

KEY-LOG ECONOMICS

Research and strategy for the land community

To: Eric Sprague and Leslie Jones, American Forests
From: Carolyn Alkire and Spencer Phillips
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Subject: Potential Employment Impacts of Reforestation Investments

In support of American Forests' efforts to accurately depict the potential job growth associated with increased investments in rural and urban reforestation, we have assisted in developing estimates using the U.S. Bureau of Economic Analysis' Regional Input-Output Modeling System II (RIMS). Below we briefly describe RIMS, the employment multipliers obtained from RIMS to assess potential reforestation impacts, how the employment multipliers are used and job impacts expressed, and how they are to be cited.

Regional Input-Output Modeling System

The Regional Input-Output Modeling System (RIMS) II is a regional economic model used to estimate the potential economic impact of projects.¹ The model provides multipliers estimating the impact of changes in final demand (changes in the purchases of goods or services by final users) on one or more regional industries in terms of output, employment, and labor earnings. That is, the total change that occurs in all industries for each additional dollar delivered to final demand by a specific industry. Multipliers are available for all industries in a region (any state, county, or combination of states or counties defined by the user) and for specific industries.

RIMS was developed and is maintained by the U.S. Bureau of Economic Analysis. The most recent RIMS II multipliers (2019) are based on 2012 national benchmark input-output data and 2017 regional data.

National Multipliers for Reforestation

To obtain national multipliers applicable to changes in reforestation investments, we defined a region consisting of the 48 conterminous states (plus the District of Columbia). RIMS II multipliers are not available for the entire United States. Because states in a user-defined region must be adjacent, Hawaii and Alaska could not be included. (Excluding these two states will likely result in lower multipliers than if they were included because activities there will not be accounted for in the model.)

¹ Available at <https://apps.bea.gov/regional/rims/rimsii/>

We identified rural and urban reforestation industry codes in the 2017 *North American Industry Classification System (NAICS) Manual*² (see column 1 of table, page 2) and the corresponding industry code for which multipliers are available in RIMS II (column 4) from the RIMS II website.³

Reforestation Industry Codes, NAICS and RIMS II

Industry Code (NAICS)	Industry Title	Activities Included in Industry (w/Manual pages)	Available in BEA RIMS II	RIMS II Industry Title
Rural Forestry				
115310	Support activities for forestry	Reforestation (p. 882), forest thinning (p. 765), forestry services (p. 765)	115000	Support activities for agriculture and forestry
Urban Forestry				
561730	Landscaping services	Installing trees (p. 503), arborist services (p. 665), tree services (e.g., bracing, planting, pruning, removal, spraying, surgery, trimming) (p. 938)	561700	Services to buildings and dwellings

Sources: 2017 *North American Industry Classification System (NAICS) Manual* and *Industry List A. RIMS II 372 Detailed Industry Codes*. (No further disaggregation of industries is available in RIMS II.)

Using Employment Multipliers

RIMS provides both Type I and Type II multipliers: Type I multipliers account for both the direct and indirect (interindustry) impacts of a final-demand change; Type II multipliers also account for induced impacts (household spending). For example, the direct employment impact of an increase in reforestation funding would be more jobs for people planting trees. An indirect impact would be more jobs for tree nursery workers, because the tree planters would buy the seedlings from the nursery. And an induced impact would be more jobs in the grocery stores where tree planters and nursery workers buy their food.

² Available at <https://www.census.gov/library/publications/2017/econ/2017-naics-manual.html>. NAICS is a business classification system facilitating the comparison of statistics of business activities in North America. Companies are classified and separated into industries defined by the same or similar production processes.

³ Available at <https://apps.bea.gov/regional/rims/rimsii/industrylist.aspx?List=3>

The broader Type II employment multipliers relevant to reforestation represent the total change in the number of jobs that occurs in all industries for each additional \$1 million of investment in reforestation in rural and urban settings. The Type II multipliers applied in the updated fact sheet are

- Rural (RIMS industry 115000) - 31.9 jobs per \$1 million invested
- Urban (RIMS industry 561700) - 25.7 jobs per \$1 million invested

The multipliers above may be applied to the increased dollar investment in rural/urban reforestation to estimate the number of jobs that could be supported. For example, if an additional \$10 million was allocated towards rural reforestation efforts, 319 more jobs could be supported (\$10 million x 31.9).

Note that “jobs” include full-time, part-time, and seasonal jobs, and are not full-time equivalents. There is no explicit time dimension to these jobs: if an investment would be made over 5 years, for example, the job estimate would be divided by 5 and the resulting number represents the average number of jobs supported each year. (It would be correct to say that those jobs would be “created” only in the first year.) One limitation of using RIMS II and similar I-O models is that they may overestimate the potential impacts of large and/or multi-year projects. Economic impacts happen due to sudden, unexpected changes in demand, such as new demand for tree planting services. If and only if you can hire all the new forestry technicians, etc., to do the work in the short term will you get the full multiplier effect. Over time, economic sectors change to accommodate the increased investment and therefore impacts may be less than originally estimated. For example, tree planting companies may anticipate business growth in upcoming years and invest in new technologies or practices that save labor. Workers may anticipate potential job opportunities and switch occupations, increasing the labor pool and thus driving down wages and reducing the multiplier effect. Any number of things can happen in the medium- to long-run that will change the way that the investment will pan out in the economy. Hence, the greater the number of years over which large project investments span, the greater the potential for economic impacts to be overstated.

Citing Multipliers

The *RIMS II User Guide*⁴ provides guidance on how to cite model output in “Citing RIMS II Multipliers” (page C-1):

When mentioning the use of RIMS II multipliers, please clarify that the Bureau of Economic Analysis does not endorse any resulting estimates and/or conclusions about the economic impact of a proposed change on an area. When referring to the multipliers, simply note the source as BEA.

And provides examples:

- “Applying a final-demand multiplier of 1.0412 (BEA RIMS II multiplier) indicates that an increase in final demand of \$1 million would lead to...”

⁴ Available at https://www.bea.gov/sites/default/files/methodologies/RIMSII_User_Guide.pdf

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- “According to conclusions that were derived using BEA’s RIMS II multipliers...”
 - “Our analysis, which was conducted using BEA’s RIMS II multipliers, shows that...”

We recommend that American Forests follow this guidance wherever the multipliers or estimates based on them are included in in the fact sheet or other materials.