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## Socioeconomic evaluation of broad-scale land management strategies

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### Abstract

This paper examines the socioeconomic effects of alternative management strategies for Forest Service and Bureau of Land Management lands in the interior Columbia basin. From a broad-scale perspective, there is little impact or variation between alternatives in terms of changes in total economic activity or social conditions in the region. However, adopting a finer scale and examining effects on the counties that are likely to be most impacted by federal lands management reveals that many of these counties may be better off under one alternative in the short term, but better off under another alternative in the longer term. The agencies can reduce their short-term impacts on federal resource-reliant counties with low socioeconomic resiliency, by concentrating initial restoration efforts in specific areas, but the environmental justice issues associated with such a policy should also be considered. Published by Elsevier Science B.V.

*Keywords:* Social impacts; Economic impacts; Socioeconomic resiliency

### 1. Introduction

Federal natural resource policy is seen not only as providing economic and social opportunities, but also as maintaining our natural and cultural heritage. Within a socioeconomic context, ecosystems are viewed as providing a wide variety of goods and services that enhance well being and benefit a range of human wants and needs (see Haynes et al., 1996). The objective of this paper is to examine the extent to which changes in policies for federal land management, as embodied in three land management alternatives, may affect the socioeconomic systems coincident with those lands. Our evaluation of the alternatives will include economic effects, social

effects and effects on areas with low socioeconomic resiliency as defined below.

The three land management alternatives under evaluation (S1, S2, S3) are outlined in the Interior Columbia Basin Ecosystem Management Project (ICBEMP) supplemental draft environmental impact statement (SDEIS) (USDA and USDI, 2000). The ICBEMP is a joint effort of the US Department of Agriculture (USDA), Forest Service (FS) and the US Department of the Interior (USDI), Bureau of Land Management (BLM). The ICBEMP study area covers approximately 58 million hectares in Washington, Oregon, Idaho, Montana, Wyoming, Nevada, and Utah (see Fig. 1). All three of the alternatives were designed to restore or maintain natural resources and provide sustainable levels of products and services from lands administered by the FS or the BLM in the project area.

Alternative S1 continues practices currently in use within over 60 separate land management plans in the

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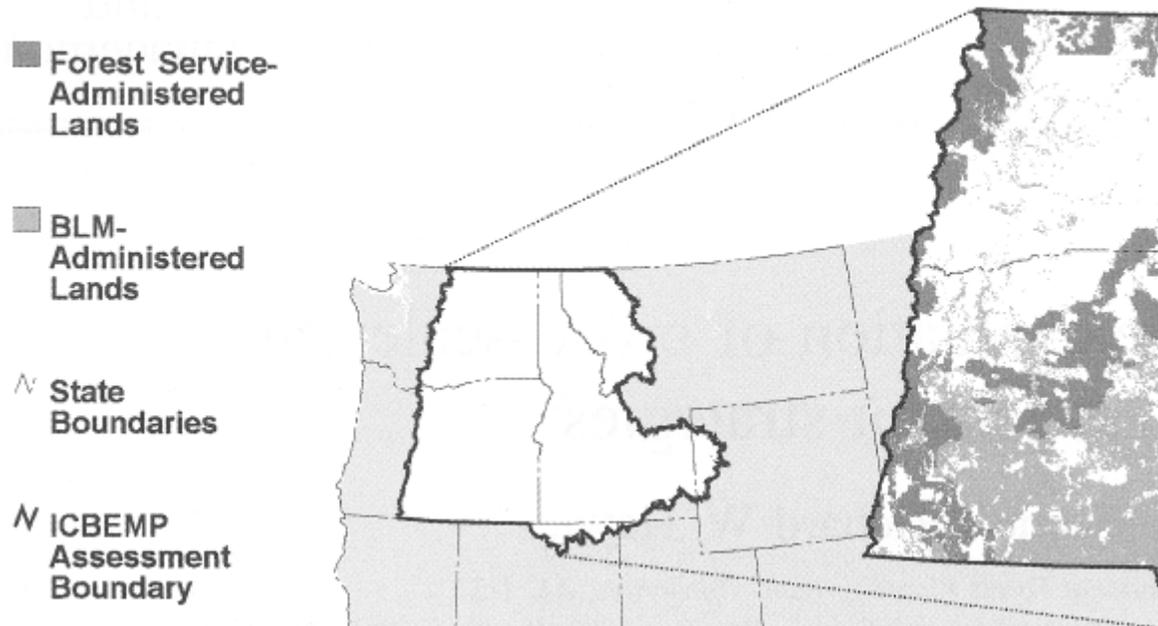


Fig. 1. Location of the ICBEMP study area within the continental United States.

study area, including amendments and modifications to existing direction. Many existing plans are based on the assumption that ecological impacts can be mitigated and that disturbances such as fire, insects, or human activities do not substantially affect planned actions or desired outcomes (USDA and USDI, 2000). Alternative S1 does not have a comprehensive restoration strategy. System components, from timber to wildlife species, are generally managed as individual resources (USDA and USDI, 2000).

Alternatives S2 and S3 "focus on restoring and maintaining ecosystems across the project areas and providing for the social and economic needs of people, while reducing short- and long-term risks to natural resources from human and natural disturbances" (USDA and USDI, 2000). They use a spatially designated network of important areas to anchor conservation and restoration efforts. Among the alternatives, alternative S2 contains greatest emphasis on connecting local decision and management actions to broadscale issues and conditions. Alternative S3 places a greater emphasis on conducting management actions immediately to address "long-term risks to resources

from unnaturally severe disturbance" (USDA and USDI, 2000).

The alternatives promote agency support and collaboration with local communities and tribal governments, particularly those that are isolated and economically specialized, as those entities develop methods that support their long-range goals of economic development and diversification. Federal trust responsibilities and tribal rights and interests are addressed as fully as possible within the scope of the direction (USDA and USDI, 2000). Alternative S3 also promotes economic participation by the local workforce by prioritizing activities near communities that are economically specialized in outputs from FS- and BLM-administered lands, and near tribal communities (USDA and USDI, 2000). See Haynes et al. (2001) for a general description of the ICBEMP project and the management alternatives.

To set the context for the analysis, we begin with a brief overview of the current social and economic conditions in the ICBEMP area (hereafter called the Basin). We then examine economic effects in terms of estimated economic activity and jobs in the Basin and

the effects of these activities on the counties that are likely to be the most impacted. Next, the effects of the alternatives on selected social issues are evaluated. These issues include concerns about isolated and federal resource-reliant communities, tribal concerns, smoke and fire, and environmental justice. This is followed by an evaluation of the alternatives in terms of their effects on counties in which socioeconomic resiliency is currently low. We conclude with a summary of the major results and a discussion of the importance of both spatial and temporal scales in interpreting these results.

## 2. Current social and economic conditions

The past two centuries have seen dramatic changes in the way in which human uses have altered landscapes in the Basin. During that time, human uses and levels of activity have evolved from relatively low populations of indigenous hunter gatherer societies through European and Asian settlement patterns to a set of contemporary urban and rural communities with a population of slightly over 3 million people. Relative to other parts of the United States, the Basin is still lightly settled (11 people per square mile, compared with 76 for the nation) and much (53%) remains in public ownership. It is an area with high overall scenic quality and remains largely rural with a diverse array of communities with strong place attachments (McCool et al., 1997).<sup>1</sup>

The Basin as a whole is enjoying robust economic growth. Following the national trend, much of the increase in employment is taking place in the services sector (McCool et al., 1997). Also following the national trend, the share of personal income from transfer payments and property income is increasing (McGinnis, 1996). Per capita income is growing faster than the US rate in Idaho, Oregon, and Washington (but not Montana). Poverty rates are lower than the US average. Unemployment rates in Idaho and Montana are lower than the US average. Earnings per job are increasing faster than the US average in each of the Basin states except Idaho

(Haynes and Home, 1997). Except for Montana, the difference in per capita income between metropolitan and non-metropolitan counties is less than the average for the United States. Employment growth in the Basin has averaged 2% per year for the past two decades, while population growth is taking place in nearly all counties. However, population growth due to net in-migration has slowed dramatically since 1995, with only about half the Basin counties showing net in-migration in the last few years (see Troy, 1999).

There has been a growing concern about the social and economic conditions of communities and the role that government and non-government organizations play as agents of change in rural communities. The disparity in economic growth during the 1990s between urban and rural areas has raised calls to use economic development to strengthen rural communities and improve social (that also includes economic) well being. These concerns are present in the Basin where farming remains important as a source of jobs. Recent economic development activity has focused on transforming low skill, low wage manufacturing toward more high tech and flexible types of manufacturing. This effort builds on the trend of decoupling rural economies from traditional resource extraction and associated manufacturing activities (Galston and Baehler, 1995).

Understanding this analysis requires clear definitions of the terms used. Briefly, a human community consists of cultural, social, economic, and institutional components that are melded together in a more or less cohesive and compatible way to provide for a level of predictability and stability for the community's citizens to help them organize their lives. Definition problems lie in both words: stability and community. The word stability connotes status quo, but without economic growth (or change) people living in such communities would face diminishing economic well being. Similarly, the places where or people with whom you live, work, recreate or take an interest in can all be thought of as communities. In this analysis, we use the more traditional definition of community as a spatially defined place such as a town (see McCool et al., 1997 for a discussion of alternative definitions of community).

Community well being also has a variety of definitions. These definitions include conditions such as

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<sup>1</sup> Place attachment or "sense" of place value includes the meanings and images that regions, areas or specific locations on the landscape have for people (McCool et al., 1997).

access to economic opportunity, absence of crime, uncial infrastructure, environmental quality, physical infrastructure, political processes, and social services. We adopted the definition that social well being is defined by economic well being, community propensity for "leadership", extent of infrastructure, and amenities.

Another evolving concept is the notion of economic and social resiliency. Resiliency, in this sense, is defined as adaptability to change. Social or economic systems with high resiliency would be those capable of absorbing external shocks, such as a recession, and rebounding as demonstrated in terms of system indicators, such as total employment and per capita income. Resiliency is influenced by more than just the economic structure of a community. It also depends on community leadership; activities like planning for the future, the presence and management of amenities that might attract and keep people in the area; and physical infrastructure (roads, sewers, and water).

Reyna (1998) summarized much of the available community data using it to describe the economic and social conditions of communities in the Basin. These data suggest that communities are more complex than labels such as "timber dependent" would imply. Most communities have mixed economic structures and their vitality is often linked to factors other than commodity production. For the most part, communities associated with agriculture are less resilient. Forest-dependent communities, especially those with manufacturing facilities, are relatively more resilient given their experience in dealing with cyclical economic changes.

Home and Haynes (1999) developed a process for measuring socioeconomic resiliency, defined as the ability of human institutions to adopt to change. The ratings of socioeconomic resiliency for the Basin counties were a composite of three factors: economic diversity, population density, and lifestyle diversity (see Home and Haynes, 1999 for details). This rating system was used below in our evaluation of effects on areas with low socioeconomic resiliency. Most of the people in the Basin (82%) live in counties with that have medium to high socioeconomic resiliency ratings. However, most of the land area in the Basin (68%) is in counties with low socioeconomic resiliency ratings.

### 3. Economic evaluation of changes in federal land management

This evaluation is composed of two parts, an evaluation of estimated economic activity and jobs at the Basin level and an evaluation of the effects of these activities on the counties they are most likely to impact.

#### 3.1. Economic activity

Table 1 shows the estimated activity levels for that set of outputs that can be influenced by federal land management actions. These include timber harvest, grazing, forest and range management and restoration activities, and fire management activities. These activity levels were derived from the outputs of landscape models that related changes in landscape conditions to changes in various input assumptions (see Hemstrom et al., 2000 for details). Activity levels for recreation were not calculated because the projected distribution of types of recreational settings did not vary across alternatives. Activity levels for timber harvest and restoration implicitly assume that smaller diameter timber can be sold and that sufficient revenue can be generated to cover the costs of these management activities.<sup>2</sup> The recent (since 1996) difficulties the FS and BLM have had selling timber are likely to continue to impact agency revenues tied to timber harvest.

Table 2 presents the direct employment associated with changes within the part of Basin affected by the management decision. Job estimates are only calculated for the first decade of implementation (1999-2008) because we have greater confidence in these projections than for longer time spans. Job estimates for recreation were not estimated because activity levels were not projected to vary by alternative. Wood products industry jobs were calculated by multiplying the estimates of timber harvest in million board feet at the end of the first decade by a direct employment multiplier of 7.75 jobs per million board feet. We derived this multiplier by dividing current

<sup>2</sup>The rapid stumpage price increases prices in eastern Oregon and Washington where prices rose from \$88 per thousand board feet in 1986 to a high of \$277 in 1993 as National Forest sale levels dropped are not expected to continue. For the next few years, prices are expected to increase by 1-2% per year (in real terms) (Haynes et al., 1995).

Table 1  
Annual average activity levels<sup>a,b</sup> for the ICBEMP management region

	Current	First decade			100-Year period		
		Alternative S1	Alternative S2	Alternative S3	Alternative S1	Alternative S2	Alternative S3
<i>Timber harvest (million board feet)</i>							
Total FS/BLM	819	814	986	981	521	546	505
Other federal	59	59	59	59	53	53	53
Nonfederal	2482	2482	2482	2482	2228	2228	2228
Total Basin	3360	3355	3527	3522	2802	2827	2786
<i>Forest/woodland planting and precommercial thinning (acres)</i>							
Total FS/BLM	142675	141726	198664	192186	105005	125129	115348
Other federal	11095	11096	11096	11096	10825	10825	10825
Nonfederal	529975	530077	530077	530077	471674	471674	471674
Total Basin	683745	682900	739838	733359	587505	607628	597847
<i>Prescribed fire (acres)</i>							
Total FS/BLM	177862	181112	1456421	1110002	158303	1454381	1075095
Other federal	1104	1111	1111	1111	633	633	633
Nonfederal	18103	18218	18218	18218	13271	13271	13271
Total Basin	197069	200442	1475750	1129331	172207	1468284	1088998
<i>Range livestock allotment maintenance/restoration (acres)</i>							
Total FS/BLM	3089715	3083378	3348622	3192691	3091024	3341214	3186525
Other federal	100335	100335	100335	100335	99621	99621	99621
Nonfederal	1510083	1510083	1510083	1510083	1517971	1517971	1517971
Total Basin	4700133	4693796	4959040	4803109	4708616	4958805	4804116
<i>Authorized AUMs<sup>c</sup></i>							
Total FS/BLM	3131406	3128803	2814418	2781411	2634316	2813421	2780578
Other federal	1509632	1509632	1509632	1509632	1293237	1293237	1293237
Nonfederal	41131694	41131694	41131694	41131694	39138078	39138078	39138078
Total Basin	45772731	45770129	45455744	45422737	43065630	43244735	43211893

<sup>a</sup> Numbers limited to ICBEMP decision space.

<sup>b</sup> Numbers may not total exactly due to rounding.

<sup>c</sup> AUMs: No. of animal unit months.

Table 2  
Employment due to activities on federal lands in the ICBEMP management region

	Current	First decade		
		Alternative S1	Alternative S2	Alternative S3
<i>Number of jobs<sup>a</sup></i>				
Wood products industry <sup>b</sup>	6345	6308	7644	7601
Forestry and range services <sup>c</sup>	293	291	415	402
Prescribed fire treatment <sup>d</sup>	356	362	2913	2220
Range <sup>e</sup>	1127	1126	1013	1001
Total	8120	8087	11985	11224

<sup>a</sup> Numbers limited to ICBEMP decision space.

<sup>b</sup> Computed assuming 7.75 jobs per million board feet harvested.

<sup>c</sup> For forestry service, we assumed one job per 500 acres treated and for range services, we assumed one job per \$43,125 of expenditures.

<sup>d</sup> Computed as one job per 500 acres treated.

<sup>e</sup> Computed assuming 0.00036 jobs per AUM.

employment in the wood products industry by current timber harvest. Range jobs were calculated by multiplying the number of animal unit months (AUMs) by the number of jobs per AUM. The figure for jobs per AUM was developed from the US FS multiplier for range jobs (in Washington and Oregon) modified for the seasonal variation in federal forage (see Haynes et al., 1997). For jobs associated with forestry services and prescribed fire treatments, we assumed one job would be created for every 500 acres treated. This was based on an average cost for thinning and fuel treatment on federal lands in Washington and Oregon of \$86 per acre in fiscal year 1999, and the assumption that labor costs average 80% of the total costs and that fringe benefits cost employers 15% per employee. Finally, for range services jobs, we assumed one job would be created for every \$43,125 of expenditures.

The alternatives have little effect on the estimated total number of jobs supported by resources from BLM- and FS-administered lands. In 1990, there were an estimated 1.5 million jobs in the Basin, and they were expected to increase by 110,000 during the 1990s (Haynes and Home, 1997). Of this, FS and BLM administered lands were estimated to support roughly 95,000 jobs, 81% of which were estimated to be direct-effect recreation jobs (this includes a small amount of other federal land, see Crone and Haynes, 1999), 9% were estimated to be in timber, and 2% were estimated to be in range. The remaining 8% were in various forestry services. The number of estimated jobs associated with alternatives S2 and S3 are within 1 % of the number expected under the continuation of current plans (alternative S1). The main effect of alternatives S2 and S3 is to increase the number of jobs in the next decade by roughly 5% in the wood products and forestry services sectors, while slightly reducing the number of range jobs. The differences between alternatives S2 and S3 reflect a deliberate attempt in S3 to focus restoration and fuel management activities in areas of greater socioeconomic need as defined by the presence of less diverse isolated communities and greater reliance on federal lands.

The job numbers for forestry services need to be interpreted carefully. First, while the job estimates are for full-time equivalent jobs, many of these are by their nature seasonal jobs. The implication is that they impact more people than the job numbers indicate because the income associated with them is shared

across multiple individuals. However, the impact on any one person will be smaller. Second, the focus on employment does not recognize potential differences in income between different types of jobs. Finally, the approach taken here is often criticized as being static because it assumes no change in the economy other than that affected by the EIS alternatives. Critics contend that economies are dynamic and interactions at regional, national, and international scales may overwhelm or offset any impact of FS and BLM decisions. Since we have no way of knowing how the economic structure of the Basin will change due to outside forces, the impacts presented here represent our best estimates given the current structure of the economy.

### 3.2. Counties of concern

We used simple rule sets to identify counties that may be the most affected by changes in FSBLM harvest and grazing levels. To identify wood products counties of concern, we included counties that had at least 10% of their employment in Standard Industrial Code (SIC) 24 in 1995 and/or contained two or more communities with medium to very high wood products specialization ratings as defined in Reyna (1998). To identify range counties of concern, we used the range reliance calculation from Home and Haynes (1999) and included counties in which 12% or more of agricultural sales in the county were derived from cattle or sheep produced from federal forage. The wood products and range counties of concern are shown in Tables 3 and 4, respectively.

To examine the effects of estimated harvest and AUM levels (by alternative) on the counties of concern, harvest volumes and AUMs were allocated from management units to counties according to acreage percentages. Tables 3 and 4 show the rankings of the alternatives for each of the wood products and range counties of concern, for both the first and 10th decade. These rankings are based on the estimated harvest and AUM levels for each county. For example, the rankings for Adams, ID in the first row of table mean that alternative S2 has the largest estimated harvest for Adams county in both the first decade and the 10th decade. Similarly, the first row of Table 4 illustrates that Adams, ID is estimated to have the largest amount of FSBLM forage under alternative

Table 3

Wood products counties of concern within the ICBEMP management region. The counties are ranked relatively from 1 to 3, with 3 being the highest level of concern

County	State	100-Year period					
		First decade			100-Year period		
		Alternative S1	Alternative S2	Alternative S3	Alternative S1	Alternative S2	Alternative S3
Adams	ID	1	3	2	2	3	1
Benewah	ID	2	1	3	3	1	2
Bonner	ID	2	1	3	3	2	1
Boundary	ID	2	1	3	3	2	1
Clearwater	ID	2	1	3	3	1	2
Gem	ID	1	2	3	1	3	2
Idaho	ID	1	2	3	2	3	1
Kootenai	ID	2	1	3	3	2	1
Lewis	ID	1	2	3	1	2	3
Madison	ID	1	3	2	1	3	2
Payette	ID	1	2	3	1	3	2
Shoshone	ID	2	1	3	3	2	1
Teton	ID	1	3	2	1	3	2
Twin Falls	ID	2	1	3	3	2	1
Granite	MT	1	2	3	2	3	1
Lincoln	MT	1	3	2	3	2	1
Mineral	MT	1	3	2	2	3	1
Sanders	MT	1	3	2	3	2	1
Crook	OR	1	3	2	1	3	2
Grant	OR	1	3	2	3	2	1
Harney	OR	1	3	2	3	2	1
Jefferson	OR	1	3	2	2	3	1
Klamath	OR	1	3	2	2	3	1
Lake	OR	1	3	2	1	3	2
Union	OR	1	3	2	1	3	2
Wallowa	OR	1	3	2	1	3	2
Wheeler	OR	1	3	2	1	3	2
Ferry	WA	2	1	3	3	1	2
Kittitas	WA	1	2	3	1	3	2
Okanogan	WA	1	2	3	1	3	2
Pend Orielle	WA	2	1	3	3	1	2
Stevens	WA	2	1	3	3	1	2
Yakima	WA	1	2	3	1	3	2
Total ranking score		43	71	84	67	79	52

S1 in the first decade and under alternative S2 in the 10th decade.

Summing the rankings for the wood products counties of concern as a group, alternative S3 is estimated to be preferred in the short run (first decade), followed by alternatives S2 and S1 in that order. In the 10th decade, alternative S2 is estimated to be the best, followed by alternatives S1 and S3 in that order. For the range counties of concern as a group, alternative S1 is preferred, with alternative S2 slightly better than

alternative S3 in the first decade. In the 10th decade, alternative S2 has the highest total ranking, followed by alternatives S3 and S1, respectively.

#### 4. Social evaluation

Our social evaluation of the alternatives focuses on several issues including the effects of the alternatives on communities in the Basin, the effects of the

Table 4

Range counties of concern within the ICBEMP management region. The counties are ranked relatively from 1 to 3, with 3 being the highest level of concern

County	State	First decade			100-Year period		
		Alternative S1	Alternative S2	Alternative S3	Alternative S1	Alternative S2	Alternative S3
Adams	ID	3	2	1	2	3	1
Camas	ID	3	1	2	1	2	3
Custer	ID	3	1	2	3	1	2
Lemhi	ID	3	1	2	1	2	3
Owyhee	ID	3	1	2	1	2	3
Valley	ID	3	2	1	2	3	1
Grant	OR	3	2	1	3	2	1
Harney	OR	3	2	1	1	3	2
Lake	OR	3	1	2	1	2	3
Wallowa	OR	3	2	1	1	3	2
Ferry	WA	3	2	1	2	3	1
Total ranking score		33	17	16	18	26	22

alternatives on the tribes, concerns about smoke management and environmental justice issues.

#### 4.1. Community effects

There has been much public interest in trying to better understand the effects of the alternatives on the economic and social conditions of communities in the Basin. Reyna (1998) suggests that small communities that are isolated from larger communities and that have a high degree of specialization in industries that use federal land resources could be more impacted by policy changes. Table 5 lists counties that contain two or more isolated communities that have medium to very high wood products specialization and for which at least 33% of the land in a 20 mile radius circle of the community is FSBLM managed land.<sup>3</sup> Table 5 also lists counties that contain two or more isolated communities that have medium to very high agricultural specialization ratings and that meet the 33% FSBLM managed land criteria just discussed. To evaluate the alternatives, we use the same ranking and evaluation procedure as that used for the counties of concern above. As shown in Table 5, in the first decade, alternative S1 provides the greatest benefit to those counties with isolated and specialized agricultural communities, while for the counties with isolated

and specialized wood products communities alternative S3 provides greater benefits.

#### 4.2. Effects of the alternatives on tribes

The 22 federally recognized tribes within the Basin and numerous off-reservation traditional Indian communities have a number of issues related to federal land management.<sup>4</sup> Among these issues, concerns about tribal communities, tribal timber values and tribal employment relate to levels of activities on federal lands. Each of the alternatives recognizes the importance of developing processes for collaborative efforts with the tribes.

##### 4.2.1. Tribal communities

The issue of tribal communities has emerged as part of the general increased concern about social and economic conditions of communities. Reyna (1998) identified 65 communities associated with American Indian reservations. These were selected primarily because of their proximity to reservations. These communities vary greatly in their relation to and reliance on federal lands. We used those tribal communities that had medium to very high specialization ratings in agriculture and wood products to

<sup>3</sup> See Reyna (1998) for details on how the specialization ratings were determined and for the definition of community isolation.

<sup>4</sup> See the draft paper "Evaluation of ICBEMP SDEIS alternatives on tribal rights and interests" by Richard Hanes. Interior Columbia River Basin Ecosystem Management Project, Boise, ID.

Table 5

Isolated wood products and agricultural community counties within the ICBEMP management region. The counties are ranked relatively from 1 to 3, with 3 being the highest level of concern

County	State	First decade			100-Year period		
		Alternative S1	Alternative S2	Alternative S3	Alternative S1	Alternative S2	Alternative S3
<i>Wood products</i>							
Idaho	ID	1	2	3	2	3	1
Lincoln	MT	1	3	2	3	2	1
Grant	OR	1	3	2	3	2	1
Wallowa	OR	1	3	2	1	3	2
Okanogan	WA	1	2	3	1	3	2
Pend Orielle	WA	2	1	3	3	1	2
Total ranking		7	14	15	13	14	9
<i>Agricultural</i>							
Idaho	ID	3	2	1	2	3	1
Lemhi	ID	3	1	2	1	2	3
Valley	ID	3	2	1	2	3	1
Grant	OR	3	2	1	3	2	1
Total ranking		12	7	5	8	10	6

identify counties of concern and to evaluate the alternatives. We used the same ranking procedure as above, and again found that in the first decade, alternative S 1 provides the greatest benefit to those counties with specialized agricultural communities, while for the counties with wood products specialized communities alternative S3 provides greater benefits. The rankings again shifted by the 10th decade.

#### 4.2.2. Tribal timber values

Since some tribes are significant forest landowners, changes in timber prices directly translate to changes in timber reserves and measures of wealth derived from timberlands. In this case, alternatives S2 and S3 have a negative impact on private timber values. In eastern Oregon and Washington, each increase of 100 million board feet of federal harvest reduces stumpage prices 25% for private landowners.<sup>5</sup>

#### 4.2.3. Tribal employment

While difficult to be specific, both alternatives S2 and S3 with their emphasis on restoration offer employment opportunities to tribal members and other

disadvantaged groups. Alternative S3 with its greater focus on economically vulnerable communities has unique advantages in this regard.

#### 4.3. Smoke/fire

In recent interactions with the public, concerns have been raised about the negative impacts associated with smoke from forest fires. Smoke management is an important issue because of the potential increased use of prescribed fire in some of the alternatives. At the broad scale, there is little difference in public perceptions between smoke from a natural fire and smoke from a prescribed fire. At the fine- and mid-scale, the use of prescribed fire is often opposed because of local concerns about human health issues and visibility impacts. Regulatory issues further complicate these concerns. In order to garner public acceptance for greater use of prescribed fire (as in alternatives S2 and S3), efforts will need to be made to manage smoke so that it does not result in public controversy.

#### 4.4. Environmental justice

In the 1990s, concerns about environmental protection and social justice have merged into a broader concern termed environmental justice. This concern

<sup>5</sup> This assumes the estimated derived demand function of  $q = 580 - 0.607p$ , where  $q$  is in million of cubic feet and  $p$  the real stumpage (cut) price for eastern Oregon and Washington.

was formalized in an Executive Order (E.O. 12898) that requires federal agencies to analyze the environmental effects (including human health, economic, and social effects) of their proposed actions on minority and low-income communities. The analysis should identify instances where the effects on these communities may be disproportionately high and adverse. Environmental justice as it relates to land management issues is a melding of concerns for environmental protection, democracy, and social justice. Social justice issues include fair procedures to allocate natural resources, fair distribution of the benefits and costs of resource management, and equal access to public resources (Salazar, 1996).

To evaluate the alternatives in terms of environmental justice as it relates to low-income populations, we use the wood products and range counties of concern listed above as the counties that may be the most impacted by FSBLM land management activities. We then examine this set of counties in terms of three economic variables: average unemployment rate (1970-1997), average per capita income index (1970-1997), and estimated Basin poverty ranking (1995) (the county with the lowest ranking (1) has the highest poverty rate). Counties from the lists of counties of concern with an average unemployment rate of 10% or more, an average per capita income index of 0.85 or less, and a Basin poverty ranking of 20 or less are shown in Table 6. Seven of these counties are on the wood products counties of concern list, one of which

(Ferry County, WA) is also on the range counties of concern list. In the short term (first decade), alternative S3 has a higher ranking for the low-income environmental justice wood products counties of concern as a group, followed by alternative S2 and alternative S1 in that order. In the long term (10th decade), alternative S1 is ranked slightly higher than alternative S2 and alternative S3 is the worst for this group of counties. For Ferry County, WA the range outcomes are the same as for the range counties of concern as a whole.

An additional environmental justice issue is the impact road closures may have on access to areas used by low-income populations to meet subsistence needs. Activities such as hunting, fishing, berry and mushroom picking, and woodcutting could be affected. Fuel wood used to heat homes in the winter is critical to people of limited means, and the consequences of road closures may have a disproportionate effect on people that depend on firewood. Road densities are predicted to be lower in alternative S2 than alternative S3 with the highest road densities associated with alternative S1. Thus, road closures are likely to be highest in alternative S2, followed by alternatives S3 and S1.

Examining environmental justice from an ethnic minority standpoint as it relates to the SDEIS is more difficult because we need to know both where such minorities live and how they use the land. Hanes and Hansis (1995) provide a good overview of these items for the various American-Indian nations and other

Table 6

Low-income environmental justice counties of concern within the ICBEMP management region. The counties are ranked relatively from 1 to 3, with 3 being the highest level of concern

County	State	First decade			100-Year period		
		Alternative S1	Alternative S2	Alternative S3	Alternative S1	Alternative S2	Alternative S3
<i>Timber</i>							
Shoshone	ID	2	1	3	3	2	1
Mineral	MT	1	3	2	2	3	1
Sanders	MT	1	3	2	3	2	1
Ferry	WA	2	1	3	3	1	2
Okanogan	WA	1	2	3	1	3	2
Pend Orielle	WA	2	1	3	3	1	2
Yakima	WA	1	2	3	1	3	2
Total timber		10	13	19	16	15	11
<i>Range</i>							
Ferry	WA	3	2	1	2	3	1

ethnic minorities in the Basin. Our minority environmental justice findings include the following:

1. Given the broad-scale design of the alternatives, we cannot determine effects on the specific populations of plants and animals species or geographical sites that are of economic, cultural or spiritual significance to the American-Indian populations or other ethnic minorities.
2. The large number of Hispanics who are employed in forestry related activities will be better off with alternative S2 since this alternative has the highest amount of restoration activity. However, in areas where local employment is emphasized, Hispanic workers from outside the Basin may be displaced.
3. Southeast Asians and Hispanics who harvest special forest products may be better off under alternative S1 than alternatives S2 and S3. As in the case of low-income subsistence forest users, this ranking arises because lower road densities will in some cases mean road closures that will probably make it harder to access at least some special forest product harvesting sites. Because these ethnic groups make up a large proportion of the special forest products industry, the higher road closures associated with alternatives S2 and S3 could have a disproportionate impact on these minorities.

## 5. Socioeconomic resiliency

There is a broad concern about the effects of changes in federal land management in areas of low socioeconomic resiliency. To evaluate the alternatives, we first identified the counties with low socioeconomic resiliency that might be affected by the SDEIS alternatives. Included were the counties from the wood products and range counties of concern lists, which had low socioeconomic resiliency ratings as defined and measured by Home and Haynes (1999). We also included the recreation counties in the Basin as identified by Johnson and Beale (1995) that had low socioeconomic resiliency ratings. The list of counties is shown in Table 7.

We examined the predicted direction of change (in the first decade) in federal timber outputs for the timber counties of concern and the predicted direction

of change (in the first decade) in federal grazing levels for the range counties of concern. We assumed that the level of recreation activity was the same across all alternatives and had a positive economic effect in the recreation counties. In some cases, a county was both a wood products county of concern and a range county of concern, or a range county of concern and a recreation county, etc. In these cases, the predicted direction of change for each output was considered for the county. For example, in a county, which was both a wood products and range county of concern, if federal timber outputs were predicted to decline but federal grazing AUMs were predicted to increase, we rated the alternative as having a neutral effect in that county and assigned it as 0. The various ratings are summarized in Table 7.

We next developed an ordinal measure to examine the relative differences between the alternatives. To do this, we first multiplied each county's proportion of the 28 county total population by the direction of change (-1, 0 or 1) for that county for each alternative. We then summed these numbers across all of the listed counties for each alternative to develop an aggregate measure for each alternative. If we assign a zero value to alternative S 1, the relative values for alternatives S2 and S3 are 67 and 106, respectively. That is, in the first decade, alternative S3 is predicted to provide the most benefit to these low socioeconomic resiliency counties, while S2 is predicted to provide less benefit and alternative S1, before the rescaling to 0 is actually predicted to result in negative overall impacts to this group of counties. Six counties<sup>6</sup> may experience negative impacts under alternatives S2, while only one county, Owyhee is predicted to experience negative impacts under alternative S3. The population of the six counties constitutes 1.9% of the Basin's population. Caution needs to be applied when considering how these mid-scale (counties and groups of counties) impacts are extrapolated downward to finer scale sets of communities within counties. The diversity of communities within a county should be considered in the design of mitigation strategies. In this sense, alternative S3 has an advantage over the first two alternatives in that it prioritizes restoration activities near selected communities.

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<sup>6</sup>Boundary, Clearwater, Owyhee, and Shoshone, ID; and Ferry and Pend Oreille, WA.

Table 7  
Effects on low socioeconomic resiliency counties of concern, by alternative

County	State	First decade <sup>a</sup> Alternative S1	Alternative S2	Alternative S3
Adams	ID	-	0	0
Benewah	ID	0	0	+
Blaine	ID	+	+	+
Boundary	ID	-	-	+
Camas	ID	+	0	0
Clearwater	ID	-	-	+
Custer	ID	+	0	0
Fremont	ID	+	+	+
Idaho	ID	-	+	+
Lemhi	ID	0	0	0
Lewis	ID	0	+	+
Owyhee	ID	+	-	-
Shoshone	ID	-	-	+
Teton	ID	0	0	0
Valley	ID	0	0	0
Granite	MT	-	+	+
Lincoln	MT	-	+	+
Mineral	MT	-	+	+
Sanders	MT	-	+	+
Crook	OR	-	+	+
Grant	OR	-	0	0
Harney	OR	0	0	0
Lake	OR	-	0	0
Wallowa	OR	-	0	0
Wheeler	OR	-	+	+
Ferry	WA	-	-	0
Okanogan	WA	0	+	+
Pend Oreille	WA	-	-	+

a (+) increase, (-) decrease, and (0) no change.

## 6. Summary

In terms of socioeconomic conditions, changes in federal land management would affect a small proportion of the human population in the Basin. None of the alternatives affect more than 0.1% of the total jobs in the Basin. Given these numbers, it is difficult to argue that FS and BLM decisions broadly affect economic development in the Basin. Rather the effects are more limited and local in nature. For most people in the Basin, expansion in other economic sectors means that the impact of FS and BLM decisions on their employment and income will be negligible.

Twenty-eight counties and the communities in those counties might experience measurable effects from the federal land management activities proposed in the

alternatives. We often found that while alternative S2 produced greater outputs, higher socioeconomic benefits were associated with alternative S3. In the case of range-reliant communities and counties, alternative S1 was often ranked higher. Low-income timber and range counties of concern were predicted to be better off under alternative S3 in the first decade but ranching counties were predicted to be better off under alternative S1 in the longer term. Six counties (1.9% of the Basin's population) with low socioeconomic resiliency may be negatively impacted by the actions of the federal agencies. These are counties where transition strategies might be first applied.

In terms of minority communities and issues, the SDEIS focuses primarily on American-Indians who account for about a fourth of the minorities in the

Basin. This raises questions about the treatment of other minority communities and issues within the Basin. Concerns about environmental justice might conflict with policies that support road closures and modify access for subsistence use. They also raise concerns about the design of jobs programs targeted towards selected communities to the exclusion of others.

The assessment of socioeconomic resiliency assumes that the counties and economies within the Basin will continue (in the next decade) to experience the economic and demographic patterns of the recent past. The future, however, may hold surprises that will result in different outcomes than assumed here. We know, for example, that the Basin has experienced periods of both in-migration and out-migration. In the 1980s, for example, the Basin experienced net outmigration as the United States coped with periods of severe recession, structural changes in the economy that diminished the role of resource-based (including agriculture) sectors, and booms in other economic sectors and regions. Despite these risks, history has shown that humans are highly adaptive creatures in the Basin's ecosystems. Faced with risks, they will continue to adapt and demand ecosystem goods and services from FS- and BLM-administered lands in the Basin.

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