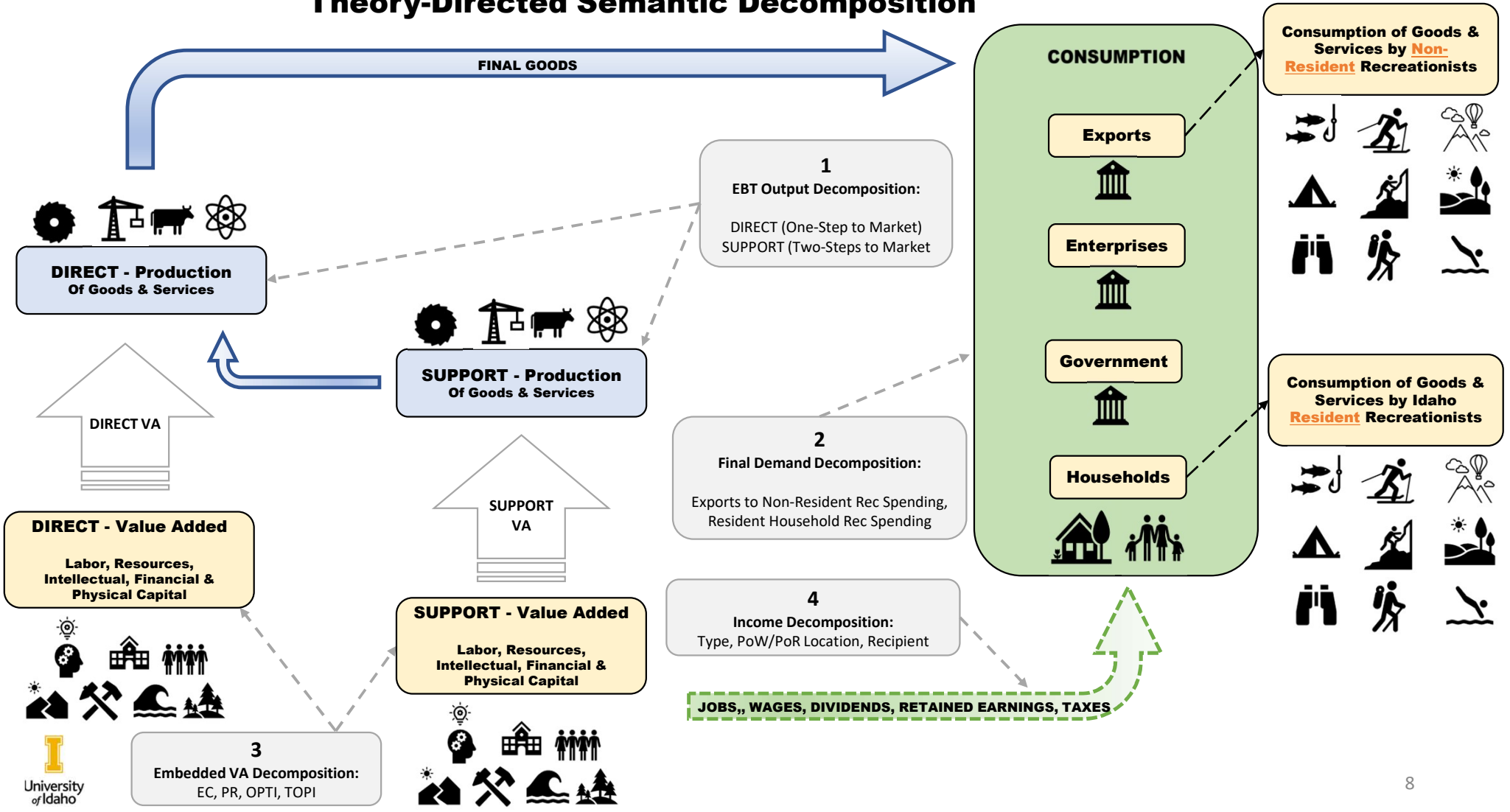
# ORSA in Idaho Product Accounts



# Accounting Framework



# Theory-Directed Semantic Decomposition





# Decomposition of Final Product Output

Leontief Accounting Model

$$(I-A)^{-1} * F^{\wedge} = O$$

$$D(I-A)^{-1} \quad S(I-A)^{-1}$$

Economic Base Decomposition:  
Direct and Support

Economic Base Decomposition:  
Direct and Support Leontief Models

$$D(I-A)^{-1} * F^{\wedge} = D O$$

$$S(I-A)^{-1} * F^{\wedge} = S O$$

$$F^{\wedge}_{HRore}$$

$$F^{\wedge}_{HNRore}$$

Recreation Expenditures  
Decomposition:  
Resident & Non-Resident  
OR Expenditures

$$F^{\wedge}_{HRore}$$

$$F^{\wedge}_{HNRore}$$

Final Product  
Decomposition:  
Delivery to Resident & Non-  
Resident Recreationists

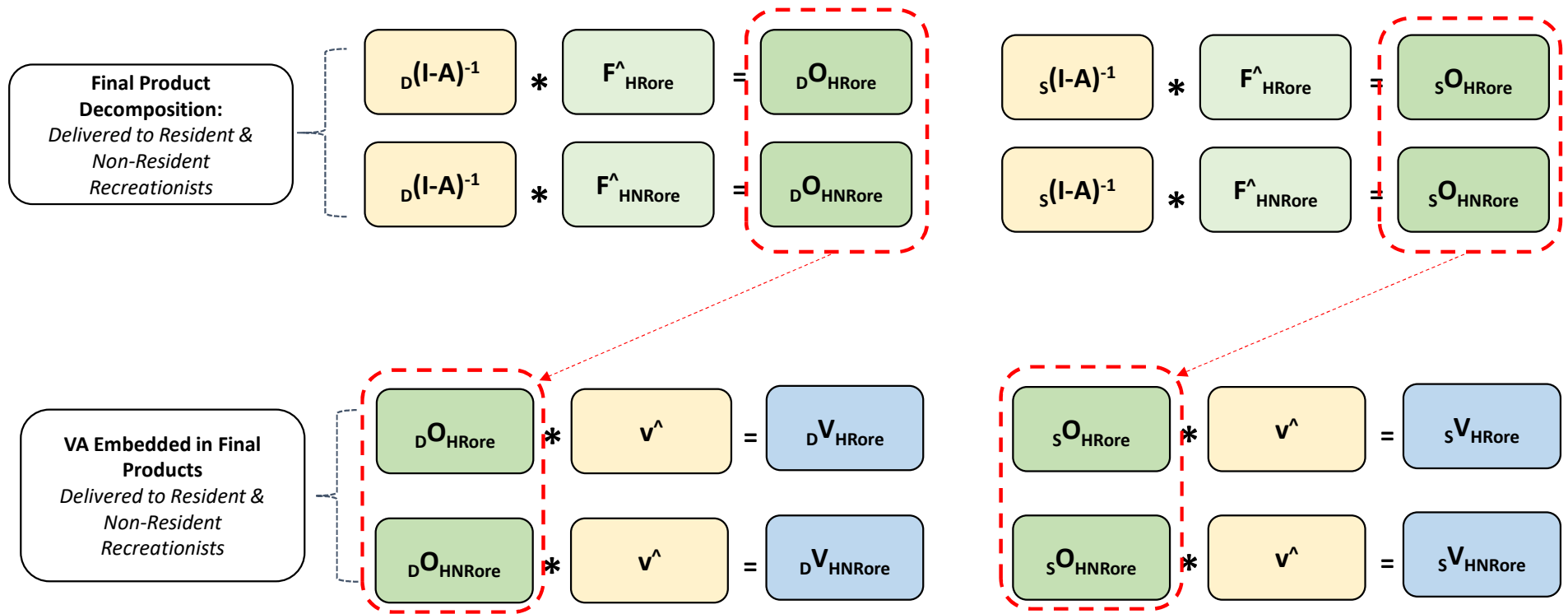
$$D(I-A)^{-1} * F^{\wedge}_{HRore} = D O_{HRore}$$

$$S(I-A)^{-1} * F^{\wedge}_{HRore} = S O_{HRore}$$

$$D(I-A)^{-1} * F^{\wedge}_{HNRore} = D O_{HNRore}$$

$$S(I-A)^{-1} * F^{\wedge}_{HNRore} = S O_{HNRore}$$

# Decomposition of VA



# Decomposition of VA

$$D O_{HRore} * \hat{v} = D V_{HRore}$$

$$\hat{v} \rightarrow \hat{v}_{EC}, \hat{v}_{PR}, \hat{v}_{OPTI}, \hat{v}_{TOPI}$$

$$D O_{HRore} * \hat{v}_{EC} = D EC_{HRore}$$

$$D O_{HRore} * \hat{v}_{PR} = D PR_{HRore}$$

$$D O_{HRore} * \hat{v}_{OPTI} = D OPTI_{HRore}$$

$$D O_{HRore} * \hat{v}_{TOPI} = D TOPI_{HRore}$$

Types of VA Embedded in Final Products (Direct & Support) Delivered to **Resident** Recreationists

$$D O_{HNRore} * \hat{v} = D V_{HNRore}$$

$$\hat{v} \rightarrow \hat{v}_{EC}, \hat{v}_{PR}, \hat{v}_{OPTI}, \hat{v}_{TOPI}$$

$$D O_{HNRore} * \hat{v}_{EC} = D EC_{HNRore}$$

$$D O_{HNRore} * \hat{v}_{PR} = D PR_{HNRore}$$

$$D O_{HNRore} * \hat{v}_{OPTI} = D OPTI_{HNRore}$$

$$D O_{HNRore} * \hat{v}_{TOPI} = D TOPI_{HNRore}$$

Types of VA Embedded in Final Products (Direct & Support) Delivered to **Non-Resident** Recreationists

$$S O_{HRore} * \hat{v} = S V_{HRore}$$

$$\hat{v} \rightarrow \hat{v}_{EC}, \hat{v}_{PR}, \hat{v}_{OPTI}, \hat{v}_{TOPI}$$

$$S O_{HRore} * \hat{v}_{EC} = S EC_{HRore}$$

$$S O_{HRore} * \hat{v}_{PR} = S PR_{HRore}$$

$$S O_{HRore} * \hat{v}_{OPTI} = S OPTI_{HRore}$$

$$S O_{HRore} * \hat{v}_{TOPI} = S TOPI_{HRore}$$

$$S O_{HNRore} * \hat{v} = S V_{HNRore}$$

$$\hat{v} \rightarrow \hat{v}_{EC}, \hat{v}_{PR}, \hat{v}_{OPTI}, \hat{v}_{TOPI}$$

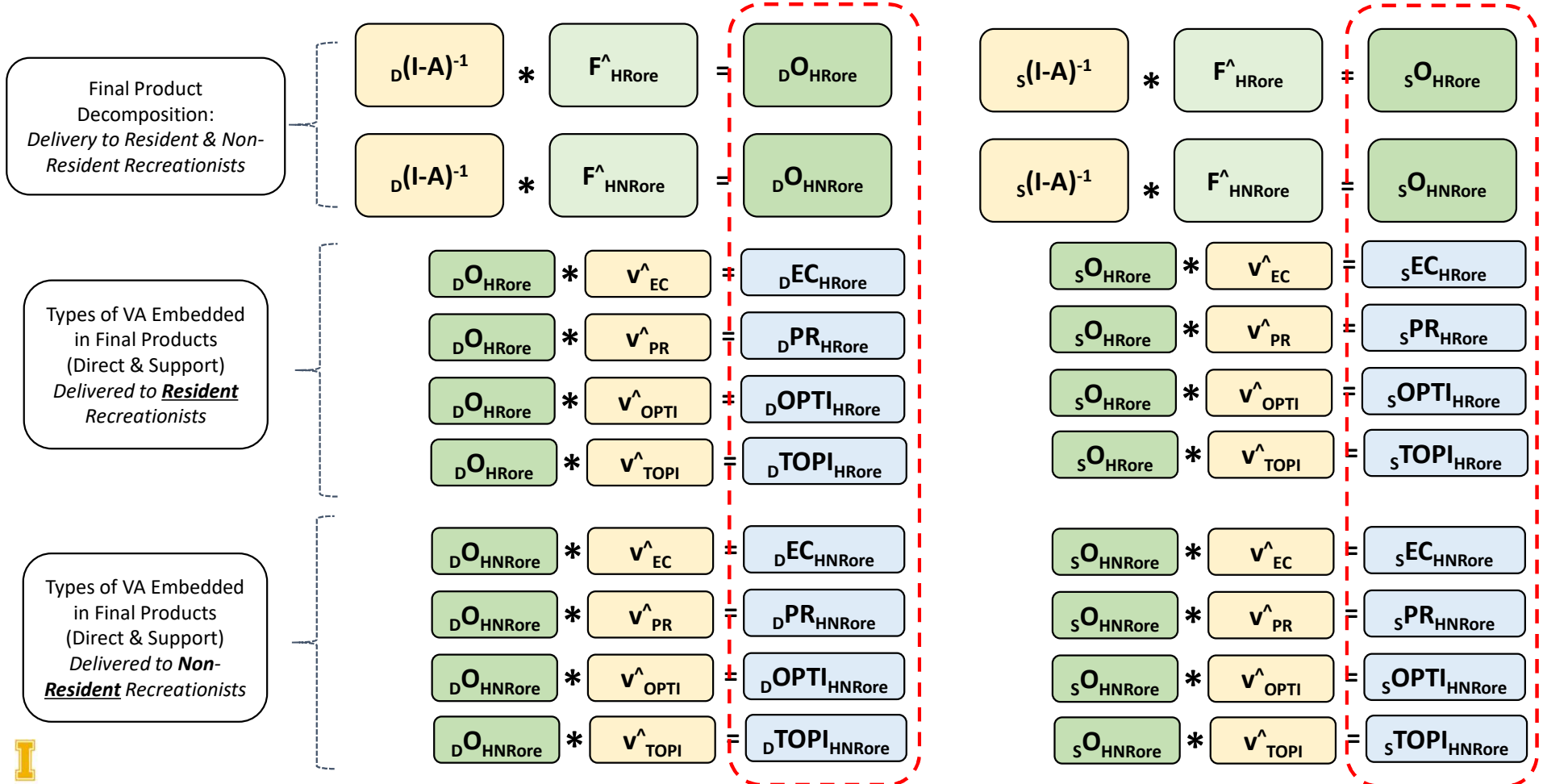
$$S O_{HNRore} * \hat{v}_{EC} = S EC_{HNRore}$$

$$S O_{HNRore} * \hat{v}_{PR} = S PR_{HNRore}$$

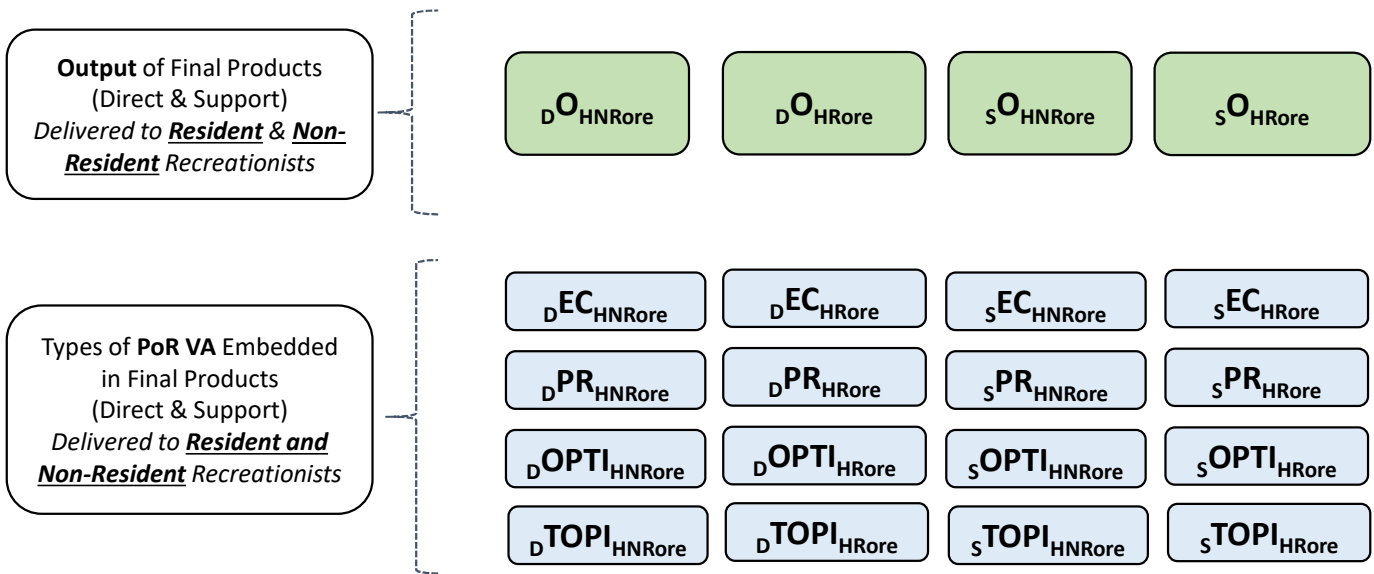
$$S O_{HNRore} * \hat{v}_{OPTI} = S OPTI_{HNRore}$$

$$S O_{HNRore} * \hat{v}_{TOPI} = S TOPI_{HNRore}$$

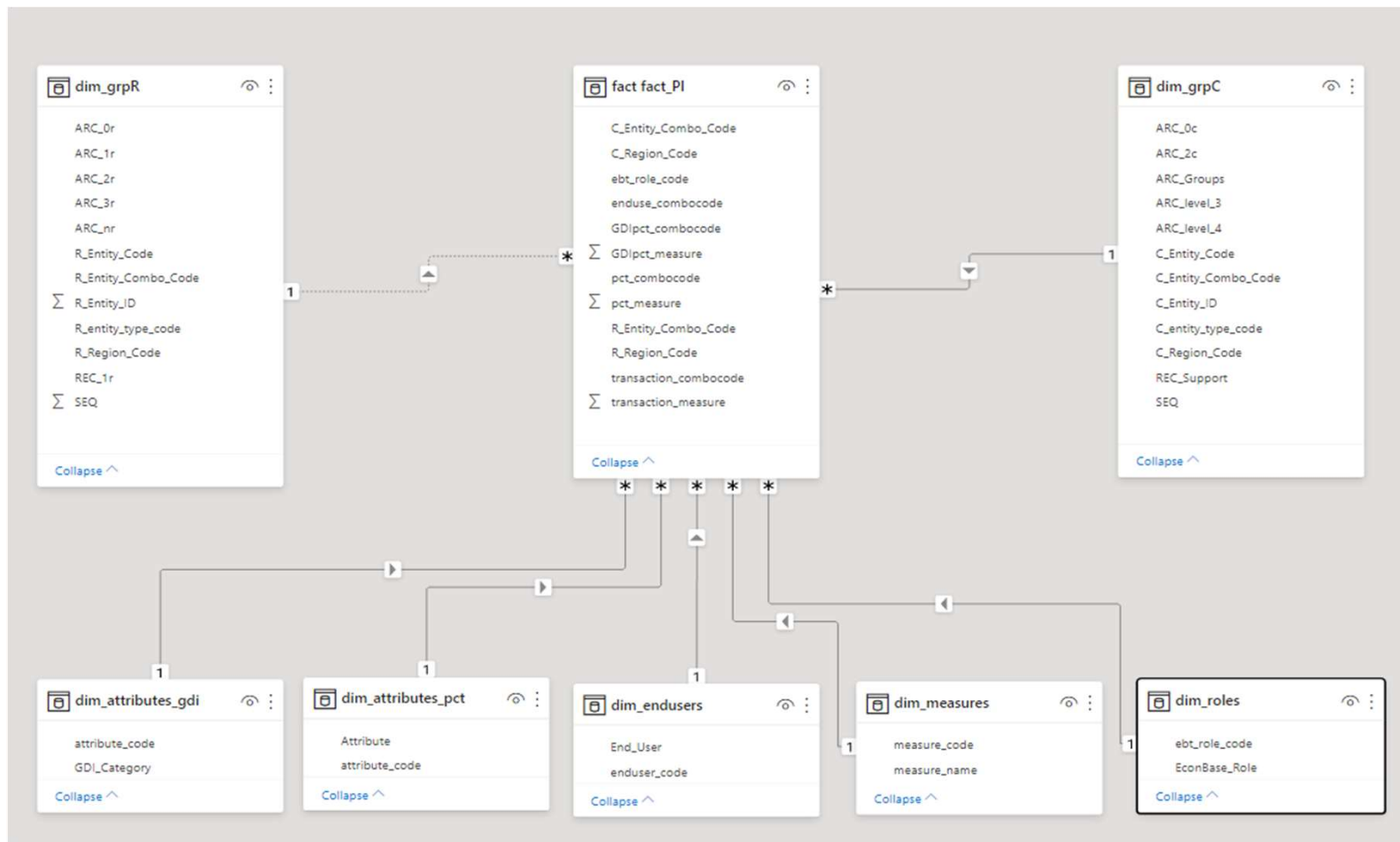
# Two “Atomized” Datasets:



# Contribution Datasets of both Amounts and Relationships



# Multi-Dimensional Data Model



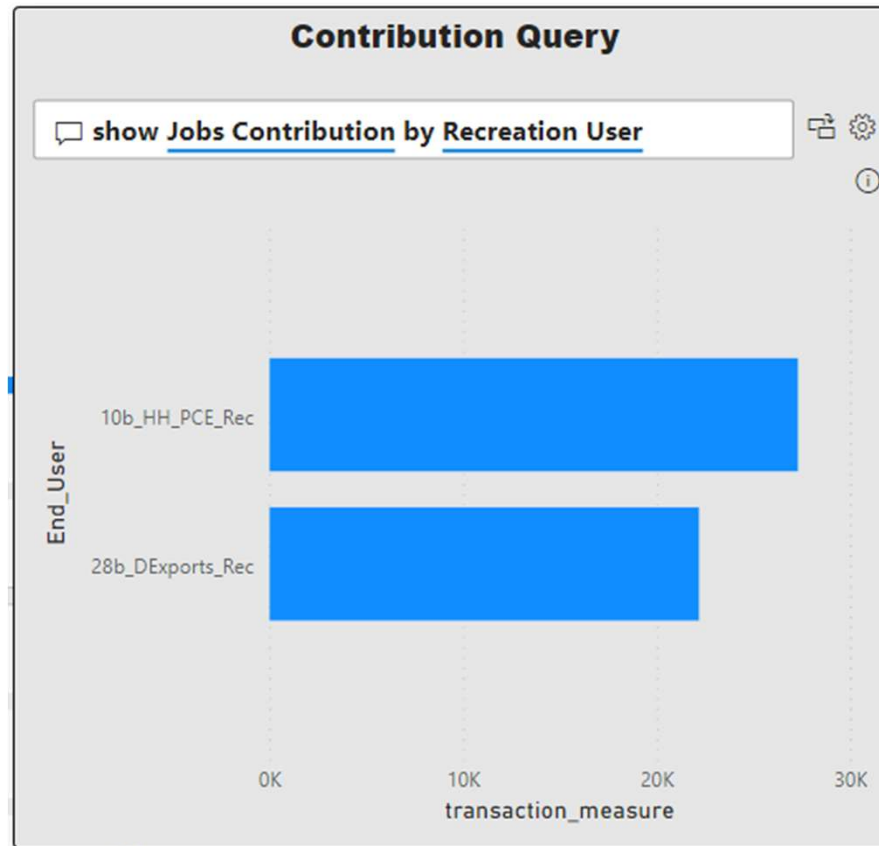
# % of Total Idaho GDI from Rec (Recapitulates ORSA)

**PRODUCTS CONSUMED BY RECREATION**

Sum of GDIpct_measure		REC_1c	1_REC_AGRIC	2_REC_MINERAL	3_REC_MFG	4_REC_TRANSP	5_REC_SERVICES	6_REC_LODGING	7_REC_DINE	Grand Total
<b>PRODUCERS</b>	ARC_1r	ARC_3r								
	1_AGRIC	01_Crops	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		02_Pasture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		03_Hay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		04_Cattle	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		05_Sheep	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		06_Othr Livestock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		07_Meat Processing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		08_Othr Ag Processing	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	2_FOREST	09_Forestry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		10_Wood Prod Mfg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3_MINERAL	11_Minerals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4_CONSTRUCTION	12_Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5_ALL_OTHER	13_All Other	0.1	0.0	0.1	0.7	1.8	0.5	0.4	3.5	
<b>Grand Total</b>		<b>0.2</b>	<b>0.0</b>	<b>0.1</b>	<b>0.8</b>	<b>1.8</b>	<b>0.5</b>	<b>0.4</b>	<b>3.6</b>	

GDI from Recreation Consumption  
(% of Idaho Total GDI)

# Query of Contribution Model Using Controlled Vocabulary





# Explanation Pattern: % Idaho GDI of Producers Serving Rec Market

< Back to report

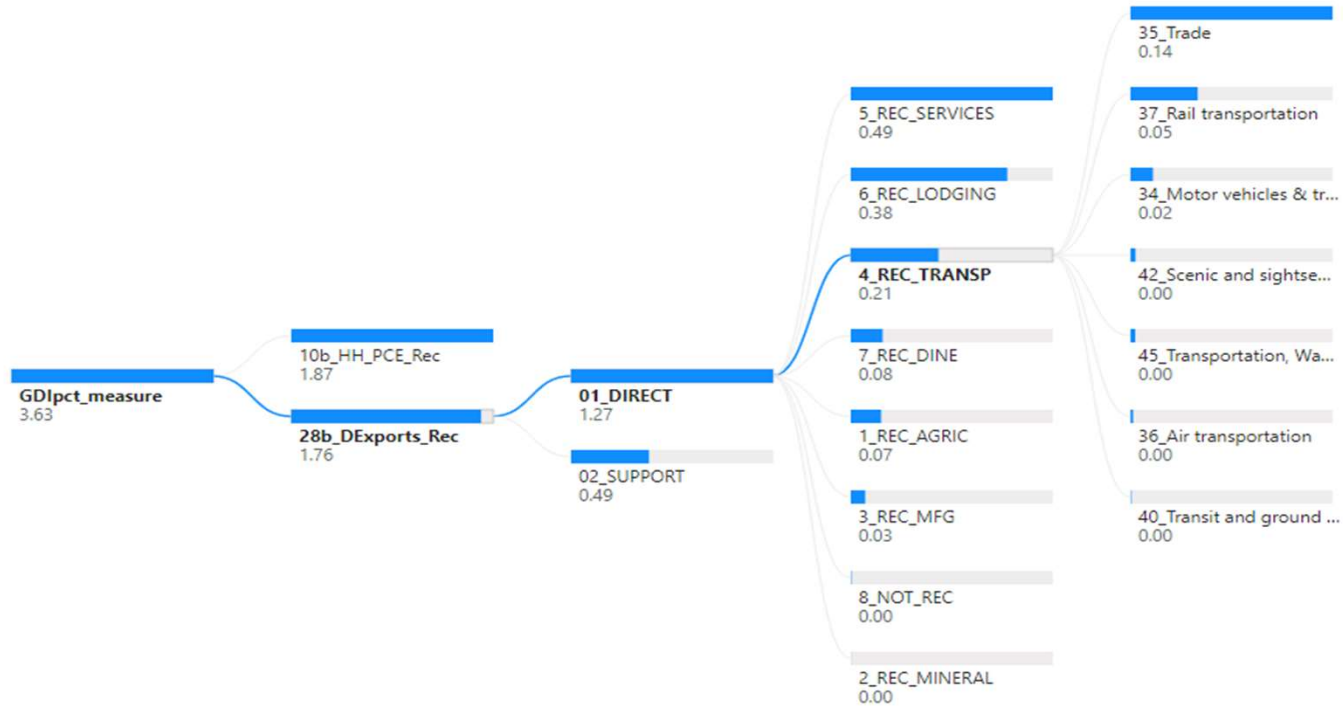
OUTDOOR RECREATION % GDI BY USER CATEGORY

End\_User ×  
28b\_DExports\_Rec

EconBase\_Role ×  
01\_DIRECT

REC\_Support ×  
4\_REC\_TRANSP

ARC\_level\_4 ×



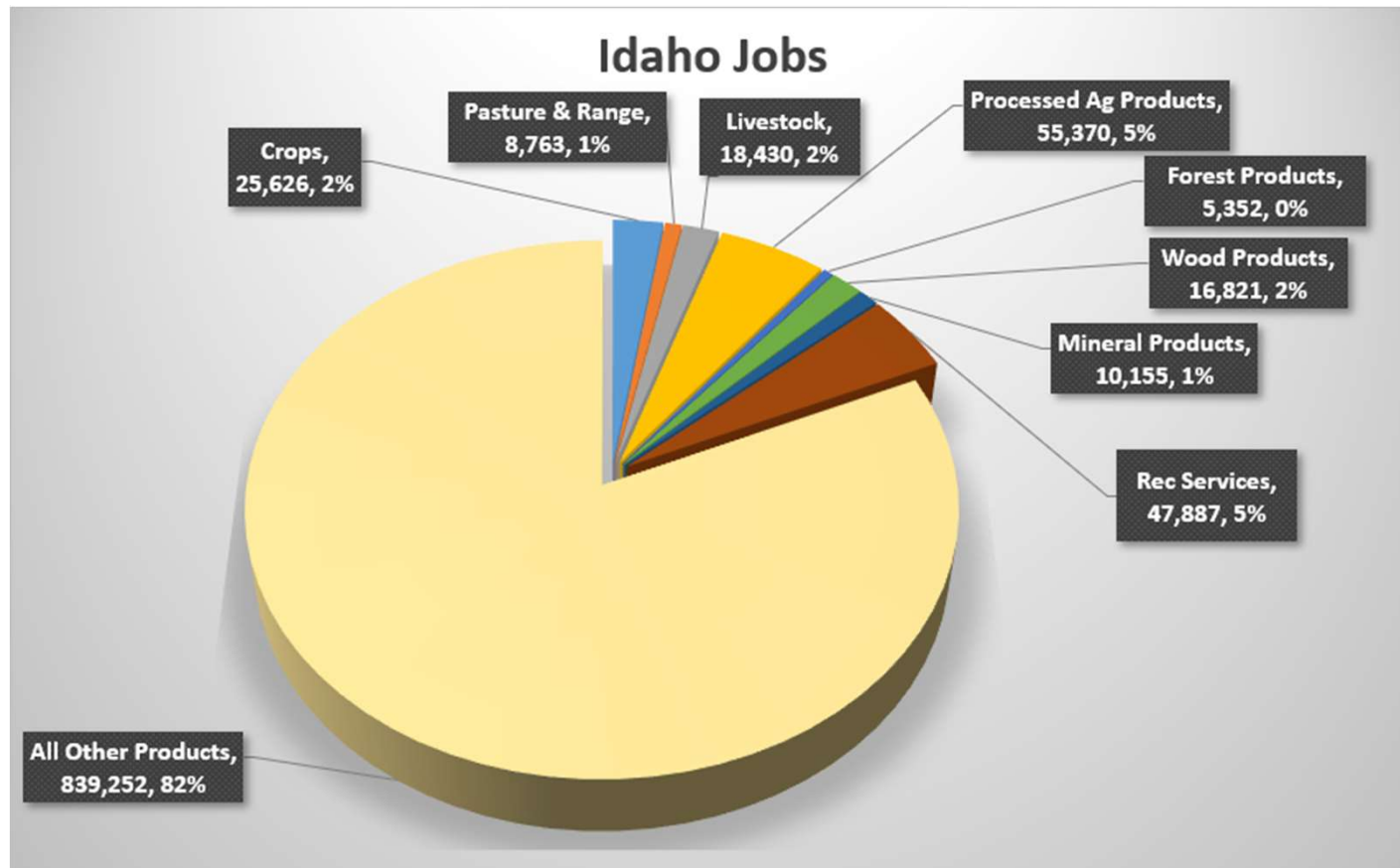
# Summary and Distribution: All Idaho Jobs

**Idaho JOBS by Producer Embedded in Final Products**

		FINAL PRODUCTS								
		Crops	Pasture & Range	Livestock	Processed Ag Products	Forest Products	Wood Products	Mineral Products	Rec Services	All Other Products
PRODUCERS	Crops	16,701	22	715	3,760	31	61	18	10	220
	Pasture & Range	8	7,235	110	219	23	54	17	1	62
	Livestock	3,001	540	9,149	4,828	251	216	4	13	161
	Agric Processing	9	1	704	22,358	1	8	1	24	199
	Forestry & Harvest	991	178	404	603	4,804	1,525	11	8	262
	Wood Prod Mfg	21	1	10	145	0	9,485	20	26	1,117
	Mineral Products	39	6	21	46	2	12	4,967	18	836
	All Other Producers	4,857	780	7,317	23,410	239	5,461	5,116	47,788	836,396
<b>Total</b>	<b>25,626</b>	<b>8,763</b>	<b>18,430</b>	<b>55,370</b>	<b>5,352</b>	<b>16,821</b>	<b>10,155</b>	<b>47,887</b>	<b>839,252</b>	<b>1,027,657</b>

Idaho Jobs from Recreation Consumption (Direct & Support)

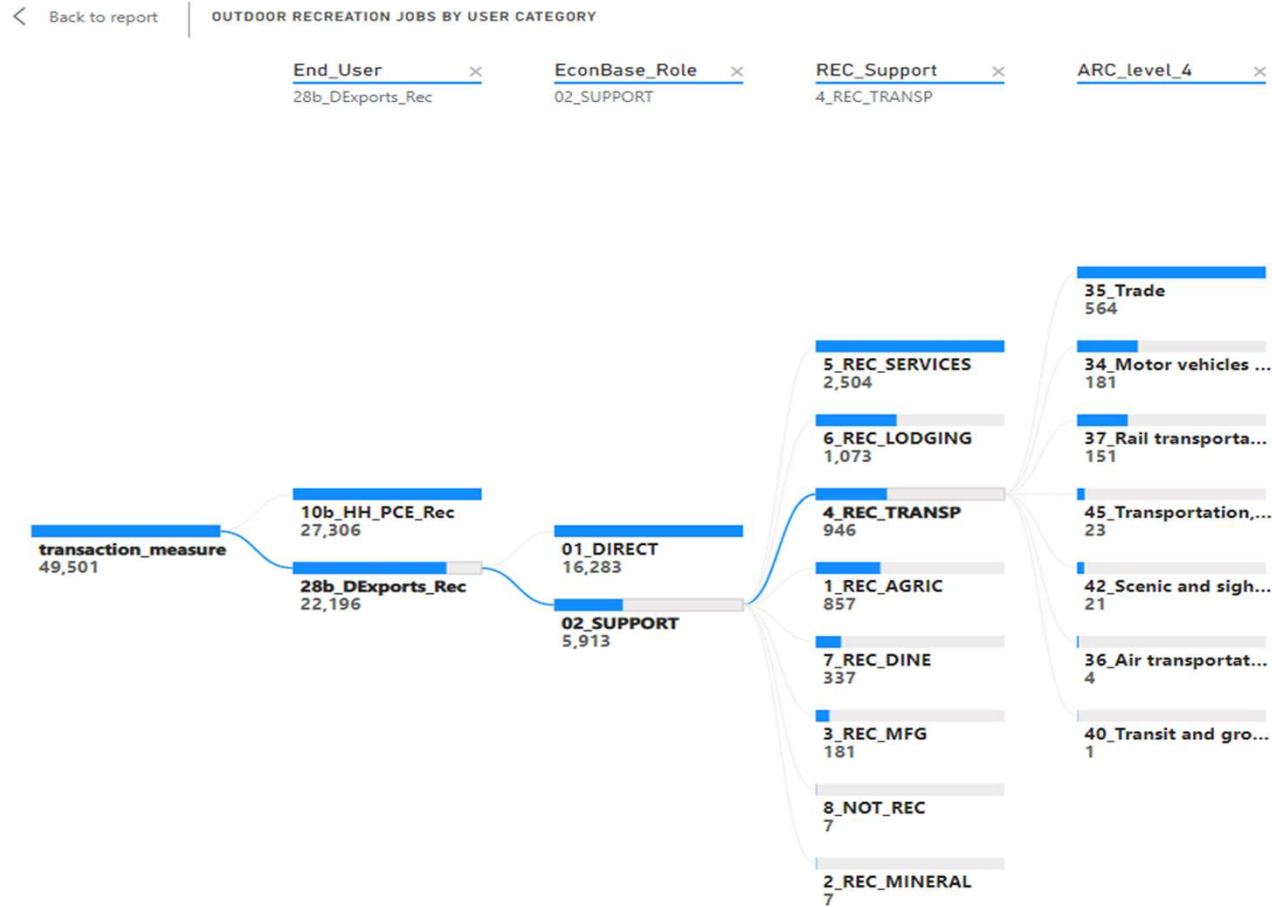
# Summary and Distribution: All Idaho Jobs



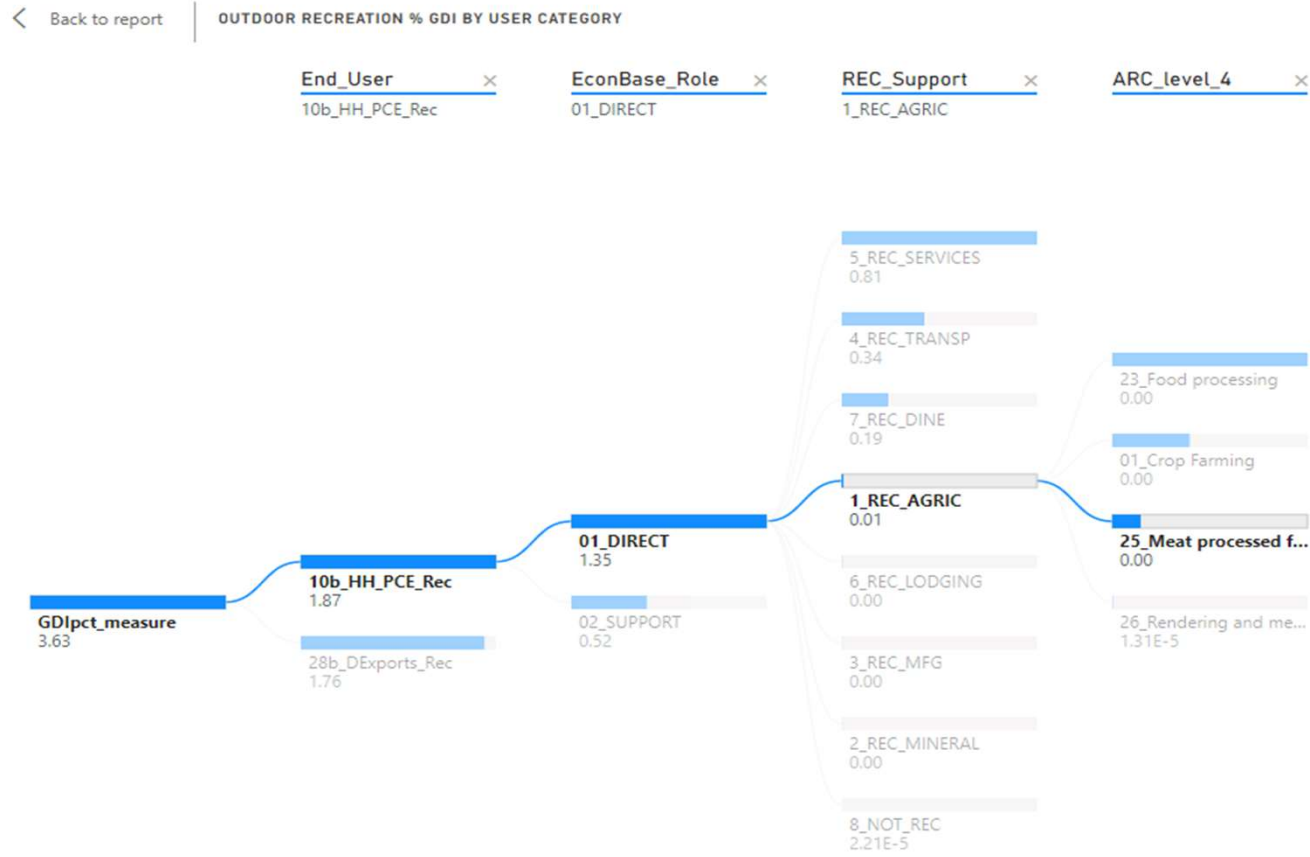
# From ORSA to Contribution Analysis

- Disaggregate (Resident & Non-Resident) the pattern of recreation expenditures to reproduce the pattern of VA by producers in the ORSA State report
- Decompose the SAM accounts to build a Contribution Data Model that explicitly relates each VA transaction to final products
- Query the Contribution Data Model using a controlled vocabulary to see how Outdoor Recreation contributes to the Idaho economy.

# Explanation Pattern: Idaho Jobs of Producers Serving Rec Market



# Explanation Pattern: % Idaho GDI of Producers Serving Rec Market

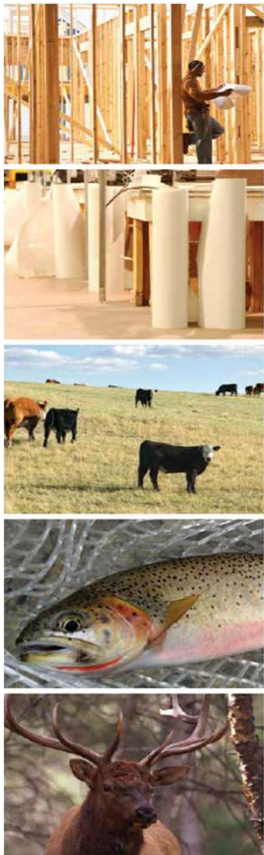


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# Thanks!

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[galward@uidaho.edu](mailto:galward@uidaho.edu)



University of Idaho  
 College of Natural Resources

**% Jobs (PoP) by Resource Group**

EconBase_Role	1_AGRIC	2_FOREST	3_MINERAL	Total
01_DIRECT	4.9	1.3	0.4	6.7
02_SUPPORT	5.6	0.9	0.6	7.0
<b>Total</b>	<b>10.5</b>	<b>2.2</b>	<b>1.0</b>	<b>13.7</b>

**Measure Selector**

< 28\_DIMP 33\_OUTPUT **34\_JOBS\_PoP**

**Resource Group Selector**

**1\_AGRIC** 2\_FOREST 3\_MINERAL >

**Percent of All Idaho Jobs by Resource Group**

