Black Hills Resilient Landscapes Project

Black Hills National Forest

All Units

Benefits to People | Ecosystem Services | Economics

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Executive Summary

Social and Economic contexts

The State of South Dakota has a higher overall per capita income ($48,503) than any county individually within the BHNF area of influence (**Lawrence, Pennington, Meade, Custer and Fall River Counties** in South Dakota and **Crook County** in Wyoming). Among these 6 counties within the BH area of influence:

- Meade County has the lowest per capita income ($39,148)
- Custer County has the lowest average earnings per job ($32,226)
- Pennington County has the highest average earning per job ($47,115)

The unemployment rates for the state of South Dakota and the BHNF study area are at or below the natural rate of 4.5% – 5%. Economists generally refer full employment – or the natural rate of unemployment – as the level of unemployment that predominantly comprises of voluntarily unemployed workers (i.e. transitional unemployment in a healthy economy).

Regional Economic Contribution

An Input-Output model was used to estimate the employment, total income and GDP contributions for the local economy based on an estimated harvest volume associated with the Proposed Action (678,000 CCF), assuming that volume will be harvested over 4 years (approximately 169,100 CCF per year, starting in 2019).

- During the project implementation period **the proposed action is estimated to support over 1,300 jobs, $55 million in total labor income, and $64 million in GDP contribution for the local economy on an annual average basis[1].**

[1] It is important to note that these may not be new jobs or income, but rather existing jobs and income in the regional economy that are supported or sustained by this harvest volume. This analysis employed a linear Input-Output model, therefore, if the actual implementation period is shorter, more jobs would be supported over a shorter period of time. Conversely, if the implementation period is expanded, fewer jobs would be supported annually but for a longer period of time.

Ecosystem Services

What are the Landscape Needs and Challenges?	How does the Proposed Action address the needs to restore and maintain ecosystem resilience (fire and insect regulation, habitat and scenery diversity)	What are the ecological outcome or intended effects?
Wildfire risks on NFS and non-NFS lands caused by beetle infestation and past fire suppression efforts. The need for returning landscape to the natural fire disturbance that native species evolved with.	Mechanical and manual fuel treatments	Reduced the potential of dead trees burning intensely, damaging soils and causing problems for firefighters
	Commercial thin	Thinning out small pine trees (not fire resistant) to reduce dense patches, preventing potential vertical and horizontal fire spread. Provision of timber for processing (see Economic Contribution section)
	Prescribed fire	Reduced fuel buildup; returning landscape to the natural fire disturbance process that native species evolved with.
	Hazard tree treatments	Reduced risk of trees falling on open roads or trails, structures, private property, or critical infrastructure
Old hardwood stands and grasslands losing vigor or disappearing caused by pine encroachment, declining aspen. The need for maintaining aspen and oak stands for their fire and insects resistant properties.	Aspen maintenance and enhancement (cut or burn encroaching / declining pine)	Maintaining aspen stands that are fire and insects (pine beetle) resistant; providing habitat and scenery diversity
	Removal of encroaching pine from oak stands	Maintaining oak stands that are fire and insects (pine beetle) resistant; providing habitat and scenery diversity
	Removal of encroaching pine from grasslands	Provides habitat diversity and scenery
Mountain pine beetle infestation has changed forest structure and composition; Small pine trees must compete for limited resources in dense young stands, potential stagnation is slowing growth. Stems remain thin, and heavy snow can result in widespread damage.	Convert some mature stands (SS4A) to young stands by removing some or all of the mature trees.	Moving toward Forest Plan objectives for SS4A and other structure stages.
	Fuel treatments in existing SS4C stands.	Increase dense mature forest stands (SS4C)
	Thinning or burning understory vegetation in some existing late successional SS5 stands.	Maintain or enhance late succession characteristics and increase stand resilience
	In areas where grass/forb (SS1) is below Plan objective, patch cut to produce more SS1	Moving toward Forest Plan objectives for SS1
	In areas where grass/forb is above Plan objective, plant trees in large burned areas to facilitate reforestation	

	Precommercial thinning small tress in young stands	Increase the vigor of remaining saplings and to prevent stagnation

Overview

This project aims to move landscape-level vegetation conditions in the project area toward Forest Plan objectives in order to:

- Increase ecosystem resilience to insect infestation and other natural disturbances
- Contribute to public safety and the local economy, and reduce risk of wildfire to landscapes and communities

This analysis focuses on various ecosystem services and economic contribution relevant to the Proposed Actions.

Regulatory Framework

The preparation of National Environmental Policy Act (NEPA) documents is guided by the Council on Environmental Quality (CEQ) regulations for implementing NEPA [40 CFR 1500-1508]. NEPA requires that **consequences to the human environment be analyzed and disclosed**. The extent to which these environmental factors are analyzed and discussed is related to the nature of public comments received during scoping. CEQ regulations for implementing NEPA [40 CFR 1500-1508] do not require a monetary benefit-cost analysis.

Many of the costs and benefits associated with Forest Service projects are not quantified in financial terms. For example, the benefit to wildlife from habitat improvement; existence value of open space, etc. These costs and benefits can best be considered and described qualitatively. Title 40, CFRs for NEPA (40 CFR 1502.23) indicates:

> For the purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are qualitative considerations.

The Healthy Forests Restoration Act (HFRA) of 2003 (16 U.S.C. 6501-6591) provides processes for developing and implementing hazardous fuel reduction projects on certain types of "at-risk" lands, and also provides other authorities and direction to help reduce hazardous fuels and protect, restore, and enhance healthy forest and rangeland ecosystems. The project area includes National Forest System lands that are managed by the Black Hills National Forest within the areas designated by the Secretary of Agriculture under the amended Healthy Forests Restoration Act (HFRA, 16 U.S.C. 6591), excluding Inventoried Roadless Areas and certain management areas. It is Forest Service policy to **consider ecological, social, and economic sustainability, among other factors, when developing goals or objectives for ecological restoration projects** (FSM 2000, chapter 2020). Further, FSM 2020 provides policy for reestablishing and retaining ecological resilience of National Forest System lands and resources to achieve sustainable multiple use management and **provide a broad range of ecosystem services**.

This analysis, therefore, comprises of discussions on ecosystem services as well as factors of economic sustainability (including local economic contributions) relevant to the Proposed Action.

Analysis Area

While the discussion on ecosystem services generally applies across the entire project area (spanning over 1 million acres among 10 management areas), however, the zone of influence specific to the regional economic contribution model includes four counties, based on locations of processing or harvesting firms receiving Black Hills timber in recent years. They include **Lawrence, Pennington and Meade Counties** in South Dakota and **Crook County** in Wyoming. **Custer and Fall River Counties** in South Dakota are not in the economic model but they are included nonetheless as part of the affected environment (existing condition) description in order to provide contexts for the social and economic environments surrounding the Black Hills National Forest. While Weston County, WY contains NFS lands, it is not included in the model because the county's primary industries are less related to the output and products associated with this project.

Affected Environment

Statistics on existing economic and social conditions of the study area are necessary to provide context for the consideration of the Proposed Action. Summaries of existing demographic, social and economic conditions are examined for all counties that contain BHNF lands. Unless otherwise noted, sources consist of 2015 data from the U.S. Department of Commerce, Census Bureau, American Community Survey, Department of Labor and other official sources retrieved using the EPS-HDT (2017) software system maintained by Headwater Economics®. Only major trends and benchmark comparisons (State of South Dakota) are presented below; detail data with complete, county-by-county statistics are found in Appendix A of the social and economics specialist report (project record).

Existing conditions on landscape needs and challenges are described in the ecosystem services framework (benefits people received from nature).

Existing Conditions – Economic Environment

Per capita income, non-labor income, average earnings per job and unemployment rate are described below in order to depict measures of individual prosperity in the BHNF zone of influence.

Per Capita Income is total personal income (from labor and non-labor sources) divided by total population. South Dakota ($48,503) has a higher overall per capita income than the zone of influence and other counties within the study area.

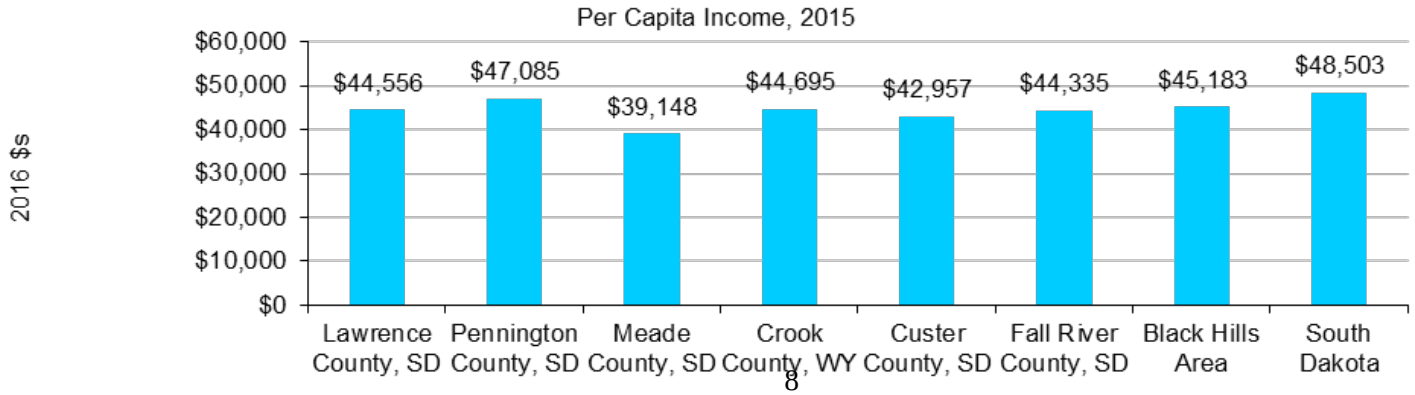

Figure 2. Per capita income for study area counties and South Dakota, 2015 (BEA, 2016).

Per capita income is considered one of the most important measures of economic well-being. However, it can be misleading. Per capita income is total personal income divided by population. Because total personal income includes non-labor income sources (dividends, interest, rent, and transfer payments), it is possible for per capita income to be relatively high due to the presence of retirees and people with investment income. And because per capita income is calculated using total population and not the labor force as in average earnings per job, it is possible for per capita income to be relatively low when there are a disproportionate number of children and/or elderly people in the population. For these reasons, **non-labor income <u>as a percentage</u> of total personal income** are reported below in Figure 3.

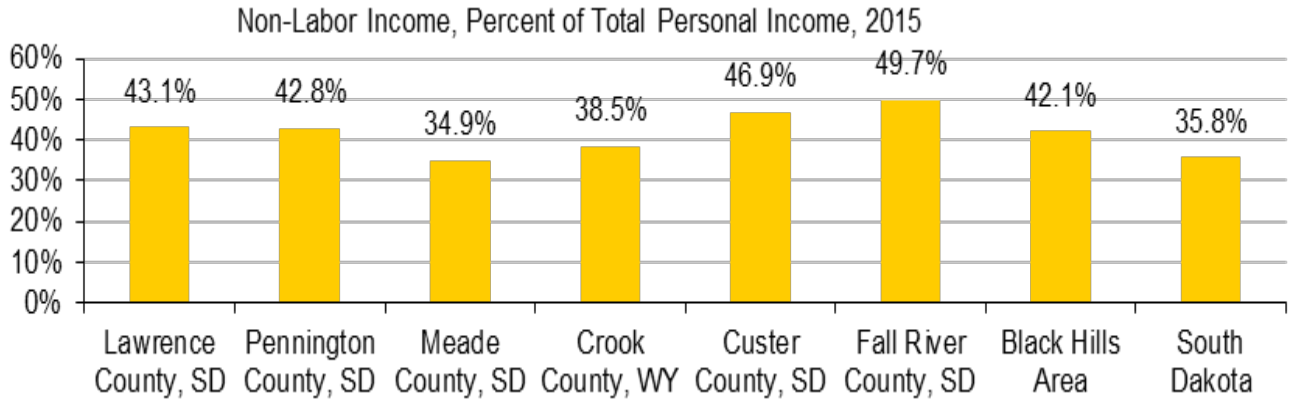

Figure 3. Non-labor income as a percent of total personal income for study area counties and South Dakota, 2015 (BEA, 2016).

Non-Labor income consists of dividends, interest and rent (money earned from investments), and transfer payments (includes government retirement and disability insurance benefits, medical payments such as mainly Medicare and Medicaid, income maintenance benefits, unemployment insurance benefits, etc.). In many counties non-labor income (e.g., retirement and investment income, government transfer payments) can be more than a third of all personal income. As the baby boomer generation retires, this source of income will continue to grow. A high dependence on non-labor income can be an indication of an aging population and/or the attraction of people with investment income. Public lands activities may affect these constituents.

Average Earnings per Job are the total earnings divided by total employment. Full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included. Average earnings per job is an indicator of the quality of local employment. A higher average earning per job indicates that there are relatively more high-wage occupations (Figure 4).

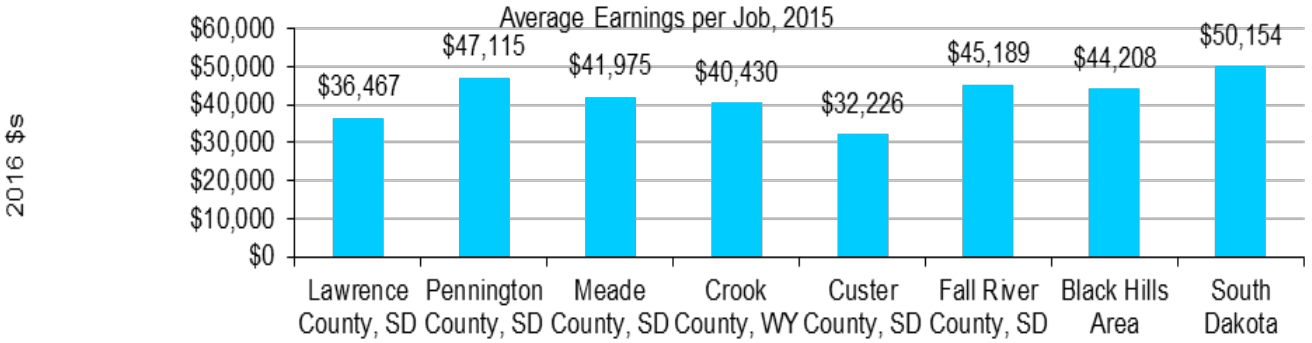

Figure 4. Average Earnings for study area counties and South Dakota, 2015 (BEA, 2016).

Unemployment Rate is an important statistics of economic well-being. The annual unemployment rate is the number of people actively seeking but not finding work as a percent of the labor force. This figure can go up during national recessions and/or when more localized economies are affected by area downturns. The unemployment rates for the state of South Dakota and the study area are at or below the *natural rate* of 4.5% – 5% (Figure 5). Economists generally refer full employment – or the natural rate of unemployment – the level of unemployment that predominantly comprises of voluntarily unemployed workers (i.e. transitional unemployment in a healthy economy).

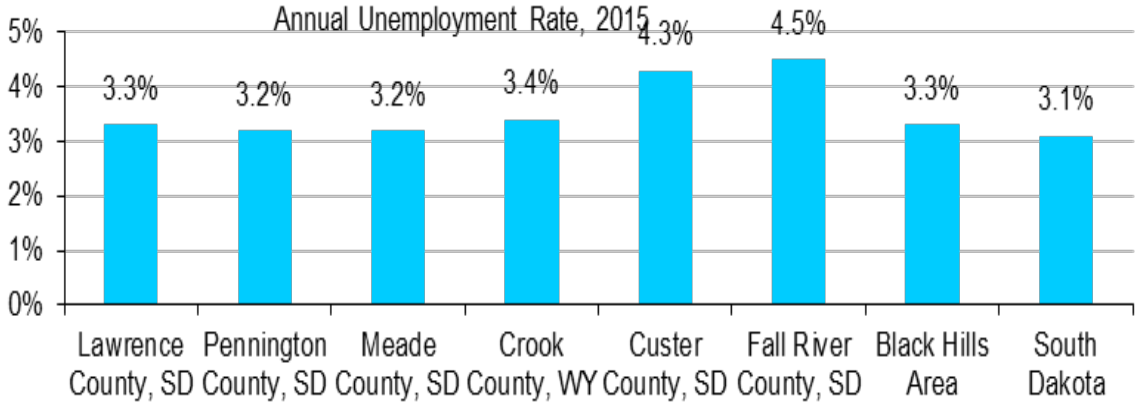

Figure 5. Annual unemployment rates for study area counties and South Dakota, 2015 (BEA, 2016). U.S. Department of Commerce. 2016. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C.; U.S. Department of Labor. 2016. Bureau of Labor Statistics, Local Area Unemployment Statistics.

Regional Economic Contribution

Commercial timber harvest, including restoration activities such as thinning on the Black Hills National Forest contribute to employment, income, or other economic activities in the local economy. In order to gain insight on the contribution timber resources make to the local economy, recent harvest volume are used as input in the Input-Output model (IMPLAN®). During the previous 5 years, annual harvest ranged from 179,554 CCF in 2014 to 206,530 CCF in 2012.

Table 1. Black Hills National Forest Recent Cut Volumes (CCF): FY2012 - FY2016

	2012	2013	2014	2015	2016	5-Yr Avg
Sawtimber (CCF)	193,848	208,936	171,388	193,427	179,010	189,322
Poles (CCF)	5,258	8,172	1,055	3,362	6,216	4,813
Posts (CCF)		1		1	115	39
Firewood (CCF)	6,650	5,093	6,100	6,168	5,925	5,987
Misc. and non-sawtimber products (CCF)	774	1,030	1,011	1,508	1,166	1,098
Total	**206,530**	**223,233**	**179,554**	**204,466**	**192,432**	**201,243**

Annual average employment, labor income and GDP contributions from timber harvest are estimated using IMPLAN® data and Forest Service modeling tools (see Analysis Framework, Methodology and Assumptions in the Environmental Consequences section), based on the 5-year average.

Table 2. Annual average employment, labor income and GDP contributions from timber harvest (based on 5-year average cut volume from 2012-2016)

	Employment
Direct	629
Indirect and Induced	922
Total	**1,551**
	Labor Income (2015$)
Direct	$27,164,538
Indirect and Induced	$36,044,769
Total	**$63,209,307**
	Contribution to GDP (2015$)
Direct	$27,606,347
Indirect and Induced	$46,082,685
Total	**$73,689,032**

* Employment is the total full- and part-time wage, salaried, and self-employed jobs in the region.

**Labor income includes the wages, salaries and benefits of workers who are paid by employers and income paid to proprietors.

This analysis employs a linear Input-Output model, therefore, if recent harvest volumes are maintained into the near future, all else equal, then the annual average jobs, income and GDP supported directly and indirectly in the local economy would likely be sustained. On the other hand, if future harvest levels were to drop, these economic contributions would also decrease accordingly, all else equal. Needless to say, future regional, national, and in some respect international wood product demand will influence these economic contribution results. But with regards to commercial harvest from the Black Hills National Forest, it is unlikely that the level of recent cut volume will be sustained in the foreseeable future (*see Timber Resources section*).

Existing Conditions – Ecosystem Services

Detailed information on the extents and needs to bring the distribution, by pine structural stage (SS), closer to desired conditions are described in the Purpose and Needs as well as the project scoping document. This section summarizes the existing landscape challenges, and identifies the ecosystem services (goods and services that people receive from nature) or ecological processes associated with those landscape needs.

Existing Condition (Landscape Needs and Challenges)	Relevant Ecosystem Services, Processes, Structure and Function
Wildfire risks on NFS and non-NFS lands caused by beetle infestation and past fire suppression efforts. The need for returning landscape to the natural fire disturbance that native species evolved with.	**Regulations of insect infestation and other natural disturbances**
Old hardwood stands and grasslands losing vigor or disappearing caused by **pine encroachment, declining aspen**. The need for maintaining aspen and oak stands for their fire and insects resistant properties.	**Habitat and scenery diversity; ecosystem resilience to disturbance**
Mountain pine beetle infestation has changed forest structure and composition; Small pine trees must compete for limited resources in dense young stands, potential stagnation is slowing growth. Stems remain thin, and heavy snow can result in widespread damage.	**Habitat and scenery diversity; Insect and fire regulation**

By associating the current needs of the landscape, with relevant ecological processes, it is clear that insect and fire regulation as well as having diverse habitat and scenery are the overlapping benefits that are critical to this landscape.

Environmental Consequences

This section summarizes the potential direct, indirect and cumulative impacts of the proposed action and alternatives. The scientific and analytical basis used for comparing alternatives under both the ecosystem services and regional economic contribution frameworks are first presented, followed by analysis of the environmental consequences of Alternative A – Proposed Action and Alternative B – No Action.

Analysis Framework, Methodology and Assumptions

Ecosystem Services

Ecosystem Services are components of nature that contribute to human well-being. This concept intends to bring explicit awareness and recognition the various ways humans benefit from and depend on the natural world. This dependency extends from essential support for life (oxygen, water and food) to security (e.g., natural regulation of insects, disease, and fire regime) and quality of life (scenic beauty and other cultural services such as outdoor recreation and spiritual values).

Multiple values and benefits are associated with the maintenance of ecological processes that are the focus of this project (insect and disturbance regulation and diverse forest structure and composition). Besides the more apparent, if not immediate, benefits of thinning or removal of beetle-infested trees (to reduce hazard to public health and safety, infrastructure, and communities), other benefits centered on the premises that not having large areas of forest that is all alike will (1) decrease susceptibility to widespread fire and insect infestation in the future, and (2) provide varied habitats for wildlife and scenery (recreation values).

(1) Forest structural diversity and resilient ecosystems

Resilient ecosystems have greater capacity to survive disturbances and large-scale threats such as wildfire and beetle infestation, especially under changing and uncertain future environmental conditions. Maintaining and perpetuating ecological resilience is critical in order to achieve sustainable multiple use management and provide a broad range of ecosystem services. When viewed over an appropriate time span, a resilient forest ecosystem is able to maintain its 'identity' in terms of taxonomic composition, structure, ecological functions, and process rates. For similar site types, diverse forests are both more resistant (remain unaltered in the face of chronic change) and more resilient than those with less diversity (Stone et al. 1996). The available scientific evidence strongly supports the conclusion that the capacity of forests to resist change, or recover following disturbance, is dependent on biodiversity at multiple scales –stand, landscape, ecosystem, bioregional (Thompson et al. 2009). This project primarily focuses on forest structural diversity at the stand and landscape scales.

(2) Forest structural diversity and wildlife habitat.

Diversified structural features provide varied recreational values as well as critical habitat components for forest-dwelling wildlife species. For example, vertebrate habitat diversity is associated with forest structure (Urban and Smith 1989; Hansen et al. 1995). In addition, it may be that structural characteristics, not plant species composition, are the primary determinants of avian community diversity (MacArthur and MacArthur 1961).

Regional Economic Contribution

Economic contributions (jobs, labor income and GDP) are estimated using input-output analysis. Input-output analysis is a means of examining relationships within an economy, both between businesses and between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. The resulting mathematical representation allows one to examine the effect of a change in one or several economic activities on an entire economy, all else constant. This examination is called impact analysis. The IMPLAN® modeling system allows the user to build regional economic models of one or more counties for a particular year. The model for this analysis employed 2014's IMPLAN data[2]. IMPLAN translates changes in final demand for goods and services into resulting changes in economic effects, such as labor income and employment of the affected area's economy.

The economic effects are measured by estimating the direct jobs and labor income generated by the processing of the timber volume from the project. The direct employment and labor income benefit employees and their families and, therefore, directly affect the local economy. Additional indirect and induced multiplier effects (ripple effects) are generated by the direct activities. Indirect effects are felt by the producers of materials used by the directly affected industries. Induced effects occur when employees of the directly and indirectly affected industries spend the wages they receive. Together the direct and multiplier effects comprise the total economic contributions to the local economy.

The direct effects were estimated using direct response coefficients developed from a national Timber Mill Survey conducted by the University of Montana's Bureau of Business and Economic Research (BBER) (Table 3). BBER timber response coefficients (also known as Keegan Timber Mill Survey Response Coefficients) are broken into multi-state regions, data for the region covering Wyoming and South Dakota are used in this analysis. Along with these direct Keegan coefficients, a Forest Service model specifically constructed (using county-level IMPLAN data) for the BHNF zone of influence is then used to model the total economic contribution of timber harvest.

[2] the latest licensed IMPLAN data available to US Forest Service analysts at the time of the DEIS

Table 3 Keegan Timber Mill Survey Response Coefficients for Wyoming and South Dakota

Industry Sector	*Direct Response Coefficients*	
	Employment (jobs per MMCF)	*Income ($2014 dollars per MMCF)*
Forestry and Logging	14	$588,000
Softwood Sawmills	12	$492,000
Other Timber Products	15	$525,000
Facilities Processing Residue From Sawmills	4	$164,000

For the No Action Alternative, the 5-year average annual cut volume (CCF) are obtained from USFS Cut and Sold Report for the BNNF, and used as model inputs in order to estimate the regional economic contribution of timber harvest given recent volume (Table 1). For the purpose analyzing the regional economic contributions under the Proposed Action, the total estimated volume from the Action Alternative is estimated at 678,000 CCF, to be harvested over 4 years, starting in 2019.

Alternative A – Proposed Action

Direct, Indirect, and Cumulative Effects – Ecosystem Services

The concept of Final Ecosystem Goods and Services (FEGS) is a useful foundation for defining, classifying, and measuring ecosystem services. FEGS focuses less on those regulating and supporting services, and more on components of nature, directly enjoyed, consumed or used to yield human well-being (Boyd and Banzhaf 2007), and places great emphases on linking specific beneficiaries with services. While the objectives of this ecosystem restoration project relate more toward supporting or regulating services (forest insect and disturbance regulations), it is still worthwhile to point out the many values human would ultimately benefit from.

Multiple values and benefits received by various end users are associated with the maintenance of ecological processes that are the focus of this project (insect and disturbance regulation and diverse forest structure and composition). By adopting the concept of Final Ecosystem Goods and Services (FEGS), this analysis relates the most critical processes (fire and insect regulation) associated with the Proposed Action with relevant beneficiaries. Four general groups of beneficiaries are identified:

- General public safety from reduce risk of wildfire to landscapes and structures
- People interested in the provision of timber source, including the consideration for future harvesting opportunities (option values)

- People interested in having a diverse habitats for their scenic / recreational value, in addition to having decreased risk to widespread fire and insect infestation in general.
- People interested in the preservation of wildlife – both use (hunting, wildlife viewing) and passive values (knowing the existence of wildlife species supported by a diverse pine forest habitats).

Overall, the Proposed Action would benefit the groups above either directly or indirectly, by way of achieving various ecological outcome or intended effects. The following table summarizes the intended outcome associated with management actions under Alternative A, as well as the ecological challenges these action aim to address. Some actions will provide commercial timber for processing, generating regional economic contributions. Those contributions are discussed in the next section.

What are the Landscape Needs and Challenges?	How does the Proposed Action address the needs to restore and maintain ecosystem resilience (fire and insect regulation, habitat and scenery diversity)	What are the ecological outcome or intended effects?
Wildfire risks on NFS and non-NFS lands caused by beetle infestation and past fire suppression efforts. The need for returning landscape to the natural fire disturbance that native species evolved with.	Mechanical and manual fuel treatments	Reduced the potential of dead trees burning intensely, damaging soils and causing problems for firefighters
	Commercial thin	Thinning out small pine trees (not fire resistant) to reduce dense patches, preventing potential vertical and horizontal fire spread. Provision of timber for processing (see Economic Contribution section)
	Prescribed fire	Reduced fuel buildup; returning landscape to the natural fire disturbance process that native species evolved with.
	Hazard tree treatments	Reduced risk of trees falling on open roads or trails, structures, private property, or critical infrastructure
Old hardwood stands and grasslands losing vigor or disappearing caused by pine encroachment, declining aspen. The need for maintaining aspen and oak stands for their fire and insects resistant properties.	Aspen maintenance and enhancement (cut or burn encroaching / declining pine)	Maintaining aspen stands that are fire and insects (pine beetle) resistant; providing habitat and scenery diversity
	Removal of encroaching pine from oak stands	Maintaining oak stands that are fire and insects (pine beetle) resistant; providing habitat and scenery diversity
	Removal of encroaching pine from grasslands	Provides habitat diversity and scenery

Mountain pine beetle infestation has changed forest structure and composition; Small pine trees must compete for limited resources in dense young stands, potential stagnation is slowing growth. Stems remain thin, and heavy snow can result in widespread damage.	Convert some mature stands (SS4A) to young stands by removing some or all of the mature trees.	Moving toward Forest Plan objectives for SS4A and other structure stages.
	Fuel treatments in existing SS4C stands.	Increase dense mature forest stands (SS4C)
	Thinning or burning understory vegetation in some existing late successional SS5 stands.	Maintain or enhance late succession characteristics and increase stand resilience
	In areas where grass/forb (SS1) is below Plan objective, patch cut to produce more SS1	Moving toward Forest Plan objectives for SS1
	In areas where grass/forb is above Plan objective, plant trees in large burned areas to facilitate reforestation	
	Precommercial thinning small tress in young stands	Increase the vigor of remaining saplings and to prevent stagnation

Indirect, and Cumulative Effects – Economic Contributions

Regional economic contributions are measured by estimating the direct jobs, labor income and contributions to GDP generated by the processing of the timber volume from the project. The direct employment and labor income benefit employees and their families and, therefore, directly affect the local economy. Additional indirect and induced multiplier effects (ripple effects) are generated by the direct activities. Indirect effects are felt by the producers of materials used by the directly affected industries. Induced effects occur when employees of the directly and indirectly affected industries spend the wages they receive. Together the direct and multiplier effects comprise the total economic contributions to the local economy.

The goal for commercial treatment in SS 4A stands is approximately 187,000 acres. On-the-ground condition as well as budgetary limitation will ultimately dictate the amount of product removed, but current estimate of potential timber volume is 678,000 CCF. For the purpose of this analysis, it is assumed that harvest will spread out over 4 years, starting in 2019. Specifically, the Input-Output model estimates job, income and GDP contributions in the area of influence based on the assumption that the majority of potential timber volume associated with Alternative A will be harvested during the implementation period (approximately 169,100 CCF per year, for 4 years).

Given these specifications, Alternative A is estimated to support over 1,300 jobs, $55 million in total labor income, and $64 million in GDP contribution for the local economy on an annual average basis. Table 4 displays the direct, indirect and induced, and total estimates for employment (part and full-time), labor income and GDP contribution that may be attributed to the Proposed Action. It is important to note that these may not be new jobs or income, but rather existing jobs and income in the regional economy that are supported or sustained by this project.

Table 4. Annual average employment, labor income and GDP contributions from timber harvest under Proposed Action (during 4-year implementation period, starting in 2019)

	Employment
Direct	549
Indirect and Induced	809
Total	**1,358**
	Labor Income (2015$)
Direct	$23,745,304
Indirect and Induced	$31,684,847
Total	**$55,430,151**
	Contribution to GDP (2015$)
Direct	$24,082,002
Indirect and Induced	$40,343,267
Total	**$64,425,269**

* Employment is the total full- and part-time wage, salaried, and self-employed jobs in the region.
**Labor income includes the wages, salaries and benefits of workers who are paid by employers and income paid to proprietors.

Since the model assumed that total timber volume associated with the Proposed Action would occur over a 4-year period, estimates of average annual part-time and full-time jobs shown in Table 4 are heavily dependent upon harvest implementation. If the actual implementation period is shorter, more jobs would be supported over a shorter period of time. Conversely, if the implementation period is expanded, fewer jobs would be supported annually but for a longer period of time. Also, within the implementation period of a project, the numbers of jobs supported may or may not be filled by the same personnel nor distributed evenly over time, depending upon the nature of the project, turnovers, number and type of firms involved and other factors. Therefore, it would be misleading – or, not meaningful at best – to calculate a 'total employment over the life of the project' figure. Due to these issues, readers are further cautioned against multiplying the average annual employment number(s) as presented below, with the project implementation timeframe (years) in an attempt to arrive at the 'total employment over the life of the project' figure.

These regional economic contributions estimates are associated with the Proposed Action, and do not include those other jobs and income effects associated with ongoing and planned timber harvest, those currently scheduled for sale, as well as those that have been sold but not yet cut.

It should be noted that IMPLAN's method of reporting employment as *annual averages* means that one cannot discern the number of hours worked or the proportion that is full time vs. part time. This method of accounting means that one job lasting 12 months = two jobs lasting six months each = three jobs lasting four months each. Each of those examples would appear as one job in IMPLAN and as reflected by the above results.

It is therefore helpful to consider employment figures shown in Table 4 as the '*cumulative*' employment effects / requirement across different sectors in the local economy, associated with the proposed activities (in this case those direct, indirect and induced labor necessary to support the harvest of 678,000 CCF, or an annual average of 169,500 CCF). In other words, '*one job*' as reported in IMPLAN may be a collection of different jobs (e.g. '*one job*' may be the summation of 1 full-time equipment operator working 3 months + 1 full-time driver working 3 months + 2 half time office support staffs working 6 months each).

It is also important to note that there will be additional jobs, labor income and GDP contributions associated with other restoration related activities (those without product removal components). Because restoration firms also incur various expenditures (labor costs, fuel, equipment, etc.) associated with BHNF contracted activities. The direct ecosystem restoration employment and labor income benefit employees and their families; while additional indirect and induced multiplier effects (ripple effects) are generated by, or associated with various direct restoration activities, from mechanical and manual fuel treatments, to thinning or burning understory vegetation.

Alternative B – No Action

Direct, Indirect, and Cumulative Effects – Ecosystem Services

Under No Action, all other ongoing and planned activities would continue to occur. While limited fuel and hazard tree treatments, hardwood and grassland enhancement, or other activities that may modify pine structural stage directly or indirectly could still occur through other project level activities on the BHNF, they will likely not be at the same extents as proposed under Alternative A. Therefore, the beneficiaries discussed above will not receive the same magnitude of benefits.

In sum, the following current landscape needs and challenges on the Black Hills National Forest will not be addressed on the same coordinated level or extent as proposed by the Action Alternative.

Landscape Needs and Challenges not Addressed under Alternative B – No Action	Relevant Ecosystem Services, Processes, Structure and Function
Wildfire risks on NFS and non-NFS lands caused by beetle infestation and past fire suppression efforts. The need for returning landscape to the natural fire disturbance that native species evolved with.	**Regulations of insect infestation and other natural disturbances** (the spread of beetle infestation has slowed down due to insects running out of forest to infest)
Old hardwood stands and grasslands losing vigor or disappearing caused by **pine encroachment, declining aspen**. The need for maintaining aspen and oak stands for	**Habitat and scenery diversity; ecosystem resilience to disturbance**

their fire and insects resistant properties.	
Mountain pine beetle infestation has changed forest structure and composition; Small pine trees must compete for limited resources in dense young stands, potential stagnation is slowing growth. Stems remain thin, and heavy snow can result in widespread damage.	**Habitat and scenery diversity; Insect and fire regulation**

Indirect and Cumulative Effects – Regional Economic Contributions

The No-Action alternative would not harvest timber or accomplish other product removal activities associated with fuel and hazard tree treatments, hardwood and grassland enhancement or pine structural stage modification objectives as described under the Proposed Action. Therefore, Alternative B will incur no immediate / direct financial costs nor produce any revenue from an Agency perspective, and make no contributions in terms of GDP, jobs or income to the local economy.

However, all other ongoing and planned activities would continue to occur, including timber currently scheduled for sale, and those that have been sold but not yet cut, will occur as planned. For the purpose of this analysis, if future cut volume similar to those described in the Existing Condition section can be sustained, all else equal, then the annual average jobs, income and GDP supported directly and indirectly in the local economy would also likely be supported. On the other hand, if future harvest levels were to drop, then these economic contributions would also decrease accordingly, all else equal. Needless to say, future regional and national wood product demands will influence these economic contribution results. But with regards to commercial harvest from the Black Hills National Forest, it is not likely that the level of harvest in recent years can be sustained indefinitely into the future (see Timber Resources section).

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