3.27 Social and Economics

3.27.1 Introduction

The mission of the FS is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The HLC NF lands both influence, and are influenced by, local and national publics. Local communities, particularly those adjacent to NFS lands, benefit from a multitude of goods and services provided by the Forest and the FS. These societal benefits are often referred to as ecosystem services, which are defined "as goods and services provided wholly or in part by ecosystems and that are of value to people" (Olander et al. 2015). The Forest's ecosystem services, alongside infrastructure and operations, are the main ways that public lands contribute to social and economic sustainability. Many local communities were formed based on availability of roads and ecosystem goods and services such as timber, minerals, grazing lands, and other natural resources. Historically, individuals in these communities have benefited from a host of services such as recreation, scenery, employment and opportunities to connect with nature. The general public across the U.S. also benefit from the HLC NF. The key benefits the Forest and the FS provide include: recreation, income, jobs, scenery, clean water, cultural, historic and tribal resources, designated areas (e.g. wilderness), fire suppression, fish and wildlife, grazing, infrastructure, timber, other forest products and wood for fuel, energy and minerals, public information, interpretation and education and carbon storage and sequestration.

The 2012 Planning Rule states that plans are to guide management so that forests and grasslands contribute to social and economic sustainability, providing communities with ecosystem services and multiple uses that deliver a range of social, economic, and ecological benefits in the present and into the future. Specifically, plan components must include standards or guidelines to guide the plan area's contribution to social and economic sustainability, taking into account ecosystem services as well as multiple uses that contribute to local, regional, and national economies and communities in a sustainable manner. Furthermore, reasonably foreseeable risks to societal benefits shall be considered when developing the forest plan.

This section, therefore, (1) describes the social and economic conditions of the affected environment using key indicators of social and economic sustainability; (2) describes how key benefits of the Forest currently contribute to social and economic sustainability of beneficiaries, both locally and at a broader scale (3) evaluates the impacts of the proposed forest plan and alternatives on the benefits the Forest provides to local beneficiaries and the general public.

The Assessment identified an analysis area for the social analysis of 13 primary area counties and seven secondary areas counties. The factors for determining the social analysis area include recreational visitation, travel corridors, and social and cultural identity. The counties where the HLC NFs are located and that meet most of these factors are considered "primary analysis area counties", or primary areas. The counties that do not meet most of these factors and do not contain HLC NFs land are considered "secondary analysis area counties", or secondary areas.

The 13 primary counties are grouped into four areas:

- West: Broadwater, Jefferson, Lewis and Clark, Powell Counties
- North: Glacier, Pondera, Teton Counties
- Central: Cascade, Chouteau Counties
- East: Meagher, Judith Basin, Wheatland, Fergus Counties

Secondary area counties include:

- Missoula County

- Deerlodge County
- Gallatin and Park Counties
- Golden Valley and Sweet Grass Counties
- Yellowstone County

It is important to note that the social area of influence is distinct from the economic area of influence. Each GA is defined by a separate methodology. In the case of the economic area of influence for the HLC NF, there are 16 counties.

Ordered by population from highest to lowest, these 16 counties include: Gallatin, Cascade, Lewis and Clark, Park, Glacier, Jefferson, Fergus, Deer Lodge, Powell, Pondera, Teton, Chouteau, Broadwater, Wheatland, Judith Basin, and Meagher County. A visual display of these adjacent and overlapping areas is provided below in Figure 18. Details on the selection process for counties is found in appendix B.

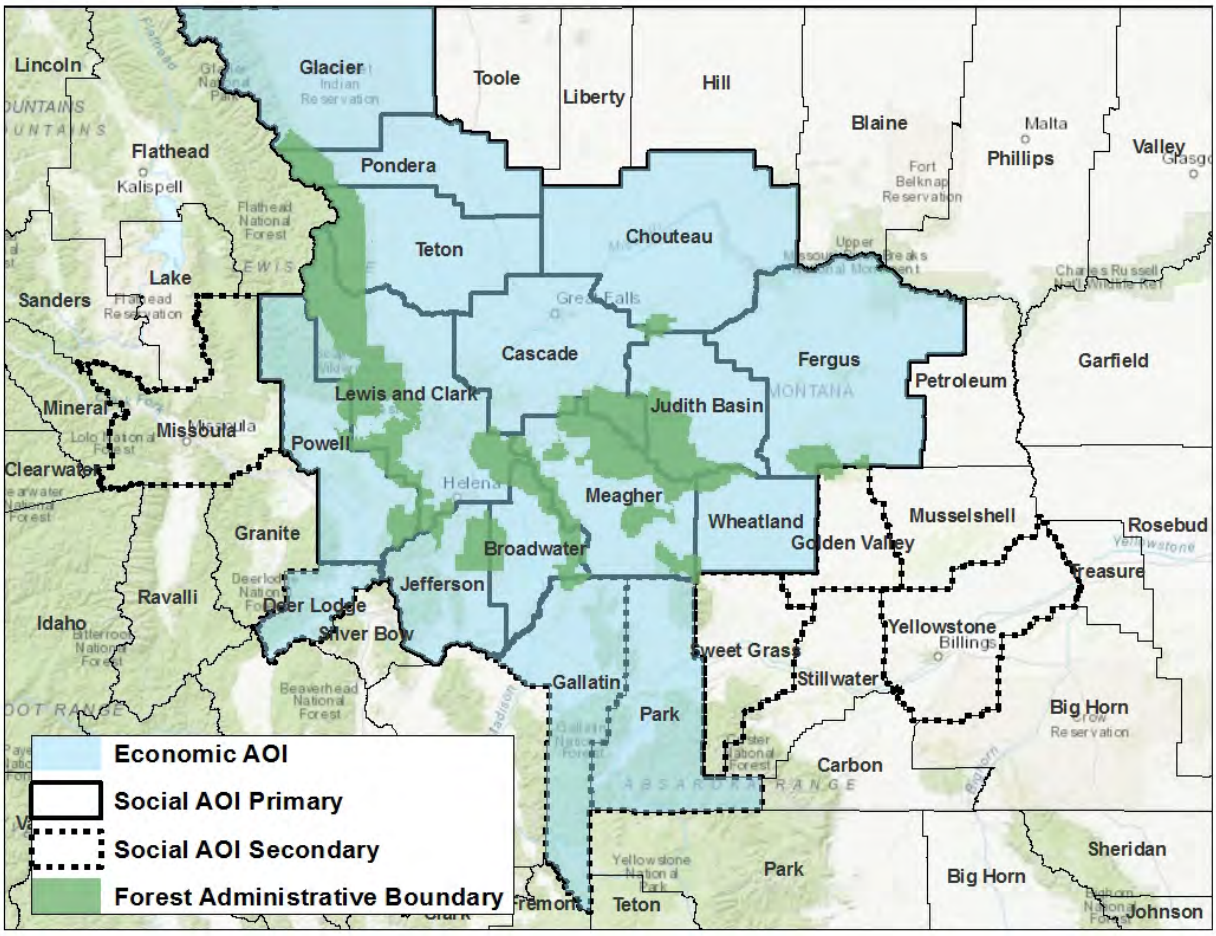

Figure 18. Map of the Economic and Social areas of influence for the HLC NF

Key indicators

Economic conditions

The economic conditions of the area of influence are assessed using the following indicators: employment (jobs and unemployment levels), income (labor and non-labor), Federal Land payments, and economic diversification. Existing conditions are accessed through the Economic Profile System – Human

Dimensions Toolkit (EPS-HDT) (http://headwaterseconomics.org/tools/eps-hdt), and report data are sourced from the U.S. Department of Commerce, and other Federal sources.

Social conditions

The social conditions of the area of influence are assessed using the following indicators: demographic characteristics and trends (population size, change and composition), land ownership and development patterns, percent of land within the WUI, and county health levels. County health rankings data are sourced from the Population Health Institute at University of Wisconsin. For an in-depth description of health metrics, please see the Assessment. Population, land ownership and WUI data are provided by the Economic Profile System – Human Dimensions Toolkit.

Societal benefits

The indicators of contributions to social and economic sustainability are the key societal benefits the Forest provides to beneficiaries. These societal benefits contribute to the social and economic sustainability of the area of influence (i.e. affected communities and beneficiaries) by enhancing the quality of life of the public. Quality of life is defined as the general level of wellbeing of individuals and society. The concept of quality of life encompasses all aspects of life including employment and health. For the purposes of this analysis, income, jobs, health, safety and well-being are often discussed separately to emphasize the specific ways the Forest enhances quality of life.

The Forest benefits include ecosystem services, multiple uses, infrastructure and contributions from management operations such as educational programs and fire suppression. The key benefits were identified through interdisciplinary discussions with Forest staff and comments from the public.

The key benefits to society provided by the forest include:

- Carbon storage and sequestration
- Clean water
- Cultural, historic and tribal resources (including spiritual experiences and non-use values)
- Designated areas (including solitude, inspiration, non-use values and research)
- Direct income and jobs
- Energy and minerals
- Fire suppression (and mitigation)
- Fish and wildlife (including non-use values)
- Grazing (including non-use values)
- Ecosystem integrity (including erosion control, flood protection, and non-use values)
- Infrastructure
- Other forest products and wood for fuel
- Other income and jobs
- Public information, interpretation and education
- Recreation (including solitude, spiritual experiences and inspiration)
- Scenery (including aesthetics and non-use values)
- Timber

3.27.2 Regulatory framework

The following is a select set of statutory authorities that govern the evaluation of social and economic resources in the plan area. There are multiple other laws, regulations, and policies - including those at the beginning of chapter three - that also guide the management of this resource.

Office of Management and Budget Circular A-116 (issued August 16, 1978): Requires executive branch agencies to conduct long range planning and impact analysis associated with major initiatives.

Executive Order No. 12898 on Environmental Justice (issued February 11, 1994): Mandates federal agencies to make achieving environmental justice part of their mission. This includes identification and response to disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

National Forest Revenue Act (amended 1908): Requires 25 percent of revenues generated by NFS lands to be paid to the States for use by the counties in which the lands are situated for the benefit of public schools and roads.

3.27.3 Assumptions

This analysis assumes that social conditions in the plan area will continue to follow observed trends. Population trends are expected to follow a similar trajectory as observed between 2000 and 2010.

3.27.4 Best available scientific information used

Data describing the social environment are taken from the Assessment. Data for the Assessment were "gathered in large part from perusal of Chambers of Commerce webpages, county planning documents, economic development groups and the like" (USDA 2015b). Demographic data are sourced from government entities through the Economic Profile System – Human Dimensions Toolkit. This data platform harmonizes data from the Bureau of Economic Analysis, the Bureau of Labor Statistics, and the US Census Bureau. The Planning Rule directs analysis to be conducted based on pre-existing information and does not encourage the collection of new, primary data to assess social conditions. Given these data constraints, the data used in the analysis of the social environment are the best available.

Data available for analysis of economic impacts are provided through the latest version of IMPLAN software, owned and sold by MIG, Incorporated. Data accessed through IMPLAN software originates from county business patterns of the U.S. Census bureau, and other Federal sources.

3.27.5 Affected environment

Social Conditions

West county group

Population dynamics

The West area is comprised of Broadwater, Jefferson, Lewis and Clark and Powell Counties. This area experienced significant population growth between 2000 and 2012, a 13 percent increase. Broadwater County experienced the most significant growth, a 27 percent increase. Powell County was the exception, losing almost 2 percent of its population during the same 2000 to 2012 period. The significant rise in population indicates increased demand for the benefits the Forest provide as well as increased stresses on vulnerable resources. Domestic migration was the main driver of population change between 2000 and 2012, with significantly more Americans moving into the West area counties than exiting. The population in the West area is slighter older than that of Montana as a whole, with median ages in the four counties ranging from 41 to 47 (compared to 39 for Montana). The population in the West area is also aging. Between 2000 and 2012, all four West area counties experienced a rise in median age, between 7 and 16 percent. This suggests that more residents may be entering retirement in the coming decades. In 2012, those aged 50 to 60 comprised the largest proportion of the West area population.

Health outcomes in the West area, as measured by the County Health Rankings composite indicator, vary by county. Broadwater, Jefferson and Lewis and Clark Counties ranked in the top half of all counties in

Montana for overall health outcomes. Powell County ranked in the bottom half, indicating that overall health outcomes in Powell County are below the Montana county average.

Land ownership, development patterns, and wildland-urban interface

Almost half of all lands in the West area, 42.5 percent, are NFS lands. Thus, these four counties are heavily impacted by FS land management decisions, particularly in terms of areas available for development. Land use is also relevant as development of private lands can influence adjacent, NFS lands. Impacts to wildlife habitat and increased recreational use are primary considerations. Residential acreage in the West area increased by 58 percent between 2000 and 2010, a substantial change. Land area (mi^2) in the wildland-urban interface (defined by Headwaters Economics as private forestlands that are within 500 meters of public forestlands), comprises 404 mi^2 of the West area. Only 5 percent of this area contains homes. This suggests that while residential acreage is increasing, residential development is occurring primarily outside of the WUI.

North county group

Population dynamics

The North area is comprised of Glacier, Pondera and Teton Counties. This area experienced a slight loss in population between 2000 and 2012, a 2 percent decrease. Teton County experienced the most significant loss, a 6 percent decrease. Glacier County had a slight uptick in population, with an increase of 1 percent. Domestic outmigration was the main driver of population change between 2000 and 2012, with significantly more Americans moving out of the North area counties than moving in. This could indicate a lack of economic opportunity in the area which is driving residents to seek employment elsewhere. The populations in Pondera and Teton Counties, similar to West area counties, are relatively older than the state average, with median ages of 43 and 46, respectively. Conversely, the Glacier County population is relatively younger, with a median age of 31 in 2012.

Health outcomes in the North area, as measured by the County Health Rankings composite indicator, vary by county. All three counties is the area ranked in the bottom half of all Montana counties, indicating that overall health and access to health services are below most other counties in the state.

Land ownership, development patterns, and wildland-urban interface

Only 8 percent of all lands in the North area are owned by the FS. There is significant variation in NFS land ownership by county. Teton County has the greatest percentage of total area under FS management, at 16 percent. Glacier County has the least, with only 2 percent. The National Park Service has a considerably larger stake in Glacier County, managing 19 percent of the area in Glacier County. Tribal lands comprise the most significant portion of Glacier County land, at 71 percent. 35 percent of all lands in the North are under tribal ownership, considerably more than in Montana overall. Considering the extent of tribal land ownership, NFS land management decisions are likely particularly relevant to tribal governments in the North area.

Residential acreage in the North area increased by 19 percent between 2000 and 2010. Teton County experienced the greatest change, with an increase of 24 percent. Land area (mi^2) in the wildland-urban interface comprises 21 mi^2 of the North area. Only 3 percent of this area contains homes. The North area has considerably fewer homes in the WUI, compared to Montana overall.

Central county group

Population dynamics

The Central area is comprised of Cascade and Chouteau Counties. While Cascade County experienced a slight increase in population between 2000 and 2012 (1 percent), Choteau County saw a 3 percent decrease. Both counties experienced significant outmigration. However, the higher number of births in Cascade County accounted for the slight net population increase. Similar to the North area counties, the

observed outmigration could indicate a lack of economic opportunity in the area. Given the higher birth rate, it is not surprising that the median age in Cascade County is lower than that of Choteau County (38.7 vs. 41.5). Both counties experienced an aging of their populations between 2000 and 2012. Median ages increased by approximately 5 percent.

Health outcomes in the Central area, as measured by the County Health Rankings composite indicator, for both Cascade and Chouteau Counties, ranked in the bottom half of all Montana counties. Cascade County ranked 27th and Choteau County ranked 20th, out of 46 ranked Montana counties.

Land ownership, development patterns, and wildland-urban interface

81 percent of total acres in the Central area are privately owned. The FS manages a total of just 5 percent of lands in Cascade and Chouteau Counties. State trust lands comprise 9 percent of the Central area. Considering the extent of private and state land ownership, FS land management decisions are likely particularly relevant to state and private forestry managers.

The Central area experienced a significant uptick in residential acres between 2000 and 2010, an increase of 52 percent. Cascade County had considerably more development in the ten year period than Chouteau County. Residential acreage increased by 22.5 mi^2 in Cascade County and only 0.4 mi^2 in Chouteau County. Land area (mi^2) in the wildland-urban interface, comprises 78 mi^2 of the Central area. The vast majority, 71mi^2, of the WUI in the Central area is located in Cascade County. 12 percent of the WUI in Cascade County contains homes. The percent of homes in the WUI in Cascade County is higher than the state average of 9 percent.

East county group

Population dynamics

The East area is comprised of Meagher, Judith Basin, Wheatland and Fergus Counties. This area experienced significant population loss between 2000 and 2012, a 4 percent decrease. The largest population losses, on a percentage basis, occurred in Judith Basin County, where population declined by 12 percent between 2000 and 2012. Similar to counties in the North and Central areas, counties in the East lost population due mainly to net outmigration, save Meager County, which had a very slight increase in net migration over the same period.

The population in the East area is considerably older than that of Montana, with median ages in the four counties ranging from 47 to 51 (compared to 39 for Montana). The population in the East area is also aging more rapidly than the state as a whole. Between 2000 and 2012, all four East area counties experienced a rise in median age, between 10 and 22 percent.

Health outcomes in the East area, as measured by the County Health Rankings composite indicator, vary considerably by county. Fergus County (ranked 5th) and Judith Basin County (ranked 13th), have some of the best health outcomes in the state. Conversely, Meagher County (ranked 38th) and Wheatland County (ranked 28th) had outcomes far below the state average.

Land ownership, development patterns, and wildland-urban interface

Similar to the Central area, the bulk of lands in the East are privately owned (71 percent). While the FS manages just 16 percent of East area lands overall, there is considerable variation across counties. The FS manages 33 percent of Meagher County lands and just 6 percent of Fergus County lands. The BLM manages 11 percent of Fergus County lands, suggesting that FS land management decisions are highly relevant to the managers of that agency. In Judith Basin County, state trust lands account for 8 percent of total lands, suggesting a need for the FS to work closely with state trust land managers when implementing decisions that may affect East area lands.

The East area is sparsely populated. While residential acres increased by 75 percent between 2000 and 2010, the vast majority of lands are still undeveloped. Less than half of one percent of private lands are

developed residential acres in the East area. Fergus County had the most developed acres, with 9.3 mi^2 in 2010. Wheatland County has the least, with only 1.9 mi^2. Land area (mi^2) in the wildland-urban interface, comprises 168mi^2 of the East area. Less than one percent of the WUI area contains homes.

Summary

Table 260 summarizes the key social conditions across the HLC NF counties.

Table 260. Summary of key social conditions by county areas

	West	North	Central	East
Population trend	Increasing	Declining	Stable	Declining
Percent of WUI lands with homes	5	3	12	<1
Health outcome	Above average	Below average	Below average	Varies by county

Economic conditions

The area of influence described in the section is different from the social analysis area. The economic area of influence is comprised of 16 counties, an area identified with the most recently available data through methods detailed in the USDA FS Protocols for Delineation of Economic Impact Analysis Areas (METI, 2010).

The Assessment provided details on the economic characteristics and trends including: sector and industry presence (jobs), employment (unemployment rate), income (labor and non-labor), and economic diversification (Shannon-Weaver index). The data in the Assessment were reviewed to determine which economic conditions may be relevant for analyzing the effects of the proposed action and alternatives on economic sustainability. With this lens in mind, the "affected environment" section provides a more focused summation of the economic conditions in the analysis area. Relevant economic conditions are summarized by characteristic.

Total population, employment, and personal income trends since 1970 fluctuate widely across the area of influence counties. Population change since 1970 ranges from 219 percent to negative 42 percent, a measurement for Gallatin and Deer Lodge counties, respectively. Employment change since 1970 ranges from 510 percent to negative 26 percent, a measurement again for Gallatin, and Deer Lodge counties, respectively. Lastly, personal income change since 1970 ranges from 664 percent to negative 11.4 percent, a measurement for Gallatin and Chouteau counties, respectively.

Unemployment and industry presence fluctuate across counties. Unemployment rate ranges from 8.6 percent to 2.8 percent, a measurement for Glacier and Gallatin counties, respectively. Timber industry presence in private employment ranges from 25 percent to 0 percent, a measurement for Powell, and many other counties, respectively. Mining industry presence in private employment ranges from 10 percent to 0 percent, a measurement for Jefferson and many other counties, respectively. Agriculture industry presence in private employment ranges from 32 percent to 1.6 percent, a measurement for Judith Basin, and Lewis and Clark and Gallatin counties, respectively. Lastly, travel and tourism industry presence in private employment ranges from 33 percent to 14.3 percent, a measurement for Meagher, and Wheatland counties, respectively.

For most primary counties, timber industries do not represent significant employment. The exceptions are Powell and Broadwater County, which collectively have more timber jobs than the rest of the area of influence. Table 261 provides the most current data on timber industry employment in the multi-county area, as observed by the U.S. Census Bureau County Business Patterns. An estimated 804 private industry timber jobs exist in this multi-county area.

Table 261. Timber industry subsector private employment in primary counties, 2015

County	Growing and harvesting	Sawmills and paper mills	Wood Products manufacturing	Total timber	Total private employment
Powell	113	165	2	280	1119
Broadwater	0	165	0	165	854
Gallatin	21	29	63	113	43091
Park	6	91	2	99	4961
Lewis and Clark	9	26	17	52	25198
Jefferson	1	46	2	49	1769
Cascade	1	14	16	31	30802
Teton	0	7	0	7	1179
Meagher	3	0	0	3	289
Chouteau	2	0	0	2	728
Deer Lodge	2	0	0	2	2758
Glacier	1	0	0	1	2164
Pondera	0	0	0	0	1334
Wheatland	0	0	0	0	364
Judith Basin	0	0	0	0	189

Benefits to society contributed by the HLC NF, including benefits directly contributing to jobs and income for communities are described in detail in the following section.

Societal benefits

The Forest provides a suite of key benefits to local communities, national and even international publics. While some benefits may be relevant to all beneficiaries (local and global), other benefits are more localized, such as jobs maintaining roads on NFS lands. Below is a discussion of the societal benefits the Forest provides and how they contribute to social and/or economic sustainability. Specifically, benefits are described in relation to how they contribute to income and jobs, protecting health and safety or/and contributing to well-being more generally. Relevant social conditions and public comments, where data are available, are examined to determine the magnitude of the contribution provided by the given benefit. Risks and stressors that may affect the ability of the Forest and the larger landscape to continue to contribute to social or economic sustainability are also considered. To gather public input, the interdisciplinary team, in partnership with the Center for Natural Resources & Environmental Policy at the University of Montana conducted several rounds of workshops in ten key local communities. These communities, aggregated by area, are:

- West: Augusta, MT; Helena, MT; Lincoln, MT; Townsend, MT
- North: Browning, MT
- Central: Choteau, MT; Great Falls, MT;
- East: Harlowton, MT; Stanford, MT White Sulphur Springs, MT

During the workshops, public input was captured by session facilitators and summarized in workshop reports. The comments captured in the reports (CNREP 2015; CNREP 2015a; CNREP 2016; CNREP 2016a; CNREP 2016b) do not provide a statistically significant sample of public opinion. They do provide insight, however, into the key forest benefits workshop attendees' care about most. Figure 19 summarizes the comment topics by social area. In the description of Forest benefits below, public input is sourced from the aforementioned workshop summary reports. In addition to the seventeen key benefits previously identified, workshop participants also raised concerns about managing for conflicts between

users groups and the importance of collaboration in management. Stakeholders expressed a keen interest in collaboration and partnerships. Several participants expressed that the Forest should make every effort to include private land owners, tribal governments and local governments in the decision-making processes.

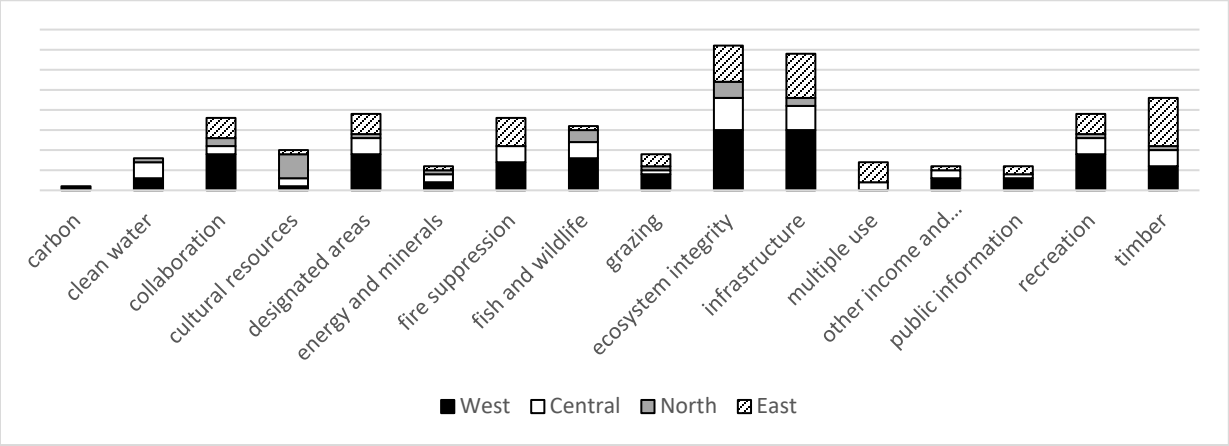

Figure 19. Public workshop comments by social area[1]

1. Data source: CNREP 2015; CNREP 2015a; CNREP 2016; CNREP 2016a; CNREP 2016b

The following subsections describe the key societal benefits of each of the resource area. Refer to the sections for each resource for more complete information.

Carbon storage and sequestration

Workshop participants from West area communities noted the importance of carbon sequestration as a key benefit that protects public health by mitigating the amount of carbon dioxide released into the atmosphere. Both national and international citizens and businesses have a keen interest in reducing the amount of carbon dioxide released into the atmosphere (C2ES 2017). The Paris Climate Change Accord compelled nations around the globe to reduce carbon dioxide emissions and increase carbon storage and sequestration, with a particular focus on reducing emissions from deforestation (Krupp 2015). There is strong support, both at home and abroad, for implementing policies that reduce harmful carbon dioxide emissions (World Bank 2009).

Communities surrounding the Forest are growing and residential acres are increasing, particularly in the West and Central areas, where residential acres increased over 50 percent between 2000 and 2010. One of the primary detractors of sequestration is the conversion of land to other uses – in addition to the urban sprawl, many areas surrounding the Forest have long been converted to agriculture rather than native plant communities. These changes in land use limit the ability of surrounding landscapes to store as much carbon as they have in the past. Thus, the role public lands play in carbon storage and sequestration will become increasingly more important as residential land use trends continue.

Clean water

Many communities depend on ground and surface water from the Forest for both drinking water and agricultural irrigation. These include larger cities such as Helena and Great Falls, and smaller towns including Neihart and White Sulphur Springs. At least 100,000 residents, or one in ten Montanans, rely on water sourced from the Forest for their drinking water.

Workshop participants in the West, Central, and North areas all mentioned clean water as a key benefit that supports income and jobs through agriculture and protects community health by providing safe

drinking water. Watershed restoration was a top priority for some local stakeholders. As populations in Helena and Great Falls continue to grow, demand for clean water will follow suit.

Cultural, historic, and tribal resources

Hundreds of cultural, historic and tribal resources exist on the Forest. Stakeholders mentioned cultural, historic and tribal resources as key benefits that enhance quality of life and support income and jobs through tourism. Stakeholders expressed an interest in increasing efforts to restore historical and cultural resources. They also expressed a desire for increased interpretation and stewardship programs. Preservation of cultural resources and values was mentioned as a key benefit by workshop participants in communities across all areas of the Forest. The Badger Two Medicine area was of particular concern to workshop participants in North area communities, which are also environmental justice communities.

Designated areas

The Forest has a plethora of designated areas. Some are designated by Congress while others are designated at the administrative level. Designated areas on the Forest include: IRAs, national recreation trails, a national scenic trail, a national historic trails, recreation areas, RNAs, a cultural district, experimental forests, wilderness areas, WSAs, WSRs, and a wildlife management unit. While each type of designation is unique and has a different management goal or philosophy, the overarching themes for designated areas are to protect ecological integrity and biodiversity, provide the public with opportunities to connect with, be inspired by, and learn from nature and history, and provide scientists with opportunities to study natural processes and impacts of management actions.

Designated areas may enhance the quality of life of both visitors and non-visitors. Visitors to designated areas have opportunities to engage in a multitude of experiences which enrich their quality of life. These include, but are not limited to: carrying out cultural traditions, challenging recreational pursuits, research, exercise, alleviating stress through connecting with nature, learning about history and culture, and becoming inspired by iconic scenery. Extensive literatures from the fields of public health, environmental sociology and environmental psychology document the health benefits (physical, mental and emotional) of connecting with nature and exposure to pristine landscapes (APHA 2013; Zelenski and Nisbet 2014).

Those who never visit a designated area may also obtain benefits from the area. For example, Cordell and others (2005) find that most Americans are inspired by just knowing a wilderness or primitive area exists, even if they never visit. Cole (2005) highlights the symbolic value of wilderness areas, which serve as demonstrations of human restraint and humility. Designated areas also enhance quality of life through science. Designated areas, and particularly RNAs, provide opportunities for scientific discoveries that advance knowledge for the benefit of society.

Level of access and permitted uses vary by designated areas, and are determined by the laws, regulations, goals and management principles of the given area. Designated areas, their associated level of access, and the array of opportunities offered to the public, are described in detail in the congressionally designated areas and the administratively designated areas sections.

Stakeholders mentioned designated areas as key benefits that enhance quality of life by supporting income and jobs through tourism and supporting community health by providing opportunities to connect with nature and be inspired by wild landscapes (which enhances both physical and emotional health). Stakeholders expressed interest in identifying areas on the Forest that contain underrepresented ecosystems and in prioritizing these areas for consideration of wilderness designation. There was also concern for the health of wilderness landscapes and a desire for integrated restoration in wilderness areas. Stakeholders also expressed an interest in WSR inventory and protection. There were also a series of comments relating to preferences for additional wilderness designation. In communities across all areas of the Forest, some stakeholders expressed a desire for more lands on the Forest to be designated as wilderness while others opposed the designation of additional land as wilderness. Public comments

pertaining to particular wilderness inventory areas were reviewed and discussed in more detail in the designated areas sections. Some workshop participants also expressed interest in creating new designated recreation areas. A group of medical professionals in Montana submitted comments expressing their interest in promoting access to nature and pristine landscapes, in the context of enhancing the quality of life of the public.

In the past decade, visits to designated areas around the country have increased, particularly day visits (Bowker et al. 2006; NVUM 2016). This increase in day use of designated areas is expected to continue as urban populations close to designated areas continue to grow (Rasch and Hahn 2018). Designated areas on the Forest that are in close proximity to the growing urbans areas of Helena and Great Falls will likely experience a significant increase in visits in the coming decades. A key issue raised by the public was permitted uses of designated areas. Preferences for motorized and mechanized (incl. mountain biking) uses in designated areas vary greatly by stakeholder group.

Direct income and jobs

The HLC NF multi-county area of influence has a range of per capita income, average earnings per job, and components of personal income. In 2016 all counties in the area measured lower per capita income and earnings per job than the U.S. average of $49,246 and $58,372, respectively. The lowest was Chouteau County at $31,202 and 22,815 respectively. In most counties, non-labor personal income was a higher proportion than the U.S. average of 36.8 percent. The counties with the highest non-labor income ratio include Meagher and Chouteau County at 57.8 percent. Income-maintenance payments (welfare payments), as a component of non-labor income, can have important implications for social and economic sustainability and environmental justice. Amongst counties in the analysis area, Glacier and Deer Lodge County have the highest proportion of transfer payments, both at approximately 30 percent of their economies.

Employment is also an important indicator of the economic health of an area. Employment (measured as recorded full and part-time jobs) in the multi-county area increased 20 percent from 2000 to 2016, over 1 percent per year, pacing faster than population growth. In 2016, the area recorded 233,070 jobs, an increase of 45,961 jobs, or 2872.6 new jobs per year.

Services-related employment (which includes a wide range of jobs, from restaurant workers and software developers to doctors) makes up the largest share of this economic area. Nearly 75 percent of all new jobs in the area are in services, rather than agricultural, manufacturing or natural resources. Approximately 16 percent of the economy is in non-service industries, 17 percent is in government, and the remaining is in services. Within non-service industries, the largest employment comes from farm, construction, and manufacturing, leaving less than 2 percent of the private economy working directly with natural resources.

In 2016, unemployment nation-wide had improved, and most counties in the analysis area were below the U.S. average at 5.7 percent. Unemployment was, however, particularly high in Glacier County at 8.6 percent, which is 3.7 percent higher than the U.S. average.

As observed in 2016, the multi-county area generally fell behind U.S. averages, in terms of personal income, but not necessarily for levels of employment. Increased, or sustained economic well-being could be achieved by activities that lead to increasing per capita income in the area, or increasing proportions of labor income to non-labor income, particularly in more rural counties, such as Glacier, Chouteau and Deer Lodge County. Employment opportunities are especially needed and important in counties with higher unemployment rates, such as in Glacier County.

The primary risks and stressors to contributed employment and income in the 16 county area around the HLC NF, external of direct FS operations, includes the further loss of forest products industry capacity

and infrastructure as well as pattern changes in annual travel and tourism, especially as it relates to non-local visitors seeking recreation opportunities.

Ecosystem integrity

Forest ecosystem integrity varies considerably across the landscape. Ecosystem integrity, and particularly stable soils, can protect the public from harm by reducing the risk of flooding and landslides. Ecosystem integrity also supports habitat for pollinators and rare and endangered species. Just knowing that these species exist is an important value to the public, and referred to in the non-market valuation of natural resources literature as a non-use value (Harpman et al 1994). Therefore, ecosystem integrity can enhance the quality of life of both users and non-user alike that value the existence of ecosystem integrity.

Participants from communities across all areas noted ecosystem integrity as a key benefit that enhances quality of life. Some participants stressed the need to have flexibility in forest management plans to ensure critical projects can be implemented. Protection of native plants, weed management, using fire as a habitat restoration tool, and considering impacts of climate change were all mentioned as important issues the Forest should consider when planning projects that will restore and/or maintain ecosystem integrity.

Energy and minerals

The Forest contains many areas previously and currently developed for mineral and energy resources. There are also many areas with potential for future energy and mineral development, including renewable energy such as geothermal resources and wind.

There are many hazardous mine openings and features which pose risks to public safety. The Forest mitigates these hazards, as resources allow, and 15 to 25 hazards are mitigated annually. There are three federal Superfund sites on the Forest that pose risks to public health. These sites are administrated by the Environmental Protection Agency. The Upper Tenmile Creek Mining Area is a Superfund site located in the Rimini district near Helena. Lewis and Clark County has relatively high health outcomes, suggesting that the Superfund site is not currently significantly impacting public health. Lewis and Clark County residents are also at risk from the State of Montana Comprehensive Environmental Cleanup and Responsibility Act superfund site, the Upper Blackfoot Mining Complex site, located near Lincoln.

The Barker-Hughesville Mining District Site is located east of Monarch. Residents in Judith Basin County have relatively high health outcomes, suggesting that the Superfund site is not currently significantly impacting their health. Residents is Cascade County have some of the lowest health outcomes in the state, suggesting they may be more vulnerable to potential health impacts from the Barker-Hughesville Mining District Site. Cascade County residents are also at risk from the Carpenter-Snow Creek Mining District site, located near Neihart.

Measured locatable and leasable mining production on the HLC NF, remains limited to small amounts of sand and gravel material. As a result, mineral activity on the Forest is not currently contributing a known number of jobs, or labor income.

Workshop participants in communities across all areas noted energy and mineral development as a key benefit that provides income and jobs. Some participants were concerned with the impacts of energy development on the ability of the Forest to provide clean water and habitat for fish species. Participants from North area communities were interested in abandoned mine reclamation projects.

Fire suppression (and mitigation)

The Forest manages both fire suppression and mitigation programs. Fire mitigation and suppression efforts contribute to the safety and well-being of the public by reducing the risk of larger, catastrophic wildfire in the future and protecting communities at risk. Wildland fires impact the public through risk to life and property. Even when fires do not directly impact communities, residents may still experience

emotional distress from the stress associated with their perceived risk to life and property (González-Cabán et al. 2007). The health of the public is also affected when wildfire smoke reaches unhealthy levels.

Larger wildfire activity and fire mitigation efforts spur economic activity temporarily as agency resources and private service contracts are expended. Some portion of large fire incident and mitigation program spending occurs locally and can boost both employment and income temporarily for community and regional businesses. Additionally, some permanent resources and annual spending is allocated to wildfire management. These resources contribute to jobs and income as a component of the total contribution from all budgeted operations and planned agency expenditures. Currently FS expenditures from the HLC NF contribute to an estimated 742 jobs, and $27 million in labor income, annually.

It is important to note that simultaneous to wildfire suppression efforts, wildfire events can cause great economic costs. Large fire activity can deter travel and tourism and change travel patterns during summer and fall. This potential business impact is important to note because it can occur in peak tourism season and can offset economic benefits associated with wildfire suppression efforts. Additionally, smoke and particulate matter generated by wildfires can directly affect public health and disease management, costing individuals and health care systems.

Participants from communities in the West, East and Central areas all mentioned fire suppression and fire mitigation measures (e.g. fuels management through pre-commercial thinning) as key benefits that enhance community well-being and keep people and property safe from the impacts of wildfire. During listening sessions, county government officials expressed concern that funding is being directed toward suppression, rather than mitigation. There was an expressed preference to steer funding toward harvesting beetle kill timber and other fire mitigation efforts. Some were particularly concerned with fuels management in the wildland-urban interface WUI and expressed interest in increased, active management in the interface to reduce the risk of wildfire damage to their communities. Irrigation districts (particularly on the Rocky Mountain Front) have expressed great concern with wildfires in the wilderness, citing (perceptions of) negative effects to the water they use.

Active management in the WUI is of particular interest to communities in the West area as more homes in the West area are located in the interface, compared to the state overall. Fire social science research also finds that the public is generally supportive of active fire mitigation management, including prescribed burning (McCaffrey and Olsen 2012).

Researchers have found that future climates are likely to be warm and dry, resulting in the potential for more wildfire and insect disturbances. More residential development is expected in the WUI, particularly in the West area, which may place an increasing number of homes at risk from wildfire.

Fish and wildlife

The Forest provides habitat for a range of fish and wildlife including trout, bats, falcons, bighorn sheep, beavers, moose, black bears and elk. There were approximately 33,000 elk on hunting districts that overlap with the Forest and 295,011 hunter days in 2016. The Forest also provides habitat for the following at-risk species: Canada lynx, wolverine, grizzly bear, flammulated owl, and Lewis's woodpecker. Consumption of, and activities associated with, fish and wildlife enhance the quality of life of the public. Fish and wildlife are consumed as food and have numerous recreational and cultural uses such as hunting for sport, trapping, viewing by recreationalists, and cultural importance to Native American populations. Fish and wildlife contribute to people's sense of place. People also benefit from just knowing fish and wildlife exist (i.e. they have non-use value).

Close to 80,000 angler days were reported for high use waters on the Forest in 2014 (USDA 2015b).

Participants from communities across all areas noted providing habitat for fish and wildlife as a key benefit that enhances their quality of life and provides income and jobs from tourism and recreation.

Stakeholders expressed interest in protecting wildlife corridors and increased coordination with state agencies. Some participants were concerned with connectivity and advocated for increases in fish and wildlife corridors that connect ecosystems. Others were interested in reintroduction of bison and some were concerned about conflicts between bison and cattle.

Grazing

Opportunities for grazing enhance the quality of life of permittees by providing them with the opportunity to sustain their rural lifestyles and livelihoods. Opportunities for grazing also enhance to the quality of the life of local publics through contributions to sense of place and rural heritage. Grazing opportunities also enhance the quality of the life of visitors to the Forest and surrounding areas by providing opportunities to view scenic, ionic Western landscapes.

Grazing allotments provide for economic opportunities across a large number of Forest communities. Currently it estimated that grazing programs contribute to 252 jobs, and $8.2 million in labor income, around the Forest, annually.

Workshop attendees in all areas mentioned grazing as a key benefit that provides income and jobs. Weed management and the impacts of weeds on livestock grazing was a concern for some stakeholders. Stakeholders advocated for an increased effort by the Forest to manage noxious weeds more aggressively. Agricultural interests and county government officials expressed a desire to maintain existing grazing allotments and restore grasslands through BMPs such as improvements to fencing. Some also expressed concern for overgrazing and the impacts of overgrazing on water quality. Others had concerns about conflicts between grazing and recreational uses as well as grazing impacts in wilderness areas. Current demand for forage from livestock operators with private land adjacent to the Forest is greater than the Forest can provide.

Infrastructure

The Forest provides an extensive system of roads, trails and airstrips for the use and enjoyment of the public. This transportation system provides the public with access to public land and enhances the quality of life of those who use the system. Transportation infrastructure also enhances public health and safety by providing access for emergency rescue teams and firefighters.

Workshop participants from all area communities noted infrastructure as a key benefit that enhances quality of life and health by providing opportunities to access nature (which enhances both physical and emotional health). Roads, trails, trailheads and airstrips were all mentioned as important benefits. Many noted that road decommissioning would limit access for recreation and firewood collection. There was particular concern that access would be limited for the elderly, who mainly access the Forest via motorized means. Many communities around the Forest have relatively older populations, compared to Montana and the nation overall. Thus, maintaining access for the elderly is of particular concern.

Other forest products and wood for fuel

Forest products enhance the quality of life of those who harvest and consume them. Some special forest and botanical products hold particular value for tribes. Forest products may also enhance the health of those who consume them for medicinal purposes.

The HLC NF timber program, which administers the sale of wood material, contributes to an estimated 119 jobs, and $5.4 million in labor income, annually. Currently, a large proportion of the total sold and harvested wood volume from the Forest is utilized for fuel, and other non-sawlog forest products.

Although collection of forest products for personal use does technically require a permit, demand for most forest products is not well-known.

Other income and jobs

Agency operations, in addition to the other multiple-use resources, provide income and jobs to local economies surrounding the Forest. Another economic relation between Federal land and counties are Federal revenue sharing and land payments, including Secure Rural Schools and payments in lieu of taxes. State and local governments cannot tax federally owned lands the way they can tax privately owned lands. As a result, a number of Federal programs exist to compensate county governments for the presence of Federal lands. These programs can represent a significant portion of local government revenue in rural counties with large Federal landholdings, such as the counties in the analysis area.

Before 1976, all Federal payments were linked directly to receipts generated on public lands. Congress funded payments in lieu of taxes, with appropriations beginning in 1977, in recognition of the volatility and inadequacy of Federal revenue-sharing programs. Payments in lieu of taxes are intended to stabilize and increase Federal land payments to county governments. More recently, the Secure Rural Schools and Community Self-Determination Act of 2000 decoupled FS payments from commercial receipts. Secure Rural Schools received broad support because it addressed several major concerns around receipt-based programs—volatility, the payment level, and the incentives provided to counties by linking Federal land payments directly to extractive uses of public lands.

Payments in lieu of taxes and Secure Rural Schools each received a significant increase in Federal appropriations through the Emergency Economic Stabilization Act of 2008. Despite increased appropriations at times, Secure Rural Schools funding status remains in question. A number of bills presented in the 115th (2017-2018) Congress address Secure Rural Schools funding, but have not yet been passed by congress or into law.

The two most significant land payments to counties in the analysis area are payments in lieu of taxes and FS receipts. Since 2008, FS receipts have declined steadily for counties around the HLC NF, where payments in lieu of taxes have increased or stayed flat. Payments in lieu of taxes formulas are specifically based on population and acres of Federal land. Under this payment structure, Gallatin, Lewis and Clark, and Park County receive considerably higher payments in lieu of taxes ($2-3 million annually) than the other counties in the analysis area. Conversely, Meagher and Powell Counties rely heavily on FS receipts, which make up a large percentage of their total Federal land payment.

HLC NF related payments to states and counties currently contribute to an estimated 151 jobs, and $6.8 million in labor income, annually.

Workshop participants from the West, Central, and East area communities noted other income and jobs as key benefits the Forest provides. Some participants noted jobs and income generated from recreation as particularly important. Others noted jobs and income from range and mineral development as key benefits. County government officials expressed the need for the continuation of Secure Rural Schools and payments in lieu of taxes as county budgets rely on these funds to provide services.

The greatest risk to Federal land payments is congressional or executive branch policy changes, which at any time could dissolve or partially remove these revenue streams, which are particular important in the western United States. A secondary risk to counties exists, if agencies were to reduce or seize management activities. FS receipts are directly tied to the level of timber sold and harvest from within a given county. For counties with a higher proportion of FS receipts, a greater fiduciary risk exists with relation to continued forest management activity.

Public information, interpretation and education

The Forest provides the public with opportunities to connect with nature, and learn about the history and cultural significance of the area through public information, interpretation and education services. These programs enrich the quality of life of participants. Some examples include: the Lewis and Clark National Historic Trail Interpretive Center programs, educational lectures with elementary school students, citizen science programs, day camps, star gazing nights and volunteer programs.

The Forest also provides essential safety information to communities affected by Forest conditions such as wildfires. Forest communication efforts can be effective tools for building trust with local stakeholders. Trust between agencies and communities is an essential component for achieving forest management and restoration goals (McCaffrey and Olsen 2012).

Workshop participants from the West, Central, and East area communities noted public information, interpretation, and education as key benefits that enhance quality of life, and particularly the health and safety (e.g. hazardous smoke updates and bear safety information) of the public. Many stressed the importance of communicating Forest management actions to the public and educating the public on why certain projects are being implemented.

Recreation

A multitude of recreation settings, opportunities, access and special uses exist on the Forest. Recreation activities enhance the well-being and health of those who engage in them. There is extensive literature on the physical, emotional and mental health advantages of outdoor recreation (APHA 2013; Zelenski and Nisbet 2014). The Forest provides many different types of recreation experiences which provide opportunities to connect with nature, find spiritual inspiration, engage in physically challenging pursuits, and experience solitude in natural settings.

Recreation on the HLC NF, as is the case on many NFs, is an important component of the contribution to Forest community economic sustainability. Currently the HLC NF contributes to an estimated 238 jobs, and $6.7 million in labor income, annually.

Participants from communities across all areas noted recreation as a key benefit which enhances well-being and community health, as well as providing jobs and income. There is concern that roads are being decommissioned and will prevent access to recreation opportunities. Many participants noted a preference for increased recreation access. Others expressed concern over user conflicts and advocated for more areas designated for particular users. Some noted a need to manage for conflicts between recreationalists and cattle grazing.

Scenery

The Forest contains many scenic landscapes, beautiful vegetation, and unique geologic features that enhance the well-being and health of the public. Viewing scenery is associated with health benefits such as reduced stress levels and a sense of joy. Scenery also contributes to the sense of place people attach to a given landscape.

Scenery including forested landscapes can influence population and economic growth by encouraging migration as well as travel and tourism. Travel and tourism related industries alone, employ an estimated 22 percent of all private jobs in the economic area of influence surrounding the HLC NF. The relative degree to which scenery contributes to population growth and travel and tourism spending remains unknown, but nonetheless it remains a notable factor for community economic health.

Participants from communities across all areas noted scenery as a key benefit that contributes to their sense of place and well-being.

Timber

The Forest contains valuable timber resources, including products that are in demand by the American public Commercial timber harvest may enhance the quality of life and safety of the public by improving watershed condition, improving wildlife habitat, and/or reducing wildfire risk through reduced fuel loads.

The HLC NF timber management program, which administers the sale of timber and other wood material, currently contributes to an estimated 119 jobs, and $5.4 million in labor income, annually.

Participants from communities across all areas noted timber as a key benefit that provides jobs and income. Local stakeholder expressed concern that timber harvest decisions take too long. Others were concerned about effects of timber harvest to water quality and wildlife habitat. County officials expressed concern that declining timber harvest negatively impacted local economies. Some stakeholders expressed a desire for increased timber production and harvest on the Forest. Others opposed timber production on the Forest. Many noted that timber harvest should be used as a tool for wildlife habitat restoration and to improve forest health.

Market conditions present risks regarding the economic feasibility of managing forests and providing timber for forest products.

Environmental justice

In the Assessment, county-level populations were analyzed, according to the Council on Environmental Quality (1997) criteria, to determine whether or not they met the definition of an environmental justice county. These determinations are summarized below. For more detail on the criteria, please see the Methodology section.

None of the West or East area counties met the criteria for environmental justice counties under either the "minority population" test or the "low-income population" test. In the North area, both Glacier and Pondera Counties met the definition of environmental justice counties under both the "minority population" and the "low-income population" tests. In the Central area, Choteau County met the definition of an environmental justice county under the "minority population" and "low-income population" tests.

In sum, the following three counties were identified as environmental justice counties in the Assessment: Glacier County (North area), Pondera County (North area) and Choteau County (Central area). In all three environmental justice counties identified, the minority and low-income populations are Native American. For a detailed breakdown of minority and low-income populations by county, please see the Assessment. In the subsequent analysis of alternatives, effects to minority and low-income populations in Glacier, Pondera, and Choteau Counties were considered to determine whether the proposed action or alternatives would disproportionately affect populations in these environmental justice counties.

3.27.6 Environmental consequences

Effects common to all alternatives

The previous sections assessed the social and economic conditions of the affected environment and the societal benefits the Forest provides. The affected environment section provides a baseline understanding of how the Forest currently contributes to social and economic sustainability, for local beneficiaries and the general public, where applicable. The key dimensions of social and economic sustainability assessed are how the Forest (and Forest management) contribute to: income and jobs, quality of life and well-being, and the health and safety of the public. The following section considers the potential impacts of alternative management scenarios on these contributions. This section provides a brief summary of the impacts to the benefits the Forest provides, and places those benefits in the context of contributions to

social and economic sustainability. For more details and the complete analysis of effects to specific Forest resources, please see the relevant resource sections.

Climate and Carbon Storage and Sequestration

Wildfires may become more severe as a result of expected hotter and drier climates in the future. The scale of wildfires, coupled with limited resources, may result in a decline in the ability of the Forest to actively mitigate wildfire risk in affected communities. All alternatives are focused on promoting forest health and would not negatively impact the Forest's ability to store and sequester carbon in the future.

Cultural, historic and tribal resources

All alternatives would provide protections for cultural, historic and tribal resources. Contributions from cultural resources to the well-being of the public in expected to continue under all alternatives.

Designated areas

All alternatives would provide for the protection of designated areas, according to the relevant laws and regulations. Designated areas contribute to the health and well-being of the public under all alternatives. The projected increase in visits to designated areas may compromise those areas' abilities to meet management goals such as maintaining opportunities for solitude, in the case of wilderness, or maintaining sufficient elk populations for hunting, in the case of the Elkhorns Wildlife Management Unit. Climate change may also impact the ecological integrity of ecosystems within designated areas. Increases in invasive species and decreases in native species populations may occur, affecting the pristine nature of some designated areas, and thus impacting the contributions of designated areas to the quality of life of the public.

Ecosystem integrity

All alternatives would provide plan components intended to preserve and restore ecosystem integrity. Ecosystem integrity would continue to contribute to the health, safety and well-being of the public under all alternatives.

Energy and Minerals

All alternatives would provide opportunities for energy and mineral development. Impacts to the health and safety of the public from energy and mineral plan direction are not expected, given the legal requirements for mitigation of environmental impacts and reclamation. In communities where income and jobs are dependent on the energy and minerals industries, mining and energy development opportunities provided by the Forest would indirectly contribute to social sustainability through contributions to jobs and income, which in turn contribute to the well-being of local residents. Fluctuations in the global prices for minerals may impact demand for mineral development.

Fire suppression (and mitigation)

All alternatives would promote fire mitigation programs. Fire suppression tactics are employed when deemed appropriated to protect values at risk. These programs contribute to the well-being and safety of the public by protecting life and property at risk, particularly for those wildland-urban interface communities in the West area. No substantial impacts to public health from smoke from prescribed burning are expected under any of the alternatives as all prescribed burning activities must comply with the Clean Air Act.

Fish and wildlife

All alternatives would provide fish and wildlife habitat for an array of species. Opportunities to consume, and otherwise engage in fish and wildlife related activities, including fishing and hunting, would be provided and are not expected to vary significantly across alternatives at the forestwide scale. These

opportunities contribute to the well-being of hunters, anglers and wildlife-viewers. Plan components designed to enhance fish and wildfire habitat also contribute to the well-being of those who are inspired by just knowing certain species (e.g. grizzly bear, bull trout) exist.

Grazing

Opportunities for grazing are provided for, and would not vary by alternative. In communities where income and jobs are dependent on the livestock and ranching industries, grazing opportunities provided by the Forest would indirectly contribute to social sustainability through contributions to jobs and income, which in turn contribute to the well-being of local residents.

Infrastructure

The current system of roads, trails and airstrips would provide access to the public and contribute to the well-being of those who use the system by providing opportunities to connect with nature. While miles of open road vary slightly by alternative, the variation is minimal and accounts for less than one percent of total open roads. Given the relatively small number of miles of proposed road closures (ranging from 11.8 to 23 miles out of a total of 2,569 miles), no significant impacts to well-being of road users are expected, across all alternatives.

Other forest products and wood for fuel

Forest products would be available to the public under all alternatives and would contribute to the well-being of those who harvest and/or consume them.

Public information, interpretation and education

Opportunities to learn about and connect with nature would be provided and would contribute to the well-being, health and safety of the public.

Recreation

A plethora of opportunities for recreation across all recreation settings would be provided. These opportunities would contribute to the well-being, health and safety of those who recreate on the Forest.

Scenery

Scenery would contribute to the well-being and health of the public, under all alternatives.

Timber

Sustainable levels of timber would be provided under all alternatives. In communities where income and jobs are dependent on the timber industry, timber provided by the Forest would indirectly contribute to social sustainability through contributions to jobs and income, which in turn contribute to the well-being of local residents.

Effects that vary by alternative

The only variation in employment and labor income, across alternatives stems from known differences in wood quantities sold, and hence more or fewer jobs contributed from timber and other forest products. Alternative E would allow for the highest level of wood volume and hence would contribute more jobs and labor income than the other alternatives.

Jobs and income

All alternatives would provide similar economic contributions in relation to employment and labor income. Results of the economic contribution analysis appear in the two tables below. In Table 262 employment refers to levels of employed individuals on an annual basis. In Table 262, labor income

refers specifically to earned wage or proprietor income and does not include Social Security, Medicaid, dividends, or capital gains, i.e., government programs or investments.

Income and employment levels contributed by the Forest and FS operations do not fluctuate widely between alternatives. However, as shown in Table 262 and Table 263, income and employment are different across alternatives due to changing assumptions regarding forest management activities under the timber program. Between alternatives A and E, job contributions range between 1502 and 2150 jobs, and labor income between $54.7 and $82.5 million.

All alternatives would produce more jobs and income over current levels, with alternative E producing the most. Variation in employment, across alternatives stems from known differences in wood quantities sold, and hence more or fewer jobs from timber resources. It is anticipated that recreation related visitation to the Forest will increase over time, regardless of the alternatives and so the economic impact model does not differentiate visitation levels, or the recreation impacts between alternatives. However, the Forest anticipates increased local and non-local visitation through enhanced recreation and wilderness areas. Nonmonetary benefits to various recreation user groups ranges between alternatives as well. For more information on recreation benefits see the recreation section.

The greatest contribution to employment and income from the HLC NF comes through FS expenditures, which includes general operations and contracted services. Ordered from higher to lower; range, recreation, Federal land payments, and timber management programs also contribute to jobs and income.

For more information regarding the following two tables, see the project record document entitled "Details of the IMPLAN economic impact analysis for the Helena Lewis and Clark Plan DEIS."

Table 262. Employment in the analysis area by resource and alternative (direct employment contribution, estimated number of jobs)

Resource	Current	A	B	C	D	E
Recreation	238	238	238	238	238	238
Grazing	252	252	252	252	252	252
Timber	119	454	444	444	445	767
Minerals	0	0	0	0	0	0
Payments to States/Counties	151	151	151	151	151	151
FS Expenditures	742	742	742	742	742	742
Total Management	1,502	1,837	1,828	1,828	1,829	2,150
Percent Change from Current	--	22.3%	21.7%	21.7%	21.8%	43.2%

Table 263. Labor income in the analysis area by resource and alternative (average annual labor income, in thousands of 2015 U.S. dollars)

Resource	Current	A	B	C	D	E
Recreation	$6,676	$6,676	$6,676	$6,676	$6,676	$6,676
Grazing	$8,207	$8,207	$8,207	$8,207	$8,207	$8,207
Timber	$5,442	$19,782	$19,382	$19,382	$19,425	$33,332
Minerals	$0	$0	$0	$0	$0	$0
Payments to States/Counties	$6,809	$6,809	$6,809	$6,809	$6,809	$6,809
FS Expenditures	$27,568	$27,568	$27,568	$27,568	$27,568	$27,568

Resource	Current	A	B	C	D	E
Total Management	$54,702	$69,041	$68,641	$68,641	$68,684	$82,592
Percent Change from Current	---	26.2%	25.5%	25.5%	25.6%	51.0%

Designated areas

All action alternatives provide additional recognition for national recreation trails. This additional emphasis may lead to greater public awareness of the trails and an increase in new users. All action alternatives provide specific plan components for IRAs that enhance and/or protect those areas for present and future generations. The greater emphasis on managing designated areas for their intended purposes may result in greater contributions to the quality of life, health and well-being of the public, compared to alternative A.

Alternative D would provide the largest contribution from designated areas to the well-being of the public, as the majority of Americans value and benefit from (either directly or indirectly) the preservation of wilderness landscapes. An additional RNA would be a candidate for designation under alternative D, which may provide more opportunities for scientific research of grassland ecosystems.

Alternative E is expected provide the smallest contributions to the well-being and health of those who use and/or value designated areas for their natural and/or wild characteristics.

Ecosystem integrity

All action alternatives include plan components are designed to maintain and enhance the health of ecosystems. Under all action alternatives, explicit desired conditions for terrestrial vegetation are developed to be consistent with the NRV, with consideration for climate change vulnerabilities. Alternative A would not necessarily preclude similar goals or management opportunities, but does not contain similar direction.

Alternative E is expected to result in the fewest acres treated to restore ecosystem integrity and therefore, a landscape less resilient to insect and disease outbreak. Therefore, contributions to the well-being, health and safety of the public from ecosystem health may be lowest under alternative E, compared to all other action alternatives.

Energy and Minerals

Access to locatable, leasable and salable minerals, as well as opportunities for mineral entry, mineral prospecting, exploration and development would vary by alternative. Contributions to the well-being of those who enjoy and/or base their livelihoods on mineral-related activities, are expected to be highest under alternative E, followed by A, C, and then B. Contributions are expected to be lowest under alternative D.

Fire suppression (and mitigation)

All action alternatives include plan components that incorporate the best available science for fire suppression and mitigation management. These components are expected to provide a larger contribution to the well-being and safety of the public, compared to expected contributions under alternative A.

Fish and wildlife

All action alternatives include plan components designed to enhance fish and wildlife habitat and connectivity, above and beyond the conditions expected under alternative A. There are also specific standards and guidelines designed to protect old growth areas, provide sufficient snags and coarse woody debris, and shield riparian areas from potential impacts of timber harvest activities. Plan components are also designed to minimize the potential for impacts to wildlife resulting from resource management activities or uses, and to reduce wildlife-human conflict. Therefore, contributions to the quality of life of

the public from fish and wildlife activities are expected to be greater under all action alternatives, compared to alternative A.

Alternative D has the most land identified as RWAs. As a result, alternative D has the lowest likelihood of negative impacts to fish and wildlife habitat from motorized and mechanized use, compared to all other alternatives. Alternative D also provides the most opportunities for wildlife connectivity among island mountain ranges.

Alternative E has no RWAs and the highest expected level of motorized use, which, in turn, may result in greater impacts to fish and wildlife habitat, compared to all other alternatives. Contributions to well-being from fish and wildlife related activities are expected to be lower under alternative E, compared to B, C, and D.

Grazing

Under alternatives B and D, portions of allotments would be recommended for wilderness designation and motorized and mechanized uses will not be permitted. The well-being of the permit holders of these allotments may be impacted by this designation as they would be required to apply for permits to access portions of their allotments using motorized vehicles, to the greatest extent with alternative D. Under alternative C, portions of 24 allotments would be recommended for wilderness designation and motorized and mechanized uses will be permitted. The well-being of the permit holders of these allotments will not be impacted by this designation. Alternatives A and E would not impact how permittees currently access their allotments relative to RWAs.

Infrastructure

Road maintenance is often required as part of timber harvest projects. Under alternative E, fewer acres are expected to be harvested, compared to all other alternatives. Therefore, contributions to the well-being and safety of those who use forest roads are expected to be smaller under alternative E, compared to alternatives B, C, and D.

Other forest products and wood for fuel

All action alternatives include plan components designed to maintain and enhance the health of ecosystems, including conditions which enhance the production of non-timber forest products. Therefore, contributions to the quality of life of those who harvest and/or consume other forest products are expected to be greater under all action alternatives, compared to alternative A.

Public information, interpretation and education

All action alternatives include plan components designed to increase opportunities for the public to learn about and connect with nature. These include components that place a greater emphasis on partnerships and volunteer opportunities, as well as goals for joint stewardship. Education programs are also expected to increase public awareness of best practices for wildfire mitigation and reduce human-wildlife conflict. Public outreach and education programs have been shown to build trust between agencies and the public (McCaffrey and Olsen 2012), improve the quality and efficacy of wildfire mitigation and suppression planning and management efforts (Steelman and McCaffrey 2013), and increase public safety. Therefore, contributions to the well-being, health and safety of the public are expected to be greater under all action alternatives, compared to alternative A.

Recreation

All action alternatives include plan components designed to enhance recreation opportunities and access, and provide safer experiences to recreationalists. Therefore, contributions to the well-being, safety and health of recreationalists are expected to be greater under all action alternatives, compared to alternative A. All action alternative include additional direction on constructing new recreation sites within riparian

areas and developing future water supplies. Alternative A does not address these issues. These plan components may curtail development of new sites in riparian areas, and may have a marginal impact on the well-being of recreationalists who desire new developed sites in riparian areas.

The contributions to the well-being and health of recreationalists varies, depending on which type of recreation they prefer. Those who prefer primitive experiences would benefit the most from alternative D. Those who prefer motorized or mechanized experiences would benefit the most from alternative E. There are still ample opportunities for mechanized and motorized recreation settings and access across all alternatives.

According to the most recent survey data available (NVUM 2017), eleven percent of Forest visits involved motorized uses (excluding driving for pleasure) and five percent of visits involved mechanized uses. The number of mechanized and motorized users are expected to increase with the uptick in West area populations. The limitations on mechanized uses in alternative D, amounting to a 30 percent reduction in trails open to mountain bikes, may impact contributions to the well-being and health of the growing population of mountain bikers and mechanized users in West area communities.

The minor limitations on motorized uses under alternatives B, C and D, are not expected to substantially impact contributions to the well-being and health of motorized recreationalists. Only a seven percent reduction in acres open to motorized over-snow use and a seven percent reduction in motorized trails are expected under alternative D, which is the most restrictive in terms of motorized use.

Under alternatives A, C, and E, expected increases in motorized and mechanized use may impact opportunities for solitude and quiet recreation settings. These impacts may reduce contributions to the well-being and health of those who prefer primitive recreation settings.

Under alternative E, fewer acres would be treated to promote ecosystem integrity and resilience. A less resilient forest could lead to lower quality recreation experiences. Impacts could include less aesthetically pleasing scenery, fewer fish and wildlife encounters, and more area closures due to wildfire.

Scenery

All action alternatives include plan components designed to enhance scenery and scenery management and planning. Plan components in all action alternatives are designed to maintain and promote old growth. Contributions to the well-being of those who value the scenery on the Forest will be greater under all action alternatives, compared to alternative A.

Timber

Under alterative E, the highest amount of timber volume would be removed, compared to all other alternatives. Larger contributions to income and jobs in the forest products industry are expected. This alternative may negatively impact the quality of life of those who are opposed to timber harvest due to preservationist values. This alternative provides the largest contribution to those who benefit from income and jobs in the forest products industry.

Cumulative effects

The same analysis area used to analyze the above effects to contributions to social sustainability is used to analyze cumulative effects. Present and foreseeable future conditions or activities that could affect the Forest's contributions to social and economic sustainability are described below. Cumulative effects are described in the context of social conditions and societal benefits, where data are available. For a detailed analysis of cumulative effects for a given benefit, please see the relevant resource section.

Population change

The population in the communities in the West surrounding the Forest is increasing. This uptick in population has resulted in increased demand for housing, and the subsequent conversion of forested lands to residential acres, limiting the ability of lands near the Forest to store and sequester carbon. These trends in population and residential acres may result in a decline in the ability of the lager landscape to store and sequester carbon. The carbon released through natural disturbance on the Forest and residential development in neighboring landscapes combined is minuscule, compared to national carbon dioxide emissions, and should not significantly impact global public health in the long term.

Projected increases in local populations in the West area are expected to lead to increases in recreational uses on the Forest. Impacts from increased recreational uses may affect the Forest's ability to provide clean water to the public in the future. Population increases may also impact the Forest's ability to maintain wilderness character in RWAs.

Given the trends in population in communities surrounding the Forest, it is expected that use will likely increase in areas on the West side of the Forest, near the growing population center of Helena. Populations are either declining or increasing only marginally in communities in the North, Central, and East areas. Estimated visitation to the Forest is approximately 700,000 visits annually. 70 percent of visits to the Forest are from visitors within 100 miles of the Forest. Approximately ten percent of visits include a motorized or mechanized activity (NVUM 2017). Given these levels of visitation, population trends and levels of motorized and mechanized use, significant increases in motorized and mechanized uses are not expected, with the exception of areas easily accessible from Helena.

Environmental Protection Agency management

The three federal superfund sites in the plan area are management by the Environmental Protection Agency. These sites have the potential to impact the health of residents in the analysis area and the Environmental Protection Agency may have limited capacity to fully address these clean-up efforts.

Environmental justice, environmental consequences

As discussed in the affected environment section, environmental justice populations exist within the planning area. Populations most at risk of experiencing disproportionately high and adverse human health or environmental effects include low-income households and Native Americans living on reservation lands. These populations are not mutually exclusive and are present in three counties: Glacier County, Pondera County and Choteau County.

Under all the alternatives, the Forest management activities would contribute to social and economic sustainability by providing key benefits to environmental justice communities. These benefits, which include the protection of cultural resources and sacred sites, provision of clean drinking water, and fire suppression activities, contribute to the quality of life, well-being and health and safety of environmental justice communities. The Forest would continue to provide access to traditional lands and areas of cultural significance.

Approximately 20 percent of jobs in Glacier and Pondera counties are in the travel and tourism sector. All action alternatives support tourism and travel employment by providing opportunities to access and recreate on Forest lands. Ecosystem protections ensure that visitors have opportunities to experience high quality, pristine landscapes. Less than one percent of employment in Glacier and Pondera counties is in the timber industry. Specific timber industry data were not available for Choteau County. However, less than four percent of employment in Choteau County is in the fishing, farming and forestry sector. The amount of lands suitable for timber production varies by alternative. Given the relatively small proportion of employment in the timber industry, the amount of lands suitable for timber production should not impact employment opportunities in environmental justice counties. There are no populations in the plan

area that would experience significant, adverse human health impacts or environmental impacts due to management actions proposed under any of the alternatives.

Conclusions

The anticipated effects of the proposed action and alternatives would meet the purpose and need because, under all alternatives, a full suite of key forest benefits would be provided and are expected to contribute to social and economic sustainability. Under all alternatives, the well-being, health and safety of affected publics would not be significantly, negatively impacted. Conversely, under all alternatives, there would be significant contributions to the well-being, health and safety of the pubic. The relative size and type of contributions vary by alternative.

3.28 Livestock Grazing

3.28.1 Introduction

This section addresses livestock grazing as well as the health of associated rangelands. The scale of the analysis is the entire HLC NF plan area, focusing on the range allotments located therein.

Public comment on livestock grazing in the HLC NF plan area generated several issues during scoping. Comments centered on providing for grazing opportunities on suitable rangelands, balancing forage use by domestic livestock with ecosystem functions, regulating grazing activities by implementing more stringent standards and guidelines, or reducing or eliminating livestock grazing to allow for vegetation and riparian recovery.

Domestic livestock grazing has been, and continues to be, an important multiple use of NFS lands within the plan area. Livestock grazing has been a use of public lands since the inception of the FS and has become an import part of the culture of the rural western U.S. The objectives for FS management of rangelands include managing rangeland vegetation to provide ecosystem diversity and environmental quality while maintaining relationships with allotment permittees; meeting the public's needs for rangeland uses; providing for livestock forage; maintaining wildlife food and habitat; and providing opportunities for economic diversity. Rangeland management is an essential part of the FS multiple-use strategy. This strategy ensures that rangelands provide essential ecosystem service such as wildlife habitat and related recreation opportunities, watershed functions, and livestock forage.

Although rangelands provide a variety of ecosystem services, such as wildlife habitat, recreation, watershed functions, carbon sequestration, and biodiversity conservation, these lands have primarily been managed for forage production and livestock grazing. Forage is a provisioning service. Provisioning services include all tangible products from ecosystems that humans make use of for nutrition, materials, and energy. Forage is managed by the FS to be sustainable, ensuring that it will be available for future generations while still providing the other rangeland's ecosystem services required by their multiple use strategy. To accomplish this, the FS divides rangelands into allotments and monitors each one. Additionally, the FS manages forage in transitory ranges. Transitory range is defined as forested lands that are suitable for grazing for a limited time following a timber harvest, fire, or other landscape events (Spreitzer, 1985).

Grazing permits for each allotment are issued to eligible commercial livestock owners. To determine the carrying capacity (livestock numbers) on an allotment, which is often called the stocking rate, rangeland managers use AUMs. An AUM is defined as the amount of dry forage required by one mature cow of approximately 1,000 pounds or its equivalent, to graze for one month. The forage allowance per day has been determined to be 26 pounds. In determining the AUMs per allotment, permitted outfitters, guides, and other recreational visitors using livestock are not included.