

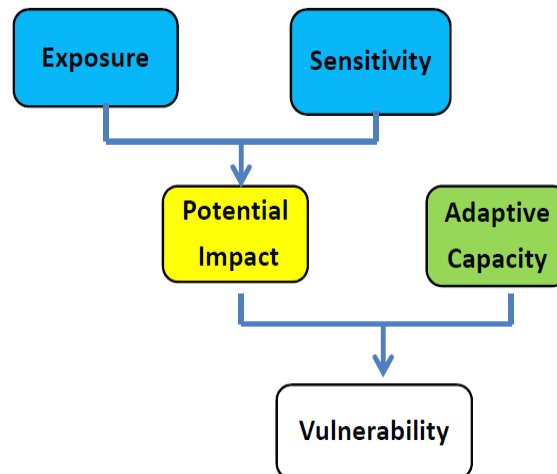
Socioeconomic Vulnerability Assessment

The impacts of climate change can be broadly grouped under three headings (Lal et al. 2011a, 2011b)ⁱ: ecological, social, and economic. This section will focus on the characteristics of the counties in the analysis area that make them more or less vulnerable to the impacts of climate change as well as the possible social and economic impacts associated with potential ecological impacts.

Climate Vulnerability

Climate vulnerability is the degree to which a system is susceptible to, or unable to cope with, adverse effects of change, including climate variability and extremes. Vulnerability is a function of exposure, sensitivity, and adaptive capacity.

Exposure and sensitivity are almost inseparable properties of a system and are dependent on the interaction between the characteristics of the system and on the nature of the climate impacts. For the purposes of socioeconomic vulnerability assessments related to National Forests, we will not distinguish between exposure and sensitivity.

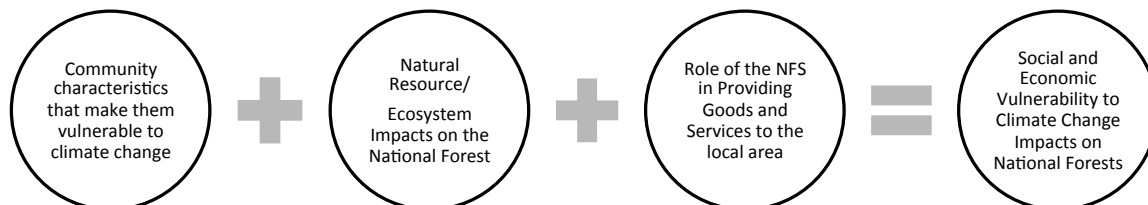


Adaptive capacity

is the ability or potential of a system to respond successfully to change, including climate variability, and includes adjustments in both behavior and in resources and technologies. Adaptive capacity is a necessary condition for the design and implementation of effective adaptation strategies to (1) reduce the likelihood and the magnitude of harmful outcomes resulting from climate change and (2) take advantage of opportunities or benefits from climate change, such as a longer growing season or increased potential for tourism.

Socioeconomic Vulnerability Assessments

Socio-economic vulnerability is a function of a community's characteristics and the potential changes in natural resources and ecosystems. The Forest Service plays a significant role in shaping community vulnerabilities because of its responsibility for managing natural resources and through direct employment, contracts, and partnerships that benefit local economies and can help build adaptive capacity.



Community Characteristics

Rural counties have several important characteristics that, in general, affect their ability to adapt to change. High poverty and unemployment rates, aging populations, and dependence on government transfer payments suggest greater sensitivity to change, including climate variability.

Natural Resource Dependence and Impacts from Climate Change

Rural communities are also often more dependent on natural resources for jobs, income, recreation, food, cultural and spiritual uses. Higher dependency on natural resources generally indicates greater exposure to the impacts of climate change.

Role of the U.S. Forest Service

Public lands, including National Forests, make up a significant share of the land base of many rural counties. The lands provide multiple ecosystem services, including timber, food, recreation, spiritual and religious values, and clean water. How they are managed is central to rural economies and community well-being.

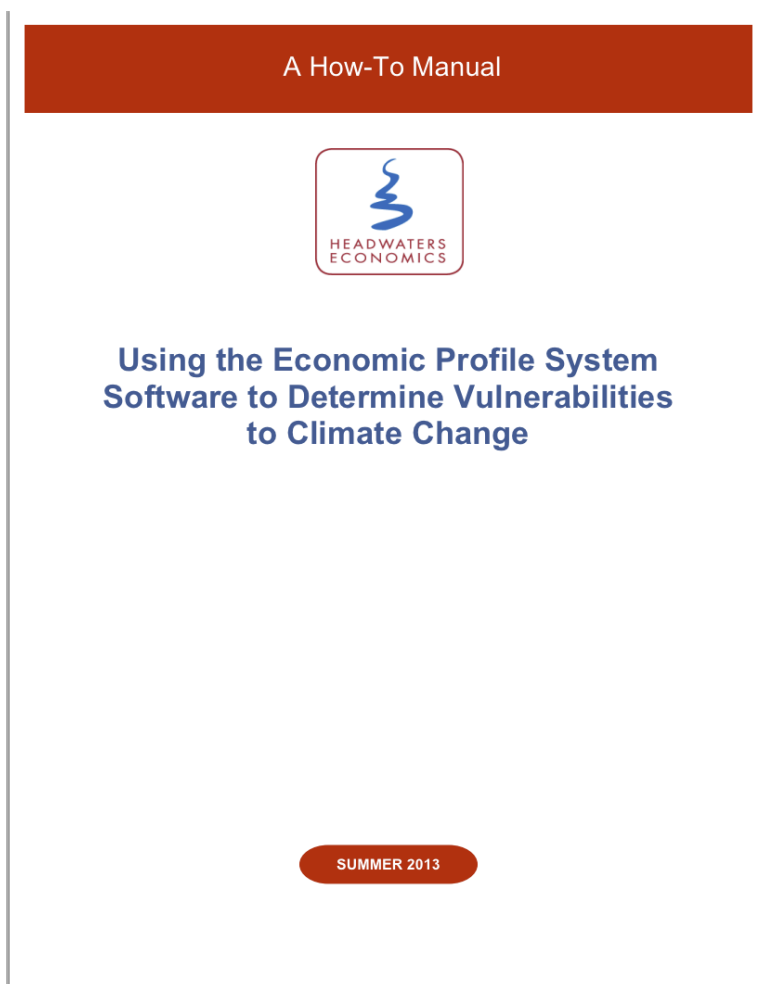
The agency is also a significant employer, providing relatively high-wage jobs and benefits important to many families and communities. Finally, the way the agency interacts with people through collaborative planning, partnerships, and shared information builds social capital and adaptive capacity in rural communities.

Economic Profile System—Human Dimensions Toolkit

Headwaters Economics, the Forest Service, and the BLM partnered to build the EPS-HDT software that allows users to gather basic demographic and economic information for most geographies in the United States. The information provided here largely comes from EPS-HDT.

We are developing a companion manual that shows how to use the EPS-HDT software as a part of socioeconomic vulnerability assessments. The manual begins by describing of the Economic Profile System-Human Dimensions Toolkit (EPSHDT, or simply EPS for short) and how to use this socioeconomic reporting software.¹

Next, the manual explains how to select the right geography for analysis and walks through various land, people, and economic measures that are useful for identifying climate vulnerabilities. Finally, it shows examples of climate adaptation plans that have established connections between climate change impacts and human and economic vulnerabilities, and outlined adaptive actions.



Regional Characteristics

Regional Characteristics

Rural counties have several important characteristics that, in general, differ from more urban communities, many of which affect the ability of rural communities to adapt to change. Rural communities tend to be poorer than their urban counterparts and unemployment is often higher, both of which suggest a higher sensitivity and lower capacity to cope with the adverse impacts of climate change.

Rural communities are also often more dependent on natural resources-related jobs and income, and are more closely tied to ecosystems for recreation, food, and cultural and spiritual use.

This document is intended to provide you with information you can use to begin a socioeconomic climate vulnerability assessment. It is organized into several sections:

1. Regional characteristics:
 - a. Economy
 - b. Income and poverty
 - c. Demographic characteristics

2. Natural Resource Dependencies
 - a. Land use
 - b. Natural resource-related economic sectors
 - c. Vulnerable populations
 - d. County payments

Economy

Because climate change may alter or disrupt basic economic infrastructure and conditions, it is useful to understand important aspects of the economy that may be vulnerable to climate change in your geography.

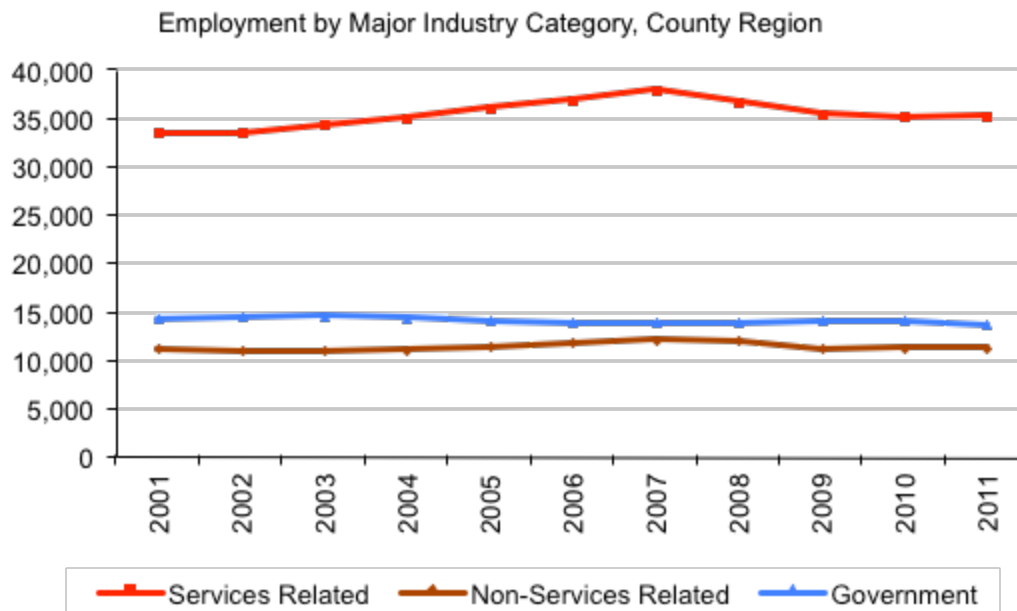
What are the principal industries in the economy?

Why is this important to vulnerability assessments?

Because climate change may alter or disrupt basic economic infrastructure and conditions, it is useful to understand important aspects of the economy that may be vulnerable to climate change in your geography.

To understand the region’s economy, it is necessary to look at the industry mix in the region. The graph below shows employment for the last decade to describe trends in services-related and non-services-related industries as well as government. Services sectors include a mix of occupations ranging from doctors, architects, and lawyers to hotel maids and retail clerks, and non-services sectors include goods-producing activities such as agriculture, manufacturing (including the wood products industry), and construction.

Regional Characteristics



The majority of jobs are in services-related industries, and this sector grew by five percent during this time period from 33,455 jobs to 35,246 jobs in 2011. By

ASSESSING SOCIO-ECONOMIC VULNERABILITY TO CLIMATE CHANGE

comparison, non-services (i.e., goods producing sectors) and government employment remained relatively stable, but those two sectors provide fewer jobs combined than the services sector.

	2001	2011	Change 2001-2011
Total Employment (number of jobs)	59,961	61,264	1,303
Non-services related	~11,204	~11,335	131
Farm	2,784	2,841	57
Forestry, fishing, & related activities	~975	~981	6
Mining (including fossil fuels)	~227	~343	116
Construction	2,930	2,876	-54
Manufacturing	4,288	4,294	6
Services related	~33,455	~35,246	1,791
Utilities	~131	~170	39
Wholesale trade	~1,217	~1,313	96
Retail trade	7,343	6,401	-942
Transportation and warehousing	~1,952	~1,541	-411
Information	~791	~799	8
Finance and insurance	~2,116	2,749	633
Real estate and rental and leasing	~1,388	1,947	559
Professional and technical services	2,226	2,482	256
Management of companies and enterprises	572	~385	-187
Administrative and waste services	1,276	~1,420	144
Educational services	~443	~724	281
Health care and social assistance	5,811	~7,114	1,303
Arts, entertainment, and recreation	869	~972	103
Accommodation and food services	4,239	~4,360	121
Other services, except public administration	~3,081	~2,869	-212
Government	14,392	13,758	-634
Percent of Total			% Change 2001-2011
Total Employment			2.2%
Non-services related	~18.7%	~18.5%	1.2%
Farm	4.6%	4.6%	2.0%
Forestry, fishing, & related activities	~1.6%	~1.6%	0.6%
Mining (including fossil fuels)	~0.4%	~0.6%	51.2%
Construction	4.9%	4.7%	-1.8%
Manufacturing	7.2%	7.0%	0.1%
Services related	~55.8%	~57.5%	5.4%
Utilities	~0.2%	~0.3%	30.2%
Wholesale trade	~2.0%	~2.1%	7.9%
Retail trade	12.2%	10.4%	-12.8%
Transportation and warehousing	~3.3%	~2.5%	-21.1%
Information	~1.3%	~1.3%	1.0%
Finance and insurance	~3.5%	4.5%	29.9%
Real estate and rental and leasing	~2.3%	3.2%	40.2%
Professional and technical services	3.7%	4.1%	11.5%
Management of companies and enterprises	1.0%	~0.6%	-32.7%
Administrative and waste services	2.1%	~2.3%	11.3%
Educational services	~0.7%	~1.2%	63.5%
Health care and social assistance	9.7%	~11.6%	22.4%
Arts, entertainment, and recreation	1.4%	~1.6%	11.9%
Accommodation and food services	7.1%	~7.1%	2.9%
Other services, except public administration	~5.1%	~4.7%	-6.9%
Government	24.0%	22.5%	-4.4%

From 2001 to 2011, the largest sectors are government (22.5%), health and social assistance (11.6%), retail trade (10.4%), accommodation and food services (7.1%), and manufacturing (7%).

Other important sectors to the region's economy such as farm, travel and tourism, and forestry are discussed below. These sectors are susceptible to future impacts from climate change—such as potential drought, extreme weather events, or longer fire seasons—and understanding both how large these sectors are, as well as the extent of their vulnerability to climate change, will help communities and local governments better prepare for potential climate change impacts.

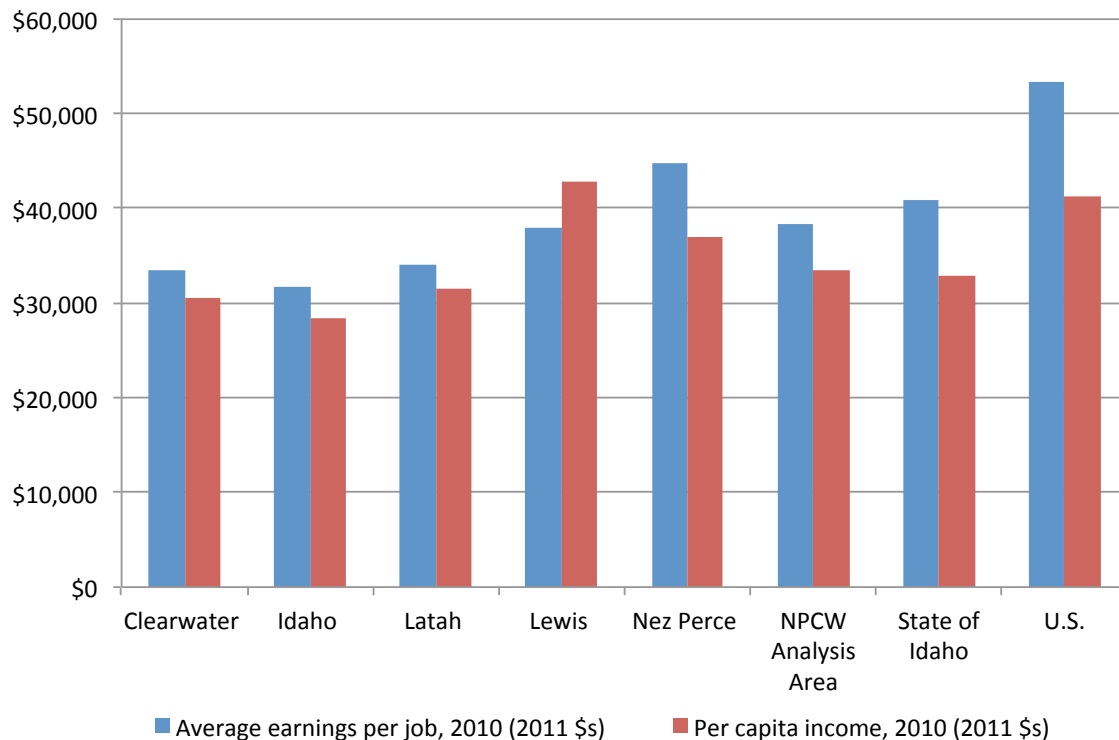
INCOME AND POVERTY

What are income levels across the regional economy?

Why is this important to vulnerability assessments?

Rural communities tend to be poorer than their urban counterparts and unemployment is often higher, both of which suggest a higher sensitivity and lower capacity to cope with the adverse impacts of climate change.

Regional Characteristics



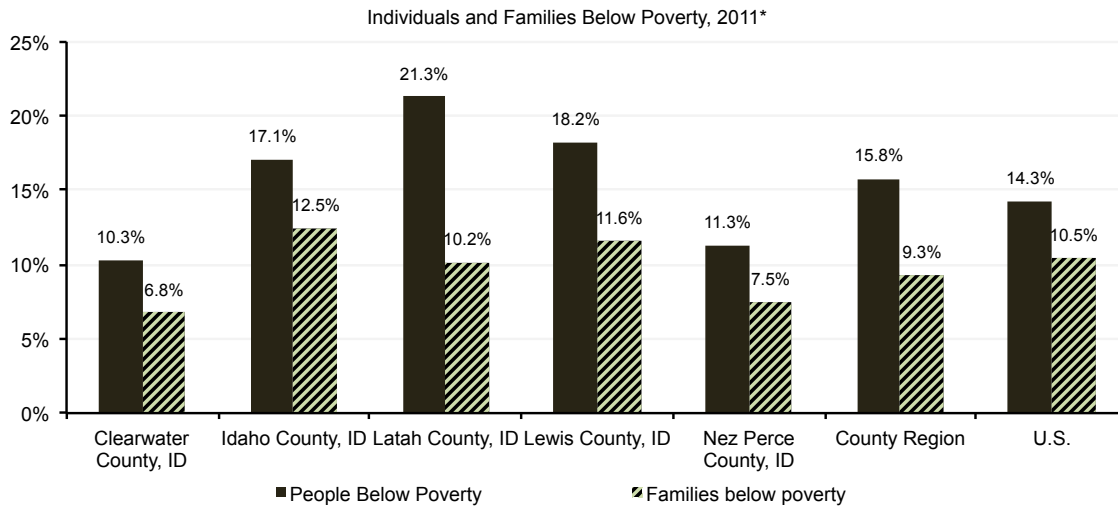
The counties in the NPCW analysis area, for the most part, tend to have low income, especially in Idaho and Clearwater Counties. Per capita income in the state of Idaho is substantially lower, on average, than for the nation as a whole. In 2010, per capita income in Idaho was \$32,904, compared to the national average of \$41,198. Four of the five counties in the analysis (all except Lewis County) had per capita income levels that were substantially below the national average of \$41,198 in 2010, including Idaho County (\$28,406), Clearwater County (\$30,584), Latah County (\$31,600), and Nez Perce County (\$36,926).

How much of the population lives in poverty or economic hardship?

Why is this important to vulnerability assessments?

People living in poverty may be more vulnerable to climate change impacts, either because of limited financial resources to respond to change, substandard housing, or limited mobility.

Regional Characteristics



In 2010, Idaho County ranked 7th in the percentage of all persons in poverty and 5th in children in poverty for all counties in Idaho. Despite some changes in rankings for the counties in the five-county area, all five counties had an increase in the percentage of people and children in poverty from 1999 to 2010, as did the state of Idaho. In 2010, the percentage of all people in poverty had increased, with a low of 12.5 percent in Nez Perce County to a high of 28.6 percent in Lewis County. Idaho, Clearwater, and Lewis Counties all had more than a quarter of children under the age of 18 living in poverty in 2010.

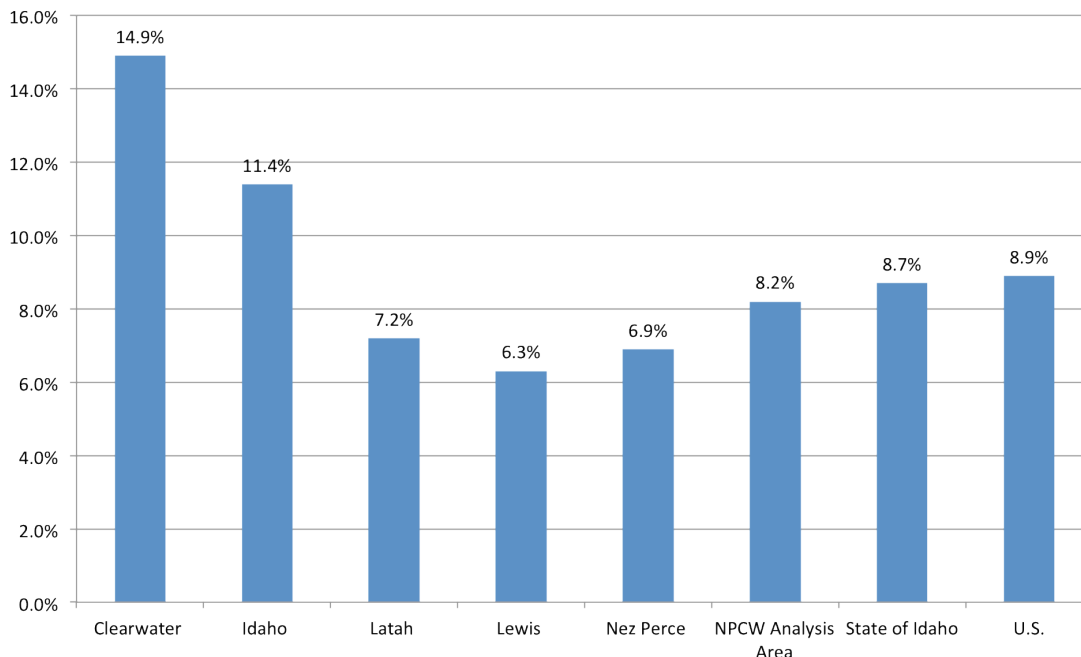
EPS-HDT uses the federal government's definition of poverty, which corresponds with how most poverty data is reported. Following the Office of Management and Budget's Directive 14, the Census Bureau uses a set of income thresholds that vary by family size and composition to detect who is poor. If the total income for a family or an unrelated individual falls below the relevant poverty threshold, then the family or an unrelated individual is classified as being "below the poverty level."

Unemployment

Why is this important to vulnerability assessments?

High unemployment rates are an indication of economic hardship that may make people and communities more vulnerable to climate change impacts because of limited financial resources to respond to change.

Regional Characteristics



Unemployment rates are high among several of the counties in the analysis area, especially in Clearwater and Idaho Counties. Over the 15 year-period from 1997 to 2011, the average unemployment rate in Clearwater County was second in the state with an average of 11.9 percent (compared to the state average of around 5 percent), followed by Idaho County with 8.9 percent and ranking sixth in the state. The other three counties have not experienced the level of unemployment seen in Clearwater and Idaho Counties. Lewis County averaged 5.4 percent and ranked 24th; Nez Perce County averaged 4.5 percent and ranked 34th; and Latah County averaged 4.1 percent and ranked 38th.

How important is age-related and economic hardship-related non-labor income to total personal income?

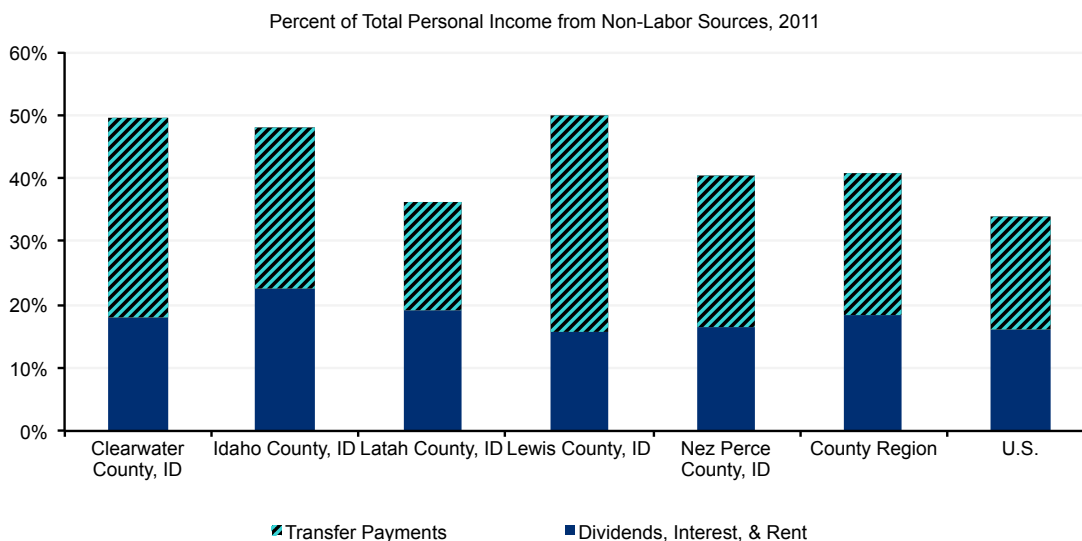
Why is this important to vulnerability assessments?

Non-labor income is often the largest single source of personal income in rural areas. Non-labor income is made up of two main components: money earned from investments (dividends, interest, and rent) and government transfer payments. Both of these major components are often closely related to an aging or elderly population, and in some cases (e.g., income maintenance) to a population facing economic hardship.

With the baby boom generation reaching retirement age, it is likely non-labor income will continue to be a growing source of personal income. Rising transfer payments from income maintenance may indicate increasing economic stress that can make people and communities more vulnerable to changes.

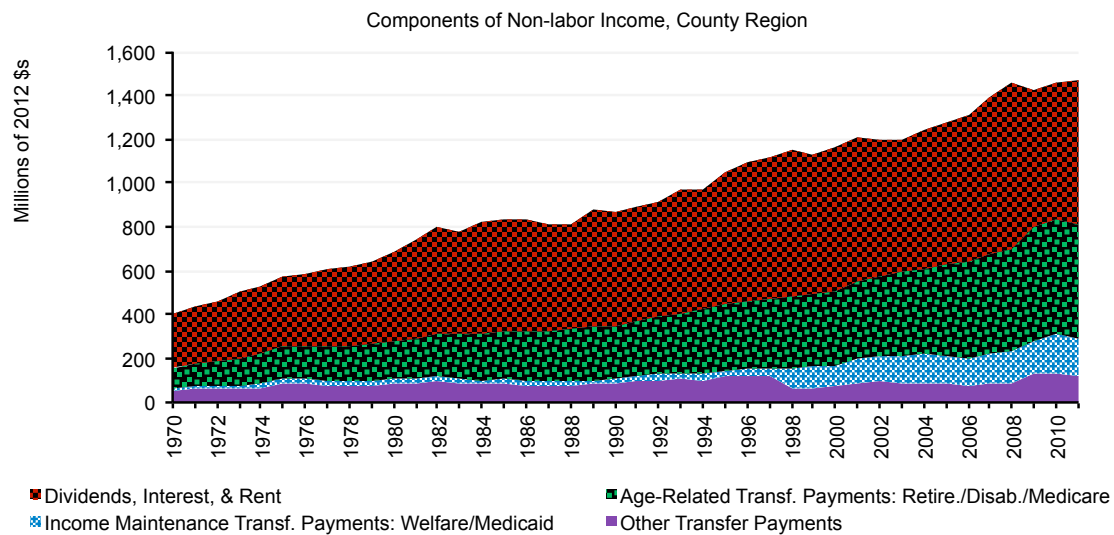
Unlike most sources of labor income, non-labor income, which often arrives in the form of a dividend check or retirement benefit, can be more difficult to see in a local economy. Because non-labor income is often a large and growing source of personal income, it is important for public land managers to understand this portion of the economy. Dependence on government transfer payments also adds to the vulnerability of rural areas, unless government transfer payments can keep up with increasing needs resulting from climate change (health care, natural disaster mitigation/recovery, etc.).

Regional Characteristics



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All types of transfer payments have increased substantially in the five-county analysis area since 1998. In fact, the biggest percent change in non-labor income (which includes dividends, interest, and rent; and transfer payments) was in transfer payments, which includes age-related payments, such as social security and Medicare, as well as income-maintenance payments. In all but Lewis County, the largest increase, in percentage terms, occurred in income maintenance payments which increased 217 percent in Latah, 167 percent in Nez Perce, 131 percent in Clearwater, and 87 percent in Idaho. In Lewis County, the increase was 121 percent, but it was surpassed by the increase in age-related payments. The large amount of transfer payments, and the increase in recent years, increases the vulnerability of the five-county area.



DEMOGRAPHIC CHARACTERISTICS

Because some populations will be more affected by climate change, it is useful to identify potentially vulnerable populations.

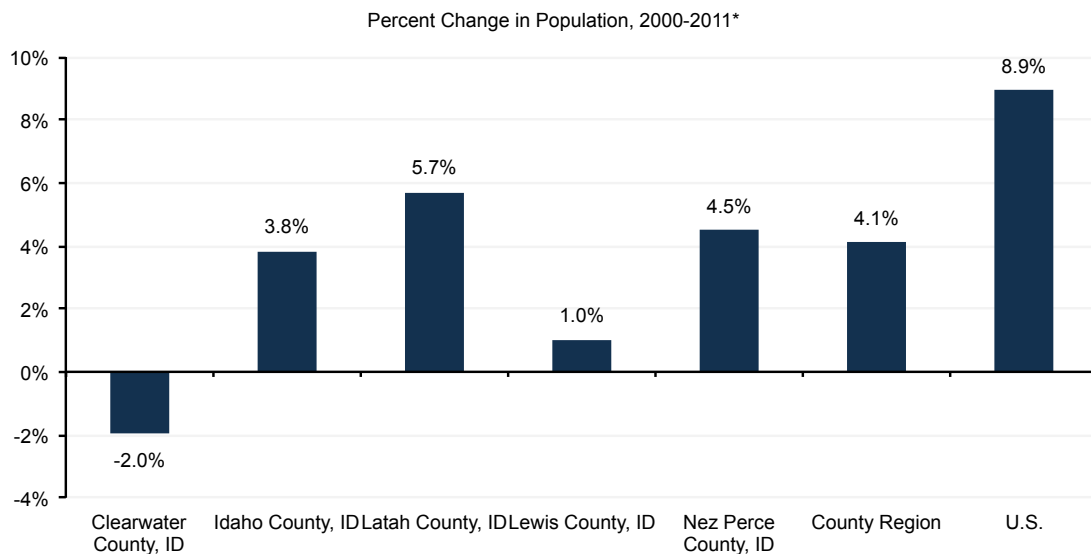
How large is the population and is it growing or shrinking?

Why is this important to vulnerability assessments?

Climate change will place additional pressures on valuable land and water resources. A growing population may indicate an important non-climate stressor that exacerbates vulnerability due to increased competition for resources and the need to plan for their use or conservation in new ways.

A declining population may indicate existing hardships (and vulnerabilities), and limited adaptive capacity due to constrained resources. Communities already experiencing economic and demographic stress are likely to be more vulnerable to climate change.

Regional Characteristics



Population, 2000-2011*

	Clearwater County, ID	Idaho County, ID	Latah County, ID	Lewis County, ID	Nez Perce County, ID	County Region	U.S.
Population (2011*)	8,753	16,108	36,932	3,785	39,088	104,666	306,603,772
Population (2000)	8,930	15,511	34,935	3,747	37,410	100,533	281,421,906
Population Change (2000-2011*)	-177	597	1,997	38	1,678	4,133	25,181,866
Population Percent Change (2000-2011*)	-2.0%	3.8%	5.7%	1.0%	4.5%	4.1%	8.9%

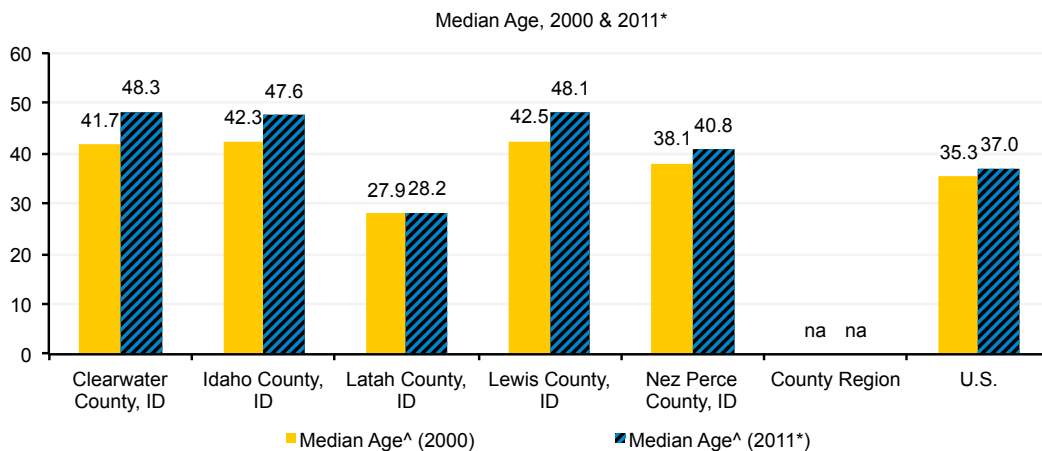
* The data in this table are calculated by ACS using annual surveys conducted during 2007-2011 and are representative of average characteristics during this period.

What is the size of the elderly and youth population?

Why is this important to vulnerability assessments?

Elderly and young portions of a population may be more vulnerable to climate change impacts, either because of health, mobility, or ability to communicate. Age related vulnerabilities are potentially exacerbated in rural communities where access to health care and communications networks are often limited.

Regional Characteristics



Except for Latah County, with the student population at the University of Idaho in Moscow, all five counties in the analysis area had higher median ages than either the nation or the state of Idaho in 2010. Clearwater County had the highest median age, at 49, with Idaho and Lewis Counties close behind at 48, while Nez Perce County’s median age was 40.8. Additionally, except for Latah County, the change in the median age from 2000 to 2010 was greater than it was for the state or the nation, with the largest increase being in Clearwater County, where the median age increased by 17.5 percent. With the exception of Lath County, the age distribution of the counties in the analysis area is shifted to the right, compared to the state and the nation, with more of the population in the categories above age 44.

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Age & Gender Distribution, 2011*

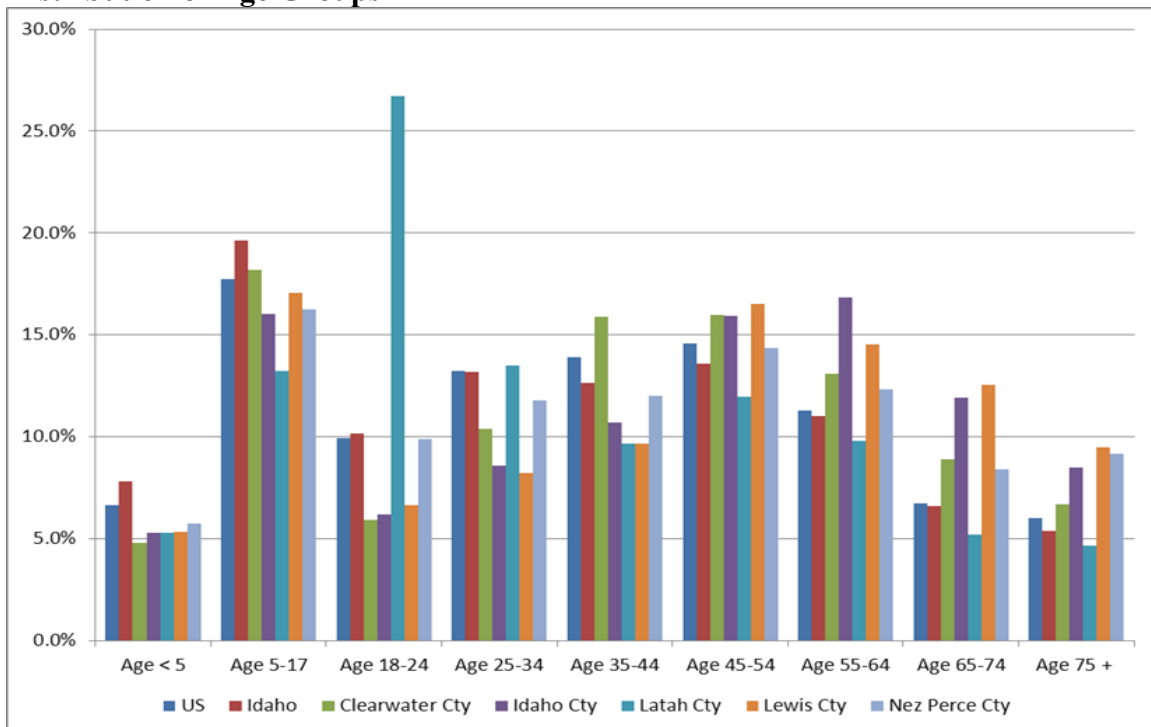
	Clearwater County, ID	Idaho County, ID	Latah County, ID	Lewis County, ID	Nez Perce County, ID	County Region
Total Population	8,753	16,108	36,932	3,785	39,088	104,666
Under 5 years	332	844	1,973	206	2,220	5,575
5 to 9 years	-417	831	1,728	-188	2,389	5,553
10 to 14 years	463	1,057	1,992	224	2,399	6,135
15 to 19 years	438	918	3,960	304	2,672	8,292
20 to 24 years	-411	-721	6,891	-164	2,651	10,838
25 to 29 years	422	708	2,967	155	2,517	6,769
30 to 34 years	456	705	2,019	143	2,254	5,577
35 to 39 years	485	882	1,693	-148	2,024	5,232
40 to 44 years	482	777	1,865	211	2,560	5,895
45 to 49 years	718	1,156	2,141	285	2,682	6,982
50 to 54 years	709	1,359	2,242	345	2,867	7,522
55 to 59 years	741	1,444	2,242	318	2,604	7,349
60 to 64 years	791	1,328	1,510	245	2,315	6,189
65 to 69 years	505	1,070	1,235	277	1,773	4,860
70 to 74 years	622	941	752	215	1,574	4,104
75 to 79 years	-289	573	734	-151	1,119	2,866
80 to 84 years	-299	-401	-523	-132	1,104	2,459
85 years and over	-173	-393	-465	-74	1,364	2,469
Total Female	4,007	7,738	17,808	1,892	19,707	51,152
Total Male	4,746	8,370	19,124	1,893	19,381	53,514

Change in Median Age, 2000-2011*

Median Age^ (2011*)	48.3	47.6	28.2	48.1	40.8	na
Median Age^ (2000)	41.7	42.3	27.9	42.5	38.1	na
Median Age % Change	15.8%	12.5%	-1.1%	13.2%	-7.1%	na

^ Median age is not available for metro/non-metro or regional aggregations. * The data in this table are calculated by ACS using annual surveys conducted during 2007-2011 and are representative of average characteristics during this period.

Distribution of Age Groups

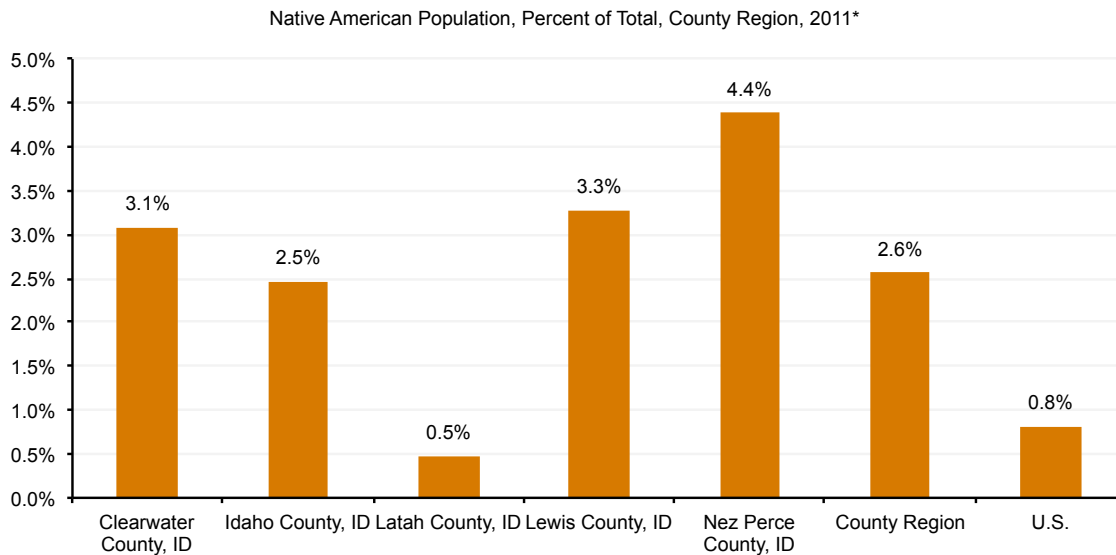


What share of the population is Native American?

Why is this important to vulnerability assessments?

Native American communities may be particularly vulnerable to climate change due to their tie to natural resources and traditional ways of collecting and sharing food.

Regional Characteristics



All of the counties in the analysis area, except Latah County, have a larger percentage of the population that classify themselves as Native American than either the state or the U.S., as high as 4.4 percent in Nez Perce County.

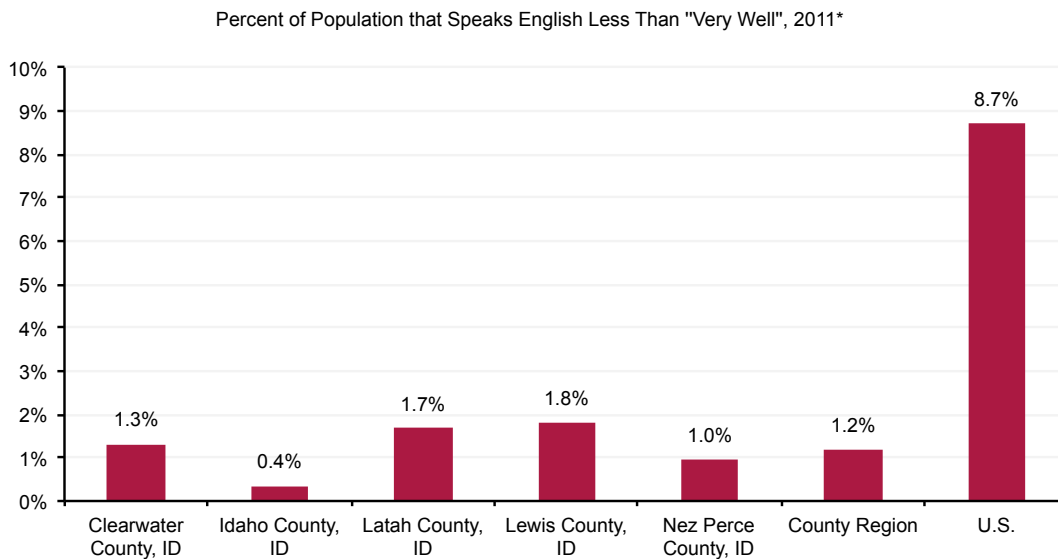
As the first occupants of this area, the Nez Perce people are intimately tied to the lands of the Nez Perce Clearwater National Forest. Nearly the entire planning area falls within what the Indian Claims Commission has determined to be the Nez Perce Tribe’s area of “exclusive use.” The Nez Perce Treaty of 1855 reserved the rights for Nez Perce people to continue to hunt, fish, or gather, and pasture on “open and unclaimed” lands, later clarified by the courts to include public lands now managed by the Forest Service. In order for tribal members to hunt, fish, or gather, there must be healthy and sustainable populations of game, fish, roots, berries, medicinal plants, etc. These all have the potential of being impacted by climate change.

What is the percent of the population that speaks a language other than English?

Why is this important to vulnerability assessments?

Some groups may be more difficult to communicate with about climate related impacts, dangers, and adaptive behaviors. These may include populations who do not speak English or Spanish well, and those that have limited formal education and may have difficulty reading.

Regional Characteristics



In the 2007-2011 period, the U.S. had the highest estimated percent of people that spoke English less than 'very well' (8.7%), and Idaho County, ID had the lowest (0.4%).

Natural Resource Dependencies

Though in general rural communities have lower adaptive capacity than their urban counterparts, climate change impacts will differ by region and sector of the country. Differences in biophysical impacts, population demographics, the dependency of local economies on natural resources, and other community characteristics make communities more or less vulnerable to the effects of climate change. Social and economic impacts particularly relevant to the communities impacted by climate-related biophysical changes that may potentially occur on the Nez Perce Clearwater National forest are listed below:

LAND USE

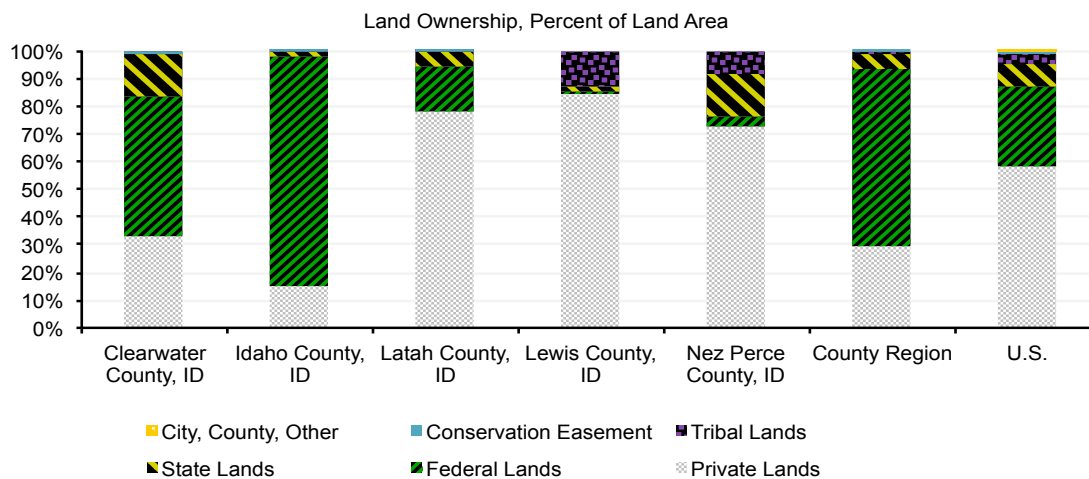
1. What is the share of land that is managed by the federal government? How is it managed?

Why is this important to vulnerability assessments?

Decisions made by public land managers may influence the local economy, particularly if public lands represent a large portion of the land base. Agency management actions that affect water quality, access to recreation, scenery (as well as other quality of life amenities), and the extent and type of resource extraction are particularly important to assessing potential socio-economic vulnerabilities.

A mix of land ownership across ecosystems brings a variety of different management priorities and actions, and regulatory and legal constraints that dictate how different lands can be managed. These institutional differences can limit the adaptive capacity of communities, focusing attention on collaboration and building social capital.

Regional characteristics and trends



Idaho County, ID has the largest share of federal public lands (83.3%), and Lewis County, ID has the smallest (0.7%).

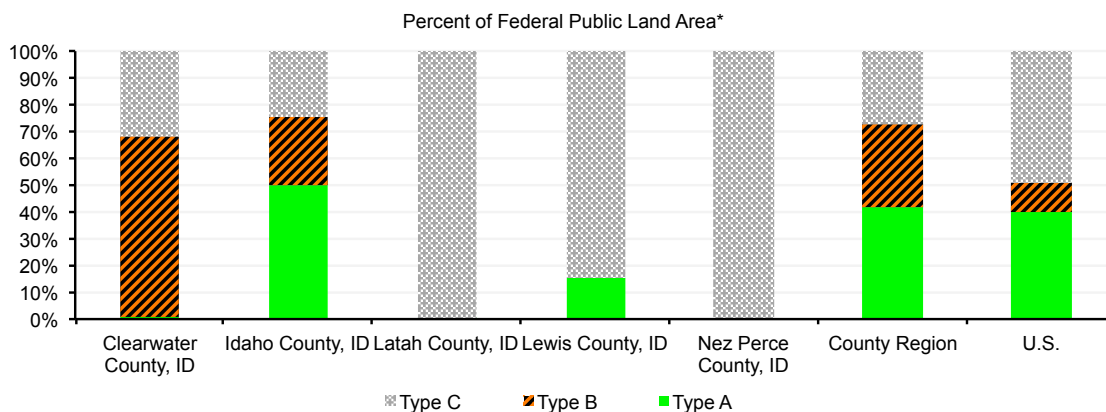
Federal public lands managed for various purposes under differing statutory authority, and different management designations can have an impact on their role in economic development and on the types and quality of ecosystem services they supply.

The EPS software describes the different types of management in three types:

Type A: National Parks and Preserves (NPS), Wilderness (NPS, FWS, FS, BLM), National Conservation Areas (BLM), National Monuments (NPS, FS, BLM), National Recreation Areas (NPS, FS, BLM), National Wild and Scenic Rivers (NPS, FS, BLM), Waterfowl Production Areas (FWS), Wildlife Management Areas (FWS), Research Natural Areas (FS, BLM), Areas of Critical Environmental Concern (BLM), and National Wildlife Refuges (FWS).

Type B: Wilderness Study Areas (NPS, FWS, FS, BLM), Inventoried Roadless Areas (FS).

Type C: Public Domain Lands (BLM), O&C Lands (BLM), National Forests and Grasslands (FS).



Idaho County, ID has the largest share of Type A land (50%), and Latah County, ID has the smallest (0%).

What is the economic importance of agriculture?

Why is this important to vulnerability assessments?

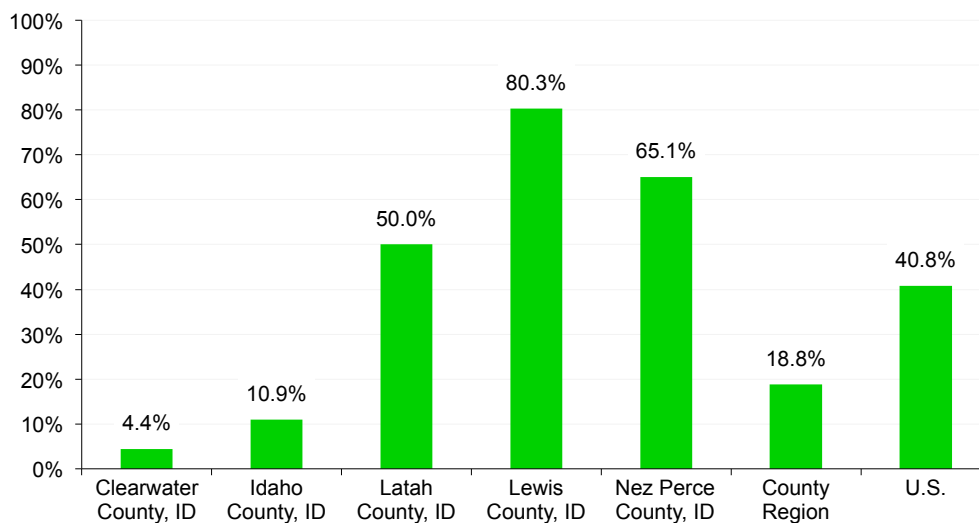
Changing temperatures, snow pack and related runoff, rainfall, etc. will have an impact on area agriculture, including crop types, irrigation practices, grazing forage, pests, and other invasive species. This section examines the agricultural economy, which plays an important role in the region and is the predominant land use adjacent to the area’s public lands.

Regional Characteristics

Some research has indicated that warmer temperatures may increase livestock production costs owing to lower feed intake and increased requirements for energy to maintain healthy livestock at higher temperatures. Forage production may also be affected by climate change. Rising atmospheric CO² concentrations can increase the quantity of forage but may reduce forage quality, as plant nitrogen and protein concentrations often decline with higher concentrations of CO² (Hatfield et al. 2008). In general, although the Forests do not have large grazing programs, some attention must be paid to the role of grazing in the regional economy.

In the five-county region, three counties have a significant percentage of their private land area in farm and ranch production: in 2007, the latest year available, Latah County had 50 percent, Nez Perce 65.1 percent, and Lewis County 80.3 percent.

Approximate Percent of Land Area in Farms, 2007



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	Clearwater County, ID	Idaho County, ID	Latah County, ID	Lewis County, ID	Nez Perce County, ID	County Region	U.S.
Number of Farms	241	760	1,104	225	473	2,803	2,204,792
Land in Farms (Acres)	69,568	590,927	344,472	245,944	353,292	1,604,203	922,095,840
Average Farm Size (Acres)	289	778	312	1,093	747	3,219	418
Approximate Land Area (Acres)	1,572,693	5,425,288	688,655	306,421	542,793	8,535,850	2,260,994,361
Approximate Percent of Land Area in Farms	4.4%	10.9%	50.0%	80.3%	65.1%	18.8%	40.8%

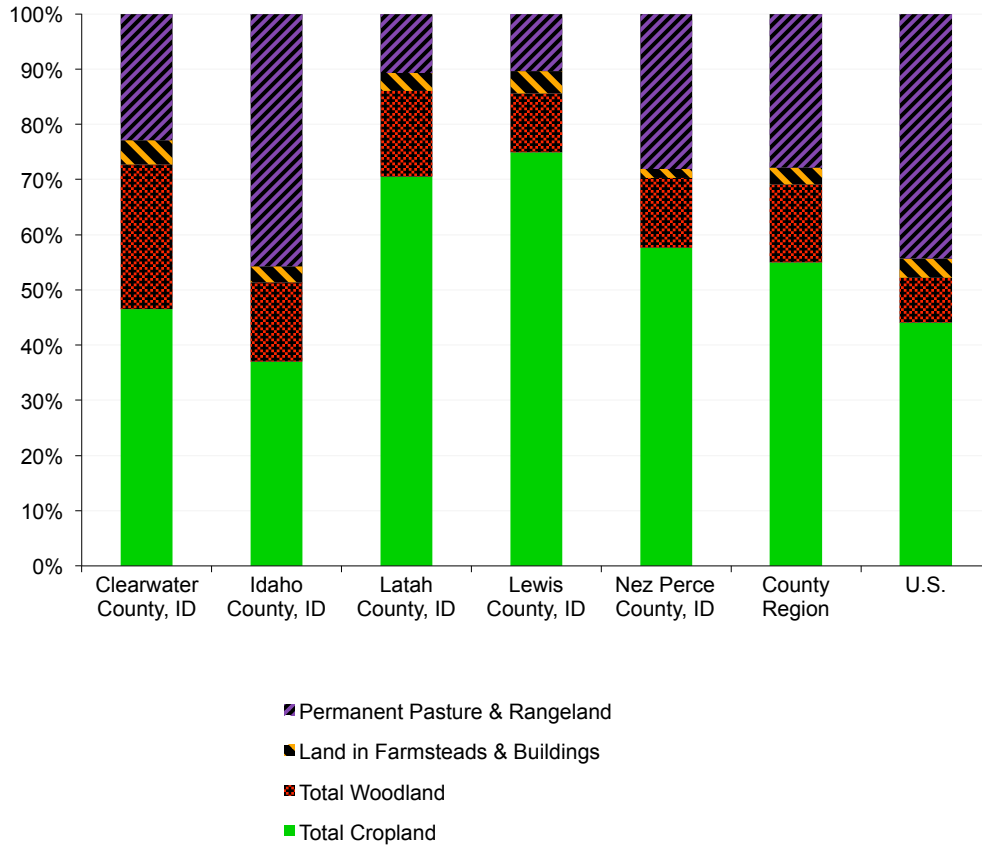
Farms by Type, 2007

	Clearwater County, ID	Idaho County, ID	Latah County, ID	Lewis County, ID	Nez Perce County, ID	County Region	U.S.
All Farms	241	760	1,104	225	473	2,803	2,204,792
Oilseed & Grain Farming	23	153	146	93	115	530	338,237
Vegetable & Melon Farming	0	6	4	0	4	14	40,589
Fruit & Nut Tree Farming	0	3	6	0	9	18	98,281
Greenhouse, Nursery, etc.	6	12	19	1	8	46	54,889
Other Crop Farming	88	200	625	75	134	1,122	519,893
Beef Cattle Ranch. & Farm.	79	242	117	38	110	586	656,475
Cattle Feedlots	5	16	7	1	4	33	31,065
Dairy Cattle & Milk Prod.	0	7	1	0	0	8	57,318
Hog & Pig Farming	0	4	4	1	3	12	30,546
Poultry & Egg Production	4	10	15	1	1	31	64,570
Sheep & Goat Farming	4	20	35	0	15	74	67,254
Animal Aquaculture & Other Animal Prod.	32	87	125	15	70	329	245,675

Percent of Total

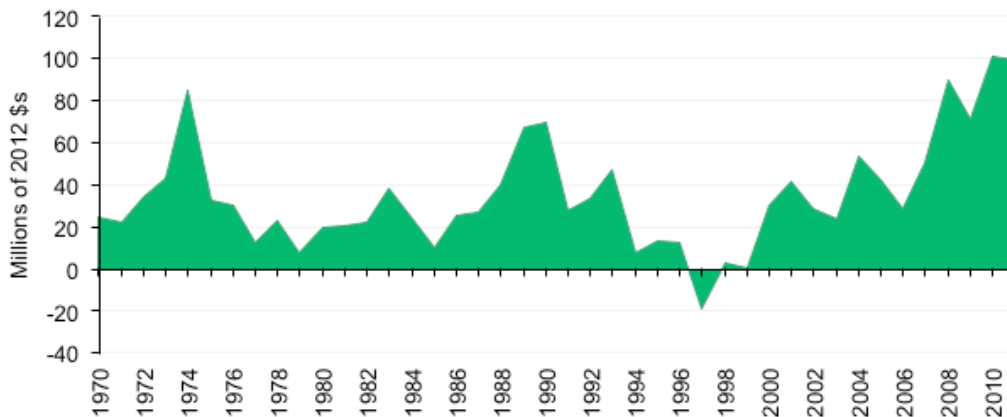
Oilseed & Grain Farming	9.5%	20.1%	13.2%	41.3%	24.3%	18.9%	15.3%
Vegetable & Melon Farming	0.0%	0.8%	0.4%	0.0%	0.8%	0.5%	1.8%
Fruit & Nut Tree Farming	0.0%	0.4%	0.5%	0.0%	1.9%	0.6%	4.5%
Greenhouse, Nursery, etc.	2.5%	1.6%	1.7%	0.4%	1.7%	1.6%	2.5%
Other Crop Farming	36.5%	26.3%	56.6%	33.3%	28.3%	40.0%	23.6%
Beef Cattle Ranch. & Farm.	32.8%	31.8%	10.6%	16.9%	23.3%	20.9%	29.8%
Cattle Feedlots	2.1%	2.1%	0.6%	0.4%	0.8%	1.2%	1.4%
Dairy Cattle & Milk Prod.	0.0%	0.9%	0.1%	0.0%	0.0%	0.3%	2.6%
Hog & Pig Farming	0.0%	0.5%	0.4%	0.4%	0.6%	0.4%	1.4%
Poultry & Egg Production	1.7%	1.3%	1.4%	0.4%	0.2%	1.1%	2.9%
Sheep & Goat Farming	1.7%	2.6%	3.2%	0.0%	3.2%	2.6%	3.1%
Aquaculture & Other Prod.	13.3%	11.4%	11.3%	6.7%	14.8%	11.7%	11.1%

Land Area in Farms According to Use, 2007

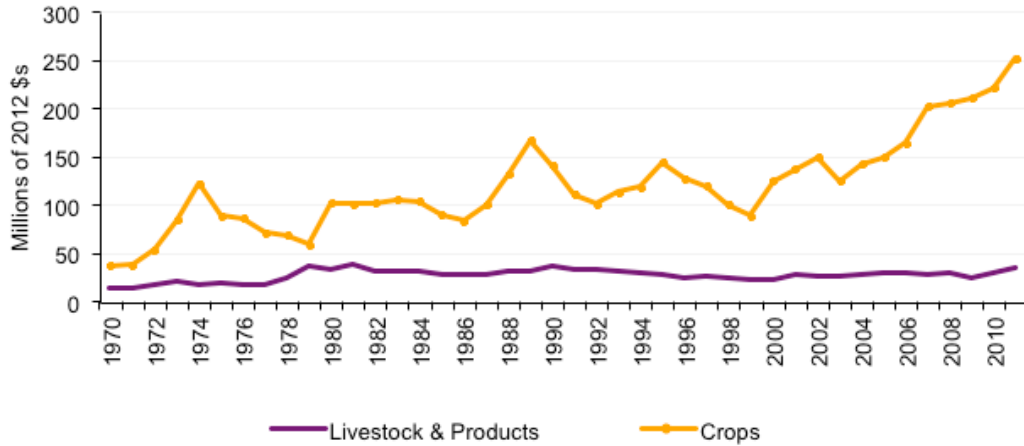


From an employment standpoint, the previous section shows that agriculture employs just less than five percent of the region’s workforce. The figure below shows the total net income for farm business income and expenses (in real terms) for the region. The next graph, immediately below this one, shows trends (also in real terms) for crops and livestock cash receipts for the region.

Total Net Income Including Corporate Farms, County Region

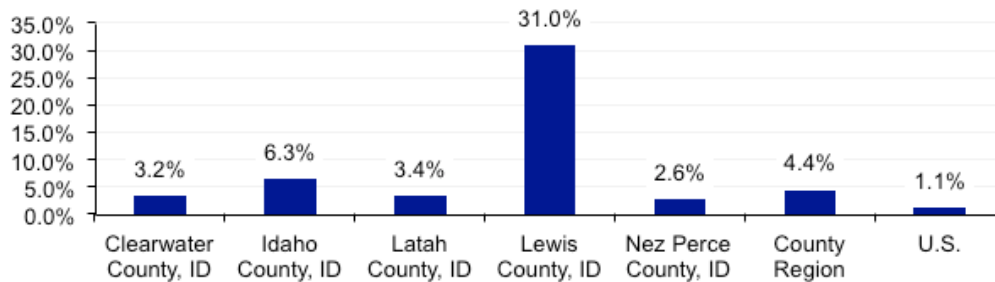


Cash Receipts from Marketings, County Region



This final chart shows farm earnings by county as a percent of total earnings. While four of the counties have a relatively small share—between 2.6 and 6.3 percent—of earnings in agriculture, Lewis County is significantly different and nearly one-third (31%) of earnings are from agriculture. For the region overall, from 1970 to 2011, farm earnings grew from \$27.2 million to \$105.3 million (in real terms), and 287 percent increase.

Farm Earnings as a Percent of Total Earnings, 2011

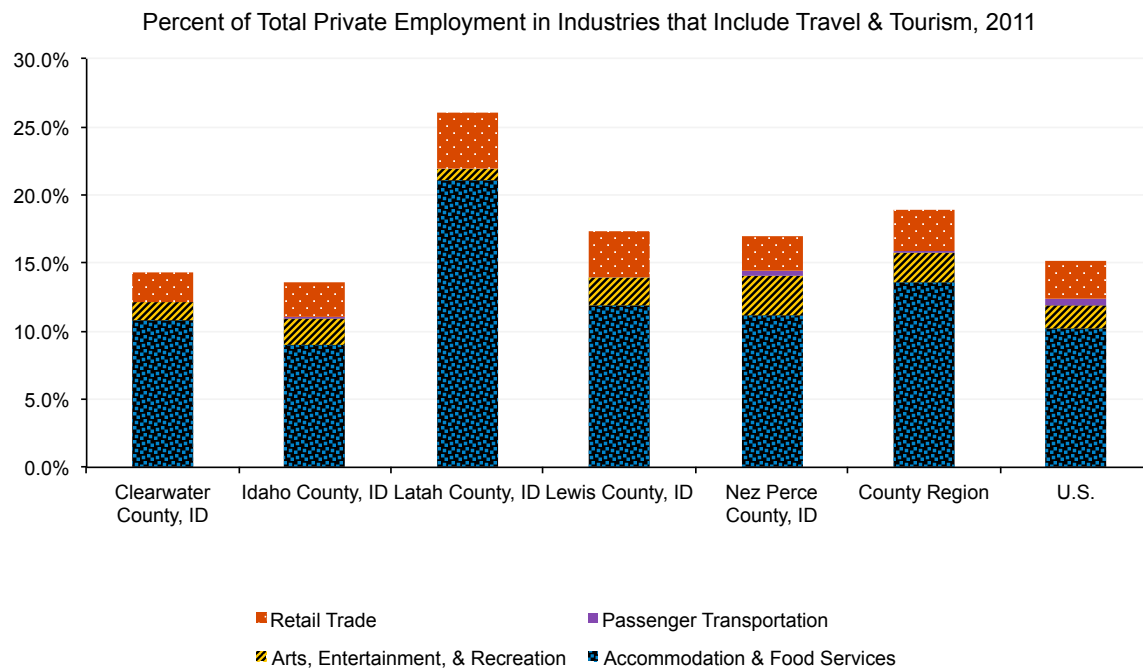


What is the economic importance of travel and tourism related industries?

Why is this important to vulnerability assessments?

Most outdoor recreation areas are in rural counties. Although most of the jobs associated with recreation do not pay well, these jobs can still be very important to the economy of rural areas. If climate change reduces or shifts recreation-related job opportunities to other areas, rural communities will see drops in employment. In other instances, climate change impacts could open up new recreational opportunities in the region.

Regional Characteristics



The National Visitor Use Monitoring system estimates approximately 300,000 visitors recreate on the Nez Perce Clearwater NF annually. These visitors spend money in the local economy on a variety of items including food, gas, and sometimes lodging. A substantial number of jobs in the five-county analysis area are associated with industries connected to travel and tourism. Around 19 percent of total private employment (total private employment does not include employment in government, agriculture, railroads, or the self-employed because these are not reported by County Business Patterns) in the five-county area is associated with industries connected to travel and tourism, with 14 of the 19 percent associated with the Accommodation and food sector. The five counties in the analysis area vary from 13.5 percent of total private employment occurring in travel and tourism-related sectors for Lewis County up to 26.6 percent for Latah County. Though these jobs are associated with very low average wages (\$17,000 per year compared to the

five-county average wage of \$35,582), they are still important to the local economies and changes due to climate change could impact the amount of employment in this sector (more discussion to follow in the discussion of recreation impacts).

Outdoor recreation activities depend on the availability and quality of natural resources such as forests, wetlands, snow, and wildlife (USGCRP 2009). Climate change could affect recreation through three pathways: winter activities such as downhill and cross country skiing, snowshoeing, and snowmobiling; nature tourism and related activities such as biking, walking, hunting, and water-related sports such as boating and fishing.

Snow and ice-dependent activities could be adversely affected by even small increases in temperature, especially in areas with marginal snow conditions. Shorter seasons, due to warmer springs and falls, would affect the profitability of ski areas, particularly if it affected the winter holiday season between Christmas and the New Year. Additionally, earlier wet snow avalanches could force ski areas to shut down earlier in the season (Lazar and Williams 2008). Although some ski areas have the ability to make snow, snowmobiling is wholly dependent upon natural snowfall, and since it often occurs in lower elevation areas, could be adversely impacted by less snow.

On the NPCW, in the 2011 NVUM survey, around 10 percent of the 293 thousand visitors (29,000 visitors) indicated that snowmobiling or cross-country skiing was the main activity that they engaged in during their visit. Changing snow conditions and shorter seasons could adversely affect the recreational experiences of these visitors and the contributions that these activities make to local economies.

Nature-based activities: The length of season and desirability of activities such as hiking, lakeshore or river visits, sightseeing, swimming, etc, may increase because of small near-term increases in temperature and longer seasons. However, altered biodiversity and increases in fire and insect infestations could adversely affect nature tourism. Hunting opportunities will also likely change as animal's habitats shift due to climate change. Lower water levels in reservoirs and rivers during the summer months could affect boating activities; however, warmer temperatures could lead to increased demand for water-related activities. (USGCRP 2009, Sussman et al. 2008)

Nature-related activities such as relaxing, viewing nature and wildlife, driving for pleasure and hiking make up four of the top five main activities on the NPCW NF (the other being gathering forest products). They also account for the top five activities enjoyed by visitors to these forests. Having longer seasons to enjoy these activities would benefit people interested in these activities. However, increases in forest disturbances, such as wildfire or insect-infestations could decrease the benefits that people receive from these types of activities, so the overall effect is uncertain.

A great deal of the outfitter and guide activity that occurs on the forest is connected with hunting and changes in hunting opportunities could adversely impact the local area.

Whitewater rafting and float boating occurs on the Salmon, Selway, Lochsa and Middle Fork Clearwater Rivers. Longer seasons and more runoff could be beneficial to whitewater enthusiasts as well as to outfitters and guides who provide these services.

Recreational fisheries: – Numerous studies project that the habitats of coldwater fish species, such as salmon and trout are likely to contract in response to global warming. (Janetos et al. 2008). One study suggests that about 90% of bull trout, which live in western rivers, will be lost on account of global warming (Williams et al. 2007).

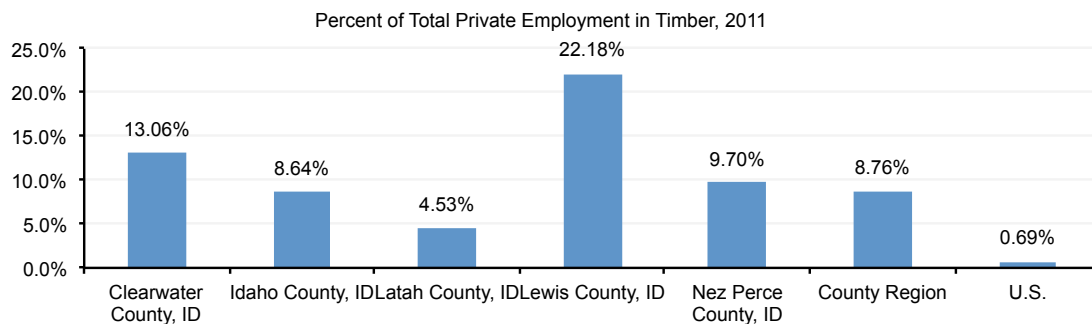
Wildfire risk – Warmer summer temperatures and reduced rainfall in the West are projected to extend the annual window of wildfire risk by 10 to 30 percent (Brown et al. 2003, Westerling 2006). An increase in wildfires may lead to a loss of forest recreation opportunities and visitors to mountain areas may experience more restrictions on their activities, campfire bans; and trail and campground closures. Besides the impacts to recreation mentioned above, many areas of the Nez Perce Clearwater NF are enjoyed for their scenic beauty. Increases in wildfires can affect view sheds thereby impacting recreation experiences and perhaps visitation numbers. Driving for pleasure is one of the top activities enjoyed by visitors to the NPCW NF.

What is the economic importance of the timber industry and related manufacturing economy?

Why is this important to vulnerability assessments?

To understand the potential impact of proposed land management practices or climate change impacts, it is important to grasp the relative size of the timber industry and its components, how these have changed over time, and how local trends compare to trends in other geographies. Some important issues to consider are whether a proposed management action would stimulate growth or decline in the industry, how proposed actions relate to on-going trends shown in the data, whether some geographies would be affected more than others, and given the relative size of the industry if changes to it will affect the broader economy.

Regional Characteristics

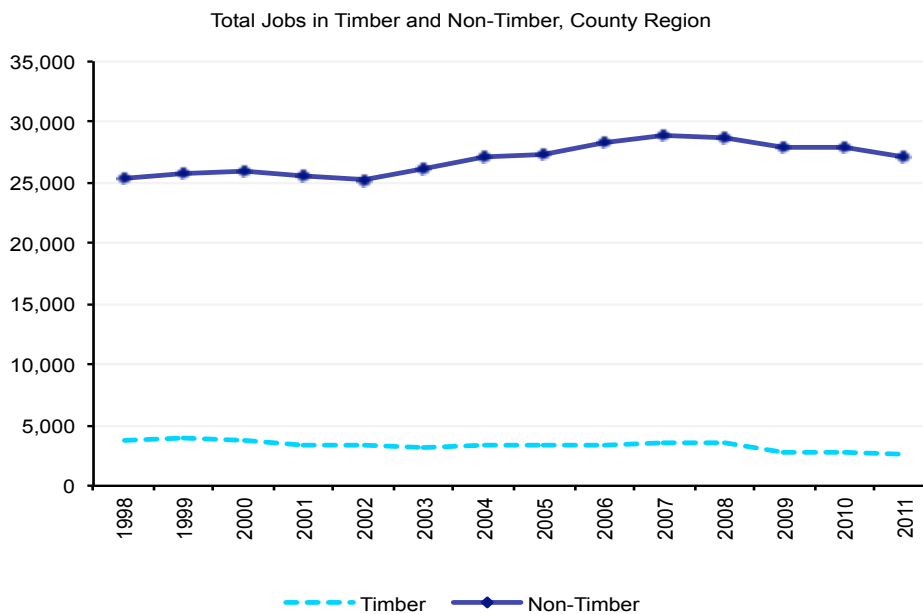
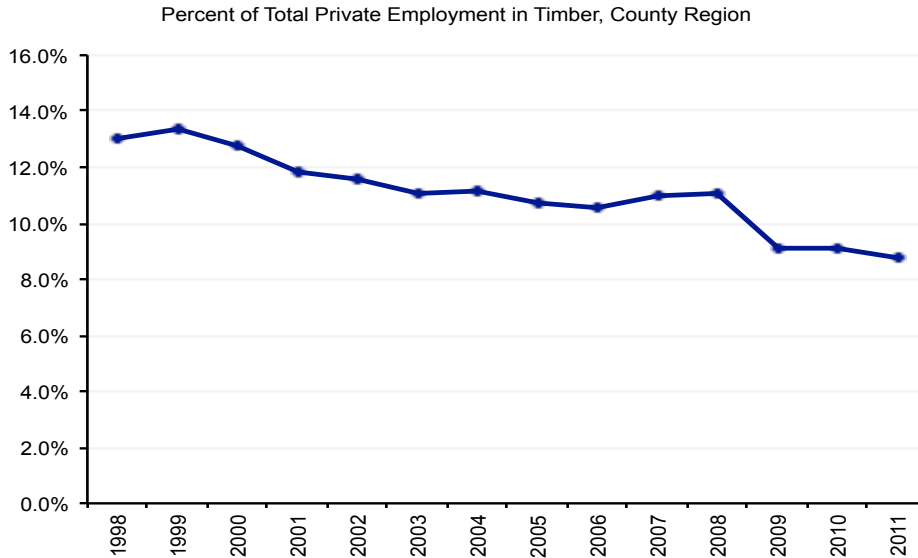


Timber and related manufacturing definitions:

Growing and Harvesting: These are jobs associated with growing and harvesting of trees on a long production cycle. It includes people employed in forest nurseries, as well as those involved in the cutting of trees and transportation of timber.

Sawmills and Paper Mills: These are jobs associated with converting logs into lumber, boards, poles, shingles, and similar milled products. It includes those involved in the conversion of logs and chips into pulp and paper as well as the creation of veneer and plywood.

Wood Products Manufacturing: These are jobs associated with manufacturing. It includes the production of corrugated boxes, gum and wood chemical products, cabinets, furniture, and other wood manufactured products.



Current research suggests that timber supply will expand nationally due to climate change; however, regional impacts are more uncertain due to shifts in forest distributions and types and differences in wildfire risk, pest attacks and diseases, and adverse impacts on biodiversity. However, where increased temperature coincides with decreased precipitation (western Alaska, Interior West, Southwest), forest growth is expected to be lower (Ryan et al. 2008). Additionally, increasing harvests in the nation as a whole would tend to lead to lower prices, and as a consequence, reducing harvests in regions with higher production costs even if productivity increases. (Perez-Garcia et al 2002, Shongen and Sedjo 2005). Warmer winters with more sporadic freezing and thawing would likely increase erosion and

landslides on forest roads and reduce access for winter harvesting (USGCRP 2009), in turn increasing costs and further reducing the supply of forest products. Under these conditions, a shrinking forest industry would lead to loss of employment for many rural communities. However, adaptation in US timber and wood product markets may offset some of the potential negative effects of climate change and, overall, consumers and mill owners would lose welfare but consumers would gain. Some of the potential adaptations in the wood products industry might include using alternative species, changing the nature or location of capital and machinery, changing reliance on imports or exports, or adopting new technologies. (Irland et al. 2001)

The counties in the NPCW analysis have already seen a large drop in the number of mills and wood products employment since the 1990s. However, although employment in Idaho's wood and paper products industry has declined from 18,440 workers in 1990 to an estimated 10,267 in 2011, many of the counties in the analysis area still derive a large percentage of their employment from timber-related industries. In 2010, Lewis County has the highest percent of employment in timber-related industries, at 21.5 percent, and both Clearwater and Nez Perce depend upon timber for more than 10 percent of their employment. Brandt et al. 2012 state a large reason for the declining wood products industry is the 35 percent reduction in timber harvest largely driven by the 80 percent decline in the Federal timber sale program from 1990 to 2006. For the Clearwater National Forest the harvest volume peaked in 1990 at 147.7 MMBF and was at its lowest point in 2008 at 7.3 MMBF. The Nez Perce's peak harvest occurred in 1989 at approximately 100 MMBF, and harvest volume was at its lowest point in 2006 at 4.8 MMBF. Further reductions in timber harvest due to climate change could have substantial impacts on the remaining firms in the wood products sectors in these counties.

Wildfire risk –Increases in wildfire may also lead to the destruction of timber resources and increased costs for fire suppression and recovery.

Insects and disease: Climate change may likely result in more disturbance from insects, invasive species, and disease (Alig et al. 2004, Logan et al. 2003). Ryan et al. 2008 estimates an increase in the frequency and intensity of mountain pine beetle and other insect attacks. Milder winters increase the survival rate and populations of such insects.

Increases in tree mortality resulting from insect outbreaks further increase fire risk, decrease timber supply, and impact public safety, thereby increasing the impacts to the counties in the analysis area.

What are risks to water supply?

Why is this important to climate vulnerability assessments?

The amount, timing, and quality of water is likely to be affected by climate change, touching almost every aspect of the economy and peoples lives.

Regional Characteristics

In the western US, studies indicate there is likely to be increasing spring rainfall and lower snowpack. Bell and Sloan (2006). This could pose problems in terms of the timing of snowmelt runoff and a loss of natural water storage. These changes in precipitation combined with increased severity of droughts and heat waves could negatively impact the available water supply. Peak river runoff could shift to winter and early spring, away from summer and autumn when demand is highest. Barnett et al. (2005). Another study indicates that a one-month advance in the timing of snowmelt runoff could threaten storage efficiencies for reservoirs. Besides providing water supply, reservoirs are operated for flood-protection purposes and consequently may release large amounts of otherwise useful water during the winter and early spring. In such facilities, earlier flows would place more of the year's runoff into the category of hazard rather than resource. This would tend to increase the length of the summer drought that is anticipated to occur in much of western North America (Stewart et al. 2004).

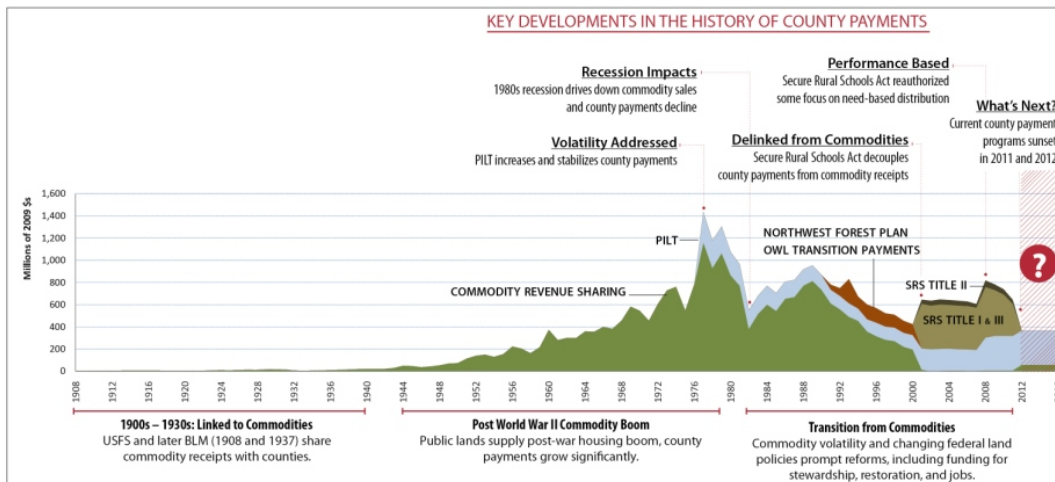
For the NPCW, although the total volume of water available is likely to remain within the historic range of variation, the timing of availability is likely to change. This timing could be problematic since late summer and early fall are the greatest times for water demand.

Climate change is also expected to alter the storms that drive hillslope erosion and mass failures following fire. In central Idaho, both high-intensity, short-duration thunderstorms in the summer and rain-on-snow events in the winter at intermediate elevations can drive subsequent erosion and mass wasting events (Meyer et al., 2001; Miller et al., 2003). In the western US, the largest reduction in the fraction of precipitation falling as snow has occurred at locations of moderate warming near typical rain-snow transitions (Knowles et al., 2006). Given the relatively large proportion of terrain in central Idaho at intermediate elevations (Tennant and Crosby, 2009), and that 60% of the increase in large wildfires over the last several decades has occurred in mid-elevation forests of the Northern Rockies where fire suppression has had little effect (Westerling et al., 2006), such warming and hydroclimatic shifts may increase sediment yields.

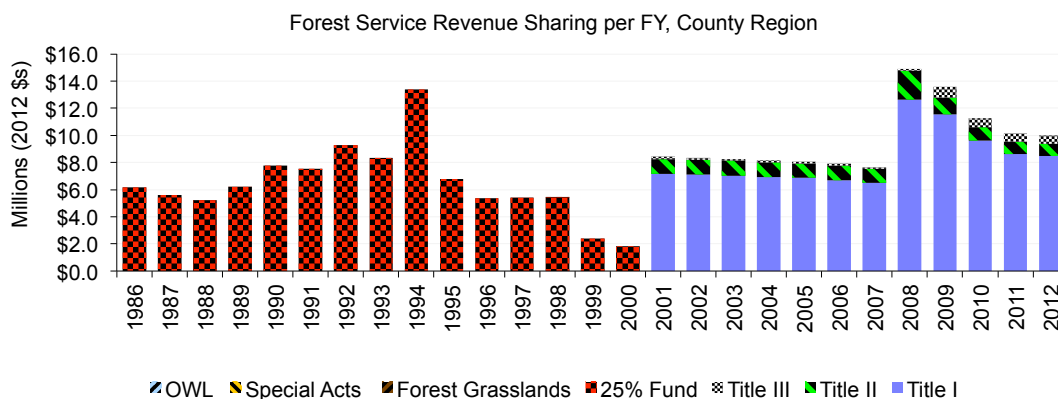
What share of county budgets do PILT and Forest Service payments make up?

Why is this important to vulnerability assessments?

Local government budgets can be highly dependent on payments made from the federal government to counties and local schools. These payments are historically tied to extraction on public lands. Changes in appropriations for these payments, and policies intended to increase the level of receipts can affect local budgets and natural resources.



Regional Characteristics

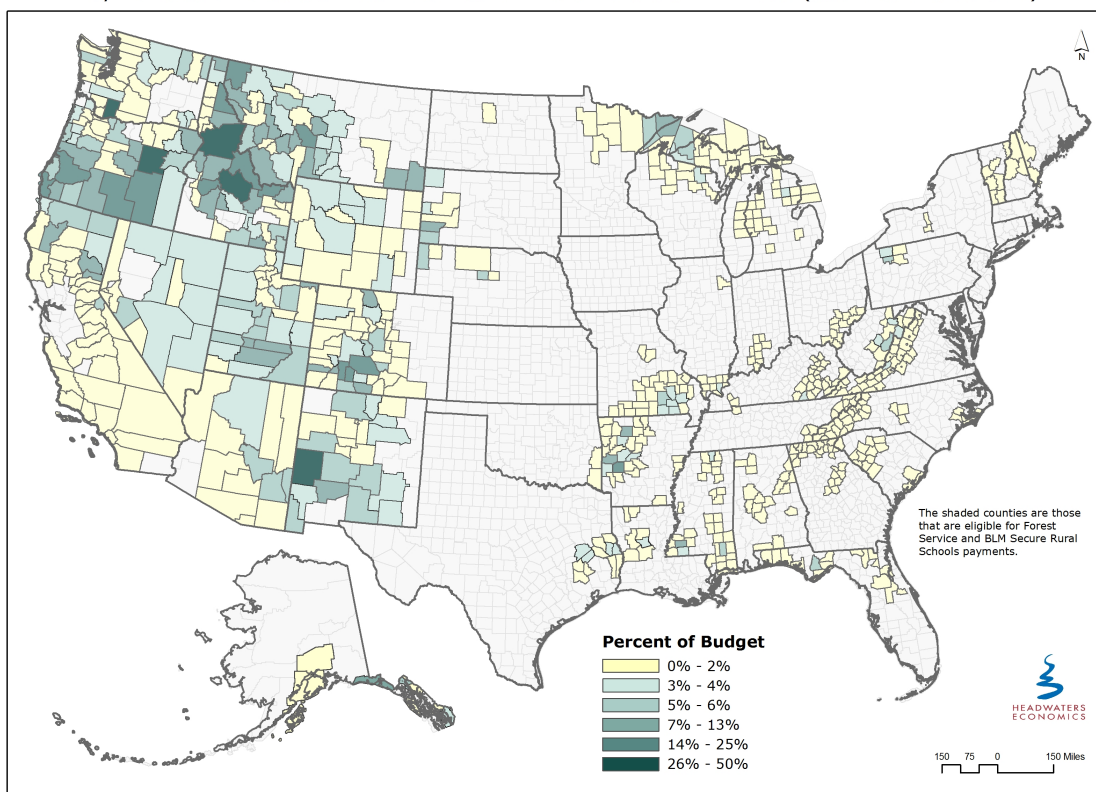


Idaho County is among a handful of counties nationally that are most dependent on Secure Rural Schools and PILT payments to fund local government services and local schools. With SRS already expired, and funding for PILT uncertain (PILT is permanently authorized but requires annual appropriations, the outcomes for communities in the region could be significant. The loss of revenue could significantly reduce adaptive capacity of local service providers that will have social and economic consequences.

SRS will be replaced with the 25% Fund, which shares a quarter of commercial receipts generated from activities on public lands with adjacent counties. There will be significant pressure to manage lands to maximize commodity values if no extension or long-term solution is reached to continue appropriations. Representative Labrador (R, ID) has already introduced legislation turning management of certain federal lands over to a board appointed by the state that would not be subject to federal land management policies or environmental laws.

How Important Are Federal Land Payments?

Payments as a Percent of Total Local Government Revenue in FY 2009 (Counties and Schools)



ⁱ The majority of the general information in this section was taken from Lal et al. 2011, "Effects of Climate Change on Natural Resources and Communities: A compendium of briefing papers – Chapter 3: Socioeconomic impacts of climate change on rural communities in the United States".