

Figure 42—The economic diversity of each county was used to develop economic resiliency ratings.

with change. Communities that have experienced what may seem to be fatal blows, such as the closing of mines in Wallace, Idaho, have continued to carry on based on a reorientation to new economic activities. Adversity, although painful and not without casualties, often provides incentive for social interaction and cooperation, catalyzing organization and forward-directed actions.

It appears that a large majority of the communities in the Basin are well-positioned to adapt to the changes. In the Basin, education and skill levels are above United States averages and continue to improve with population growth. Although exceptions exist, the smaller communities in the arid, agricultural portions of the Basin face the greatest challenges. Their lower resiliency is associated with fewer physical amenities and fewer business opportunities, since consolidations and technological advances within agriculture have constrained new entries into this sector. The high-quality environments in the Basin, particularly those areas with water and forests, appear to be positive contributors to social resiliency. These settings attract new migrants, provide a diverse set of business options, and offer abundant recreation opportunities for an increasingly mobile and wealthy society.

### **Risks to Social and Economic Resiliency**

These assessments of social and economic resiliency do not mean that human systems in the Basin face no risks. Structural changes in the U.S. economy (for example, the growth in the trade and service sectors) and technological changes, like telecommunications, will continue to affect economic and social well-being. These changes have allowed people greater choice about where and how to live. In the Basin, this freedom has manifested itself in the argument that quality of life is driving social and economic changes. Many of the notions behind social resiliency are based on the experience of the past five years which has been a period of rapid economic growth fueled in part by extensive immigration. From the standpoint of assessing risk, we caution that the Basin has experi-

enced periods of both in-migration and out-migration. In the 1980s, for example, the Basin experienced net out-migration as the United States coped with periods of severe recession, structural changes in the economy that diminished the role of resource-based (including agriculture) economies, and booms in selected economic sectors and regions. Finally, there is the offsetting factor that humans are the most adaptable creatures in the Basin's ecosystems and that in spite of the change they will adapt and continue to demand ecosystem goods and services.

### **Social and Economic Clusters**

Like the forest and range clusters, groupings of counties can be developed based on physical and demographic attributes. The Johnson and Beale (1995) typology is one of several typologies that sort the 3,041 counties in the United States into different clusters (by economic activity, policy focus, or other). The Johnson and Beale typology was originally an attempt to identify the fastest growing counties in the United States. In general, they found that there were three patterns of growth. The first was a pattern of very high growth owing to high migration rates in counties that seem to contain significant recreation opportunities. These recreation counties are those that possess a combination of amenities and services that attract new migrants, many of whom are retirees or footloose entrepreneurs who seek environments and lifestyles that are cleaner and less stressful than those found in typical urban centers. The second were those counties that contained significant urban populations. The remaining counties experienced slower rates of growth. Figure 24 is a map of these three types of counties (there are 21 recreation, 6 metropolitan, and 77 others counties in the Basin). One implication from that map is that the social and economic systems in the Basin are affected by the ecosystems in which they are embedded. These same ecosystems are contributing to changes in human population densities. For example, the Basin is generally experiencing a period of population

growth-96 percent of the Basin's counties increased in population for the period 1990 to 1994, reversing the trend of the 1980s. Recent population growth has been concentrated, however, in those counties that Johnson and Beale classified as either "urban" (metro) or "recreation."

## Developing a Measure of Socioeconomic Resiliency

After measuring social and economic resiliency separately, the next step was to devise a measure of social and economic resiliency that can be used to assess the broad goal for ecosystem management. This composite rating combines three factors discussed as part of social and economic resiliency: population density (expressed as people per square mile), economic resiliency (defined by economic diversity), and lifestyle diversity. We assigned the socioeconomic resiliency ratings (fig. 43) based on the sum of the total ratings for each of the three factors where each was weighted equally.

A low socioeconomic resiliency rating is defined as counties with low population density (<11 people/sq. mile, 4.3 people/sq. km), low or medium economic resiliency, and low or medium lifestyle diversity. In the Basin, there are 54 such counties. These counties account for 68 percent of the area but only 18 percent of the population. As shown in figure 43 many of the counties traditionally thought of as agricultural are in this category. There are 14 counties that have medium economic resiliency, but most of them are among the least densely populated counties in the Basin (<6 people/sq. mile, 2.3 people/sq. km) and most contain National Forests.

A medium socioeconomic resiliency rating is defined as counties with mostly medium economic resiliency ratings and generally either medium or high lifestyle diversity or population density ratings. In the Basin, there are 20 such counties. Exceptions include Klickitat County, which has low economic resiliency and high lifestyle diversity; and Cassia County, which has low population density but medium economic and lifestyle diversity. Baker County has the lowest population density ratings, but a medium

level of economic resiliency reflecting a diverse economy, and the highest level of lifestyle diversity reflecting great adaptability of its social systems.

A high socioeconomic resiliency rating is defined as counties that are more densely populated (> 11 people/sq. mile) and have the highest economic resiliency. There are 26 such counties in the Basin. Counties with high socioeconomic resiliency typically have high population densities, medium economic resiliency, and medium to high lifestyle diversity values. The exceptions to these are Klamath County, which has low population density but high economic resiliency and high lifestyle diversity and Silver Bow County, which has low economic resiliency, but high population density and high lifestyle diversity. High lifestyle diversities in these two counties suggest that there are higher infrastructure values than the population densities would suggest.

This approach recognizes the 44 (of 100) counties with very low (< 6 people/sq. mile) population densities, sometimes called "frontier counties." Typically these counties have low socioeconomic resiliency, and include many of the 60 Basin counties labeled "Federal" in the sense that more than 33 percent of their area is in Federal ownership. The interest in identifying these so-called frontier counties is a concern that they may lack sufficient population to sustain existing services or to develop necessary social services. A related concern is whether they are able to maintain the existing infrastructure both in the physical sense and in the social sense especially in the sense of community. For example, there are counties that are too sparsely populated to sustain a medical clinic. This relative isolation also stimulates some people to locate in these areas. Some people choose these counties specifically because they are sparsely settled.

We caution against concluding that low to high ratings are equivalent to bad or good ratings; the intent is to describe the adaptability or vulnerability of these counties, not to rate them as good or bad. Generally, most of the people in the Basin (82%) live in counties that are medium or high in the degree of adaptability, as measured by the socioeconomic resiliency. Most of the land area (68%) in the Basin, however, is in the low category for socioeconomic resiliency.

Figure 43—Socioeconomic resiliency ratings are the sum of ratings for economic resiliency, population density, and lifestyle diversity.

## Risks Associated with the People-Wildland Interaction

Risks to ecological integrity are affected in two ways (*Component Assessment*—Introduction, Quigley and others 1996a). First, risks to ecological integrity can be affected if the demands of people (for both commodities and services) outstrip the capability of an ecosystem or if land-use decisions limit the capability of an ecosystem. Second, the risks can be affected to the extent biophysical systems affect people, their assets, and elements they value especially at the people-wildland interface. We assumed that risk to ecological integrity is generally higher in proximity to densely populated areas, and risk to people and their assets is generally higher in close proximity to wildland areas than to agricultural or urban areas. Natural events occurring within wildland areas might prove risky to people, homes, and other assets people value that are associated with wildland areas. The integrity of ecosystems is also influenced by the presence of people and their activities.

Floods, fire, road slumping, culvert plugging, cougars frequenting backyards, deer and elk eating ornamental shrubs, and coyotes bothering pets are all examples of increasing risks to people and their assets associated with their proximity to wildland areas. Generally the more wild the area the higher the risk; more humans living in close proximity to wildland areas the greater the risk. We assumed a symmetric relationship exists concerning the risks to the integrity of wildland areas from human influence and the risks faced by humans in proximity to wildland areas. Road building, fishing, camping, hiking, wood cutting, berry picking, and development of recreation sites are all examples of activities that tend to increase in wildland areas in close proximity to population centers, with larger population centers having higher activity levels. These activities tend to create risk to ecological integrity. Recreation tends more toward developed site recreation while still supporting increased dispersed recreation.



Photo by T. Iraci

Photo 10—The separation of towns and cities from the forest land and rangeland is becoming less as this central Oregon community scene demonstrates.

Societal risk to ecological integrity and risk to people and their assets from wildlands were estimated using a set of rules that related population density to forest, non-forest, and agricultural wildland vegetation groups. Higher-population densities in proximity to forest and rangeland vegetation types were rated as having higher risk than low-population density areas (see photo 10). Agricultural lands were rated with lower risks than forest and rangeland areas. To estimate the risk associated with the FS and BLM portion of the wildland areas, a set of rules was developed that related urban-rural classes to FS and BLM vegetation groups. This relation assumes a generally higher risk associated with forested vegetation groups than with nonforested vegetation types and higher risk with increasing population densities.

Risks associated with the interaction of urban and wildland areas are associated with the six major metropolitan areas within the Basin (Boise area, Idaho; Missoula, Montana; Spokane, Tri-Cities, and Yakima, Washington). Missoula, the Boise area, and Yakima are in close proximity to FS- and BLM-administered lands and therefore are anticipated to have a greater risk associated with the interface of FS and BLM wildlands than Spokane or the Tri-Cities. Spokane does have substantial wildland interface risks, but they are mostly associated with private land. Tri-Cities is a mixture of wildland and agricultural interfaces. Where these metro areas are in close proximity to high-integrity wildlands, risks to the maintenance or improvement of ecological integrity would be high. Likewise these metro areas would pose higher risk to areas in close proximity of high integrity than to areas of low integrity, suggesting additional emphasis to manage the risks to attain and maintain high ecological integrity.

Risks to human assets from wildland areas and risks to ecological integrity are not restricted to metropolitan areas. Rural areas where people reside as well as primitive areas where people are only visitors also have risks. Risks include wild-fire; flood; wild animals; maintenance of improve-

ments; mitigation on cropland from elk and deer; cougars, bears, and coyotes killing livestock; and, increasing risks associated with implementation of management activities (for example, prescribed fire in proximity to people and structures). Additional human-related risks and complications arise from local publics who may prefer stability in scenery and lobby to have projects put in someone else's back yard, pressure to have low levels of harvest and grazing in specific areas, and pressure for increased recreation activities dispersed throughout the wildland areas. Sparsely populated areas generally have fewer resources to address risks or assist in control of natural events such as fire, flood, and insect outbreaks than exist in the metropolitan areas. The demand for FS and BLM participation in managing the risks within the least-populated areas will generally be high. Small communities typically have the least ability to provide social infrastructure and to manage risks (for example, fire) from wildland influences.

Considering all land within the Basin, approximately 58 percent of the area is classed as low urban/rural area with approximately 23 percent as high or very high. This reflects the low density of population within much of the Basin. Translating this societal risk to ecological integrity from people and the risk to human assets from wildland areas there is about 58 percent with low risk and 21 percent with high or very high risk (fig. 44). Thus

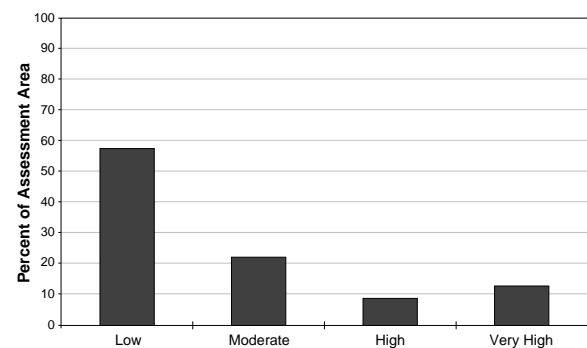


Figure 44—Societal risk of human-ecological interaction: percent of the Basin with low, moderate, high, or very high risk associated with the management of human ecological interactions.





Photo by T. Iraci

Photo 11—The expansion of human habitation into the wildland setting introduces risks from fire and other disturbances. This complicates the FS- and BLM-management of these risks.

the majority of the area in the Basin would be viewed as having low risk from a societal standpoint. The risks differ by location with the very high risks associated with the major metropolitan areas in the Basin. The view from the FS and BLM manager's frame of reference would be slightly different (fig. 45). Removing the non-FS- and BLM-administered lands from consideration and recalculating the risk to ecological integrity from people and the risk to human assets from wildlands shifts to a higher risk in general. On FS and BLM lands approximately 50 percent is classed as moderate risk while about 19 percent is classed as high or very high (fig. 46). Thus, from the FS and BLM perspective there are more risks to manage the wildland areas than might be

viewed by society as a whole. Forested vegetation occurring in areas of moderate urban-rural classes results in high risk from the FS and BLM manager's perspective, while society might consider this as a moderate risk to all ownerships (see photo 11).

Managing risks in areas where human populations are increasing becomes more complex as fewer options for treatment become available. Managing smoke from prescribed fire, reducing tree densities in areas with high scenic values, fencing riparian areas frequented by recreationists, and allowing flooding to occur naturally in stream channels are all examples of increasing complexity as human populations increase in proximity to wildland areas.

Figure 45—Level of risk associated with the management of human ecological interactions on FS-and BLM-administered lands.



## Discussion of Ecosystem Integrity

The challenge is how to bring these notions of ecological integrity and socioeconomic resiliency together to make some broad statements about ecosystem conditions in the Basin and to answer the questions posed at the beginning of this section. The results for the twin themes of ecological integrity and socioeconomic resiliency are shown in figure 47. In this section we will briefly discuss the construction of this figure and the implications that can be drawn from it.

The first step in construction of figure 47 involves developing a rating of composite integrity (fig. 40) based on initial integrity ratings for aquatic integrity, forest integrity, range integrity, and hydrologic integrity. In figure 40, high ecological integrity includes the subbasins that exhibit the highest level of the elements of integrity described in the previous chapter. Low ecological integrity includes subbasins that exhibit the lowest level of the elements of integrity. Medium ecological integrity includes those areas that are intermediate in their exhibition of the elements of integrity. The next step involves adding the ratings of socioeconomic resiliency already discussed in this chapter.

In figure 47 the leftmost set of bars represent the composite ecological rating. If all of the underlying components are high, the composite rating is high; if all are low the composite rating is low; if there is a mix of ratings then an assignment is made based on judgment of the conditions in the subbasin. The next two sets of bars represent the ratings of socioeconomic resiliency expressed in two ways. In the center, socioeconomic resiliency is expressed on an area basis. It shows that 68 percent of the area in the Basin has low socioeconomic resiliency. The rightmost set of bars in figure 47 show only 17 percent of the population lives in these areas of low socioeconomic resiliency. Indeed, 67 percent of the people in the Basin live in areas of high socioeconomic resiliency. One should not assume that the population that lives in

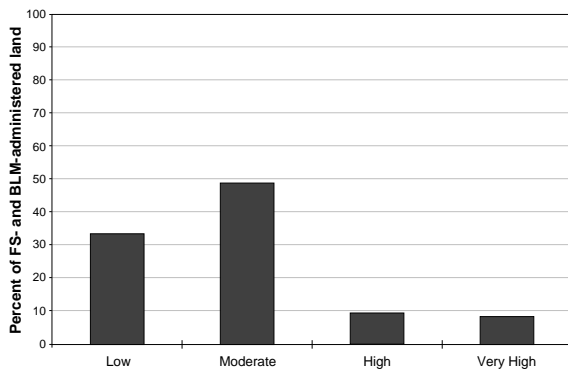


Figure 46—FS/BLM risk of human-ecological interaction: percent of FS- and BLM-administered land with very high, high, moderate, and low risk associated with the management of human ecological interactions.

areas of low socioeconomic resiliency (17%) experience low economic or social well-being. Rather, that these people live in areas that have a low level of adaptability to change.

The first question posed at the beginning of this section asked where ecological integrity and socioeconomic resiliency are high, medium, and low. Figures 40 and 43 show how these measures differ across the basin.

Several trends become apparent with regard to those places within the Basin where ecological integrity and socioeconomic resiliency is high, medium, or low. Some of these trends are:

1. There is an apparent relation between economic (and social) activity and ecological integrity. High levels of activity have taken place in areas with high ecological integrity, less activity in areas with low ecological integrity. For example, many of the areas with low economic resiliency ratings and low population densities are associated with the dry forests and rangelands that have low ecological integrity, just as the moist and cold forested areas are associated with higher economic resiliency. This does not mean that low ecological integrity leads to impoverished human conditions, as many of these subbasins are in counties with above-

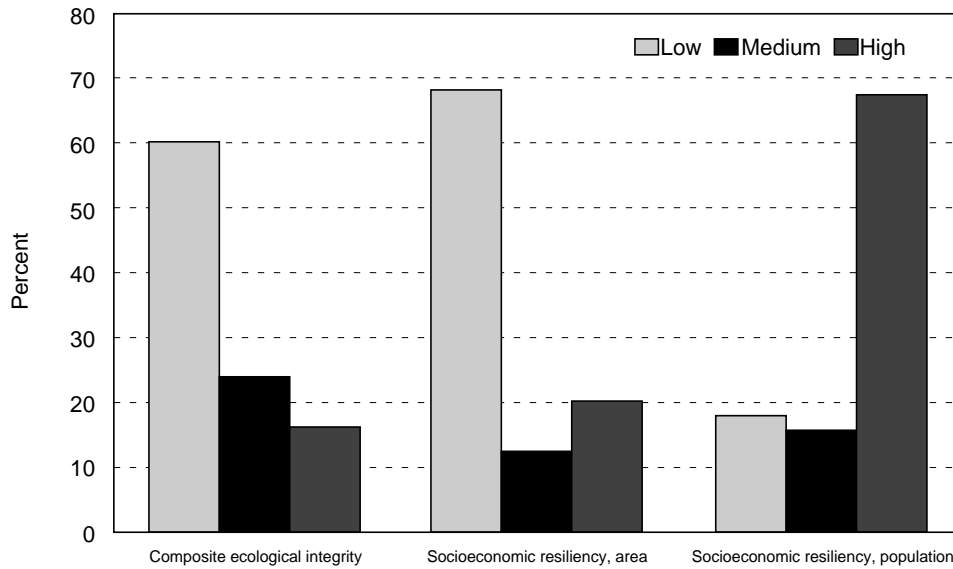


Figure 47—Percentage of the Basin by ecological integrity and socioeconomic resiliency ratings.

average per capita incomes derived from agriculture or less diverse areas of manufacturing. Other than for central Washington and parts of southern Idaho this same relation holds for population densities because the effects of Interstate 84 offset the underlying relations between the social and ecological factors. It is important to recall that the integrity ratings are relative ratings within the Basin and are keyed to the presence or absence of ecological processes and functions. Under this rating system one would expect agricultural lands to rate lower than areas that are managed less intensively.

2. There are several areas where human pressures may threaten areas of high ecological integrity. Yakima and Chelan Counties are examples.
3. The urban/forest interface issue will be most acute where high population and high economic resiliency coincides with areas of moderate-to-high integrity (such as northern Idaho and northwest Montana). Another concern is the propensity for wildland fire in dry forest

and range types that occur in an urbanizing environment such as the Spokane metropolitan area (Stevens, Spokane, and Kootenai Counties), Deschutes County, the area just north of Boise, Idaho (Payette, Gem, and Washington Counties), and the area between the Flathead and Lolo National Forests (Lake County).

4. The Basin is fortunate (as is the country) in that some of the highest ecological integrity for both forest and range clusters occur in large contiguous blocks in areas where human population density is low and is projected to remain low. One example is the central Idaho wilderness.

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