

FY19 ECONOMIC CONTRIBUTIONS FROM NATIONAL FORESTS AND GRASSLANDS

Methodology and Summary Report

USDA Forest Service, Ecosystem Management Coordination, Social Science and Economics



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PURPOSE OF REPORT

The USDA strategic plan states “The USDA mission includes serving the American people who live in and around national forests and helping these communities thrive economically” (USDA Strategic Plan FY 2018 to 2022). National Forests and Grasslands contribute to economic activity nationwide by providing recreational opportunities as well as commodities such as timber, mineral and energy, and livestock grazing. Payments to local governments as well as mineral and energy royalty payments also support schools, road maintenance, stewardship management projects and county government operations. Additionally, Forest Service investments in infrastructure, ecosystem and watershed restoration, forest health, and workforce salaries further support economic activity. The Forest Service plays a particularly valuable role in rural economies where the economic base may be limited. For these reasons, in addition to legislative and agency mandates, it is useful to quantify the economic contributions of national forests to the American public. This report provides the annual economic contribution that measures how Forest Service management activities and subsequent user/visitor spending cycles through local economies, generating business sales and supporting jobs, income and contributions to the National’s Gross Domestic Product (GDP).

What is an Economic Contribution Analysis and How to Use

Estimates of local jobs and income contributions supported by activities on individual National Forests and Grasslands have been made available through “At A Glance” reports. Economic contribution analyses describe the gross economic activity associated with Forest Service management activity and forest user spending in a regional economy. Results can be interpreted as the relative magnitude and importance of the economic activity generated through forest-related uses and spending in the regional economy.

Economic contributions are estimated by multiplying total spending (associated with uses on National Forests and Grasslands) by regional economic multipliers. Economic contribution analysis can be a useful indicator; however, this is only a portion of the full economic and social contributions of the current management. This analysis considers only the market transactions that result from activities on a particular national forest or in a Forest Service region. Numerous non-market, social, and economic values exist on National Forest and Grasslands. The value of ecosystem services, such as, clean air and water, are not captured in the economic contribution analysis. Therefore, this analysis should not be characterized as a representation of the economic value of National Forests and Grasslands. However, these results are important to agency leadership, constituents, partners and the public. The results can be used as depicted in the ‘Recommended Presentation of Forest-level Results’ section below or with interpretive text from the [At A Glance SharePoint site](#).

INTRODUCTION

National Forests and Grasslands provide multiple benefits to the American people and to local communities. They provide clean air and water, preserve cultural resources, and conserve lands for the enjoyment of present and future generations. This report focuses on economic contributions

supported in local economies by National Forest and Grasslands associated with market transactions from recreation visitor use, forest products, mineral and energy, and livestock grazing. In addition, counties with national forests or grasslands receive funds to support schools, road maintenance, and stewardship projects. The Forest Service also invests in such things as the construction and maintenance of infrastructure, environmental restoration, and forest health. These payments, goods, services and opportunities are vital to rural economies and are of interest to agency leadership, constituents, partners and the public. For example, residents and local government officials in surrounding communities have interest in how management of the National Forests and Grasslands affect their local economies.

Ecosystem Management Coordination (EMC) provides “At A Glance” (AAG) reports and information for economic contributions on 111 national forest and grassland units in the National Forest System (NFS) as well as the nine Forest Service Regions (see regional results in the appendix). This report details the contributions these resources make to local economies. Project and planning-specific effects may be different. For example, management may propose a different allowable level of resource use and thus economic activity would be different than the existing economic contribution associated with existing use at the time of the report generation.

Economic “contributions” describe the role Forest Service natural resource management plays in the local market economy as measured by jobs, labor income and gross domestic product (GDP). An economic contributions analysis should not be confused with an economic impact analysis. Economic impact analyses estimate the net changes to a regional economy that can be attributed to the inflow of new money from investment outside the region (e.g., non-local visitors). Economic impacts can be interpreted as the economic activity that would likely be lost from a local economy if the national forest unit was not there (i.e., changed to a different land use). Economic contribution analysis applies total investment from inside *and* outside the region of analysis (e.g., total visitor spending by both local visitors and non-local visitors).

AAG reporting is provided on a three-year cycle (2016 reports were previously provided and this reporting cycle uses 2019 data). The next section of this report provides a description of the methods used to conduct an economic contribution analysis, including the concept of Input-Output modeling and the protocol for analysis area delineation. The Data and Methods section also includes descriptions of the National Forest and Grassland data applied to the models, in the section ‘Modeling Process by Resource Areas’. Forest-level economic contribution results are provided in terms of jobs, labor income, and GDP alongside a discussion of result interpretation and caveats.

DATA & METHODS

Analysis Area Delineation

Before constructing an economic model, the geographic area that forms the underlying local economic structure of the analysis must be determined. The geographic area should represent a functional economic area where there are activities supported by Forest Service land management.

To delineate economic analysis areas in a consistent, defensible and appropriate manner, a more rigorous protocol was developed (METI and EIC 2010). This process was further refined in 2018 (USDA Forest Service 2018) so that functional economies would encompass a contiguous set of counties where direct expenditures are made by the following groups: recreationists, range permittees, timber harvesters, timber processors, mineral and energy producers, local government (from revenue sharing and payments-in-lieu-of-taxes) and the National Forest or Grassland unit. These changes have expanded the range and degree of expenditures included and, in many cases, have changed the set of counties making up a forest or grassland's analysis area. This area can differ by the resource under investigation, surrounding geography, and overall analysis objectives. Other objectives, for example NEPA project analysis, may focus on a different geography.

Counties with Direct Expenditures

Counties with Forest Service lands are a good place to begin the delineation process, but it is not a reliable guide for the final delineation (METI and EIC 2010). The first step in delineating an economic analysis area is to identify the counties where actual market transactions occur.

Expenditures by recreationists within 50 miles of forests are assessed under the National Visitor Use Monitoring (NVUM) effort. Accordingly direct expenditure recreation counties include all counties within 50 miles from the national forest unit. Range and timber data from Natural Resource Manager (NRM) are used to identify counties where range and timber expenditures are anticipated. For range, grazing permittees' addresses and associated Animal Unit Months (AUMs) are recorded; for timber, bid winner's address and hundred cubic feet (CCF) volume are used. A county qualifies as an expenditure county if it contains at least 5% of all range permittees or timber bid winners from the national forest unit.

Specific counties included in each National Forest or Grassland unit analysis area are included in a map for each forest on the [At A Glance SharePoint](#). More detail on specific direct expenditure counties, including a file distinguishing the type of direct expenditure counties (e.g., whether county experienced direct expenditure from associated with timber contract, recreation, etc.) for national forest units, is available upon request.

Input-Output Models

Once the analysis area is determined, an "Input-Output" economic model is created as a representation of that regional (local) economy, representing the linkages between economic sectors. The Input-Output (I-O) model is used to characterize the structure of the local economy and is used to examine the relationships both among businesses and between businesses and final consumers, capturing all monetary market transactions for consumption over a given period. The I-O modeling technique is well-suited for this analysis because it can estimate the ripple effects throughout the economy from an infusion of money stemming from National Forests' products, services, and amenities.

For example, a visitor on a camping trip to a National Forest incurs several expenditures (fuel for their vehicle, food, and other incidental supplies). These expenditures represent the recreationist's final demand for gas, groceries, and other local retail sectors, or in I-O terms, the 'direct effect' of recreation spending. This in turn generates demand by each retail store for the goods, services and labor to run their businesses and sell to consumers. In this case, other industries supply inputs to the gas stations, grocery stores and local retail sectors, supporting the local economy. These are called 'indirect' effects. Additionally, people spending wages earned in any of these industries also contribute to other goods and service industries; they are the 'induced' effect. Thus, these transactions result in direct, indirect, and induced effects, respectively, in the regional economy. These direct, indirect, and induced effects are measured with "multipliers" which measure the rate of direct and indirect economic activity (e.g., jobs and income) stimulated by direct demand for goods and services. These coefficients represent how jobs/income/spending cause ripples of additional activity as expenditures are spent and re-spent in the economy.

Contribution analysis performed for the 'At A Glance' reports and Forest Service resource management impact analysis, uses a commercially available I-O software and data system called IMPLAN (IMPact analysis for PLANing, The IMPLAN Group, LLC). IMPLAN is a regional economic analysis system first developed by the Forest Service and now updated and supported by the IMPLAN Group (www.implan.com). IMPLAN estimates rates of economic response. The model for this analysis used 2019 IMPLAN data. While 2020 data was available at the time of this analysis, it was not used since it represented an atypical year (i.e., COVID-19 effects on industry characteristics and NFS uses) not representative of average annual National Forest or Grassland contributions.

IMPLAN not only examines the direct contributions from a given national forest, but also indirect and induced effects. Indirect employment and labor income effects occur when a sector purchases supplies and services from other industries to produce their product. Induced effects are the employment and labor income generated as a result of spending household income generated by the direct and indirect employment. The modeling system allows the user to build regional economic models of one or more counties for a particular year and estimates the economic consequences of activities, projects, and policies on a region. The resulting model of the local economy is enhanced by adding national forest specific data, such as recreation visitor expenditures and National Forest budget profiles for salary and non-salary expenditures, characterizing agency operation effects. This step generates "response coefficients" or rates of response of the local economy to each dollar spent by the Forest Service or by users of National Forest resources (i.e., recreation visitors) in private sector businesses.

Forest-level Resource Inputs

Forest-level resource data are used as inputs for the analysis modeling and include:

- Recreation visitor use, annual visits and expenditure (from the National Visitor Use Monitoring (NVUM) survey)

- Forest Products, cut volume of timber and primary products processed (CCF) (from the Forest Products Financial System)
- Livestock grazing, Animal Unit Months (AUMs) for both cattle and sheep (from the Natural Resource Manager (NRM) system)
- Mineral and energy, locatable, saleable and leasable mineral production (various sources detailed in Waltz 2018)
- Payments to local governments (All Service Receipts, Department of Interior)
- Agency operation (National Finance Center (NFC), Office of Planning & Policy Analysis in the Office of Personnel Management)

Combining the IMPLAN model and the resource inputs above provides estimates of the economic contributions of Forest Service management. The process of combining the two relies on the Forest Economic Analysis Spreadsheet Tool (FEAST) developed by the U.S. Forest Service Ecosystem Management Coordination (EMC) office. This tool uses a Microsoft Access database as an interface between user inputs and data generated using the IMPLAN input-output modeling system. User inputs include resource outputs— in this context, the amount of a resource (forest products, AUMs, recreation visits, etc.) that were used in 2019. The application FEAST multiplies Forest Service resource output figures by IMPLAN model results to derive the employment and income estimates by national forest and Forest Service Region.

Modeling Process by Resource Areas

Recreation Visitor Use

For recreation, the number of annual visits came from the National Visitor Use Monitoring (NVUM) survey. As part of the NVUM survey a subset of visitors takes an economic survey; answering questions on expenditure totals and types of expenditures within 50 miles of the forest they visited. This information is then categorized by the type of trip visitors take. Type of trip is divided into seven categories for analysis of expenditures:

Visitors who reside greater than 60 miles from the visited forest:

- Non-local residents on day trips (NL Day),
- Non-local residents staying overnight on the forest (NL OVN-NF),
- Non-local residents staying overnight off the forest (NL OVN).

Visitors who live within 60 miles of the visited forest:

- Local residents on day trips (L Day),
- Local residents staying overnight on the forest (L OVN-NF),
- Local residents staying overnight off the forest (L OVN).

In addition, nonprimary is the seventh category for visits indicating where recreating on national forests is not the primary trip purpose. After separating economic survey responses into these trip-types, and excluding outliers and contaminants, sample sizes are too small at the forest level to

reliably estimate spending averages for each trip-type on individual national forests. Visitor spending can differ from place to place with differences in local spending opportunities and local prices. To account for these differences, trip type spending profiles are available for forests with below-average, average, and above-average spending. These spending averages are not for specific recreation activities apart from downhill skiing and wildlife related activities (watching wildlife, hunting and fishing). Downhill skiers/snowboarders spend more during recreation trips than individuals engaged in other recreation activities. If left in the general recreation sample, downhill skiers/snowboarders inflate the general trip spending averages. In addition, the Forest Service has a variety of policies and management efforts aimed at conserving wildlife habitat and wildlife populations and the agency is regularly asked to report outcomes related to these investments (White 2017). Spending for these groups is available in the General Technical Report “Spending Patterns of Outdoor Recreation Visitors to National Forests” linked in the references below (White 2017).

NVUM survey data also provides distinct patterns of spending for three recreation categories (downhill skiers/snowboarders, wildlife visitors and all other recreation visitors) and their type of trip (NL Day, NL OVN-NF, NL OVN, L Day, L OVN-NF, and L OVN) across 10 expenditure categories:

- Motels
- Campgrounds
- Restaurants
- Groceries
- Gas & oil
- Other transportation expenses
- Entry fees
- Recreation & entertainment
- Sporting goods
- Souvenirs and other expenses

These ten categories are bridged to IMPLAN industry sectors using the Bureau of Economic Analysis (BEA) National Income Product Account (NIPA) Personal Consumption Expenditure (PCE) data. The NIPA PCE tables consist of 100 or so expenditure categories. The BEA benchmark I/O tables are used to distribute these expenditure categories among the IMPLAN sectors and the PCE data are in purchaser prices, so margining and re-sectoring are necessary to obtain producer prices for use in IMPLAN. These patterns of spending are used to create 54 expenditure profiles used to generate response coefficients available for characterizing forest and grassland visitor spending by recreation category (downhill skiers/snowboarders, wildlife visitors, and all other recreation visitors), type of trip (NL Day, NL OVN-NF, NL OVN, L Day, L OVN-NF, and L-OVN), and for high, average, or low party trip types.

The response coefficients are combined with visitation estimates (converted to party-trips) to apply the spending averages for the three recreation categories: downhill skiers/snowboarders, wildlife visitors, and all other recreation visitors. The distribution of visitor type (i.e., local or non-

local visitor) and recreation category (i.e., downhill skiers/snowboarders, wildlife visitors, and all other recreation visitors) from NVUM are used to estimate visitor spending. This analysis includes the effects of spending by all visitors, both those who reside in the local area and those who do not.

Forest Products

The provision of forest products is an ecosystem service and is important for local economies surrounding National Forests across the nation. Timber harvests, including salvage and restoration activities such as thinning, provide forest products and contribute to local economies, in addition to being an important tool in shaping the structure and composition of the forest. For timber, the cut volume (CCF) comes from the Forest Products Financial System (FPFS). The modeling process takes the cut volume and accounts for "leakage" of direct effects associated with removal of timber and volume processed by only those firms based in the analysis area. Leakage is accounted for by taking cut volume harvested and allocating to the different types of wood product processing firms¹ that exist in the analysis area (sawmills, plywood and veneer mills, OSB, etc.) using the percentages processed in the analysis area. These primary processing percentages come from data provided by The University of Montana Bureau of Business and Economic Research (BBER) as part of USDA Forest Inventory & Analysis (FIA) Timber Product Output (TPO) data. For the western U.S., these processing percentages are forest-specific, while the eastern U.S. TPO data relies on state level summaries. These wood processing percentages are applied using a table in the FEAST spreadsheet tool, designed to cover all potential timber product categories across the nation. In some forests, timber harvest volume showed up in timber sectors that did not exist in the IMPLAN data or do not have a corresponding direct response coefficient. Alternatively, timber flow data were not available from BBER in a given year for some forests. Adjustments were made, in many cases, to either make sure the processing was included in results or was leaked when appropriate. All forest specific assumptions are available upon request.

Volumes are multiplied by relevant firms/types of manufacturing percentage in the FEAST spreadsheet tool table to obtain volume harvested and processed in the IMPLAN analysis area. These volume estimates are applied to Direct Response Coefficients (DRCs) to obtain estimates of direct effects. DRCs are regional estimates of employment and wages per unit of timber harvested developed by BBER (Sorensen et al. 2016). DRC estimates are based on TPO and federal

¹ Backward linkages to harvest and forest timber tract production have been removed from the production functions for wood product processing firms to avoid double-counting economic contributions. Additional information is available upon request.

employment data and offer comparisons of direct timber processing employment associated with various sectors and geographic regions. The DRCs provide potentially more accurate, geographically explicit direct effects, than those obtained from use of the market value of timber (Sorensen et al. 2016). In addition, Sorensen et al. note that the DRCs can be used in conjunction with input-output analysis to estimate indirect and induced effects. We apply this approach and use the estimates of direct effects to calculate indirect and induced effects using multipliers specific to the IMPLAN analysis areas.

Timber harvest directly supports jobs and income in logging and wood products manufacturing firms and indirectly contributes to several other industries, from transportation, local government, and other support sectors in the local economy. Income earned from timber-related jobs stimulates the area’s economy as it circulates through local businesses.

Livestock Grazing

Rangelands on the forest provide a variety of forage and habitats for grazing livestock and wildlife. The economic contribution of livestock grazing was estimated using authorized use levels in 2019. Annual authorized use is based on forage conditions and other management considerations. For range, the AUMs (Animal Unit Months) for both cattle and sheep (as well as horse or goat) came from the Natural Resource Manager (NRM) system. The modeling tool takes the grazing use estimates, in AUMs (data source described above), and multiplies them by a forage-based Direct Response Coefficient (DRC) specific to each state. The DRC is a ratio of the statewide cattle ranching employment over all AUMs required for cattle and calf inventory in that state.

$$\frac{\text{Statewide cattle ranching employment}}{\text{Statewide cattle AUM requirement}} = \frac{\text{hw} + \text{p}}{\text{INV} * 12 \text{ months}}$$

The ratio on the right side depends entirely on information from National Agricultural Statistical Service’s (NASS) Census of Agriculture (CoA) for the NAICS sectors for Beef cattle ranching and farming (112111) and sheep and goat farming (1124). Where the numerator is hired workers (hw) and proprietors (p), the denominator is beef cattle or sheep inventory (INV) times 12 months.

Similar to the method applied for timber suggested by Sorenson et al. 2016, DRCs can be used in conjunction with input-output analysis to estimate indirect and induced effects. Indirect and induced effects for forage use are calculated using the DRC applied to IMPLAN response coefficients calculated from NASS CoA data on farm production expense for Beef cattle ranching and farming (112111) and sheep and goat farming (1124) specific to each state. Expenses are bridged to IMPLAN sectors for the following categories:

- Cash rent for land, buildings, and grazing fees
- Chemicals purchased
- Contract labor
- Custom work and custom hauling
- Feed purchased

- Fertilizer, lime, and soil conditioners purchased
- Gasoline, fuels, and oils purchased
- Hired farm labor
- Interest expense
- Livestock and poultry purchased or leased
- Property taxes paid
- Rent and lease expenses for machinery, equipment, and farm share of vehicles
- Seeds, plants, vines, and trees purchased
- Supplies, repairs, and maintenance costs
- Utilities
- Custom services for livestock
- All other production expenses

The jobs and labor income estimates reported here are intended to capture the portion of a job that is supported by livestock grazing on Forest Service lands. For example, if operations use forage on National Forest lands for only a portion of the operation or year (summer months), only a portion of employment is attributable to Forest Service land and management. Finally, self-employed individuals are included in the estimates, however unpaid labor are not. While unpaid labor is not uncommon in agriculture, it does not represent a job or associated labor income in this analysis of market activity.

Mineral and Energy Production

Federal lands can play an important role in mineral and energy production. Mineral production affects the local economy and communities when companies extract natural resources on federal lands. For mineral and energy, all leasable mineral production information was obtained from the Office of Natural Resource Revenue. Locatable mineral production is obtained from the Forest Service Minerals and Geology Management staff² and saleable mineral production is obtained from iWeb report 16. All mineral production information (and associated payments to local

² Unlike leasable and saleable mineral operations, which are required by law to report or otherwise account for production to the land management agencies, no such provisions are found within the United States mining laws (30 U.S.C. 21-54) nor Forest Service locatable minerals regulations at 36 CFR 228 Subpart A. Therefore, reporting of any locatable mineral commodity production on NFS-managed lands is strictly voluntary on the part of the operator or parent company.

governments) is compiled by Forest Service Enterprise staff for EMC. A detailed explanation of sources and the data management process is available upon request (Waltz 2018).

The FEAST spreadsheet tool multiplies data entered on minerals volume and price to obtain a value of total industry output (TIO) for each mineral sector. TIO includes both final and intermediate demand and final demand is needed to avoid overestimates of market transactions associated with agency mineral production. The FEAST spreadsheet tool estimates final demand, using a final demand factor which is the inverse of the Type SAM multiplier for each mineral sector. A Type SAM Multiplier (where SAM stands for Social Accounting Matrix) is calculated by dividing the sum of the direct, indirect, and induced effects by the direct effects.

$$Final\ Demand\ Factor = 1 / \left(\frac{direct + indirect + induced}{direct} \right)$$

After TIO is multiplied by the final demand factor for each minerals sector, these estimates of final demand are multiplied by the mineral sector response coefficients generated from the IMPLAN analysis area model.

Payments to Local Governments

States and counties that contain National Forest System lands receive annual payments in the form of Payments-in-lieu-of-taxes (PILT), the Secure Rural Schools (SRS) program and 25 Percent Fund. The PILT program compensates local governments for the lack of property taxes associated with nontaxable Federal land located within a county's boundary. Local governments provide a variety of services that support the use and enjoyment of the forest, including road maintenance and emergency services. PILT payments are distributed by the Department of the Interior (DOI) for tax-exempt Federal land administered by the Bureau of Land Management (BLM), the Forest Service, the National Park Service, U.S. Fish and Wildlife Service, and for Federal water projects and some military installations. PILT payments are attributed to counties based on acreage of individual forest and grassland units in each county found in Forest Service Land Area Reports.

The Forest Service also makes payments to local governments through the Secure Rural Schools (SRS) program to offset declines in revenue-sharing payments due to lower timber harvest volumes. The SRS program supports schools, roads, and ecosystem restoration in the area. The 25 Percent Fund shares revenue generated from the sale of commodities produced on public land with the county where the activities take place. Twenty-five percent payments are typically lower than those under the SRS program. Changes to these payment programs have a larger effect on rural counties which depend, to a greater degree, on these payments for school, road, and bridge funding. Service Secure Rural Schools Act & 25 Percent Fund payments come from the State Payments report ASR-10-02.

The FEAST spreadsheet tool allows distribution of payments according to legal and regulatory requirements to four distinct IMPLAN response coefficients:

- Roads
- Schools
- General Government
- Title II Projects: funding for Resource Advisory Council projects

The road related expenditures applied are an IMPLAN response coefficient composed of sectors related to road construction and road repair and maintenance. The response coefficient for school related expenditures contains two expenditure profiles: one examining salary related expenditure and the other specific to operating budgets of elementary and secondary schools. The response coefficient for general government similarly is composed of an expenditure profile for local government salary and another specific to general government operating budgets. The response coefficient for Title II Projects may apply the sector for support activities for agriculture and forestry.

Agency Operation

Management of the forest directly contributes to the local economy by employing individuals living within the area and by spending federally appropriated dollars on goods and services to carry out management programs. While forest plans do not include staffing and procurement strategies, the contribution of Agency investment in resource management are often vital in local economies and included in this analysis. Forest Service salary and non-salary budget expenditure data were obtained from the USDA National Finance Center (NFC). Permanent and Non-Permanent FTEs are obtained from Office of Planning & Policy Analysis (in the Office of Personnel Management) or Human Resources. Non-salary emergency suppression related expenditures (WFSU) are excluded since these expenditures most often accrue on incidents off the forest unit outside the analysis area.

Salary expenditures are those expenditures by Forest Service employees in the local economy from salaries earned. A labor income change (IMPLAN event type) is used to adjust expenditure patterns with household income levels according to the composition of household income levels in the analysis area. In addition, the labor income change reduces salary to disposable income (without savings, taxes or rents) using additional data unique to each analysis area.

Non-salary expenditures are agency operational expenditures on equipment and services necessary to perform resource management activities. Agency Budget and Finance information allows categorization of forest service unit expenditures to almost 400 IMPLAN industry sectors.

The FEAST spreadsheet tool applies the salary and non-salary expenditures to the salary and non-salary response coefficients generated from the IMPLAN analysis area model.

SUMMARY RESULTS

Summary Results by Forest

National Forests and Grasslands support social, cultural, and economic conditions in communities adjacent to Forest Service land. These contributions include ecosystem services, or nature's

benefits, as well as multiple products and uses from the forest that provide both direct and indirect benefits to people. Management of the forest, in terms of its operations, employees, and connection to institutions and people outside the National Forest boundary are also an important contribution to the surrounding communities both socially and economically. This section summarizes the economic contributions (jobs, labor income, and gross domestic product [GDP]) from each National Forest and/or Grassland unit.

The contributions detailed in this report represent jobs, income and GDP supported in segments of the private sector, stemming from use of forest resources, infrastructure, and other amenities developed and managed by national forest units, as well as resources which the Forest Service directly manages. The Forest Service collects resource use data, such as recreation visits and grazing forage authorized. The economic contribution analysis combines baseline economic data from IMPLAN with Forest Service resource data to estimate employment, labor income and GDP associated with Forest Service programs, resources, and uses.

The presentation of data by program area (recreation, forest products, livestock grazing, mineral and energy, payments to local governments, and agency operation) provides a convenient way of displaying the economic contributions of Forest Service activities. It does not mean that the economic contributions can be fully attributed to individual program areas, nor that economic contributions should be compared across programs. For example, the health and availability of forage for grazing is supported by management activities done through expenditure on agency operation.

Jobs supported by the national forests and grasslands are often in small, rural communities and therefore can be an important contribution to economic and social sustainability. Employment is the estimate of average annual full-time, part-time, temporary, and seasonal jobs. Direct job contributions come from economic activity associated with a Forest Service Program. Secondary job contributions are the ripples of economic activity through linked sectors stimulated by the direct economic activity. Total job contributions are the sum of direct and secondary contributions.

Many jobs surrounding National Forests are in services-related sectors, such as jobs in restaurants, hotels, healthcare, and other accommodations. These services jobs are often related to the recreational opportunities provided by the forest. In many small rural communities, government employment represents an important component of the economy. In others, there have been important changes in employment in mining (which includes fossil fuel energy development), manufacturing (which includes lumber and wood products), and construction. Since economic diversity generally promotes stability and offers greater employment opportunities, additional information on employment by industry helps identify which industries are important to the local economy surrounding National Forests and Grasslands. Additional sources of industry information can be found in the 'Results Interpretation' section below.

Labor income is the value of wages, salaries, and benefits for wage earners plus income to local business owners including sole proprietors. Income and employment are two important measures to understand local economic conditions and how Federal land management affects local economies. Jobs and labor income supported by national forests and grasslands are spread across many local economic sectors. Note that sectors that have the highest employment (i.e., number of jobs) may not generate the highest labor income and vice versa.

In addition to jobs and income supported by management of the National Forests and Grasslands a third result from the analysis, Gross Domestic Product (GDP), is reported in Table 1. GDP is a commonly reported indicator of the national economy. Also referred to as “value added”, GDP is defined as the total market value of all final goods and services produced from goods, services and amenities/infrastructure provided by National Forests, representing wealth created by industry activity (that relies on Forest goods, services, and amenities).

Details on methods are provided above however, care should be taken when attempting to generalize from the resource-specific effects to other management scenarios. While IMPLAN is an excellent tool for its designed purposes, it is the responsibility of analysts using IMPLAN to be sure inputs are defined appropriately and to be aware of the following assumptions within any I-O Model:

- Constant returns to scale
- No supply constraints
- Fixed input structure
- Industry technology assumption
- Constant byproducts coefficients
- The model is static

Further, the following key limitations apply to Input-Output Models such as IMPLAN and should be considered by analysts using the tool:

Feasibility: The assumption that there are no supply constraints and there is fixed input structure means that even if the input resources required are scarce, IMPLAN will assume the same portion of production value is required to acquire that input, unless otherwise specified by the user. The assumption of no supply constraints also applies to human resources, so there is assumed to be no constraint on the talent pool from which a business or organization can draw. Analysts should evaluate the logistical feasibility of a business outside of IMPLAN. Similarly, IMPLAN cannot determine whether a given business venture being analyzed will be financially successful.

Backward-linked and Static model: I-O models do not account for forward linkages, nor do I-O models account for offsetting effects such as cannibalization of other existing businesses, diverting funds used for the project from other potential or existing projects, etc. It falls upon the analyst to take such possible countervailing or offsetting effects into account or to note the omission of such possible effects from the analysis.

Like the model, prices are also static: Price changes cannot be modeled in IMPLAN directly; instead, the final demand effects of a price change must be estimated by the analyst before modeling them in IMPLAN to estimate the additional economic effects of such changes.

Table 1. Fiscal Year 2019 Economic Contributions from Agency Operation, Industry and Visitor Use of Natural Resources, and Payments to Local Governments			
	Jobs	Labor Income	GDP
Northern Region			
Beaverhead-Deerlodge National Forest	1,130	\$42,938,000	\$65,404,000
Bitterroot National Forest	510	\$19,294,000	\$26,104,000
Custer-Gallatin National Forest	4,020	\$225,583,000	\$407,845,000
Dakota Prairie Grasslands	4,550	\$281,019,000	\$638,443,000
Flathead National Forest	1,260	\$48,307,000	\$70,304,000
Helena-Lewis and Clark National Forest	1,450	\$61,545,000	\$93,894,000
Idaho Panhandle National Forests	2,180	\$96,625,000	\$144,166,000
Kootenai National Forest	2,130	\$96,508,000	\$148,991,000
Lolo National Forest	1,850	\$73,460,000	\$114,375,000
Nez Perce-Clearwater National Forest	1,830	\$78,656,000	\$115,572,000
Rocky Mountain Region			
Arapaho and Roosevelt National Forests	3,320	\$201,312,000	\$275,637,000
Bighorn National Forest	520	\$20,518,000	\$31,663,000
Black Hills National Forest	2,480	\$102,661,000	\$151,617,000
Grand Mesa, Uncompahgre and Gunnison National Forests	3,990	\$152,307,000	\$249,328,000
Medicine Bow-Routt National Forest	5,570	\$265,771,000	\$506,791,000
Nebraska National Forest	680	\$27,510,000	\$47,807,000
Pike and San Isabel National Forests	4,390	\$189,658,000	\$303,294,000
Rio Grande National Forest	1,580	\$55,676,000	\$90,325,000
San Juan National Forest	2,590	\$85,015,000	\$148,051,000
Shoshone National Forest	540	\$23,265,000	\$33,002,000
White River National Forest	22,230	\$960,366,000	\$1,592,176,000
Southwest Region			

Table 1. Fiscal Year 2019 Economic Contributions from Agency Operation, Industry and Visitor Use of Natural Resources, and Payments to Local Governments

	Jobs	Labor Income	GDP
Apache-Sitgreaves National Forests	2,100	\$77,174,000	\$117,867,000
Carson National Forest	1,880	\$63,399,000	\$117,614,000
Cibola National Forest	1,430	\$43,897,000	\$71,486,000
Coconino National Forest	6,990	\$276,296,000	\$459,969,000
Coronado National Forest	1,710	\$45,833,000	\$70,119,000
Gila National Forest	1,170	\$28,533,000	\$41,500,000
Kaibab National Forest	930	\$31,864,000	\$46,887,000
Lincoln National Forest	1,100	\$32,271,000	\$50,329,000
Prescott National Forest	970	\$29,088,000	\$42,713,000
Santa Fe National Forest	1,030	\$37,148,000	\$57,797,000
Tonto National Forest	1,930	\$66,592,000	\$101,074,000
Intermountain Region			
Ashley National Forest	670	\$27,496,000	\$42,575,000
Boise National Forest	1,400	\$52,430,000	\$77,346,000
Bridger-Teton National Forest	1,850	\$69,799,000	\$119,251,000
Caribou-Targhee National Forest	2,440	\$97,610,000	\$153,961,000
Dixie National Forest	1,330	\$50,055,000	\$79,745,000
Fishlake National Forest	860	\$24,639,000	\$42,087,000
Humboldt-Toiyabe National Forest	2,470	\$129,861,000	\$233,786,000
Manti-La Sal National Forest	1,930	\$79,086,000	\$186,141,000
Payette National Forest	1,200	\$44,625,000	\$64,675,000
Salmon-Challis National Forest	920	\$34,140,000	\$48,176,000
Sawtooth National Forest	1,670	\$55,630,000	\$89,193,000
Uinta-Wasatch-Cache National Forest	4,750	\$168,795,000	\$284,917,000
Pacific Southwest Region			
Angeles National Forest	1,200	\$50,659,000	\$77,514,000
Cleveland National Forest	590	\$21,303,000	\$30,243,000

Table 1. Fiscal Year 2019 Economic Contributions from Agency Operation, Industry and Visitor Use of Natural Resources, and Payments to Local Governments

	Jobs	Labor Income	GDP
Eldorado National Forest	2,100	\$94,043,000	\$144,068,000
Inyo National Forest	5,290	\$201,482,000	\$328,837,000
Klamath National Forest	810	\$33,896,000	\$45,864,000
Lake Tahoe Basin Management Unit	15,870	\$644,708,000	\$1,056,938,000
Lassen National Forest	890	\$41,121,000	\$59,332,000
Los Padres National Forest	720	\$30,480,000	\$45,269,000
Mendocino National Forest	380	\$14,917,000	\$20,431,000
Modoc National Forest	870	\$36,377,000	\$55,600,000
Plumas National Forest	1,020	\$47,583,000	\$69,086,000
San Bernardino National Forest	2,300	\$105,655,000	\$167,072,000
Sequoia National Forest	1,030	\$42,803,000	\$65,478,000
Shasta-Trinity National Forest	1,520	\$65,756,000	\$94,896,000
Sierra National Forest	1,210	\$48,993,000	\$72,375,000
Six Rivers National Forest	460	\$17,080,000	\$22,815,000
Stanislaus National Forest	2,100	\$88,418,000	\$137,076,000
Tahoe National Forest	1,910	\$82,929,000	\$126,737,000
Pacific Northwest Region			
Columbia River Gorge National Scenic Area	920	\$40,409,000	\$64,701,000
Colville National Forest	1,760	\$94,139,000	\$137,906,000
Deschutes National Forest	3,290	\$138,964,000	\$206,910,000
Fremont-Winema National Forest	1,490	\$79,864,000	\$117,282,000
Gifford Pinchot National Forest	1,070	\$63,899,000	\$95,100,000
Malheur National Forest	1,340	\$61,901,000	\$86,727,000
Mt. Baker-Snoqualmie National Forest	1,130	\$59,781,000	\$97,368,000
Mt. Hood National Forest	2,650	\$121,471,000	\$187,435,000
Ochoco National Forest	560	\$24,727,000	\$34,903,000
Okanogan-Wenatchee National Forest	2,510	\$124,082,000	\$193,593,000

Table 1. Fiscal Year 2019 Economic Contributions from Agency Operation, Industry and Visitor Use of Natural Resources, and Payments to Local Governments

	Jobs	Labor Income	GDP
Olympic National Forest	520	\$32,507,000	\$49,258,000
Rogue River-Siskiyou National Forests	1,480	\$77,685,000	\$112,740,000
Siuslaw National Forest	1,710	\$97,260,000	\$145,456,000
Umatilla National Forest	820	\$38,472,000	\$53,863,000
Umpqua National Forest	1,040	\$54,534,000	\$77,018,000
Wallowa-Whitman National Forest	1,110	\$40,187,000	\$57,956,000
Willamette National Forest	2,240	\$125,690,000	\$183,923,000
Southern Region			
Chattahoochee-Oconee National Forests	1,920	\$79,251,000	\$129,596,000
Cherokee National Forest	890	\$34,845,000	\$52,168,000
Daniel Boone National Forest	940	\$38,689,000	\$58,127,000
El Yunque National Forest	710	\$29,987,000	\$42,106,000
Francis Marion and Sumter National Forests	1,560	\$69,737,000	\$110,828,000
George Washington and Jefferson National Forest	1,080	\$51,671,000	\$77,271,000
Kisatchie National Forest	880	\$45,854,000	\$71,863,000
Land Between the Lakes National Recreation Area	690	\$24,295,000	\$37,719,000
National Forests in Alabama	890	\$49,476,000	\$78,748,000
National Forests in Florida	1,170	\$54,281,000	\$84,302,000
National Forests in Mississippi	1,360	\$65,523,000	\$101,881,000
National Forests in North Carolina	3,550	\$143,847,000	\$230,939,000
National Forests in Texas	740	\$44,533,000	\$64,866,000
Ouachita National Forest	1,740	\$81,234,000	\$126,373,000
Ozark-St. Francis National Forest	2,090	\$91,465,000	\$144,920,000
Eastern Region			
Allegheny National Forest	1,540	\$71,642,000	\$108,826,000
Chequamegon-Nicolet National Forest	2,120	\$93,277,000	\$141,733,000
Chippewa National Forest	1,030	\$42,379,000	\$67,257,000

Table 1. Fiscal Year 2019 Economic Contributions from Agency Operation, Industry and Visitor Use of Natural Resources, and Payments to Local Governments

	Jobs	Labor Income	GDP
Green Mountain and Finger Lakes National Forests	2,370	\$100,593,000	\$166,396,000
Hiawatha National Forest	1,120	\$41,896,000	\$65,001,000
Hoosier National Forest	240	\$11,630,000	\$16,086,000
Huron-Manistee National Forest	1,730	\$77,008,000	\$118,671,000
Mark Twain National Forest	2,240	\$110,033,000	\$198,538,000
Midewin National Tallgrass Prairie	140	\$5,891,000	\$8,605,000
Monongahela National Forest	1,030	\$43,172,000	\$64,082,000
Ottawa National Forest	980	\$45,549,000	\$67,024,000
Shawnee National Forest	290	\$11,172,000	\$16,030,000
Superior National Forest	1,580	\$64,730,000	\$98,733,000
Wayne National Forest	260	\$12,554,000	\$18,865,000
White Mountain National Forest	4,690	\$194,280,000	\$320,841,000
Alaska Region			
Chugach National Forest	490	\$26,750,000	\$35,969,000
Tongass National Forest	3,720	\$201,935,000	\$410,905,000

Recommended Presentation of Forest-level Results

The following example from the Boise National Forest (Table 2) can be used as a reporting template for unit-level economic contribution results. Specific results for individual units can be found at the [At A Glance SharePoint](#).

The National Forest is managed to generate a variety of forest goods and services that are used by industries, in combination with labor and other inputs, to produce final market goods and services (e.g., timber used as an input to wood products; forage as an input to livestock production). Wildlife, fish, campgrounds and other natural and built features on the National Forest also serve as inputs to visitor satisfaction derived from recreational, cultural, historical, and educational experiences on National Forests.

This report presents a snapshot of regional jobs, labor income, and gross domestic product (GDP) supported by the production of final market goods and services (livestock, mineral and energy, forest products, recreation visitor use) made possible in part by the consumption or use of a subset

of forest good and service inputs from the National Forest in fiscal year 2019. This report also describes job, income and GDP contributions from (i) National Forest spending on salaries and operations used to manage and produce forest goods and services inputs³, and (ii) spending of payments to local governments (e.g., Payments in Lieu of Taxes [PILT], Secure Rural Schools [SRS]) as a substitute for tax or other transfer payment spending that would occur if National Forests lands were under other ownership.

This report does not include non-market forest goods and services such as clean water and air, biodiversity, cultural resources, and wilderness. The results presented in this report should not be used to characterize the benefits of forest goods and services. Also, the significance of the results is difficult to determine without examining the results within the aggregate context of public benefits and social impacts derived from forest goods and services. Higher or lower numbers of jobs, income or GDP do not necessarily translate into higher or lower levels of public benefits or contributions to social and economic sustainability.

Fiscal Year 2019 Economic Contributions by [Boise] National Forest

Natural Resources Production and Recreation Visitor Spending

In 2019, the production of livestock, mineral and energy, and forest products from resource inputs provided by the [Boise] National Forest, as well as recreation/cultural/historical visitor spending linked to visits on the [Boise] National Forest, are estimated to directly support 550 jobs, \$16 million in labor income, and contribute about \$26 million to Gross Domestic Product (GDP).

Including secondary, or ripple effects⁴, forest resource use and visitor spending are estimated to support a total of 860 jobs, \$29 million in labor income, and contribute about \$47 million to GDP. These contributions represent jobs, income and GDP supported in segments of the private sector, stemming from use of forest resources, infrastructure, and other amenities developed and managed by the [Boise] National Forest, as well as mineral resources which the [Boise] National Forest directly manages.

³ Backward linkages to spending on forest good and service inputs have been removed from final market good and service production for forest products to avoid double-counting economic contributions.

⁴ Direct contributions come from economic activity and output associated with individual resource areas; indirect and induced effects of spending (secondary effects) describe how the injection of various final demands and spending in the local economy multiply to generate additional economic activity. Total contributions are the sum of direct and secondary contributions.

Livestock Grazing: The [Boise] National Forest authorized livestock grazing use to several permittees, for a total of 37,387 Animal Unit Months (AUMs) during Fiscal Year 2019. Making forage available to cattle or sheep (as well as horse or goat) ranchers operating in and around the [Boise] National Forest will support economic activities in the local areas. Livestock grazing on the [Boise] National Forest in FY 2019 was estimated to directly support 70 jobs, \$503,000 in labor income, and \$917,000 in Gross Domestic Product (GDP). All direct contributions are in the agriculture sector in the local economy. Accounting for secondary, or ripple effects, livestock grazing on the [Boise] National Forest is estimated to support a total of 100 jobs, \$1.8 million in labor income, and \$2.9 million in GDP, with contributions spanning across almost all sectors in the local economy, from accommodation, food services, to transportation and the wholesales industries.

Mineral and Energy: Mineral and energy production affects the local economy and communities when companies extract natural resources on the National Forest. During Fiscal Year 2019, \$539,000 in mineral revenue was generated from production of [insert type of mineral e.g., xxx barrels of oil, and xx mcf of natural gas] on the [Boise] National Forest. Mineral and energy production on the [Boise] National Forest is estimated to directly support 2 jobs, \$76,000 in labor income, and \$68,000 in Gross Domestic Product (GDP) on an annual basis to the analysis area. All direct jobs, income, and GDP contributions are in the mining sector in the local economy. Accounting for secondary, or ripple effects, mineral and energy production on the [Boise] National Forest is estimated to support a total of 3 jobs, \$153,000 in labor income, and \$204,000 in GDP, with contributions spanning across almost all sectors in the local economy.

Recreation Visitor Use: The Forest Service's National Visitor Use Monitoring Survey (NVUM) estimated the [Boise] National Forest had 1.5 million annual visits in 2019. Recreationists spend money on supplies, lodging, gas, food, and services. Accounting for all recreation activities on the forest, spending by local and non-local visitors directly supported approximately 425 jobs, \$12.6 million in labor income, and contributed approximately \$20.3 million to Gross Domestic Product (GDP) on an annual basis in the [Boise] National Forest's analysis area. Accounting for secondary, or ripple effects, recreation related expenditure on the [Boise] National Forest is estimated to support a total of 610 jobs, \$21 million in labor income, and approximately \$35 million in GDP, with contributions spanning across almost all sectors in the local economy.

Forest Products: Timber harvest directly supports jobs and income in logging and wood products manufacturing firms and indirectly contributes to several other industries, from transportation, local government, and other support sectors in the local economy. Income earned from timber-related jobs stimulates the area's economy as it circulates through local businesses. During Fiscal Year 2019, 16,808 hundred cubic feet (CCF) of sawtimber, 107 CCF of other forest products, and 14,966 CCF of fuelwood (includes commercial and household use) were harvested from the [Boise] National Forest. these forest products are estimated to directly support 60 jobs, \$3.2 million in labor income, and contributed \$4.2 million to Gross Domestic Product (GDP) on an annual basis within the analysis area. All direct jobs, income, and GDP contributions are in the agriculture and

manufacturing sectors in the local economy. Accounting for secondary, or ripple effects, timber harvest on the [Boise] National Forest is estimated to support a total of 140 jobs, \$6.1 million in labor income, and \$9.1 million in GDP, with contributions spanning across almost all sectors in the local economy.

Agency Operation and Payments to Local Governments

Agency operational spending on workforce, infrastructure construction, improvement, restoration, fuel treatment and various land and resources management activities further stimulate economic activities in the local areas. This spending represents expenditures of public funds to produce and provide opportunities for public and industry access to forest goods and services on the [Boise] National Forest that in turn serve as inputs to the production of other goods and services noted above. In 2019, agency operational expenditures from the [Boise] National Forest totaled \$22.5 million and supported an estimated 480 full and part time jobs, approximately \$20 million in labor income and \$26 million in GDP contributions.

Payments to Local Governments: Local governments receive payments from programs such as Secure Rural Schools (SRS), 25% Fund, Payments in Lieu of Taxes (PILT) and mineral royalties. These payments support schools, road maintenance, and other projects in local communities and totaled \$5 million. In FY 2019, Payments to local governments supported an estimated 70 full- and part-time jobs, approximately \$3.4 million in labor income and \$4.8 million in GDP contributions on the [Boise] National Forest. These contributions are not attributable to [Boise] National Forest management but instead represent, in large part, the effects of compensating state and local governments for the effects of federal ownership on the ability to collect state and local tax revenues.

Table 2. Fiscal Year 2019 Economic Contributions from Boise National Forest

	Jobs (average annual full- and part-time employment)		Labor Income (thousands \$2019)		GDP (thousands \$2019)		Quantities	Sources / Units of Measure
	Direct	Total	Direct	Total	Direct	Total		
Agency Operation	380	480	\$15,600	\$20,090	\$17,580	\$25,690	22,552	<i>Spending on agency operation (thousands \$2019)</i>
Forest Products	60	140	\$3,250	\$6,110	\$4,250	\$9,130	31,881	<i>CCF cut volume (saw, fuelwood and others)</i>
Livestock Grazing	70	100	\$500	\$1,830	\$920	\$2,900	37,387	<i>AUM authorized</i>
Minerals & Energy	2	3	\$80	\$150	\$70	\$200	538,548	<i>Production Value (\$2019)</i>
Payments to Local Governments	50	70	\$2,420	\$3,400	\$3,120	\$4,850	4,963	<i>SRS, 25% Fund, Payments in Lieu of Taxes and minerals royalties (thousands \$2019)</i>
Recreation Visitor Use	420	610	\$12,610	\$20,840	\$20,310	\$34,570	1,490,000	<i>Annual Visits (NVUM)</i>

Table note: Data characterizing resource uses and budget on National Forest units (described in the section 'Modeling Process by Resource Areas') comes from standardized national data sources (from 2019). This data may not match site specific data sources or other published sources with differences in methods used to compile data or corrections to distinct data sources.

DISCUSSION

Results Interpretation

Information for the Boise National Forest provides resource specific information of direct and total jobs, labor income and GDP. However additional information is useful for interpretation of results. This information includes economic context specific to the analysis area provided by other sources. For example, livestock grazing or recreation related industries may be of cultural importance to an area and additional information on trends for those industries provides context vital to the results above. The research group [Headwaters Economics](http://www.headwaterseconomics.org/)⁵ maintains several useful reports including the [U.S. Forest Service Socioeconomic Profile Tool](#) that provides details on the social and economic characteristics of the area. There are also reports which include important information for consideration of outreach and effects to Environmental Justice populations.

After contextualizing forest-specific results alongside additional information on industry totals it is often the case that National Forest and Grassland contributions are small (e.g., less than 3 percent of area totals). This is often the case due to the size of the analysis areas and the inclusion of 'functional economies' where direct, indirect and induces expenditures occur. It should be noted that the economic contributions are not evenly distributed in the analysis areas and localized contributions may be greater for smaller areas within the analysis areas included here.

Comparisons of the magnitude of contributions across resource areas (e.g., total jobs from forest products vs. total jobs from recreation) should be made with caution. There are not necessarily tradeoffs associated with different resource uses and production of goods and services may rely on the same production functions (e.g., investments in forest management may enhance recreation opportunities and provide forest products). In addition, the type of jobs created are not the same (temporary, seasonal, part-time or full-time) and effect different industries with different characteristics thus comparisons are often spurious or not 'apples-to-apples'. Additional detail on analysis area characteristics (e.g., forest product and recreation related industry totals) are needed to make assertions on level of dependency or comparisons implying importance to the local economy.

⁵ <http://www.headwaterseconomics.org/>

In addition, it is important that we do not interpret these results as new jobs but rather contributions. So instead of saying 'jobs are created' we say 'contribute' or 'sustained' or 'maintained'. This is due to the differences between an economic contribution analysis and an economic impact analysis as discussed in the Introduction to this report.

Definitions

So, what is a "job" and associated labor income? Is each job represented by a person, say Charlie the logger, who is working full time in the woods all the time? Can we go out to a project work site and talk to Charlie and shake his hand? No. That is not what a job is in the context of job and labor income contribution analysis. IMPLAN uses the value of sales for each industry in a defined geographic area and how many employees each business needs to meet that demand. The IMPLAN model calculates all the little bits and pieces of sales through that area that we can claim as 1) being directly tied to uses on National Forests and agency operation, 2) tied to businesses that support the directly affected firms, and 3) the bits and pieces of people's income that is supported by 1) and 2) which people are spending locally (i.e., direct, indirect and induced effects). All these bits and pieces (estimates from the IMPLAN data for those industries) are added up to get an estimate of the average annual number of jobs and labor income supported in the area. Labor income is based on the same industry data and includes proprietor income and employee compensation (wages and benefits).

So, what about Gross Domestic Product? It is defined as the total market value of all final goods and services produced within a region. That's not actually what we are measuring above since we're only measuring the agency's contribution to GDP, which is value added. Value added is the difference between an industry's or establishment's total output and the cost of its intermediate inputs. Value added or GDP should not be used as a depiction of value or benefits from the National Forests as it does not include non-market values. Additional information on non-market values from the forest should be explored. If monetary data cannot be found for non-market values they can be described qualitatively. Additional definitions can be found in a table of definitions in the appendix below.

Differences from previous 2016 AAG results

At a Glance reports are provided on a three-year cycle thus the data applied and the modeling process have changed since the 2016 AAG results were provided. We've applied 2019 IMPLAN data, that characterizes industries, labor flows and new information on interindustry relationships, with new data from the Bureau of Labor Statistics, Census Bureau, etc. We combined this with 2019 resource data for each National Forest that is also different from the 2016 analyses. In addition, we've refined analysis approaches that combined the agency resource data to include new information and methods. Thus, changes in effects from the 2016 results may reflect any combination of these differences. Therefore, while it may be tempting to compare the 2019 AAG results with past 2016 results, they should not be compared as two points in time. Unique analysis should be performed to apply the same methodology and isolate the cause of changes to

characteristics of the local of economy or changes in resource uses on National Forest and Grasslands. An overview of resource specific differences is provided below. Additional detail is available upon request.

Changes from the 2016 results for **recreation** effects resulted from updates to visitation estimates, activity and segment share data, party size conversion factors, and visitation expenditure estimates from new NVUM data. In addition, recreation related changes to the 2019 IMPLAN models resulted in different contribution estimates, compared to 2016.

Livestock grazing related contribution estimates were down, in many cases from 2016, due to updated methodology and data source for estimating livestock grazing contributions. This update often resulted in higher estimates for direct effects, and lower indirect and induced effects, overall lowering contribution estimates.

Changes from the 2016 results for the **mineral and energy** contribution estimates were mixed. In a few cases, minerals data was erroneously reported or omitted in 2016⁶, resulting in discrepancies between the 2019 and 2016 contribution estimates.

Changes in **forest products** results stemmed from refinement in methods and adjustment in data collection for volume inputs. For example, much of the fuelwood volume was excluded from the 2019 analysis, resulting in lower effects compared to 2016, especially in the Southwestern Region. Updated timber flow data⁷ was also applied in the 2019 analysis specific to individual forests while the 2016 analysis applied data for regions. Also, there were a few instances of modeling errors that occurred in the 2016 analysis, which inflated contribution estimates.

Differences in results for **agency operation** were due to the exclusion of non-salary emergency suppression related expenditures from the 2019 analysis; since these expenditures most often accrue on incidents off the forest unit and outside the analysis area. However, in the 2016 analysis much of these funds were not excluded, which resulted in higher agency operation contribution estimates.

⁶ For some types of minerals there a no reporting requirements and therefore data must be collected from a variety of sources.

⁷ Timber flow data is used to estimate which processors received timber volume harvested from NFS lands.

Finally, for contributions from **payments to local governments**, the IMPLAN models used in the 2016 analysis magnified contribution estimates due to a modelling error. The IMPLAN models were corrected in the 2019 analysis, resulting in comparatively lower estimates.

Use of results and caveats

The results in Table 1 (and available from the [At A Glance SharePoint](#) like Table 2) are only meaningful with interpretation provided in the section 'Recommended Presentation of Forest-level Results' and considering the 'Results Interpretation' above. In addition, the definitions provided above are integral to correct interpretation. In some cases, talking points may be desired for quickly communicating results in briefing materials or presentation. An example, using results for the Boise National Forest, is provided here:

Talking Points:

- Boise National Forest programs and activities contributed **1,400 jobs and \$77 million in Gross Domestic Product (GDP) to the regional economy** in 2019.
 - **61 percent of the employment contribution was associated with direct use of forest and grassland resources**, including livestock grazing, mineral and energy production, forest products, and hunting, fishing, and other forms of outdoor recreation.
 - **34 percent of the employment contribution was tied to National Forest investments**, such as construction and maintenance of infrastructure, firefighting, ecosystem restoration, research and development, fuels treatments, Job Corps, salaries, etc.
 - **5 percent of the employment contribution came from payments to local governments** to support schools, roads, and other government services.

Along with these talking points it's vital to acknowledge that these estimates should not be used to characterize the benefits of forest goods and services. Higher or lower numbers of jobs, income or GDP do not necessarily translate into higher or lower levels of public benefits or contributions to social and economic sustainability. The significance of the results is difficult to determine without examining the results within the aggregate context of public benefits and social impacts derived from forest goods and services. For additional information visit the [Social Sciences and Economic Resources SharePoint](#).

Data characterizing resource uses and budget on National Forest units (described in the section 'Modeling Process by Resource Areas') comes from standardized national data sources (from 2019). This data may not match site specific data sources or other published sources with differences in methods used to compile data or corrections to distinct data sources. Adjustments and site-specific data can be added but require the assistance of an economist trained in use of IMPLAN and the

FEAST spreadsheet tool. For more information on steps needed to modify IMPLAN and FEAST models contact the appropriate [Regional, Enterprise or EMC economists](#).

REFERENCES

IMPLAN 2020. Glossary found at <https://support.implan.com/hc/en-us/articles/360044986593-Glossary>

METI and EIC 2010. USDA Forest Service Protocols for Delineation of Economic Impact Analysis Areas. METI Corp/Economic Insights of Colorado, LLC. Available at: <https://usdagcc.sharepoint.com/sites/fs-emc-secf/Aphy/Economic%20Area%20of%20Influence/Protocol%20for%202014%20and%20prior%20contribution%20impact%20area%20delineation/Analysis%20Area%20Protocol%20Tech%20Guide%20rev092710%20.pdf>

Sorenson, C.B., C.E. Keegan, T.A. Morgan, C.P. McIver, and M.J. Niccoulucci. 2016. Employment and Wage Impacts of Timber Harvesting and Processing in the United States. *Journal of Forestry* 114(4):474 – 482

USDA Strategic Plan FY 2018 to 2022. STRATEGIC GOAL 6: Ensure Productive and Sustainable Use of Our National Forest System Lands. Can be accessed online at: <https://www.usda.gov/sites/default/files/documents/usda-strategic-plan-2018-2022.pdf>

USDA Forest Service 2018. Briefing Paper: Defining a national forest and grassland's economic area of influence: 2018 Revision. And supporting documentation can be found at: <https://usdagcc.sharepoint.com/sites/fs-emc-secf/Aphy/Economic%20Area%20of%20Influence/Forms/AllItems.aspx>

Waltz, Kristen 2018. Technical Advice Bulletin: 2017 Minerals data entry for Aphelia.

White, E.M. 2017. Spending patterns of outdoor recreation visitors to national forests. Gen. Tech. Rep. PNW-GTR-961. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 70 p available at: https://www.fs.fed.us/pnw/pubs/pnw_gtr961.pdf

APPENDIX

Table of Definitions

Input-Output	A type of applied economic analysis that tracks the interdependence among various producing and consuming industries in an economy; it measures the relationship between a given set of demands for final goods and services, and the inputs required to satisfy those demands
Industries	The different IMPLAN Industry codes based on definitions put forth by the Bureau of Economic Analysis (BEA) for types of business operations; there is a crosswalk available between NAICS codes and IMPLAN Industries
Direct	Initial effects (jobs, labor income, etc.) to a local industry or industries due to the activity or policy being analyzed
Indirect	Effects stemming from business-to-business purchases in the supply chain taking place in the region
Induced	Effects in the region stemming from household spending of income, after removal of taxes, savings, and commuters
Employment	An industry-specific mix of full-time, part-time, and seasonal employment. An annual average that accounts for seasonality and follows the same definition used by the BLS and BEA. IMPLAN employment estimations are not equal to full-time equivalents (FTEs).
Labor Income	All forms of employment income, including Employee Compensation (wages and benefits) and Proprietor Income
Value Added	The difference between an industry's or establishment's total output and the cost of its intermediate inputs; it is a measure of the contribution to GDP
Gross Domestic Product	total market value of all final goods and services produced from goods, services and amenities/infrastructure provided by National Forests, representing wealth created by industry activity (that relies on Forest goods, services, and amenities).
Intermediate Inputs	Purchases of non-durable goods and services such as energy, materials, and purchased services that are used to produce other goods and services rather than for final consumption
Multipliers	Multipliers are a measure of an Industry's connection to the wider local economy by way of input purchases, payments of wages and taxes, and other transactions. It is a measure of total effects per direct effect within a region.

Source: IMPLAN 2020

Regional Results

Fiscal Year 2019 Regional Economic Contributions from Agency Operation, Industry and Visitor Use of Natural Resources, and Payments to Local Governments			
	Jobs	Labor Income	GDP
Northern Region			
Livestock Grazing	1,410	\$44,723,000	\$100,357,000
Minerals & Energy	4,040	\$305,611,000	\$621,667,000
Recreation Visitor Use	4,600	\$150,157,000	\$245,557,000
Forest Products	4,310	\$208,743,000	\$328,187,000

Fiscal Year 2019 Regional Economic Contributions from Agency Operation, Industry and Visitor Use of Natural Resources, and Payments to Local Governments

	Jobs	Labor Income	GDP
Agency Operation	5,080	\$322,221,000	\$388,307,000
Payments to Local Governments	1,510	\$80,777,000	\$111,556,000
Rocky Mountain Region			
Livestock Grazing	2,750	\$72,360,000	\$144,595,000
Minerals & Energy	2,320	\$215,880,000	\$346,708,000
Recreation Visitor Use	34,080	\$1,311,489,000	\$2,212,799,000
Forest Products	3,540	\$152,817,000	\$232,744,000
Agency Operation	4,290	\$289,102,000	\$370,096,000
Payments to Local Governments	1,030	\$58,797,000	\$85,196,000
Southwest Region			
Livestock Grazing	4,480	\$53,915,000	\$93,345,000
Minerals & Energy	250	\$15,411,000	\$46,759,000
Recreation Visitor Use	9,380	\$358,060,000	\$619,938,000
Forest Products	1,550	\$60,149,000	\$92,836,000
Agency Operation	4,790	\$317,781,000	\$410,740,000
Payments to Local Governments	710	\$40,866,000	\$59,294,000
Intermountain Region			
Livestock Grazing	2,950	\$58,864,000	\$127,508,000
Minerals & Energy	2,380	\$172,550,000	\$369,667,000
Recreation Visitor Use	10,380	\$411,932,000	\$721,042,000
Forest Products	930	\$37,225,000	\$56,810,000
Agency Operation	5,050	\$324,082,000	\$414,904,000
Payments to Local Governments	910	\$51,020,000	\$75,626,000
Pacific Southwest Region			
Livestock Grazing	660	\$18,529,000	\$29,481,000
Minerals & Energy	110	\$9,972,000	\$18,095,000
Recreation Visitor Use	26,440	\$1,386,053,000	\$2,237,531,000
Forest Products	3,600	\$213,725,000	\$337,936,000
Agency Operation	9,660	\$695,397,000	\$892,903,000
Payments to Local Governments	590	\$46,305,000	\$66,094,000
Pacific Northwest Region			
Livestock Grazing	1,620	\$23,120,000	\$39,399,000
Minerals & Energy	0	\$150,000	\$238,000
Recreation Visitor Use	9,200	\$422,153,000	\$738,459,000
Forest Products	9,050	\$583,231,000	\$908,685,000
Agency Operation	7,780	\$531,891,000	\$677,239,000
Payments to Local Governments	1,240	\$84,079,000	\$122,630,000
Southern Region			
Livestock Grazing	70	\$619,000	\$1,384,000

Fiscal Year 2019 Regional Economic Contributions from Agency Operation, Industry and Visitor Use of Natural Resources, and Payments to Local Governments

	Jobs	Labor Income	GDP
Minerals & Energy	220	\$19,359,000	\$32,735,000
Recreation Visitor Use	13,110	\$546,150,000	\$925,420,000
Forest Products	5,490	\$302,893,000	\$518,485,000
Agency Operation	6,580	\$440,658,000	\$575,282,000
Payments to Local Governments	800	\$45,285,000	\$67,024,000
Eastern Region			
Livestock Grazing	180	\$2,077,000	\$4,749,000
Minerals & Energy	250	\$17,718,000	\$42,518,000
Recreation Visitor Use	13,590	\$643,916,000	\$1,076,291,000
Forest Products	6,310	\$352,049,000	\$541,132,000
Agency Operation	4,420	\$316,972,000	\$408,620,000
Payments to Local Governments	500	\$34,089,000	\$49,912,000
Alaska Region			
Livestock Grazing	0	\$0	\$0
Minerals & Energy	2,480	\$147,379,000	\$426,135,000
Recreation Visitor Use	930	\$35,931,000	\$60,694,000
Forest Products	180	\$8,780,000	\$13,669,000
Agency Operation	1,040	\$87,661,000	\$105,731,000
Payments to Local Governments	230	\$12,856,000	\$16,637,000