MONITORING SOCIOECONOMIC TRENDS IN THE NORTHERN SPOTTED OWL REGION:
FRAMEWORK, TRENDS UPDATE, AND COMMUNITY LEVEL MONITORING RECOMMENDATIONS

PAUL SOMMERS

Technical Report

February, 2001

USGS FOREST AND RANGELAND ECOSYSTEM SCIENCE CENTER
CASCADIA FIELD STATION
COLLEGE OF FOREST RESOURCES
BOX 352100
SEATTLE, WASHINGTON 98195-2100

The Cascadia Field Station was established by the National Park Service in 1970. Known as the Cooperative Park Studies Unit, it was and still is located in the College of Forest Resources. In 1996, the CPSU was transferred to the U.S. Geoplogical Survey (USGS) and administered out of the Biological Resources Division (BRD), Forest Rangeland Ecosystem Center (FRESC) located in Corvallis, Oregon. The mission of FRESC and that of Cascadia Field Station is to work with others to provide the scientific understanding and technologies needed to support the sound management and conservation of our nation's biological resources. Cascadia Field Station programs are developed to provide the appropriate depth and breadth of objective science to meet the information needs of resource managers who encounter complex environmental problems driven by myriad biological, physical, social, and economic forces.

MONITORING SOCIOECONOMIC TRENDS IN THE NORTHERN SPOTTED OWL REGION:
FRAMEWORK, TRENDS UPDATE, AND COMMUNITY LEVEL MONITORING RECOMMENDATIONS

PAUL SOMMERS
Graduate School of Public Affairs
Institute for Public Policy and Management
Northwest Policy Center

Technical Report

February, 2001

USGS FOREST AND RANGELAND ECOSYSTEM SCIENCE CENTER
CASCADIA FIELD STATION
COLLEGE OF FOREST RESOURCES
BOX 352100
SEATTLE, WASHINGTON 98195-2100

Cooperative Agreement No: 1434-98HQAG2200, 98200HS005 (Project 79-95C)
U.S. Geological Survey and the University of Washington

This research was supported financially by the USDA Forest Service, the Bureau of Land Management and the U. S. Geological Survey.

Table of Contents

List of Figures

List of Tables

PREFACE

During the late 1980s, the intensity of the conflict between timber harvesting on federal lands and environmental interests continued to escalate. Timber sales declined as litigation was brought to bear against each sale. Control of our nation's forests was contested at every turn, until April 1993, when the President held a summit to hear from the various competing interests. A result from his conference was the directive to develop a plan to achieve specified goals. The approval of the Northwest Forest Plan (NFP) was highlighted by the joint signing of a Record of Decision (ROD) by the Departments of the Agriculture and Interior. The ROD established a series of Standards and Guidelines (S&G) to direct the assortment of activities occurring in our Nation's forests. It also committed the federal agencies to achieve the plan's five goals:

Adhere to the nation's laws
Protect and enhance the environment
Provide a sustainable timber economy
Support the region's people and communities during the economic transition
Ensure that federal agencies work together

The ROD requires numerous monitoring actions. Three types of monitoring are identified: implementation monitoring, effectiveness monitoring, and validation monitoring. Implementation monitoring is ongoing at this time. Effectiveness Monitoring Plans have been developed to address Northern Spotted Owl, Marbled Murrelet, and Late Successional Old Growth issues. The ROD requires effectiveness monitoring for rural economies and communities.

This is a report for Phase I of a two Phase study. The ultimate goal of this project is to design and implement a socioeconomic monitoring process for the counties in California, Oregon, and Washington included in the region affected by the President's Forest Plan for recovery of the northern spotted owl. The goal is to assess how federal forest management activities have affected the economy and society of this region in a very disaggregated way, at both a county scale and where feasible, community scale.

Phase I of this project attempts to: (1) establish a research framework; (2) collect preliminary data and (3) estimate the feasibility of completing the project in Phase II at both the county and community levels.

General guidance for this work was provided by the NWFP Socioeconomic Monitoring Team members. These are Chris Christensen, USFS, Curt Loop, US Army Corps, Darryll Johnson, USGS/BRD/FRESC/Cascadia Field Station, Dick Phillips, USFS, Terry Raettig, USFS, and Leslie Freewing-Runyon, BLM. Darryll Johnson served as Project Manager representing the team in administration of the project cooperative agreement on the University of Washington campus.

Executive Summary

This report examines economic and social trends in the coastal northwest region impacted by the listing of the Northern Spotted Owl and the subsequent actions of federal agencies implementing the President's Northwest Forest Plan. It is a preliminary report in a continuing research project aimed at developing a theoretical framework, sampling plan, and research process that could be used to monitor socioeconomic conditions in communities affected by the list of the Northern Spotted Owl. This line of research is intended to meet a requirement in the Record of Decision following President Clinton's Forest Policy Conference in Portland, Oregon in 1993. The report builds on work conducted by staff of several federal agencies that are involved in the monitoring process.

A brief literature review in the report supports the conclusion that there is no generally agreed on model or framework that links federal land management decisions to economic changes and social impacts. This report proposes a regional economic model framework to meet this need. The suggested model organizes possible causal relationships among various economic and social variables. County level data are then examined to see if these data could confirm some of the key linkages in the proposed model.

However, an examination of timber harvest trends vis á vis forestry and wood products employment data at a county level reveals no systematic association. Flows of material across county lines are endemic, and an association between harvest and mill output can only be established at a broad regional level, and even then changes in technology and product market conditions make interpretation of trends difficult. Trends in employment within the spotted owl region suggest stronger economies in metropolitan areas and those counties adjacent to metropolitan areas. Owl region counties gained population more quickly during the 1990s than non-owl region counties in the same states, but employment and wage changes did not consistently follow the same pattern. These trends reflect the well-known urban-rural divide or "Cascade Curtain" in the Northwest, with metropolitan counties faring better than rural counties, and the western metropolitan areas doing particularly well as compared to smaller metro areas east of the Cascades. Comparisons of counties by type of economic base and by policy impact category revealed few consistent patterns of change over the 1990s, whether the owl counties are considered as a group, or compared to non-owl counties. The one variable that consistently differentiates outcomes is the degree of rurality. This finding is consistent with prior work in this region. For example, federal agency economists indicate that population size and distance from major transportation corridors are major factors affecting how communities will be impacted by a harvest decline. The data analyzed in this report show that the metropolitan part of the region, led by Seattle and Portland, gained more population and employment, and experienced real wage gains, in contrast to the real wage declines in rural counties.

The county-level trend analysis is not very supportive of the regional analysis model since inter-county flows of people and resources could not be measured directly. The proposed model may perform well if community level data are assembled and regional flows in and out of particular communities can in fact be quantified. Research conducted

by University of Arizona geographers indicates that such an approach is feasible. A primary data collection research strategy would be essential to directly measure these flows, and to follow this strategy comprehensively would be very expensive, suggesting a sampling approach. Surveys and meetings with economic decision makers in a sample of communities would be required. A pilot scale approach is recommended if a community level analysis is attempted in the future. Whether a comprehensive analysis of the effects of federal land management decisions on communities in this region is feasible has not been demonstrated in this preliminary report. However, the framework suggested seems promising and further investigation of its feasibility and utility is recommended. An alternative is to build a set of tools for economic and social impact analysis in small timber-dependent communities, and pilot test them in a handful of communities. Assuming successful tests, the program could then be scaled back to a small scale effort to monitor broad economic and social conditions, and track federal land management decisions, until some large scale change comes along with a substantial potential impact. For example, timber harvest policy could change in some dramatic way, or a natural disaster could occur in part of the region. At that point, the on-the-shelf tools could be quickly deployed to monitor changing economic and social conditions in "real time" as the changes unfold. Much more accurate impact estimates could be developed with this strategy, and monitoring costs would be minimized relative to a sampling strategy with continuous on-going costs of a fairly substantial character.

Introduction

The purpose of this project is to examine patterns of change in the economy and society of the region impacted by the listing of the Northern Spotted Owl, and to determine if there are discernable impacts of federal land management activities in this region over the decade since the listing. This study is a response to the socioeconomic effectiveness monitoring requirement established through the Record of Decision for the Bureau of Land Management and the Forest Service in the spotted owl region (Record of Decision, 1994). This is a preliminary report in an on-going research process; a planned second report will provide a detailed research design for a monitoring process based on primary data collection from a sample of impacted communities.

The Socio-economic Effectiveness Monitoring Team, an interagency group responsible for this task, developed an outline listing 8 types of variables (and specific indicators for each of the types listed below) that may be important factors in determining the social and economic status of communities in the affected region:

1. Demographics
2. Employment
3. Government revenues
4. Facilities and infrastructure
5. Social services burden
6. Federal assistance
7. Business trends
8. Taxes

In this report, we cover trends from the end of the 1980s to the most recent data available, usually 1998 with respect to most of these data categories; in a few instances we were unable to develop recent information. We start with a framework or model that provides a guide to thinking about how changes in one type of variable may affect other types of variables. The detailed review of trends follows, using data at a county level and comparing different groups of counties both inside the owl region and in neighboring regions within the same three states. A final section offers some thoughts on how a true community level monitoring process could be developed.

Framework for Community Socioeconomic Effectiveness Monitoring

Several bodies of literature were reviewed to ascertain how scholars and public officials have dealt with issues pertaining to community effectiveness monitoring. These literatures include socioeconomic impact assessment, rural development, and community stability studies. Much of this literature is descriptive in character and does not provide models showing how one type of variable affects others, nor do these works provide clear guidance on what is important to monitor at a community level. These conclusions led to development of a new model for effectiveness monitoring which is described in a subsequent section of the report.

Johnson and Burdge (1994) recommend a comparative framework for conducting social impact analyses as a component of Environmental Impact Assessments. They recommend selecting similar regions, usually counties, in which projects similar to the

one that is the subject of the EIS were undertaken in the past. Changes which occurred in these comparator counties can then be used as indicators of likely changes in the EIS target county. They suggest examination of a variety of types of data including Census data, state and county government records, business statistics, and survey data. They indicate that no universally applicable "statistical model" has been developed to predict impacts. As they say in a concluding paragraph:

> First, a statistical procedure must be developed to examine the changes that take place in qualitative variables between the various time frames. We must be able to establish whether or not the change has meaning and if it does what are the consequences for the individuals and communities. (p. 23)

This conclusion is somewhat startling, coming from experienced analysts who have been involved in many impact studies and after 20 years of experience with the EIS process. If valid, their conclusion indicates that the goals of this socioeconomic effectiveness monitoring project place it at the frontiers of social science. No established models or frameworks are likely to be found in the literature that will provide a definitive guide to which variables are relevant and how they relate to each other in a casual fashion.

Carley and Bustelo (1984) note that monitoring programs use data on key indicators of social, environmental, and economic impacts to guide a cyclical process of program planning, implementation, evaluation, and re-planning. The unit of analysis in monitoring programs is often the community, not just the project on which an economic impact study was previously conducted. Unanticipated developments affecting the community have to be tracked, as well as impacts stemming from the project that motivated the study.

Force, Machlis, and Zhang (2000) test the explanatory power of three competing explanations of change in small resource-dependent communities: local resource production, local historical events, and broad societal trends. Using regression models and data on community size and structure from 7 communities in the Pacific Northwest, these authors conclude that broad historical trends and local historical events have more explanatory power than local resource production. Their findings suggest that attempts to associate resource production changes and community level outcomes may not be too successful because other sources of change may overwhelm the impacts of changes in resource production.

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) is the most ambitious attempt to date to assess economic and social conditions at a community level for a large portion of the Northwest. The 1998 report from ICBEMP describes the industry base and degree of geographic isolation of 543 communities within 98 counties in parts of six states comprising the Interior Columbia Basin. The industry base portion of the report uses an industry specialization measure, or location coefficient, that may be useful in characterizing how dependent a community is on a single dominant industry such as forestry or wood products manufacturing. Isolation is assessed using a dichotomous measure of whether a given community is inside or outside a city circle of 50 mile radius, an indicator showing whether the community is part of an Indian reservation, and a final variable showing the percentage of the region in a 20 mile radius

around the community that is Forest Service or BLM land. As is the case with other impact studies, there is no explicit model or framework linking economic changes to social impacts. However, the report does provide a qualitative assessment of probable impacts of various management alternatives being considered by federal government agencies for the lands under their jurisdiction in this region. For example, the report discusses possible impacts of grazing alternatives on agriculturally-dependent communities, and the possible impacts of alternative timber management policies on timber-dependent communities. Combined with lists of communities with these types of economic specializations or "dependencies," the report provides a guide to the geographic distribution of possible impacts of the various land management alternatives under review.

Horne and Haynes (1999) extend the framework of the earlier ICBEMP report by developing measures of the socioeconomic resiliency of communities in the Lower Columbia Basin. These authors note that communities are constantly exposed to change in their economic environment and that it is therefore interesting to consider factors that make communities resilient or able to adapt to changes. They note that they are specifically interested in measures of resiliency that would aid federal land management agencies in understanding potential impacts of policy changes. Horne and Haynes define resiliency as diversity of employment; the more widely distributed local employment is across a set of industries, the more resilient the local economy should be because these industries focus on different markets, use varied resources, and are affected by public policy changes in diverse ways. In addition to this measure of economic resiliency, communities are considered more resilient if the population is more dense, and if socioeconomic characteristics measured by Census data suggest a diverse lifestyle among residents. A combined resiliency index is computed by combining results of the economic resiliency, population density, and lifestyle diversity scores. The authors demonstrate the practical usability of their indices by computing values for western counties and selected urbanized areas in the Lower Columbia Basin region.

The ICBEMP work on resiliency grows out of a long research tradition aimed at understanding the structure of local and regional economies and the degree to which various structural characteristics leads to greater resiliency as an area is hit with an economic shock of some sort. Several recent works focus on forested regions and small rural communities. Input-output pioneer Walter Isard developed much of the intellectual framework for studying regional economies. His development and use of input-output models focuses analysts' attention on external sources of income such as exports from the region and transfer payments to regional residents from outside the region. Input-output models then trace the inter-industry impacts of these primary income sources on secondary industries as the primary industries purchase inputs and compensate labor or other local resources (Isard et al. (1998) provides a summary of his monumental contributions to the literature). Ashton and Pickens (1992), who observe that federal policymakers have a long term concern with their impact on small rural communities, but maintain that the relationship between economic vitality in small communities and federal resource policy is poorly understood. These authors suggest that more diverse economies, those with employment in many sectors, will be better able to cope with

changing economic conditions. Siegel et al. (1995) maintain that an input-output framework, combined with portfolio theory, can be used to explore the relationship between economic structure and the performance of a regional economy. Robison (1996) suggests that very small, rural communities can be studied using input-output models and a variety of techniques to estimate key components of the model without resorting to expensive surveys. The Arizona Communities Project provides practical examples of this kind of analysis in very small towns in another region (Gibson, 19xx).

Jackson and Lee (1998) provide an interesting attempt to characterize changes in socioeconomic variables at a sub-county level. Using Census files for "Census Designated Places" and "County Civil Divisions" in combination with state/local government data, they are able to sub-divide two Washington State counties into smaller regions and provide characterizations of population characteristics, academic performance based on school district records, household income, employment trends, utilization of public assistance programs, and crime rates. While an innovative step forward, this study suffers from several shortcomings. The several different data sources do not measure phenemena at a consistent level of geography. Census of Population data are available only once per decade, far too wide an interval for useful agency monitoring programs. Most importantly, this work does not provide any model linking economic to social phenomena or delineating what is important to measure. No guide is provided to as to the impact of one measured phenomenon on another and thus it is impossible to reach causal conclusions about what is driving changes in these counties. Rather, these authors have done an exceptional job of reporting on what can be measured at a sub-county level using public data sources.

Conclusions

This brief literature review demonstrates that a wide range of social and economic variables can be measured at a county, and sometimes community level, and that it is possible to at least provide qualitative assessments of probable impacts of management alternatives that alter the flows of resources into local economies in resource dependent regions. Several authors have developed interesting indices to assess socioeconomic phenomena such as the degree of economic specialization of the local economy, the relative isolation of communities, or the resiliency of communities. These indices represent hypothesized links between changes in the economic environment of rural communities and the impacts of these changed conditions on the viability of communities and the well-being of their residents. Much of this literature goes on to provide qualitative assessments of the potential impacts of particular changes resulting from public policies or specific construction projects. These impacts are thought to be most detectable or significant in communities that specialize in the extraction or processing of a particular type of resource. Regional modelers using input-output techniques have provided thorough characterizations of the structure of small area economies, with fairly complete specification of trading relationships and transfer payments that bring income into a region and trigger local spending and multiplier effects. However, the review demonstrates that there is no generally agreed on model or framework that links

economic changes to social phenomena such as household or individual behavior or local public sector viability.

This last point is very important. Much of the sociological literature implicitly hypothesizes links between economic conditions and social outcomes, but no structural models are proposed showing exactly how these impacts are realized. One work reviewed above notes that monitoring programs often encounter economic and social developments that were not anticipated at the time the monitoring program was put in place to track the actual impacts of a major project. Another paper notes that broad societal trends and unique local historical events may have more impact on resource dependent communities than changes in resource flows in the local area. The likelihood of encountering unanticipated historical developments or sweeping societal forces makes it even more important to have a structural framework in place so that changes in a community or region can be tracked back to casual factors and not to specious factors. In the section that follows, we propose such a structural model as a framework for deciding what variables should be monitored in a socioeconomic impact monitoring program.

Community Socioeconomic Model

The phrase "community socioeconomic effectiveness monitoring" as used in the Record of Decision has to be defined. The definition used in this report relies on a conceptual model linking economic phenomena to household characteristics and outcomes of private and public organization activities at a community scale. This model stems from research traditions attempting to uncover the structure of a regional economy, that is, the relations of one sector of a local economy to another and to external regions that supply products and services, or demand products and services from the study region. The regional economics literature dealing with these topics is vast, and no comprehensive survey of this literature is attempted here. However, this model shares with other works in regional analysis the fundamental insight that impacts of any actor in a small rural economy, such as a federal land manager carrying out certain actions with the resources on the federal lands, must be analyzed in a larger regional context (Hamilton *et al.*, 1991). The model is diagrammed on the next page, and the following several pages define the contents of each box on the diagram and the flows coming out of each box. In principle this is a model that can be estimated using appropriate data, and a subsequent section of the report discusses the data requirements. Some of the social components may not be readily modeled, but hypotheses about the relationships between economic and social phenomena can be constructed and rough associations established with data that should be available. Working "model" or quantitative characterization of socioeconomic effects stemming from forest management actions could then be constructed.

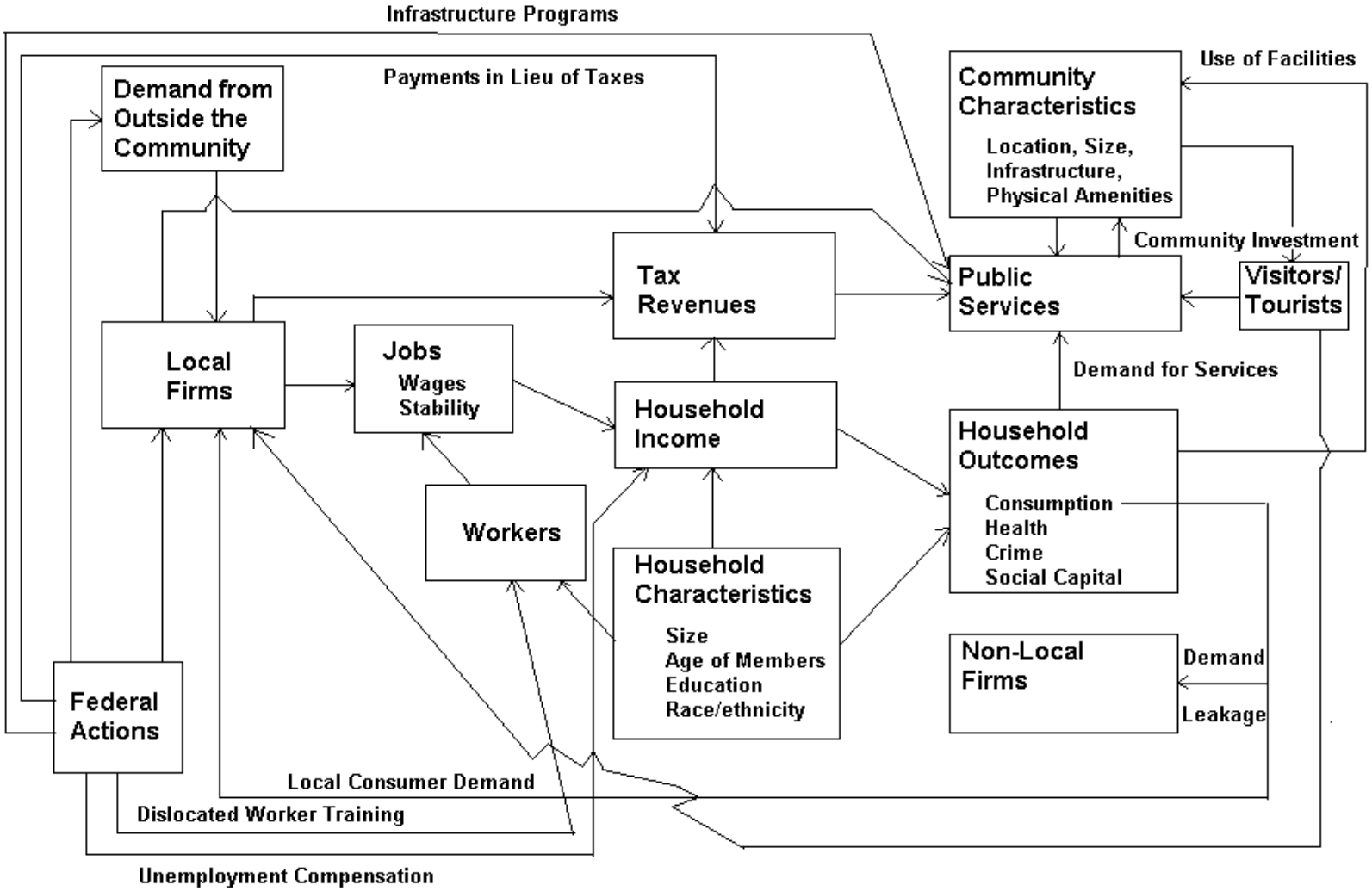
In general, the model below is an export base model. Income brought into the local region by the sale of goods and services to customers outside the region, or through transfer payments to local residents, drives further economic activity among secondary, or locally focused firms providing goods and services to local residents and other local businesses. The key to use of such a model is to develop good estimates of the flows of exports and transfer payments, and to estimate the multiplier effect of those external funds on local businesses. The tendencies of local residents and businesses to purchase goods from outside the local area are also key factors that must be traced. Federal actions affect the flow of incomes coming into the region, driving changes in the local industries. Social impacts are seen as stemming from changes in local economic conditions.

Household Characteristics

Begin with household characteristics. Each household has a certain number of members, of various ages, education levels, and race/ethnicity. These characteristics determine:

(a) how many household members will enter the labor force,
(b) ability to earn enter particular occupations and thereby earn income, and
(c) household outcomes such as consumption activity, health, criminal activity, and participation in community activities that constitute the "social capital" of the community.

Figure 1: Structural Model of Local Economic Flows



These three flows are shown as arrows on the model depicted on the next page linking the household characteristics box to:
(a) local supply of workers,
(b) household income, and
(c) household outcomes

Workers

Aggregating labor force participation across all households in a community produces an estimate of the local supply of workers. These workers may be working in local firms, in non-local firms (not shown on the diagram), or they may be unemployed. They earn wages or salaries that depend on their education, skills, and work experience, and important job characteristics such as the duration or stability of the job over time. The earnings of these workers are a major contributor to household income.

Household Income

The earnings of workers are not the only source of household income. The model shows one other income source, unemployment compensation. In fact many households have other income sources not shown on the diagram for simplicity, but these sources may include income from savings or investments, other transfer payments from government agencies, and income from any businesses the household owns. Transfer payments have become an increasingly important source of income in rural areas. The total income stream determines both the consumption activity of the household, shown in the household outcomes box, and any tax payments the household may owe to government agencies.

Household Outcomes

Four categories of household outcomes are listed in the diagram: consumption, health, criminal activity, and "social capital" (Putnam, 2000; Hawe and Schiel, 2000; Rudd, 2000). Consumption activity links households to both local and non-local firms; it is important to trace how much consumption activity feeds back into demand for the products and services of local firms, and how much "leaks" outside the community to non-local firms. Health and crime are two types of household outcomes that translate into demands for the services of local government agencies. In addition, households use local public facilities such parks and roads; their use of these facilities in turn affects the condition of these facilities. Finally, the "social capital" category is listed under household outcomes to capture the household's participation in a variety of community activities through non-governmental organizations and informal activities. Putnam and others have linked social capital to health and other outcomes in communities.

Visitors

Another important group of users of public services in many rural communities is visitors or tourists. These visitors may just be travelling through the community, perhaps just using the road or a rest stop, but perhaps also stopping to purchase goods or services from

local firms. Tourists may be visiting local attractions, and can be important sources of revenue for local firms and a significant source of demand for local government services.

Public Services

Local public services are affected by three flows: tax revenues from households and individuals, demand for services from households or firms, and physical conditions of the jurisdiction which necessitate public investments and services to provide roads, parks, water and sewer facilities, etc.

Local Firms

Turning to the left side of the diagram, another major category of actors on the local scene are the business firms who provide products and services to both local and non-local customers. These customers may be other businesses, or individual consumers. These local firms also hire workers, many of them from the local area; they pay taxes to local governmental jurisdictions; and they demand local public services such as water, sewer, police, and fire services. Local firms usually have external linkages of great interest. Many buy inputs from outside the region, and some sell their product or service to customers outside the region. These external linkages bring money into the local area, siphon funds out of the local area, thereby linking small community to a larger regional economy. Regional input-output models explicitly track these linkages in order to predict the impact of a change in an external flow on a region of interest.

Federal Actions

Federal actions affect communities in a number of ways. By contracting with private companies to harvest timber or carry out maintenance activities on federally owned lands, the Forest Service and Bureau of Land Management inject money into a local economy. Funds enter the local economy as the contractors buy supplies, fuel, or hire local workers. Local mills may buy some of this timber, ensuring further economic activity within the area. Of course, at a local level, the fact that a local stand of trees is cut does not guarantee any local economic impact. A federal agency may contract with a non-local company to do the harvesting and transporting, and the cut timber may be sold to a non-local mill. Thus, the extent to which federal activity affects local businesses and workers is an important variable. Changes in federal activities are the exogenous variable in this framework, and the model is designed to show the impact of these changes within a small community, taking into account the effect of non-varying external linkages. If other external linkages are also varying, the model can also be manipulated to study the combined effect of all exogenous changes on the local area.

Other federal activities are shown in the model. Payments of in lieu of taxes, including a percentage of the value of timber sales receipts, are made to counties in which there is federal land. These payments are important revenue streams for some local governments; these payments compensate local jurisdictions for the revenues they would have received had the federal activity on its timberlands been private sector activity. In addition, the federal government provides a set of rules within which states operate unemployment compensation, dislocated worker training, and welfare assistance systems for which local residents may be eligible. Finally, the federal government's economic development

funding has been a significant source of infrastructure funding for local areas within the spotted owl region.

When federal land management policy changes substantially, a local economy can be "shocked," to use a term favored by input-output economists. Rather than just modestly changing the supply or demand for some good, shocks are larger scale shifts in supply or demand. Using neo-classical economic theory, when the federal agencies listed the Northern Spotted Owl under the Endangered Species Act and compelled federal timberland managers to set aside areas as protected habitat for the owls, timberland supply was permanently reduced; that is the federal land supply curve was abruptly terminated at a certain level. Input-output modelers model the impacts of such an action by ignoring many of the market dynamics induced in a neoclassical framework by such a discontinuity. In the input-output framework, the shock is simply a larger scale version of a small change in supply or demand, and the impacts on other sectors of the economy follow the same patterns for large or small changes. Only the magnitude of the changes differs. In contrast, a neoclassical model of this change could posit any number of dynamic effects of the shock which could alter the structural relationships in the economy, resulting in different long run impacts than the input-output model would predict.

Given the diverse nature of the federal management actions considered in this project, it seems preferable to approach the task within the general spirit of the input-output model, positing fixed relationships between different sectors of the economy until such time as the research indicates dynamic impacts that cannot be handled within such a "fixed coefficients" model. Available tools from the input-output literature can then be employed readily, whereas a dynamic neoclassical framework would require a far more ambitious research effort.

Scope and Use of the Model

This model of local economic and social phenomena generally covers the scope addressed by socioeconomic impact statements. The economic portion addresses phenomena regarded as important by regional economists, especially the flows from local consumer demand, employment, external demand faced by firms, the local public sector, and the mechanisms by which federal actions impact the local economy. Variables such as community stability and diversity that have been studied by rural economists and sociologists are captured in the characterization of local firms and the jobs they provide. The local public sector depicted in the model captures major fiscal impacts from changing levels of economic activity, as well as the variation in local public service demands due to local resident and visitor demands. The household outcomes box links this model to significant sociological phenomena at the community and household levels.

In principal this model could be estimated in the sense of equations that characterize the size and shape of each box, and the quantities associated with the flows in the model. Doing so for any particular community would be a substantial undertaking, as shown by the Arizona Communities Project. However, estimating an empirical simulation model based on this conceptual model is not the only possible use. The conceptual model can

also be used as to guide monitoring programs, guiding analysts' decisions about which variables to track. Over time, collection of data through monitoring programs might allow accumulation of a database that would permit formal model building projects later on.

The model provides guidance on what should be monitored in the socioeconomic impact monitoring program for the region affected by the President's Forest Plan. All of the variables contained in an atlas prepared for the spotted owl region by Christensen et al. (2000) seem relevant for example. In addition, this model highlights the importance of separating local consumption demand and local employment demand from the total demands of consumers and firms respectively, and it indicates that non-local employment opportunities and income from non-wage earnings should be taken into account. These critical distinctions would allow analysts to capture the local effect of actions taken by the federal government, rather than the total regional or statewide impacts. Local consumer demand and non-local income sources are not mentioned in the Christensen et al., and this is a very important set of additions to the data requirements laid out in the Christensen et al.

This framework also avoids over-reliance on measures of diversity or resilience whose empirical association with desired economic or sociological outcomes has not been formally tested. By collecting the primary data required to build these indices as well as data on significant outcomes, formal tests of the utility of various indices can be carried out in the future. This approach of collecting the underlying data, monitoring trends in these data, and preparing for the day when formal model-building can take place is preferable to placing strong reliance on indices whose association with stable local employment or ability to adjust to economic changes with modest social strain has not been empirically demonstrated.

Measurement Issues

At a county level, most of the boxes or "actors" or "systems" in the model can be adequately characterized, and many of the flows linking actors and systems can be estimated. Some variables, such as local consumer demand, cannot be estimated from available data, and special surveys would have to be undertaken. This type of research is common among economic impact analysts and can be readily accomplished given sufficient resources.

However, at a community level, the situation is much worse. Except for a few of the household characteristics, which can be measured by federal census estimates every ten years, or by data collected by state and local agencies on an annual basis, very little of the model can be measured through available data sources. Some of the household outcomes can be assessed using data from state agencies, and local government data can be assembled either from state agencies or individual local jurisdictions. However, consistent measures are unlikely to be available from these state and local government sources unless they are artifacts of mandatory federal programs. A primary data collection strategy based on surveys of businesses and residents would be required to implement a community level monitoring program based around this model. One way of

implementing such a program would be using a sampling strategy stratified by different types of communities that are common in the region. Stratification could be based on the economic base clustering in the region (manufacturing, timber-dependent, recreation-oriented, etc.) or on a typology of the size and geographic isolation of places. In that way, federal agency officials would have a useful set of indicators or regional social and economic phenomena without having to pay for a complete set of community level censuses.

Empirical Trends Update

The decade of the 1990s was a time of tremendous change in the forest products industry and for those rural communities dependent on jobs in this industry. Larsen and Aust (2000) note two contradictory trends that characterize the past decade:

(1) total harvest fell dramatically, with reductions of total harvest in Washington of about a third, which included a drop of national forest harvests of 85 percent, shifting the supply from public to private lands and forcing closure of many mills that were dependent on harvests from federal lands; and at the same time,

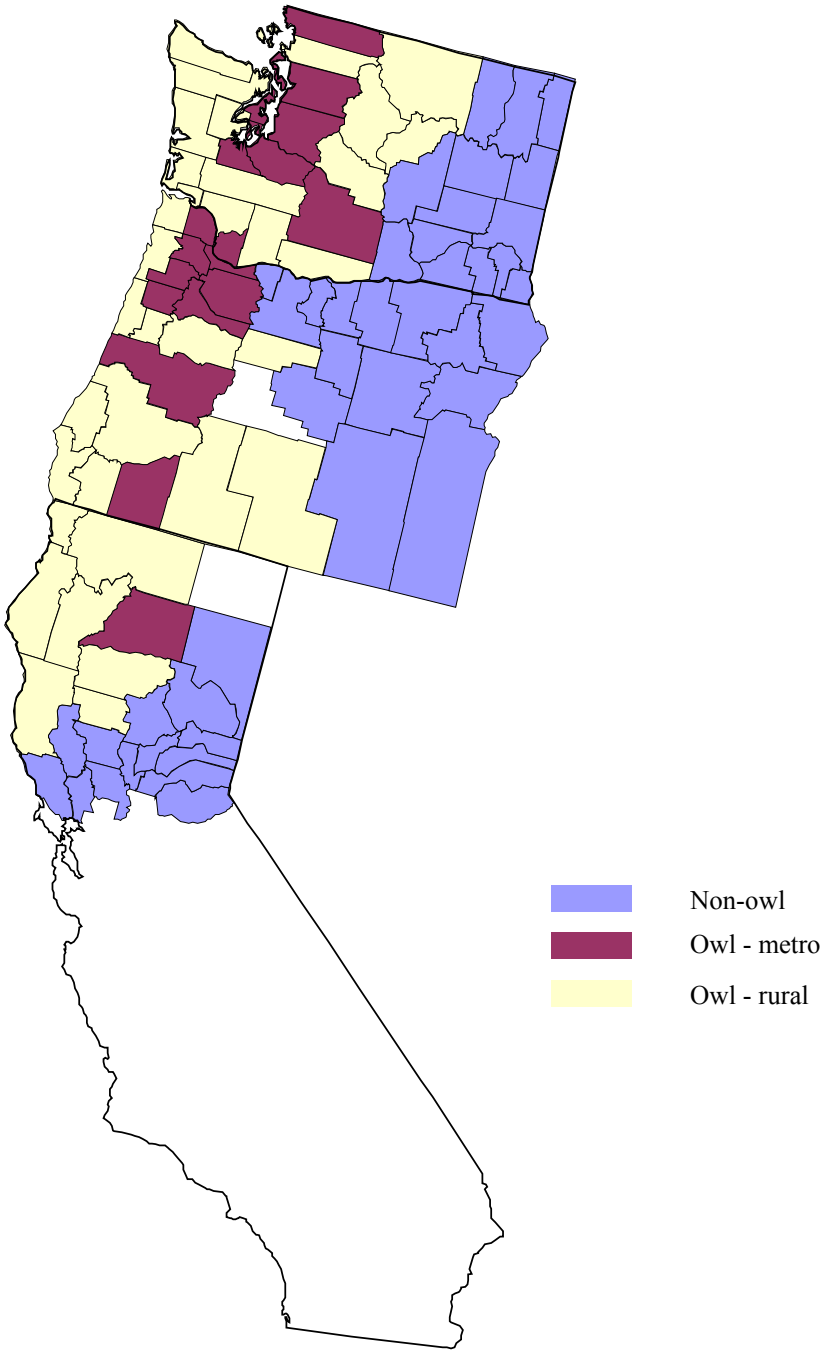
(2) lumber production rose from 3.9 billion board feet in 1986 to 4.2 billion board feet in 1996, and pulp production rose from 3.6 million tons to 4.0 million tons in the same two years.

Taken together, these two trends suggest massive structural shifts in the location and character of harvesting and processing activities within the state of Washington. Given those structural shifts, it would not be surprising to see a variety of dramatic impacts on rural communities within this region. However, as this trends analysis demonstrates, a many of these communities were subject to a variety of additional economic influences, and it is difficult to demonstrate impacts at a county level, the lowest geographic level at which economic data are readily available.

Christensen et al. (2000) provide a comprehensive effort to document changes at a county scale of analysis in the economy and society of the region included in the President's Forest Plan from 1989 up through 1994. In the following pages, the story is brought forward through 1998, and cast generally in the framework sketched on the previous pages. Consistent with Christensen et al., county level data are used. The use of data at this level of aggregation reflects both a practical issue - few indicators are systematically available at a more dis-aggregated, community scale - and a desire to step down below the state level due to the wide range of economic circumstances embraced by state boundaries. Changes in federal actions – timber harvest on federal lands and 25% payments to counties – are covered first, with an attempt to link these changes to employment outcomes at the county level. The analysis of harvest and employment levels illustrates the importance of the external linkages in the structural framework presented in the previous section of this report, and the difficulty of making casual links between federal actions and economic outcomes at the county level.

A number of comparisons are then offered between the "owl counties" as a whole, i.e., those counties within the region encompassed by the President's Forest Plan, and "non-owl counties," that is, the counties in the same three states but outside the region encompassed by the President's Forest Plan. The owl and non-owl region counties are depicted on the map in Figure 2. These comparisons are based on the recommendation of Johnson and Burdge (1994), as mentioned in the literature review above, that similar counties be compared in order to tease out the implications of a particular project or program in a target county where the primary impact is expected. These owl and non-owl counties were subject to many similar economic influences over the decade of the 1990s, including spillover impacts from growing urban economies, waves of in- and out-

Figure 2: Map of Owl Region and Non-Owl Region Counties



migration from urban areas, sweeping changes in environmental policy affecting all resource-based industries, and economic forces of globalization and centralization. However, the owl counties bore the additional burden of the listing of the owl and more severe reductions in harvest levels on public timberlands. These similarities and differences between the owl and non-owl counties suggest that a comparison of counties in these two regions may show some of the impacts of changing policy.

No inter-regional comparison is capable of providing a pure "ceteris paribus" test, holding all but one factor constant so that the impact of this factor can be clearly discerned. Counties within the two regions have somewhat different economic bases and this factor is considered by comparing the owl counties classified as dependent on a particular industry base to the same type of county in the non-owl region. Figure 2 also shows the metropolitan counties within the owl region. The economy within these metropolitan counties is much more diversified and subject to different influences than the rural counties. Using a classification of counties according to degrees of rurality, dominant industries, and reliance on certain income flows determined by public policy, similar rural and metro counties are compared in the "owl" and "non-owl" regions. A limited set of social variables is examined as well as economic factors.

One confounding variable, or violation of the "ceteris paribus" conditions is that federal policy changes also resulted in reduced harvests in the non-owl counties. These policy changes resulted in modified planning constraints and lower allowable harvest levels on federal forest managers, and listings of salmon and other species that may have affected eastern counties more than western counties in this time period. Thus, despite efforts to control as many factors as possible, the owl/non-owl comparisons are not as good a test case as one might ideally like. However, the broad similarities influences on these counties, and the distinctive impact of the owl listing suggest that these comparisons are more meaningful than comparing owl counties to the nation as a whole or to rural counties in another forested region of the U.S. such as the southeast where the environmental variables, market influences, and urban impacts could be very different.

Degree of Rurality

While it is natural to think of forestry as a rural activity, the region covered by the President's Forest Plan in fact encompasses a number of urban counties. Urban areas are composed of counties occupied by large metropolitan areas, and counties adjacent to such metropolitan counties and having substantial population so their own. As Table 1 below demonstrates, the Northwest, home of Seattle and Portland, has 5 large metropolitan counties plus another 4 counties adjacent to these metropolitan counties, and 4 medium sized metropolitan counties with another 6 counties adjacent to these medium sized metropolitan counties. The remaining 29 counties having 20 thousand or fewer residents and not adjacent to a metropolitan county can be regarded as rural. In effect 19 of 58 counties in the region are either urbanized or strongly affected by the adjacent urban economy. These urban economies may be sufficiently diverse economically that the impacts of changes in land management, as filtered through forestry and wood products

manufacturing firms, may be hard to detect unless one can analytically "hold constant" the changes in economic activity that occurred in all other sectors.

In those rural counties that are dependent on manufacturing activity it may be easiest to spot the impacts of changes in land management, since the manufacturing activity in such counties is most likely in wood products. However, there are only 8 non-metro counties where manufacturing is the primary economic base, which is a very limited set of "cases" from which to draw general conclusions. Two of these eight counties are also destinations for retirees looking for a low cost, attractive place to live; retirees moving with pensions or other non-wage income sources may confound attempts to establish a linkage between federal land management actions and the overall level of local economic activity. One of the eight rural manufacturing dependent counties is within commuting distance of a major metro area, so again the link between land management and local economic impact is muted by the availability of other job possibilities for local residents.

Table 1: Owl Region Counties by Degree of Rurality

Type of County	Number in Owl Region
Metro, >1 million pop'n.	5
Adjacent to Metro	4
Metro >250K pop'n.	4
Metro 20K to 250K pop'n.	6
Adj & >20K pop'n.	8
Urban >20K pop'n; Not Adj.	6
Adj. & 2.5K to 19.9K pop'n.	10
2.5K to 19.9K pop'n., not adj.	11
Rural <2.5K pop'n.	2

Source: USDA Economic Research Service rurality classifications for owl region counties

Leakages, or flows of economic activity across county lines are endemic in the spotted owl region. Just within the forestry and wood products economy this can be easily demonstrated by examining employment changes in the forestry sector and in wood products manufacturing. If local forests supplied only local mills, there should be a perfect correlation between changes in employment in forestry and corresponding changes in mill employment. However, examination of employment changes in these two industries for the owl region counties reveals 2 cases where both forestry and wood products employment went up from 1989 to 1998, and 3 counties where both employment figures declined. However, there are also 2 counties where forestry employment went up but wood manufacturing employment declined, and 1 county where forestry employment declined but wood products employment increased. In the remaining counties, either the forestry data or the wood manufacturing data are not available in one of the two years. The data are missing either because there is no employment in this industry in that county, or because the employment that exists cannot be published under federal confidentiality rules (3 or fewer firms reporting, or at least 80% of the employment reported by a single firm).

The available evidence does not support the local impact hypothesis very strongly, but suggest that there are leakages in the system. That is, many mills are buying their timber from non-local sources. In addition, we really don't know how dependent mills are on local supplies in the vast majority of counties in the study region. While state agencies have occasionally published data on the source of timber processed in mills in each county, these data do not span the decade of the 1990s, nor are such data available for all counties in the three states. A further data limitation is that the available employment data on the "forestry" sector represent land management activities in the private sector and does not include federal employees doing similar types of work. Logging is considered part of the lumber and wood products sector, along with milling. No separate data on logging are available for the majority of these counties due to confidentiality issues. Forestry employment levels may not vary much with harvesting activity as logging sector employment would.

Federal Actions

The impact analysis begins with federal actions that may have affected the level of economic activity in the region. Two types of federal actions are considered: timber harvest levels on federal lands, and payments to counties of a portion of the revenues from timber sales.

Timber Harvest Changes

An important factor to consider in considering the impact of federal harvest changes on local mills is the availability of timber from non-federal sources. Figure 3 shows annual timber harvests on public and private lands in all 57 owl counties, and Figure 4 provides the comparable picture for non-owl counties in the three state region. Public harvests in owl counties dropped from over 6 billion bd.-ft. in 1988 to under 400 million bd.-ft. by the late 1990s. Private land harvests declined more modestly, from about 9 billion board feet to approximately 7.5 billion bd.-ft. In non-owl counties in these three states, public harvests also declined precipitously from about 2 billion bd.-ft. in 1988 to about 425 million bd.-ft. by 1998. Harvests on private lands in the non-owl counties have not declined at all over this decade, although there are some large short term cycles in the harvests on these lands. These variations make the supply to local mills dependent on a number of factors, including harvests on both public and private lands, as well as the price of stumpage and the costs of hauling it to a particular mill. One cannot assume that mills utilize only locally harvested timber.

Figure 3: Public and Private Timber Harvests in Owl Region Counties

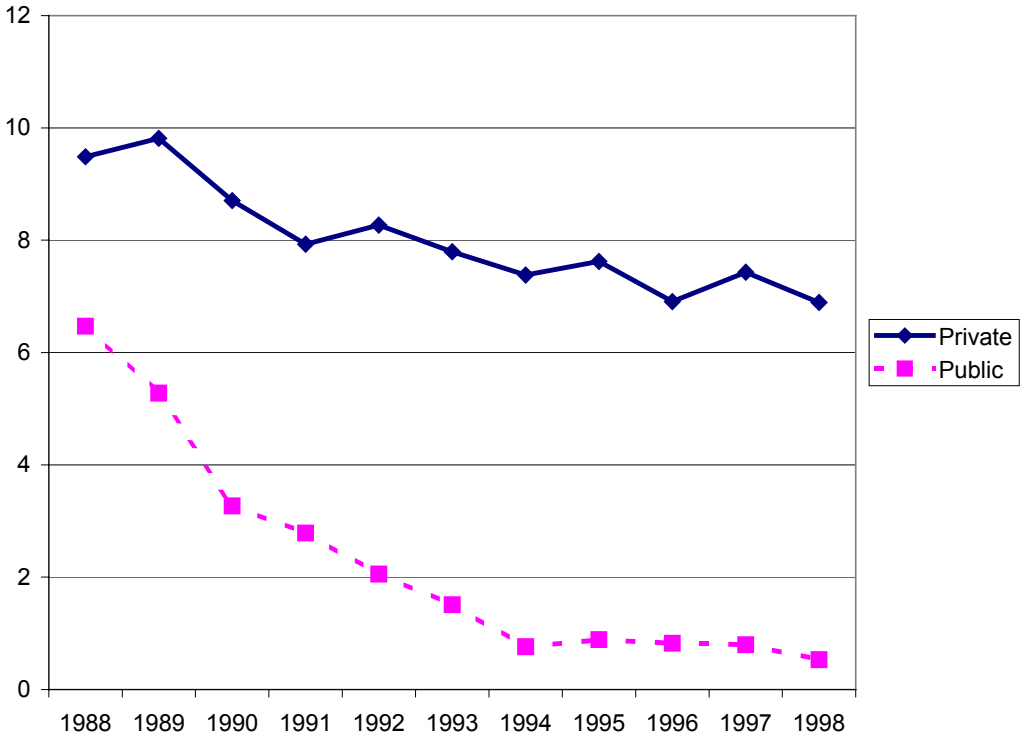
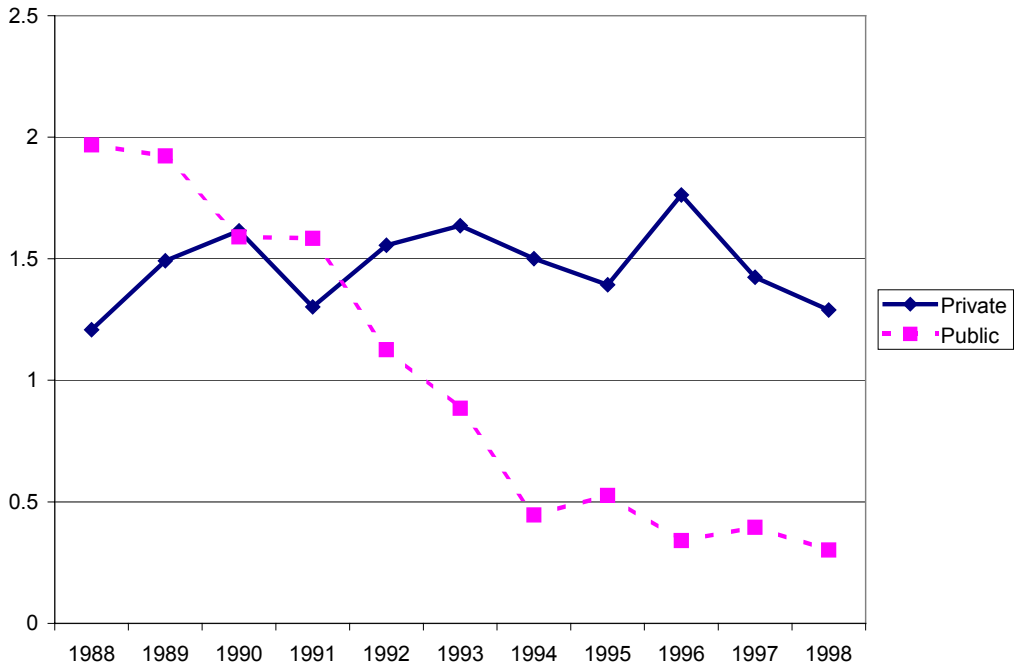


Figure 4: Public and Private Land Timber Harvests in Non-Owl Region Counties



Examining the data at a county level demonstrates this reality with greater clarity. Table 2 shows timber harvests on public and private lands, with the 57 owl region counties sorted into several groupings depending on the balance between federal and private harvests:

- ***Group A*** consists of those counties where federal harvest was unchanged over the period from 1989 to 1998;
- ***Group B*** includes counties in which federal harvest declined as other harvests increased, but not enough to offset the decline on federal lands;
- ***Group C*** consists of just 2 counties where federal harvest was more than offset by increases in private harvest, resulting in increases in total harvest; and
- ***Group D*** encompasses the majority of the counties in the owl region; in these counties both federal and other harvests declined.

To the extent that mills rely on local supplies, employment in the lumber and wood products industry should track changes in total harvest. Table 2 shows that the percentage decline in total harvest was largest for ***Group D*** counties, followed by ***Group B*** and then ***Group A***. ***Group C*** counties experienced a harvest increase which one might expect would support a forestry or mill employment increase. However, Table 3 demonstrates that the percentage decline in forestry employment counties was greatest in **Group C** counties where harvests increased. **Group A** counties, where harvests also declined overall, experienced a forestry employment increase but a lumber and wood products employment decline. Forestry employment may increase even though harvest declines if management strategies change. For example, with higher timber prices typical of much of the 1990s, many landowners found it profitable to extend the growing time of particular stands and invest more in labor-intensive practices such as thinning and pruning stands to produce higher quality wood, perhaps also moving to a somewhat longer growing cycle. These results also demonstrate that timber is often hauled across county lines once harvested, and therefore there is little county level correlation between harvest and milling employment.

It must be noted, however, that employment data are often suppressed at the county level to protect the confidentiality of particular firms. The number of reporting counties for both 1989 and 1998 in Table 3 is less than half of the owl region counties, making it impossible to reach definitive conclusions about the strength of the relationship between local harvests and local lumber and wood products employment. Interestingly, however, the one county in ***Group C*** shows an increase in lumber and wood products employment, consistent with the harvest increase in this county.

25% Payments

The Forest Service allocates 25% of the revenues from timber sales from each federal forest, apportioned on the basis of forest acreage in each county. Many of these federal forests span multiple counties. In response to declining federal timber harvests and revenue sharing with local governments in the owl region of the Pacific Northwest, Congress made a commitment to maintain the level of payments for a period of time irrespective of the level of actual harvests through owl guarantee legislation. Figure 5 shows the relationship between actual payments and what would have happened if the

relationship to sales had been maintained in lieu of actual policy in each of the three owl region states. While actual payments to counties have declined in all three states, the decline was less precipitous than it would have been based on actual sales of timber. In all three states, the owl payment is increasing and becoming the largest component in the total payment to counties.

Table 4 breaks these payments out by the harvest groups used in Tables 2 and 3. The variation in the percentage decline of actual "25% payments" by harvest group is much less than the variation among these four groups in federal harvest levels. This comparison illustrates the ameliorating impact of the 25% payments to counties. This softening of the blow to local government revenues resulting from timber harvest declines on federal lands is an important factor to consider in later sections of the report dealing with public sector outcomes. In addition to the Forest Service 25% payments, significant federal revenue sharing program occurs under the BLM's 50% receipt sharing with counties containing Oregon and California (O&C) lands. Declines in these payments are also lessened under the owl guarantee. Counties also receive federal dollars based on acres of land under federal ownership under the Payments in Lieu of Taxes (PILT) program. Congress has not fully funded authorized appropriations for these purposes in the last decade. However, these actions are not considered "federal land management actions" and are not within the scope of this report.

Table 2: Mean Percent Change in Timber Harvest by County, 1989-98

Harvest Group	Federal	Other	Total	n
A	0%	-29.5%	-35.3%	12
B	-86.5%	130.4%	-41.6%	11
C	-72.0%	24.3%	13.4%	2
D	-91.7%	-33.7%	-56.6%	32
Total	-75.9%	9.0%	-46.7%	57

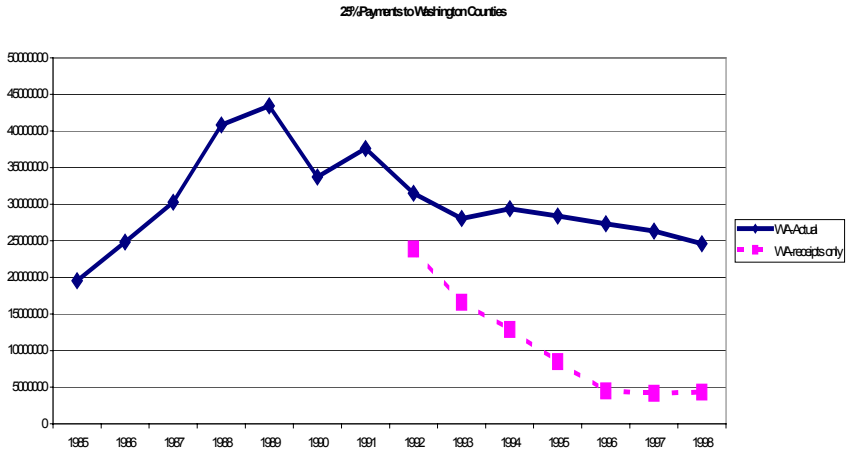
Source: Washington Department of Natural Resources; Oregon Department of Forestry; California: USDA Forest Service PNW Experiment Station and California Board of Equalization

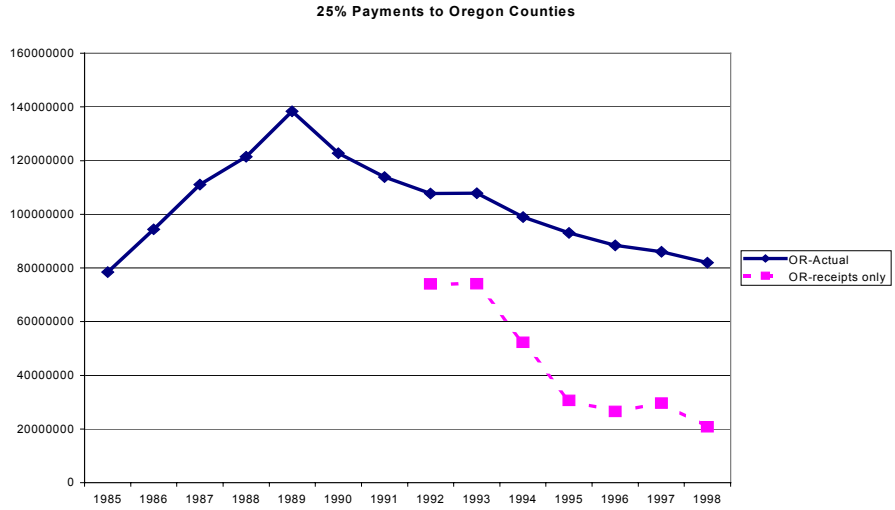
Table 3: Changes in Employment by Harvest Group

County Group	Forestry Employment		Lumber & Wood Employment		Total Employment	
	mean	n	mean	n	mean	N
A	38.9%	6	-29.4%	5	49.4%	12
B	56.0%	8	20.9%	1	16.3%	11
C	-54.8%	2	27.3%	1	24.0%	2
D	-26.1%	16	-19.3%	20	88.9%	32
Total	4.8%	32	-18.0%	27	64.3%	57

Source: Bureau of Labor Statistics covered employment

Figure 5: 25% Payments to Owl Counties





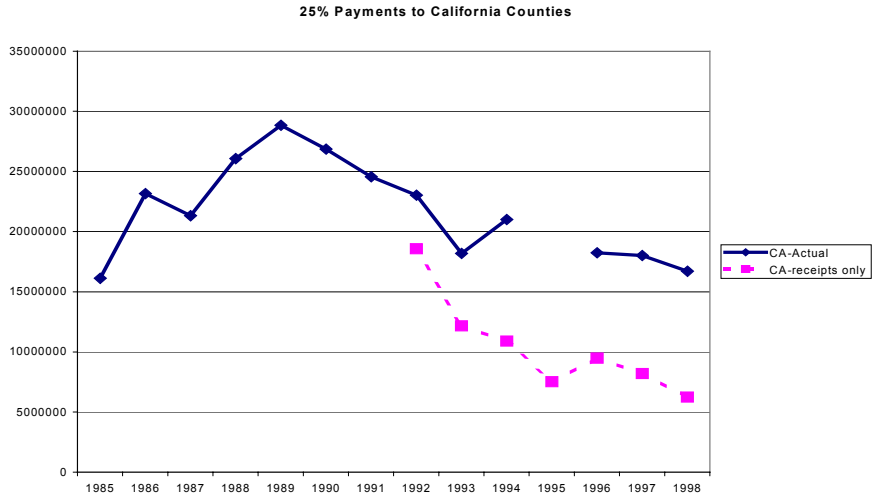


Table 4: Mean Change in 25% Payments by Harvest Group, 1989-98

Harvest Group	Mean Percent Change in 25% Payments	n
A	-36.66%	6
B	-40.30%	11
C	-42.31%	1
D	-42.85%	31
Total	-41.51%	49

Source: USDA Forest Service Pacific Northwest Experiment Station

Conclusions Concerning the Economic Impacts of Federal Actions in the Owl Counties

Timber harvests on federal lands declined dramatically from 1989 to 1998, much more dramatically than on non-federal lands in these counties. The harvest decline on federal lands averaged 46.7 percent across all 57 owl-region counties. This harvest decline was accompanied by a 4.8% decline in forestry sector employment and an 18% decline in lumber and wood products employment. The variation in these three percentages indicates that many other factors affect economic outcomes, including non-federal harvests, timber imports from distant domestic or foreign forests, and technological changes in the forestry and lumber/wood processing sectors. The influence of some of these factors is apparent in the tables showing harvest and employment changes. There is no one-to-one relationship between harvest and employment levels at any regional scale that can be measured with available data. As the structural framework suggests, many "leakages" can complicate and obscure the quantitative relationship between harvest and employment levels even in those sectors of the economy very dependent on the flow of timber from the forests. This complexity is illustrated above in the county groups analysis showing the variation in federal and non-federal harvests. Non-federal landowners have offset a portion of the decline in federal harvest. Overall, however, both harvests and related industry employment declined during the 1990s in the owl-region counties.

The impact of reduced economic activity resulting from public harvest declines was offset to some degree by payments made to local governments by federal agencies. A quarter of federal harvest revenue from Forest Service lands and one half of BLM revenues from O&C lands have traditionally been allocated to local government, as an implicit payment in lieu of taxes for lands and resources under federal ownership. These payments were augmented in the 1990s with the owl guarantee to minimize the disruption to local government finances that would have ensued if these payments had declined strictly in accordance with harvest levels. The impacts of these payment streams on local governments have not been ascertained.

Changes in the Overall Economic Vitality of the Owl Region

While no precise relationship can be shown between federal actions and economic outcomes, the overall vitality of the owl region counties can be described using population, employment, wage, and personal income data. These 57 counties can also be compared to other similar counties in the same three states to see if the owl region has fared better or worse. All rural counties in Oregon and Washington are included in this analysis, divided into either owl region or non-owl region groups. In California, only counties north of a line at about the latitude of Sacramento were included. That is, none of the Bay Area urban counties were included but all Northern California counties were included, divided into owl region and non-owl region groups. Figure 2 above provides a map depicting the owl and non-owl regions included in this analysis. The comparisons of owl and non-owl counties below are an attempt to hold constant as many factors as possible, including the influence of metropolitan regions on rural economies, the impacts of globalization, general trends affecting resource industries, etc. However, an important confounding factor should be kept in mind – public sector timber harvests were also reduced during the 1990s on non-owl lands in response to changing markets, prior harvesting, and new management guidance provided to the land managers. It is possible that the differential impacts of the management decisions made due to the endangered species listing of the owl was masked by the many changes affecting all timber oriented counties in the Northwest.

Two sources of data on economic performance are used in the comparisons below. Population and personal income data come from the federal county level estimates provided by the Bureau of Economic Analysis of the Department of Commerce. Employment and wage data come from the Bureau of Labor Statistics at the Department of Labor. The BLS data series do not include proprietor's income, an important source of income in some rural areas. Real wages are estimated by deflating the annual wage per worker reported by the BLS to constant dollars, using the CPI as a measure of inflation.

Overall the owl region counties grew in the 1990s, in terms of population, employment, and personal income, at rates comparable to growth in earlier decades (see Figures 3-6). Population of this region has increased from about 7.2 million to 8.4 million during the 1990s, total personal income has grown from $130 billion to over $220 billion, and employment has grown from 5.7 million to 6.7 million. Real wages were falling as the decade began, but recovered by the end of the 1990s. This picture of a generally robust region masks very different patterns of change for subgroups of counties within the region.

The comparisons below rely on two classifications of counties developed by the USDA Economic Research Service (Cook and Mizer, 1989). Counties can by classified by the dominant industry type (farming, mining, manufacturing, government or services), or by large sources of income that are dependent on public policy decisions and actions taken by non-local residents (retirement, federal land, commuting, and transfers). The latter classification scheme is called the "policy type" classification, but would be equally well called the "transfer payments" classification since it describes sources of income other than employment in local firms than can be significant income sources in rural counties.

In both classification schemes, metro counties are considered as a separate group. In terms of the "degrees of rurality" classification used previously, metro counties consist of four groups:

- Central counties with large metro areas of over 1 million residents,
- Counties adjacent to central counties with over 1 million residents,
- Counties with medium sized metro areas of 250 thousand to 1 million residents, and
- Counties with smaller metro areas of 20,000 to 249 thousand residents.

Table 5 shows that the metro counties performed much better than the more rural counties in terms of employment growth and wage changes over the period from 1989 to 1997. The large metro areas, Portland and Seattle, and those counties adjacent to these metropolitan centers, had positive real wage changes and substantial employment growth. The medium sized and smaller metro areas also experienced substantial employment growth but real wage declines. All of the smaller sized counties experienced modest to substantial employment growth, accompanied by much larger declines in real wages. The notion of a "rural-urban divide" in the owl region is reinforced by these findings. Better employment prospects have been located in the urban areas, both in terms of the number of jobs and the wages paid.

Table 5: Changes in Employment and Real Wages by Degree of Rurality

County Type	% Change in Employment	n	Change In Annual Real Wages*	n
Major Metro (>1 million urbanized pop'n)	28.8	5	$312.15	5
Adj. To Major Metro	8.5	4	410.38	4
Medium Metro (>250K urbanized pop'n)	35.0	6	-690.80	6
Adj. To Med. Metro	318.9	8	-540.05	8
Adj. To Metro Co. w/ >20K Urbanized	22.0	6	-747.22	6
Not Adj. To Metro Co. w/ >20K Urbanized	29.4	10	-459.48	10
Adj. To Metro w/ 2.5K to 19.9K Urbanized	18.8	11	-419.76	11
Not Adj. To Metro w/ 2.5K to 19.9K Urbanized	51.0	2	-1686.81	2
Rural < 2.5K Urbanized	32.0	1	-218.67	1

Source: Bureau of Labor Statistics, Covered Employment and Wages
*Real wages estimated by deflating annual wage per worker by the CPI

These changes in the economic performance of the owl-region counties need to be put in context however. A contextual analysis is provided by comparing the owl counties to similar counties in the same states but located outside the owl region. Population, employment, and personal income comparisons are offered below.

Figure 6: Owl Region Population Growth

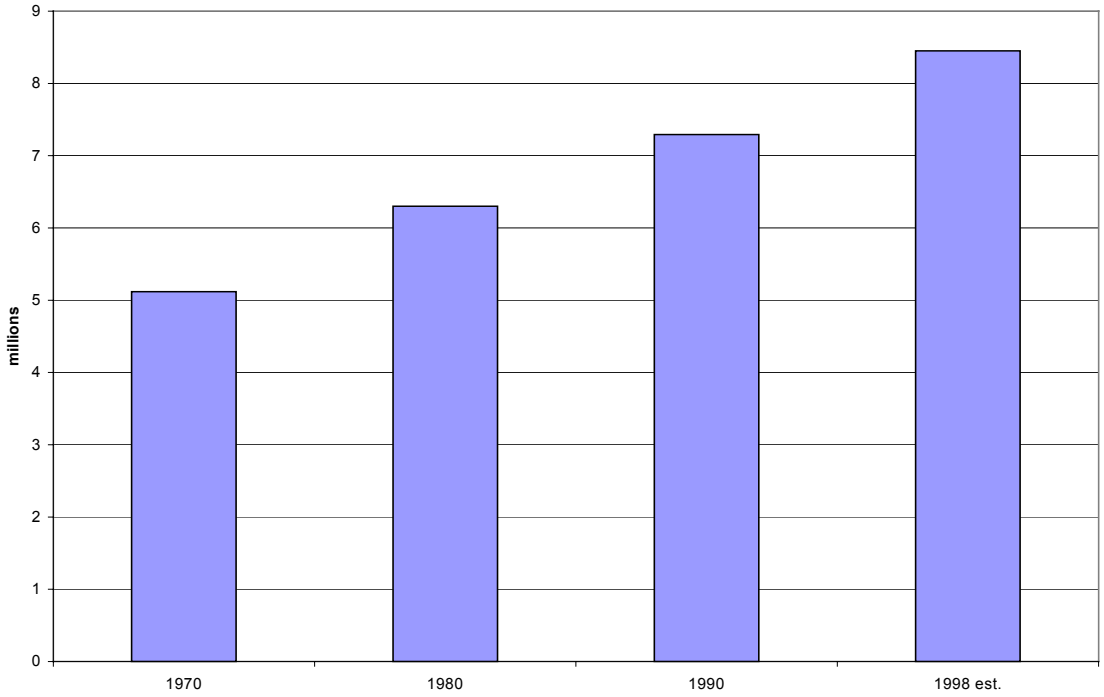


Figure 7: Owl Region Personal Income Growth

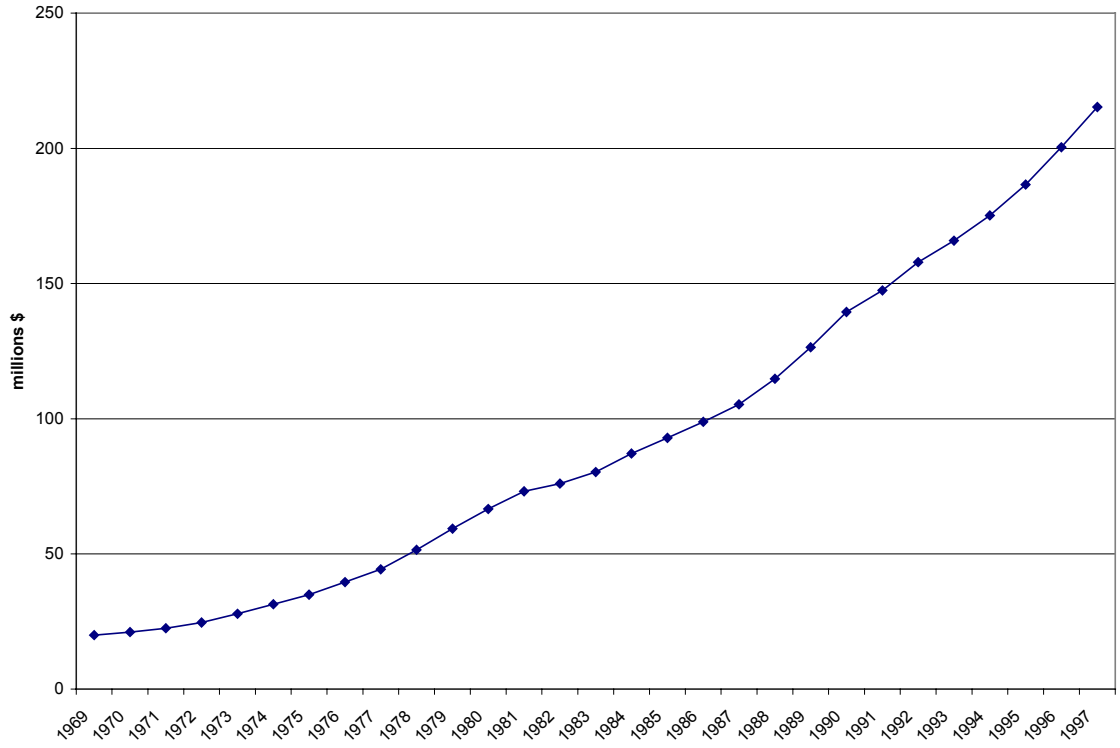


Figure 8: Owl Region Wage and Salary Employment Growth

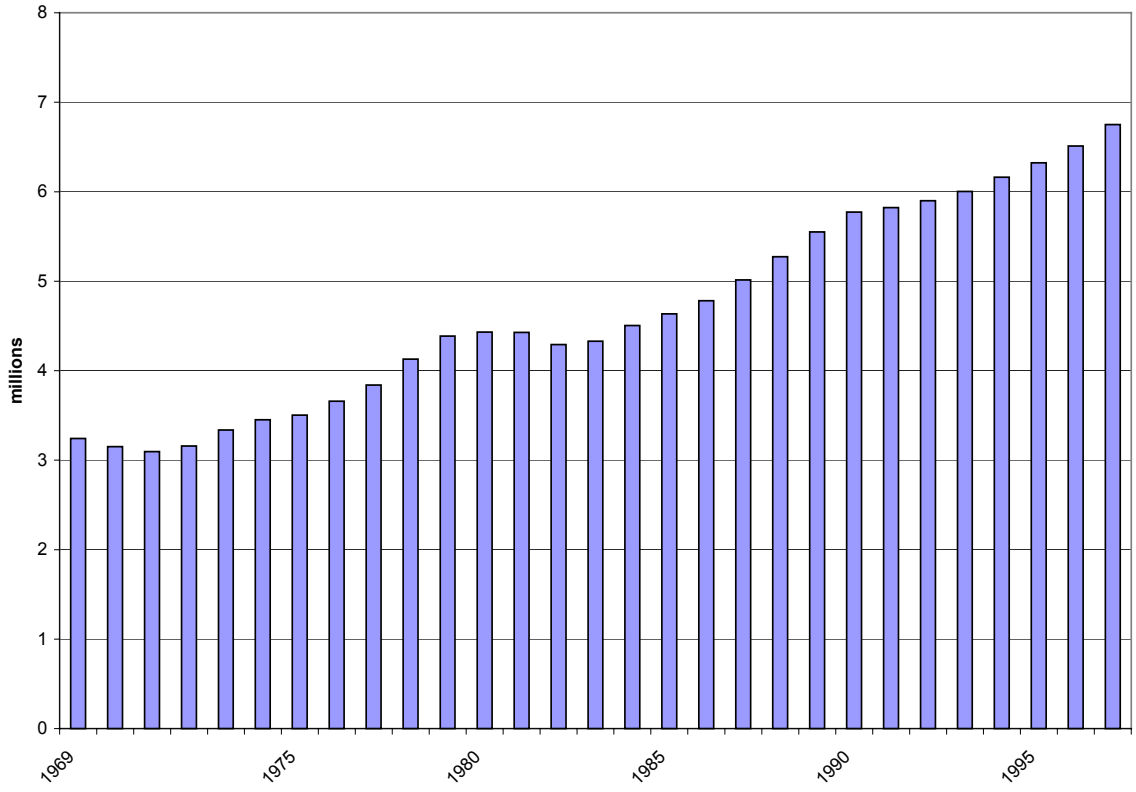


Figure 9: Owl Region Real Wage Growth

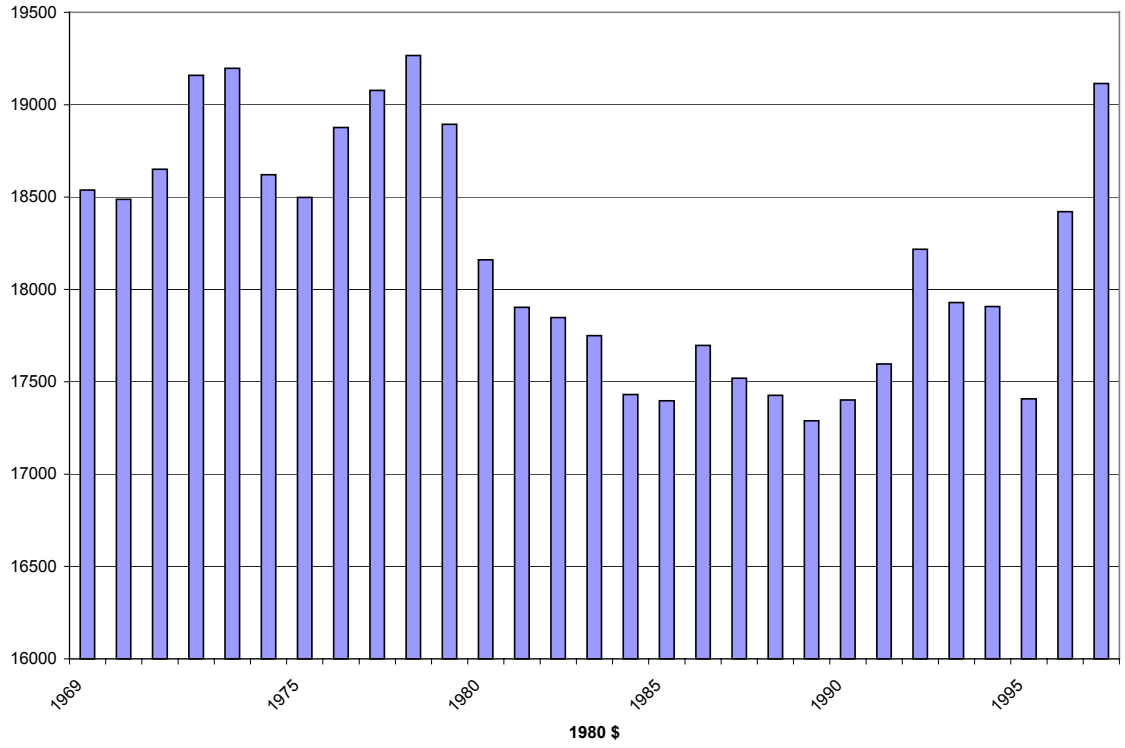


Table 6 compares population changes in owl region and non-owl region counties classified by dominant industry type. Metro counties are more diversified and are reported as a consolidated group rather than by any dominant industries. This table shows that the metropolitan counties grew more rapidly than the rural counties in both the owl and non-owl regions. The metro counties in the owl region actually grew more than the metro areas in the non-owl region, reflecting the influence of two rapidly growing centers of high tech industries, Seattle and Portland. However, many of the rural counties in the owl region also grew more rapidly in population than rural counties of similar economic bases outside the owl region in these three states. Farming, Government, and Services dependent rural counties in the owl region all attracted new population at a higher rate than non-owl counties of similar economic type. Manufacturing oriented counties in the owl region did less well in attracting new residents than the one non-owl region manufacturing counties. The more diversified counties (labeled in this typology as "non-specialized") within the owl region also did less well than the comparable counties in the non-owl region.

Rural counties can also be classified by the type of public policies that significantly affect their economic vitality by providing a source of income to residents through transfer payments. Those owl region counties with unusually large income streams from retired individuals or from federal land management programs did better in attracting new residents than their counterparts in the non-owl counties. Those counties with a high level of transfer payments in the owl region did less well attracting new residents than their counterparts in the non-owl region. The implications of these differences in terms of economic vitality are debatable. Having a stream of retired individuals moving into a county may seem to be a good source of revenue for both private businesses catering to local consumers, or government agencies whose tax revenues depend on local property owners and consumer goods purchases. However, retired people also bring with them demands for medical and other services. Similarly, those counties with an unusually high level of transfer payments may tend to have a higher percentage of persons in poverty who cannot afford to purchase much in goods and services. A large, but not exclusive percentage of transfer payments are from income assistance programs.

Patterns of change in employment and real wages differ substantially between the two sets of counties (Table 8). Metro areas in the owl region performed much better than the non-owl region metro areas, reflecting the dominant influence of Portland and Seattle within the owl region. Among the rural counties, employment increased more slowly among the owl counties than among non-owl counties of similar economic base, except for 3 owl-region service sector oriented counties as compared to the same number of non-owl region service sector counties. On the other hand, real wages went up substantially in owl region farming counties as compared to a very small increase in non-owl region farming oriented counties. Wages in manufacturing counties declined less in the owl region, as was the case for government oriented counties. Owl region service oriented counties experienced a substantial increase in real wages as compared to an even larger decline in the comparable non-owl region counties. Non specialized counties in the owl region experienced a moderate decline in real wages, while the comparable non-owl region counties saw a substantial increase. This mixed pattern of change indicates that

there are many sources of employment and wage change in addition to the federal actions of harvesting timber or remitting funds to local governments. The only consistent pattern is that employment and wage outcomes were far better in metro areas than rural areas, and the metro owl region counties did especially well.

Table 6: Population Changes by Type of Economic Base

Population Change	PctCh 1990-98	n
Owl Counties	15.75%	57
Farming	13.39%	6
Manufacturing	14.43%	8
Government	9.63%	3
Services	19.57%	6
Nonspec	12.08%	15
Metro	19.72%	19
Non-Owl Counties	11.93%	38
Farming	9.43%	16
Manufacturing	22.15%	1
Government	8.56%	3
Services	12.63%	2
Nonspec	15.15%	8
Metro	13.54%	8

Source: US Department of Commerce, Bureau of Economic Analysis

Table 7: Population Changes by Policy Impact Type

Population Change	PctCh 1990-98	n
Owl Counties	15.75%	57
Retirement	17.87%	15
Federal Land	14.97%	20
Transfers	8.66%	4
Metro	19.72%	19
Non-Owl Counties	11.93%	38
Retirement	9.48%	3
Federal Land	9.33%	14
Transfers	19.60%	3
Metro	13.54%	8

Source: US Department of Commerce, Bureau of Economic Analysis

Table 8: Change in Employment and Real Wages

	Employment Change	Real Wage* Change	n
Owl Counties	20.07%	396.41	57
Farming	12.64%	647.39	6
Manufacturing	14.02%	-78.65	8
Government	17.30%	-7.44	3
Services	23.36%	202.08	6
Nonspec	18.68%	-146.12	15
Metro	25.46%	1070.62	19
Non-Owl Counties	17.49%	213.78	38
Farming	19.68%	19.68%	16
Manufacturing	17.07%	-528.55	1
Government	20.89%	-875.50	2
Services	13.48%	-863.59	3
Nonspec	21.89%	471.46	8
Metro	14.17%	120.36	8

Source: U.S. Department of Labor, Bureau of Labor Statistics, Covered Employment and Wages

*Real wages estimated by deflating annual wage per worker by the CPI

Table 9: Employment and Wage Change by Policy Impact Type

Employment Change	Employment Change	Real Wage* Change	n
Owl Counties	20.07%	396.41	57
Retirement	21.70%	131.95	15
Federal Land	18.42%	-105.82	20
Transfers	16.05%	-956.79	4
Metro	25.46%	1070.62	19
Non-Owl Counties	17.49%	213.78	38
Retirement	20.26%	-701.15	2
Federal Land	13.66%	-238.05	14
Transfers	24.68%	-762.79	3
Metro	15.28%	477.64	36

Source: U.S. Department of Labor, Bureau of Labor Statistics, Covered Employment and Wages

*Real wages estimated by deflating annual wage per worker by the CPI

Social Factors

A few social variables can be measured for the owl region counties, giving some sense of whether people living in these areas are likely to feel that living conditions have improved or worsened during the 1990s. Data are available for the unemployment rate, bankruptcies, and crime levels.

Table 10 shows the average unemployment rate for groups of counties organized according to degree of rurality. As one scans down the table from the 3 most urban counties (all in Washington; Oregon data not available), two patterns are apparent. First, the unemployment rate is lower in the metro areas and the counties adjacent to metro areas than in the more rural county groups in both years. Second, while the metro and metro-adjacent counties experienced a slight drop in the unemployment rate between 1990 and 1998, the rural county groupings all show an increase in the unemployment rate. Even the smaller metro areas saw increases in unemployment, similar to the more rural counties.

Table 10: Average Unemployment Rates for Owl Region Counties, 1990 and 1998

County Type	Unemployment Rate		
	1990	1998	n
Major Metro (>1 million urbanized pop'n)	4.7	4.4	3
Adj. To Major Metro	5.4	5.2	4
Medium Metro (>250K urbanized pop'n)	6.6	7.1	46
Adj. To Med. Metro	7.3	7.9	40
Adj. To Metro Co. w/ >20K Urbanized	8.2	8.4	6
Not Adj. To Metro Co. w/ >20K Urbanized	7.9	8.4	10
Adj. To Metro w/ 2.5K to 19.9K Urbanized	8.5	9	11
Not Adj. To Metro w/ 2.5K to 19.9K Urbanized	6.4	7.3	2
Rural < 2.5K Urbanized	5.9	7.0	1

Source: U.S. Department of Labor, Bureau of Labor Statistics

Table 11 demonstrates that the three rural counties specialized in manufacturing saw a decline in unemployment rate between 1990 and 1998, as did two counties whose workers commute into neighboring counties to find work. All other county economic base and policy impact groupings saw an increase in the unemployment rate between 1990 and 1998. Coupled with the previous table that shows substantial population growth in all of these rural counties, the combined picture suggests a potential for growing poverty rates in the rural owl counties. Another possibility raised by some observers is that people who qualify for unemployment may move into rural areas where the housing costs are lower, thereby achieving a small improvement in their living standard. This would not appear to be a sustainable choice of residence since unemployment benefits are relatively short term, and no comprehensive indicator of this alleged phenomenon is available.

Table 11: Average Unemployment Rates by County Type, 1990 and 1998

	1990	1998	n
Economic Base			
Farming	7.1	7.3	5
Manufacturing	4.7	4.4	3
Government	4.4	4.6	3
Services	6.6	7.1	5
Non-Specialized	7.2	7.9	13
Policy Impact			
Retirement	7.5	8.4	14
Federal Lands	7.2	7.6	19
Commuting	9.4	8.4	2
Transfer Payments	6.7	8.0	2
Metro	7.4	7.7	18

Source: U.S. Department of Labor, Bureau of Labor Statistics

Table 12 shows data on percent change non-commercial (personal) and commercial bankruptcies by county type within the owl region. The number of non-commercial bankruptcies increased in almost all counties in the owl region, but the percent increase was lower in the metro counties than in any of the rural county groups except for farming oriented counties. The commercial bankruptcy patterns are more complicated. The number of bankruptcies decreased in farming, commuting, and transfer payment oriented counties, but increased in all other counties. Among the counties experiencing increases in commercial bankruptcies, metro counties experienced lower increases than all but the government based counties. As an indicator of stress, the bankruptcy data suggest greater financial stress throughout the owl region, and some tendency towards greater increases in bankruptcies in the rural counties as compared to the metro area counties.

Table 13 shows a summary of changes in crime in the owl region counties. Data are available only for counties in California and Oregon both before and after the listing of the owl. The changes in crime incidence are quite varied from one county grouping to another and there do not seem to be any clear patterns of differentiation among the county types. Overall there were modest increases in the incidence of both crimes against persons (rape, murder, robbery, assault) and crimes against property (burglary, arson, motor vehicle theft) throughout the owl region.

Table 12: Percent Change in Bankruptcies by County Type in the Owl Region, 1989-98

	Non-Commercial	Commercial	n
Economic Base			
Farming	102.7%	-3.9%	6
Manufacturing	135.4%	150.4%	8
Government	132.5%	51.9%	3
Services	191.1%	210.0%	6
Non-Specialized	153.4%	247.0%	15
Policy Impact			
Retirement	178.2%	312.3%	15
Federal Lands	155.4%	100.1%	20
Commuting	243.8%	-54.5%	2
Transfer Payments	181.9%	-31.4%	3
Metro	104.9%	52.8%	19

Source: US Bankruptcy Courts, California, Oregon, Washington

Table 13: Percent Change in Crime Incidence by County Type in the Owl Region, 1989-98

	Crimes Against Persons	Crimes Against Property	n
Economic Base			
Farming	-5.6%	114.9%	1
Manufacturing	27.3%	-4.6%	3
Government	-62.2%	45.2%	2
Services	70.1%	59.3%	3
Non-Specialized	32.4%	31.4%	8
Policy Impact			
Retirement	46.3%	2.6%	7
Federal Lands	48.7%	32.6%	8
Commuting	n/a	n/a	0
Transfer Payments	-35.1%	22.0%	2
Metro	20.4%	32.1%	9

Source: U.S. Federal Bureau of Investigation

Summary of Economic and Social Trends

The trend analysis above does not show any consistent relationships between county level harvest changes and changes in employment in the sectors of the economy most closely related to timber harvest such as lumber and wood products manufacturing or forestry. The absence of strong correlations at this level of analysis suggests that much of the harvest may cross county borders before reaching a mill. In addition, imports from outside the region are utilized by some mills, and the propensity to export material in log form has changed over time in response to economic conditions and federal policy. Technology also has evolved significantly. All of these factors make it difficult to show definitive, casual relationships between changes in harvest volumes and economic activity levels.

Trends in overall employment suggest stronger economies in metropolitan areas and those counties adjacent to metropolitan areas. Owl region counties gained population more quickly during the 1990s than non-owl region counties in the same states, but employment and wage changes did not consistently follow the same pattern. These trends reflect the well-known urban-rural divide or "Cascade Curtain" in the Northwest, with metropolitan counties faring better than rural counties, and the western metropolitan areas doing particularly well as compared to smaller metro areas east of the Cascades. Comparisons of counties by type of economic base and by policy impact category revealed few consistent patterns of change over the 1990s, whether the owl counties are considered as a group or if they are compared to non-owl counties. The one variable that consistently differentiates outcomes is the degree of rurality. This finding is consistent with prior work in this region. For example, federal agency researchers indicate that population size and distance from major transportation corridors are major factors affecting how communities will be impacted by a harvest decline. The data analyzed in this report show that the metropolitan part of the region, led by Seattle and Portland, gained more population and employment, and experienced real wage gains in contrast to the real wage declines in rural counties. Few consistent differences are apparent in the social trends for which data could be assembled at a county level.

While this review of trends establishes a general regional context, it does not directly confirm or refute the structural framework laid out in the second section of this report. The county and regional level trends reflect so many cross-cutting factors that the casual relationships regional economic theory suggests cannot be discerned. Some relationships, such as a broad relationship between harvest volume and employment in lumber and wood products manufacturing may be discernable at a more aggregated level, but interpreting such relationships would be difficult given changes in exports, technology, and market conditions. Likewise, it is difficult to discern the mediating roles a strong tourism component to the economy or the growth of nearby urban areas may have on a rural economy where federal land management changes are also occurring. To tease out the impacts of changing federal land management actions, whether they are relatively small changes in timber sales or adjustments to federal payments to local governments, or large scale changes such as sudden and sweeping restrictions on harvest, requires dropping down to a lower unit of analysis: the community rather than counties

or multi-county regions. The remainder of this paper considers strategies for a community level analysis.

Monitoring at a Community Level

Monitoring was called for at a community level in the Record of Decision, but very little research has been conducted on sources and explanations for changes in socioeconomic variables at a community level. Standard data sources on population, economic, and social changes tend to report data at a county or higher level of aggregation. Our literature search uncovered only two attempts to collect comprehensive data at a community level. The piece by Horne and Haynes relies on county level measures of economic specialization, and uses circles drawn around individual communities to attribute county level data to particular communities. In addition to employment specialization, they develop data from agency sources on public lands in these communities. The circles used by Horne and Haynes represent a rough application of "distance theory," a branch of regional economics that suggests that consumers will buy at the closest location to minimize travel costs. Analogously, workers can be expected to minimize travel costs to reach competing jobs paying an equal wage. However, it must be noted that this work does not have the advantage of precisely measured community level economic attributes. In contrast, Jackson and Lee have determined what can be measured from secondary data sources for sub-county units for a two county region on the northern Olympic Peninsula. The range of data types they identify is much broader than Horne and Haynes' employment and land data, but on the other hand their geographic resolution is unique to each data source and does not correspond to typical community boundaries.

Neither of these pieces captures the complexity of issues suggested by the research framework sketched above. Most importantly, neither of them was able to capture flows of resources and people across county lines, except for the cross-county commuting flow of workers captured every 10 years by the Census. The difficulties these researchers encountered in trying to conduct community scale analyses suggests that the only feasible approach would be primary data collection through surveys and observations. This approach to research is very expensive and might have to be combined with a sampling scheme to keep costs within reasonable bounds.

In utilizing the Department of Agriculture's economic base and policy dependence codes for counties in the spotted owl region, we were hopeful that consistent and meaningful differences would be found between these groups of counties. If retirement counties tended to show distinctive employment or population patterns as compared to manufacturing oriented counties, for example, then we could recommend a sampling frame to pick up patterns of change characteristic of these different types of counties. However, considering the range of variables examined in the economic trends section above, the only consistent differences are between the metropolitan counties and those adjacent to these large cities, vis á vis the more rural counties. Within the broad set of rural counties with different economic bases or policy impacts, no consistent patterns are apparent. In terms of the research framework shown above, "leakages" or cross county flows are probably more important than anticipated. Workers crossing county lines from a place of residence to a place of work, and firms who import materials and export products across county lines, are so common that one cannot trace changes in forest

harvest to changes in mill employment or overall employment. Likewise, manufacturing counties are not necessarily better off than service oriented counties, nor are counties with extensive transfer payments necessarily going to grow more quickly or slowly than those with extensive federal lands. The unmeasured "leakages" render the model useless in the absence of direct data measuring the leakages themselves. The only way out of this trap is to directly measure the flows across county lines. While some secondary data is available that may be useful in working at a community level, much of the required information would have to be gathered through interviews and surveys.

The other research approach used in the trends analysis above was to compare the owl region counties to neighboring counties in the same three states located outside the owl region. By comparing rural western (owl region) counties to rural eastern (non-owl region) counties, holding constant the economic base and policy dependence, we saw that in many ways the owl counties saw larger population increases but mixed results on employment, wages, and personal income. If the leakages across county lines are roughly constant in the owl and non-owl region, this comparative approach gives some assurance that the overall vitality of the owl region has not been destroyed by changes in federal policy. However, a stronger conclusion about the vitality of the owl region really is not possible with the available data. Furthermore, this comparative approach is compromised by the many changes in resource flows from the non-owl counties during the 1990s, due to other endangered species issues and changes in planning directives governing the decisions of the forest managers.

Dropping down to a community level and data gathered through interviews and surveys, it should be possible to directly measure the leakages across county lines. The current number of workers who commute outside the county to find work should be relatively simple to estimate using surveys of the local population. Wage, income, and social outcomes data could be collected by the same means. These estimates could be compared to Census data to ascertain trends. The Washington State Population Survey, modeled after the federal Current Population Survey, provides an example of a comprehensive survey of economic and social factors of the sort that would be required. This survey yields usable estimates at a state level and for eight sub-state regions. For community level analyses, a different sampling frame would be required to yield reliable estimates at a community level. This research approach may provide current descriptions of economic structure and would allow impact monitoring for fairly recent management actions. However, this approach is not likely to yield defensible measure of the impact of actions that took place a decade or more ago when the Forest Plan was first being devised and very dramatic reductions in harvest were implemented. Community respondents are unlikely to have accurate memories or records of the economic structure of that time, particularly if firms closed or people have moved away in the interim.

The findings summarized above do not give confidence that a sampling approach will be viable for a community level monitoring program. The best suggestion is to experiment with a survey based approach in a few pilot communities, and if the findings yield results that are useful, then the program could be expanded to more communities as resources permit. In a private communication, BLM economist Frewing-Runyon suggests a

combination of data availability and findings from past work as a basis for sampling. Her first suggestion is to focus only on communities recognized by the Bureau of Census so that the 1980, 1990, and 2000 census data can be incorporated. Second, she notes that federal agency staff have identified population size and distance from transportation corridors as key factors affecting the capacity of communities to adjust to a major economic shock such as a sudden reduction of harvesting levels on a federal forest. Communities considered to have low capacity to respond to such a shock because they are small and isolated could be paired with similar sized higher capacity communities, i.e., those near an interstate highway or close to an urban area. Pairs could also reflect different economic bases, including with and without wood processing facilities, with and without tourism, etc. Such a sampling scheme could be further developed at modest cost, investigating the availability of information from prior federal agency work on these issues. Initial pilot testing could take place in perhaps three communities of similar capacity, but different economic bases, or two communities of similar base but differing capacity.

Another monitoring approach is based on the recognition that broad societal trends and specific local events affect residential and business location decisions, the value of commodities extracted from the land, and the value of non-extractive uses of the natural landscape. These trends cannot be predicted but can be studied or "monitored" once it is clear that something different is happening in a particular community. Instead of sampling through a scheme developed in advance, tools for monitoring would be developed along the lines suggested here using data collected in perhaps two or three communities. These tools would then be applied further only in communities where a substantial change in management practices is anticipated, e.g., a new endangered species listing, a change from resource extraction to park-like uses, or closure of a regional office of a federal agency. In addition to this "on the shelf" toolkit, it might be advisable to carry out a general indicators monitoring program as represented by this report or the Pacific Northwest Atlas every 3-5 years as a check on overall conditions in the region.

If either the Frewing-Runyon sampling approach, or the toolkit development approach is adopted, the next step is a set of community level studies to build practical models. The remainder of this section discusses some issues that must be resolved to accomplish this, and develops a rough budget estimate for this next step.

Practical approaches to data collection must be developed to trace as much of the conceptual model as possible. Development work on these aspects would be guided by several prior works:

- Yin's (1994) case study methodology, suggesting that hypothesis testing can be conducted using structured case studies; this approach would allow construction of tools to study the impact of federal actions without having to sample large numbers of communities
- Work by Robison (1996) and others on estimating small area economic characteristics and processes in part through data estimation techniques to overcome suppression codes, supplemented by surveys to confirm key pieces of missing data;

- The Arizona Communities Project (Gibson, 1999), which traced the trade linkages of firms in small rural communities and estimated simple economic base models in Arizona through interviews and surveys;
- Federal agency work on the Interior Columbia Basin, which used analyst-constructed indices of diversity and stability (Horne and Haynes, 1999);
- Beyer's small community investigations, focused on personal income trends including non-earnings income and the role of environmental amenities in attracting new residents who in some manner telecommute or commute periodically to urban area jobs; and
- Jackson & Lee's exploratory administrative and Census data collection effort for Olympic Peninsula communities.

In developing the research design, several very difficult issues would have to be confronted, including the following:

- How to investigate, and then integrate sociological and economic perspectives based on the social capital approach or other paradigms;
- Ability of informants in communities to provide accurate information on historical impacts as well as relatively current events;
- Isolating the impacts of federal actions given dynamic changes in local economies and the confounding influences of many economic and social variables that cannot be held constant while an impact monitoring process is implemented; and
- How the interest and cooperation of community members can be gained to make the research feasible, perhaps by making findings available for local community and economic development projects.

Very preliminary budget estimates have been constructed based on the following assumptions:

- For each study community, a team of two graduate students, or researchers with a similar skill level, would be required to conduct a survey of businesses and a survey of residents. These two field researchers would require approximately two months each to complete the field research. The cost of the field research would be approximately $15,000 per community, plus a one time cost of $15,000 for a principal investigator who would work with the field researchers to develop the survey instruments and guide the work of the field researchers. If as many as 6 communities were studied, the principal investigator time would increase to perhaps 2 months ($20,000 with travel, office costs etc.).
- Senior scientists at a university or research station would estimate the structural model and models linking social impacts to changes in the economy, using data from at least 3-6 communities. Two months of an economist and 2 months of a sociologist would be required for this task. More robust models are likely if data from 6 communities are used in the modeling.
- Total costs for 3 communities would be in the range of $85,000; for 6 communities, the cost would rise to approximately $140,000.

Bibliography

Ashton, Peter G. and James B. Pickens. "*Employment diversity and economic performance in small, resource-dependent communities near Western national forests.*" Society and Natural Resources, 1995, v. 8, pp. 231-241.

Carley, Michael J. and Eduardo S. Bustelo. *Social Impact Assessment and Monitoring: A Guide to the Literature*. Boulder and London: Westview Press, 1984.

Christensen, Harriet H., W. McGinnis, T. Raettig, and E. Donoghue. *Atlas of Human Adaptation to Environmental Change, Challenge, and Opportunity: Northern California, Western Oregon, and Western Washington.* Portland, OR: USDA Forest Service Pacific Northwest Research Station, 2000.

Cook, Peggy J., and Karen L. Mizer, *The revised ERS County Typology: An Overview*, Washington, D.C.: Rural Economy Division, Economic Research Service, U.S. Department of Agriculture, Rural Development Report 89, December, 1989.

Force, Jo Ellen, Gary E. Machlis and Lianjun Zhang. The engines of change in resource-dependent communities. Forest Science, 2000, 46(3), pp. 410-421.

Gibson, Lay James, and Erik Glenn. The Round Valley region economic base study: A generic case study of three hypothetical communities. Economic Development Review, Fall 1999, pp. 53-62.

Hamilton, J.R., N.K. Whttlesey, M.H. Robison, and J. Ellis, "Economic impacts, value added, and benefits in regional project analysis." 1991, *American Journal of Agricultural Economics*, 73(2), 334-344.

Hawe, P. and A. Shiell. "Social capital and health promotion: A review." *Social Science and Medicine*, September 2000, 51 (6) : 871-885

Horne, Amy L., and Richard W. Haynes. *Developing Measures of Socioeconomic Resiliency in the Interior Columbia Basin.* U.S. Department of Agriculture Forest Service Pacific Northwest Research Station, Portland, OR, PNW-GTR-453, April 1999.

Interior Columbia Basin Ecosystem Management Project. *Economic and Social Conditions of Communities.* U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, February 1998

Isard, Walter, et al. *Methods of interregional and regional analysis*. Aldershot; Brookfield, Vt.: Ashgate, 1998

Jackson, J. Elizabeth and Robert G. Lee, "Big Changes in Small Places: A Report on Trends in Social and Economic Indicators for Local Areas of Clallam and Jefferson Counties," draft manuscript, Department of Sociology and College of Forest Resources, University of Washington, Seattle, December 1998.

Johnson, Sue and Rabel J. Burdge, "Social Impact Statements: A Tentative Methodology," In Rabel J. Burdge, *A Conceptual Approach to Social Impact Assessment*, Middleton, WI,: Social Ecology Press, pp. 13-24.

Larson, Dave and Phil Aust. "Washington mill survey 1986-1996: Has the sun really set on Washington State's forest products industry?" Presented at the Pacific Northwest Regional Economics Conference, Bellingham, April 27-29, 2000 (http://www.ac.wwu.edu/~cebr/pnrec/Aust.html).

Leistritz, F. Larry and Steven H. Murdock. *The Socioeconomic Impact of Resource Development: Methods for Assessment*. Boulder and London: Westview Press, 1981.

Putnam, Robert D. *Bowling Alone : The Collapse and Revival of American Community.* New York : Simon & Schuster, c2000.

Record of Decision for Amendments to Forest Service and Bureau of Land Management Plans within the Range of the Northern Spotted Owl, Washington, D.C., April 13, 1994.

Robison, M. Henry. "Community Input-Output models for rural area analysis: with an example from Central Idaho." Moscow: Economic Modeling Specialists, October 1996.

M.A. Rudd, "Live long and prosper: collective action, social capital and social vision." *Ecological Economics*, July 2000; 34 (1) : 131-144.

Siegel, Paul B., Thomas G. Johnson, and Jeffrey Alwang. "*Regional economic diversity and diversification*." Growth and Change, Spring 1995, v. 26, pp. 261-284.

Washington State Office of Financial Management, Washington *State Population Survey: A Current Profile of Washington State*. URL: http://www.ofm.wa.gov/sps/index.htm, February 1999.

Yin, Robert K. *Case study research: Design and methods*. 1994. Thousand Oaks: Sage Publications.