

**Public Attitudes and Perceptions of
Air Quality and Bluegrass Seed Residue
Burning in Northern Idaho**

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Executive Summary

The Pacific Northwest is home to about three quarters of all the agricultural production of grass seed in the United States, the overwhelming volume of which is Kentucky bluegrass seed. The traditional practice of thermally removing post-harvest residue in grass seed production is believed by many to be essential to promoting plant vigor and to stimulate the seed reproduction cycle. Idaho remains the only Pacific Northwest state that maintains a state-wide open-field burning policy and regulates bluegrass seed producers within that framework. The views of the scientific community about the role of fire in improving overall seed quality and quantity vary.

Increasingly, many communities and individuals question regulatory enforcement and effects on public and environmental health resulting from air pollutants. In the past decade, stakeholder groups have emerged within the region because they believe smoke from burning post-harvest bluegrass residue (hereafter, called bluegrass field burning) has caused negative health effects for communities around northern Idaho. It remains unclear whether a causal link exists between changing demographics in the northern region of the state and increased controversy over the burning practices. However, in the last five years the bluegrass seed production industry has come under unprecedented pressure by litigation and monitoring from special interest groups opposed to agricultural burning.

This study assesses the perceptions of the general public regarding overall air quality in the region, possible trade-offs to bluegrass field burning, and the policies that impact both the general public and Idaho's grass seed farmers through the following measures:

- The comparison of perceived impacts of pollution from bluegrass field burning to other sources of air pollution;
- The perceived effect of bluegrass field burning on air quality in the region;
- The possible environmental and community trade-offs of bluegrass field burning;
- Policy choices to limit or eradicate air pollution due to bluegrass field burning; and
- The effectiveness of communications between the public and officials as provided by the Idaho state Smoke Management Plan.

Several trends can be noted with respect to air quality, agricultural burning, and the case of bluegrass field burning, based on a random-sample telephone survey of the general public:

- The vast majority of respondents rank air quality as either 'good' or 'very good', with only 7% ranking the air quality in northern Idaho as 'poor' or 'very poor' quality.
- Smoke from agricultural burning and forest fires are perceived to have a statistically equal *negative* effect on family health.
- By and large, respondents do not believe that the media reports all sides of the bluegrass industry fairly, as 73% of people believe the media is biased.
- Eighty-seven percent of respondents believe that it is better for farmers to burn bluegrass fields than to apply more chemicals to the fields to manage crop residue.
- Results indicate the majority of respondents are content with current regulations.
- Those who do want to see the greatest restrictions on burning want those restrictions in effect the quickest.

Introduction

Bluegrass Farming and Regulations in the Pacific Northwest

Debates over environmental quality in rural regions often stem from conflicting perspectives and expectations between newcomers and longer-term residents (Smith and Krannich, 2000; Sharp and Smith, 2003). In agricultural regions, farmers and the agricultural industry may receive much of the blame for environmental impacts, including odors, poor visibility, and pollution from dust, smoke, and animals. Many of these are associated with longstanding agricultural practices. When put in a community-based context of the rural-urban interface and ex-urban residential development, the perceived effects of these practices may change.

The Pacific Northwest is a noteworthy agricultural region. Idaho, Oregon, and Washington are home to 75% of the grass seed farms in the United States, as well as significant production levels of cereal grain crops. These farms produce more than 800 million pounds of seeds annually, including about 36 million pounds of bluegrass seed. The seed is sold globally to produce turf, forage for livestock, and grass buffers for conservation. Production and management of grass seed and grain crops often includes burning of post-harvest residue to control weeds and pests and serves as a low-cost method to eliminate excess residue (Stelljes, 1997). In the case of bluegrass seed production (a perennial crop with an average life of six to eight years), burning practices also increase yields over the life of the stand.

The views of the scientific community about the role of fire in improving the overall seed quality vary substantially. Historically, grasslands have been dependent on periodic fires for existence and regeneration. In addition, substantial evidence supports the claim that the use of fire in open field burning helps remove a high percentage of post harvest residue, eliminates major diseases, improves the effectiveness of soil active herbicides, helps thin or maintain tiller density for optimum seed yield, and potentially increases fertilizer efficiency (Chilcote and Young, 1991; Canode and Law, 1977; Hardison, 1976; Holman and Thill, 2005a, 2005b). Kentucky bluegrass farming in northern Idaho has helped to protect soil against erosion, thereby contributing to the overall improvement and protection of watershed quality. However, some scientific studies have indicated accelerated and reduced microbial activity in soils where field residue has been burned for more than 20 years (Rasmussen and Collins, 1991).

Though the particulate matter released by crop residue burning must fall within the National Ambient Air Quality Standards (NAAQS) established within the Clean Air Act which seeks to control air pollution, Idaho regulations remain the least restrictive in the nation (Sullivan, 1995). Smoke management program guidelines were established in Idaho in 2002 (Idaho State Dept. of Agriculture, 2005)¹.

¹ After years of significant political conflict, the state of Washington phased out bluegrass residue burning beginning in 1996 and ending in 1998 (Washington DOE 1999). The State of Oregon, where many varieties of grass seed are produced, limited open field burning to 250,000 acres in 1980, then began a phase-down in 1991 to a total of 65,000 acres in 1998 (Oregon Dept. of Agriculture 2005).

Kentucky Bluegrass Residue Burning and Public Health Issues

Increasingly, many communities and individuals question regulatory enforcement and effects on public and environmental health resulting from air pollutants (Hofrichter, 2000, 2002; Visgilio and Whitelaw, 2003). In the past decade, stakeholder groups have emerged within the Inland Northwest region because they believe smoke from Kentucky bluegrass burning has caused negative health effects for communities around northern Idaho (SAFE, 2004).

In the past fifteen years, northern Idaho overall has also experienced a dramatic population increase (nearly 30%) that remains concentrated in a few areas (Table 1). It is unclear whether a causal relationship exists between changing demographics in the state and increased controversy over the burning practices. However, in the last five years the bluegrass seed production industry has come under unprecedented pressure by litigation and monitoring from special interest groups opposing agricultural burning.

Table 1. Demographics for Ten Northern Idaho Counties, 1990-2003.²

<i>County or Region</i>	<i>Total Population, 1990</i>	<i>Total Population, 2000</i>	<i>Total Population, 2003</i>	<i>Percent Change, 1990-2000</i>	<i>Percent Change, 2000-2003</i>
<i>Benewah</i>	7937	9171	9029	15.5	-1.5
<i>Bonner</i>	26622	36835	39162	38.4	6.3
<i>Boundary</i>	8332	9871	10173	18.5	3.1
<i>Clearwater</i>	8505	8930	8401	-9.5	-5.9
<i>Idaho</i>	13768	15511	15413	12.7	-0.6
<i>Kootenai</i>	69795	108685	117481	55.7	8.1
<i>Latah</i>	30617	34935	35087	14.1	0.4
<i>Lewis</i>	3516	3747	3748	6.6	0.0
<i>Nez Perce</i>	33754	37410	37699	10.8	0.8
<i>Shoshone</i>	13931	13771	12993	-1.1	-5.6
<i>Combined Counties</i>	216777	278866	289186	28.6	3.7
<i>State</i>	1006734	1293953	1366332	28.5	5.6

Large smoke plumes containing microscopic particulates rise from the thousands of acres of grass seed fields burned each summer in northern Idaho. The frequency and the severity of adverse health effects of smoke from Kentucky bluegrass burning have been perceived as growing issues in the region (Johnston and Golob 2004; Mills, 2004; Steele, 2004). Smoke from bluegrass burning generates small, fine particles less than 2.5 micrometers in diameter. According to the EPA, these small particles can damage lung tissue and cause respiratory and cardiovascular problems when inhaled deeply into the lungs. Other complications associated with the bluegrass burning include: eye irritation, irritated throats, and impaired visibility which can lead to road accidents. Medical evidence links increases in particulate matter air pollution to health deterioration, motivating citizens to organize themselves to

² Sources: 1970, 1980, and 1990 U.S. Census, U.S. Bureau of the Census, County Population Census Counts, <http://www.census.gov/population/www/censusdata/cencounts.html>; 2000 U.S. Census, U.S. Bureau of the Census, Census 2000 Gateway, <http://www.census.gov/main/www/cen2000.html>; 2000-2003, Population Estimates Program, U.S. Bureau of the Census, <http://eire.census.gov/poptest/estimates.php>.

fight the perceived threat from bluegrass field burning (Dockery *et al.*, 1993; Pope III, 2000; Walt, 1994).

Ethical Issues Associated with Bluegrass Burning

Because resource use is often interlaced with the broader social context, understanding the cultural environment of the burning area is essential to understanding the controversy surrounding bluegrass burning (Svedin, 1998; Hjort af Ornas and Svedin, 1992). Ethics play an important role in the way that people see and define their social or cultural context, and concerns over bluegrass burning can be better understood by relating the social context of the burning activities and the ethics of the community and stakeholders involved in the controversy (Allen *et al.*, 2001; Wulfhorst and Nielsen-Pincus, 2003).

According to the Idaho State Department of Agriculture, no viable alternative to burning exists for producers in Idaho (ISDA, 2005). Consequently, bluegrass producers face an important ethical dilemma with regard to bluegrass burning: they can continue burning and maintain farming traditions or family legacies while having potentially negative impacts on other residents, or they can stop burning and jeopardize their livelihood and a business which may have been in their family for generations. Special interest groups demand clean air and a safe environment as basic human rights for everyone living in the region. Thus, the objectives of some stakeholders in a community or place may conflict with the needs of farming residents who also live close by. Each group may rightfully feel its needs and objectives are imperative to maintaining a viable economy, public health, and community well-being.

Policy-makers also face ethical challenges given the regulatory complexities for bluegrass residue burning. The actions of policy makers can have important consequences on public health and welfare of the region. A policy that favors burning might increase respiratory problems in the region, but a policy that over-emphasizes health and environmental protection might endanger the sustainability of the bluegrass seed industry, as well as the long-term health of other aspects of the ecosystem. Local seed producers in the region are already experiencing higher costs associated with farming. These repercussions make the debate over the role of ethics crucial for the success of any policy that aims to deal with the bluegrass field burning controversy (Thompson *et al.*, 1994).

Kentucky Bluegrass Burning, Public Policies, and Social Tension

Since the 1990's, policymakers in Oregon and Washington have sought after a reduction or elimination of acreage burned through a combination of regulations and incentives. These measures include the ban on Kentucky bluegrass field burning in Washington and in certain areas of Oregon because of the human and environmental health risks associated with smoke management (Roberts and Corkill, 1998). These policies also call for a mandatory decrease of the number of acres burned per year, registration and special permit to burn, incentives to adopt alternative practices, and money to support research on alternatives to field burning.

In Idaho, the concern over health problems associated with the reduced air quality by agricultural field burning has led to legislation in the 1990's that mandates limitations on burning periods and areas, as well as the institution of a special permit for burning. At the same time, courts in the state have seen a surge in the number of lawsuits against farmers for air pollution, wrongful death, nuisance, trespass, and for failing to comply with the Resource Conservation and Recovery Act (RCRA). Lawsuits also target the state for failing to protect public health as mandated by the Clear Air Act (CAA) and RCRA. These lawsuits increase the financial burden on insurance companies, who in turn, pass on higher insurance costs to farmers.

In total, threaten the survival of the grass farming industry. This situation led the Idaho state legislature to “protect economic viability” of the farming business in Idaho through legislation. In 2003, the Idaho state legislature enacted House Bill 391 (HB 391), which abolished the right to litigate against farmers if they remain in compliance with the state regulations. In other words, Idaho created “a safe harbor to farmers when burning crop residues” (Idaho State Legislature, 2003, p.2). The bill also calls on the Idaho Department of Agriculture to oversee and manage field burning in the absence of “other economically viable alternatives.” The Director of the Idaho State Department of Agriculture is required to make an annual assessment of other economically viable alternatives. To date, concerned citizen groups that oppose the field burning have unsuccessfully challenged the constitutionality of HB 391.

The intersection between traditional agricultural practices and recent demographic changes in northern Idaho may have contributed to social tensions over agricultural field burning. Public concern over health issues and the state policy-makers' responses to environmental problems often reflect societal constraints, including economic forces and inaccessible technology (Dockery *et al.*, 1993; Stern 1992; Kempton *et al.* 1995). The tension over bluegrass burning has created numerous social impacts including stress, anxiety, public health concerns, decreased community well-being, industry change, higher insurance costs, strained livelihoods of the farming community, identity conflict, and threatened farming family legacies (Burnham, 2005; Kempton *et al.*, 1995).

Research Objectives of This Study

The purpose of this study is to assess public perceptions of air quality issues in northern Idaho and to determine the level of public understanding of bluegrass burning practices. In the context of the heightened controversy over open-field burning, we attempt to gain insight into the changing social landscape of the region. We assess the general attitudes and perceptions among the public lead to the identification of acceptable practices and viable alternatives that reflect the agronomic, environmental, economic, and cultural contexts affecting the grass seed industry and surrounding communities in the region.

Specifically, this study assesses the perceptions of the general public through the following measures:

- The comparison of perceived impacts of pollution from bluegrass field burning to other sources of air pollution;
- The perceived effect of bluegrass field burning on air quality in the region;
- The possible environmental and community trade-offs of bluegrass field burning;
- Policy choices to limit or eradicate air pollution due to bluegrass field burning; and
- The effectiveness of communications between the public and officials as provided by the Idaho state Smoke Management Plan.

These measures will help to outline the views of the public towards field burning issues and may help develop better relationships among stakeholders, possibly resulting in compromises. In addition, the study provides a framework for developing policy to address health concerns and environmental issues, while simultaneously protecting the livelihoods of the farmers.

Methodology

The Social Science Research Unit (SSRU) at the University of Idaho was contracted to design a data entry program and conduct a telephone survey for this study following development of a social survey instrument and subsequent external review by four non-affiliated experts at different institutions in the western United States (see Appendix A). The SPSS data entry program was prepared and tested for accuracy and changes were made as necessary to provide a satisfactory instrument.³

A random sample of 4,165 households throughout northern Idaho was purchased from Survey Sampling, Inc. The sample is divided among five regional zones (see Appendix B), each ranging from 830 - 835 potential respondents. Zone 1 includes Bonner and Boundary counties, parts of Shoshone County and Kootenai County (Athol, Bayview, and Spirit Lake only). The more urbanized sections of Kootenai County (Couer d'Alene, Hayden, Post Falls, and Rathdrum) made up the entirety of Zone 2. Zone 3 was composed of Benewah County, northern portions of Latah County, Kootenai County (Worley), and the remainder of Shoshone County (Calder, Avery, and Clarkia). Zone 4 included the portion of Nez Perce County that includes Lewiston and the portion of Latah County encompassing the city of Moscow and the town of Viola. Finally, Zone 5 was composed of Clearwater, Idaho, and Lewis counties, as well as the remainder of Nez Perce County (Lapwai, Culdesac, and Peck).

A pre-calling postcard was sent to all potential respondents prior to the actual telephone calls to increase the telephone survey response rate. The postcard stated they would be receiving a phone call the following week, explained the purpose of the survey, and provided the SSRU's toll-free number. Respondents were encouraged to call if they had any questions regarding the survey.

Two-thousand and eight-three of the pre-calling postcards were sent on January 7, 2004; the remainder was mailed on January 21, 2004. Actual telephone interviews began on January 15, 2004 and continued through March 11, 2004. Interviewers made calls each week in the

³ SPSS Data Entry Builder, Version 4.0. 2004. SPSS, Inc.

mornings, afternoons, evenings, and on four weekends, in an attempt to reach as many potential respondents as possible. The SSRU had a Spanish language speaking interviewer who completed one interview in Spanish. To randomize the sample the interviewers asked to speak to the adult (>18 years) in the household with the most recent birthday to complete the survey. Interviewers debriefed the research team to note comments about the high refusal rates. The majority of refusals occurred as an ‘unwillingness to respond’ but covered a broad range of perspectives, categorized as both “a non-issue” as well as “too controversial.”

In preparation for the telephone survey, the SSRU interviewers attended a four-hour training session covered the purpose of the study and the basics of proper telephone interviewing. Interviewers were also trained in the use of Computer Assisted Telephone Interviewing (CATI) stations and techniques. As calls were made, the interviewers recorded those who completed the survey, those who asked to be called back, those who were no longer eligible to participate, and those who refused. Interviewers were monitored during each calling session by trained supervisors. Interviewers gave out the toll-free SSRU phone number and/or the SSRU website address when asked for them.

A total of 2,010 of the 4,165 potential respondents completed the survey. Seven hundred and sixty-six potential respondents in the sample were identified as ineligible because of disconnected telephone numbers with no new listing, or because they were deceased, ill, or had moved out of the area. All incorrect and disconnected telephone numbers were checked through internet directory assistance for new listings and when new listings were found they were called. A total of 280 potential respondents households were not reached after repeated attempts within the allotted time frame, and 1,109 households declined to participate in the study. The final response rate for the survey was 60%.

Frequencies, standard errors, cross-tabulations (Chi-square), and logistic regression analyses were conducted using the SAS⁴ statistical software package. When shown, error bars on figures represent 95% confidence intervals. The margin of error for individual questions varies slightly by the number of respondents, but is at or greater than 3.0% for the majority of results reported below.

Results

Demographic Profile of Respondents

All eligible respondents were asked a series of demographic questions, including their age, level of education, income, the number of children in their household, and the length of time they had lived in Idaho. Gender of respondents was also noted by interviewers. Of the 2,010 respondents, 47% were female and 53% were male. The average age of the respondents was 54 years. Almost a third of the respondents were high school graduates (32%); most had at least some college or vocational coursework and only 4% did not graduate from high school. Two-thirds of the respondents lived in households with no

⁴ SAS, Version 9.3 (2005. SAS Institute, Inc. Cary, N.C.)

children (68%), while an additional 24% lived in households with only one or two children. Most households (59%) had an annual income of more than \$20,000 but less than \$60,000 (Table 2).

Table 2. Demographic profile of respondents.

Age (n = 1974)		Education (n = 1985)		Children in Family (n = 2010)	
18-25 years	3.7%	Some high school	4.0%	None	67.8%
26-36 years	9.6%	High school graduate	31.8%	One	11.5%
37-45 years	17.2%	Vocational/ Some college	30.5%	Two	11.6%
46-55 years	23.0%	College graduate	22.8%	Three	4.8%
56-65 years	21.6%	Advanced degree	10.8%	Four	2.0%
Over 65	24.9%			Five or More	2.2%

Length of Idaho Residency (n = 2010)		Annual Household Income (n = 1751)	
Less than two years	3.4%	Less than \$10,000	4.8%
Two to five years	7.4%	\$10,000-\$19,999	12.4%
Six to seven years	3.4%	\$20,000-\$29,999	16.6%
Eight to nine years	3.1%	\$30,000-\$39,999	17.5%
More than 10 years	82.7%	\$40,000-\$49,999	14.2%
		\$50,000-\$59,999	11.0%
		\$60,000-\$69,999	6.4%
		\$70,000-\$99,999	9.7%
		Over \$100,000	6.4%

The vast majority of respondents (83%) had lived in Idaho more than ten years (Table 2). For those residents who had lived in Idaho less than ten years, a follow-up question was asked to determine from which state or country they moved. Of the 347 respondents who had lived in Idaho for less than ten years, 324 responded with their previous residence. Twenty-nine percent of these recent immigrants came from Washington state. Another 23% report moving from California, and 20% had moved from the states of Alaska, Oregon, Montana, Utah, and Wyoming combined. The remainder came from other parts of the U.S. (Figure 1). Only 2% originated from outside the U.S., including: Canada, Mexico, Ecuador, and various countries in Europe.

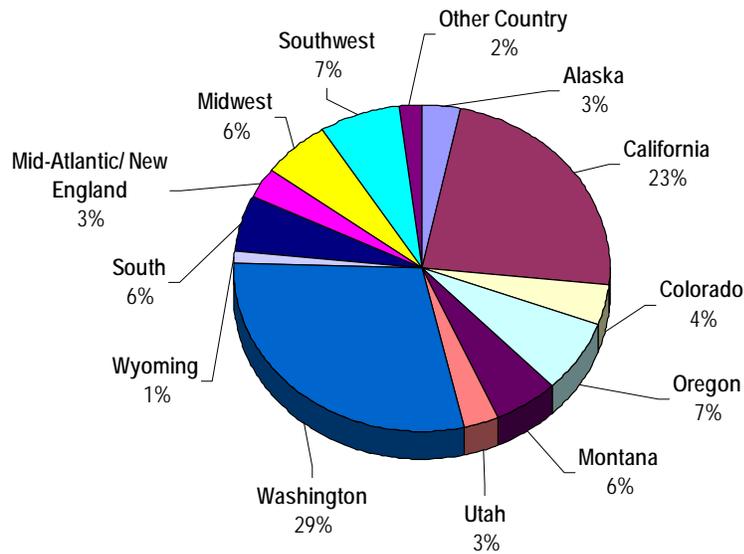


Figure 1. Place of Residence Prior to Idaho (n = 324).

The survey included a series of questions about how closely each family is associated with farming (i.e. do the respondents currently farm, were they raised on a farm, or do they have relatives or friends that farm). These questions determined if an individual's connection to the farming industry affects their opinion about agricultural burning. We found that while only 15% of the respondents are currently involved in the farming industry, over a third (39%) were raised on a farm, and over half (54%) have close friends who farm (Figure 2). While a large portion of the individuals have a connection to the farming industry, this demographic characteristic is also generally representative of the Inland Northwest region.

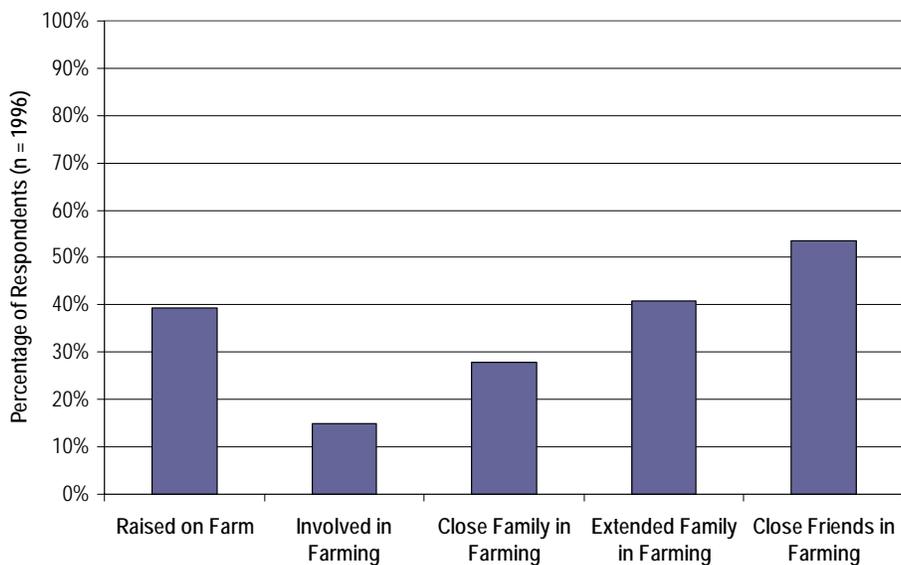


Figure 2. Associations with Farming (n = 1996).

Because the study design included stratification by geographic region, the respondents were almost equally divided amongst the five regions (Region 1: 20%, Region 2: 18%, Region 3: 23%, Region 4: 19%, and Region 5, 21%). Respondents were asked their county of residence. Nine of the respondents have a summer home in the study area; their county of permanent residence was listed as “other.” The remaining respondents were divided among the sampled counties roughly proportional to population density of those counties (Figure 3).

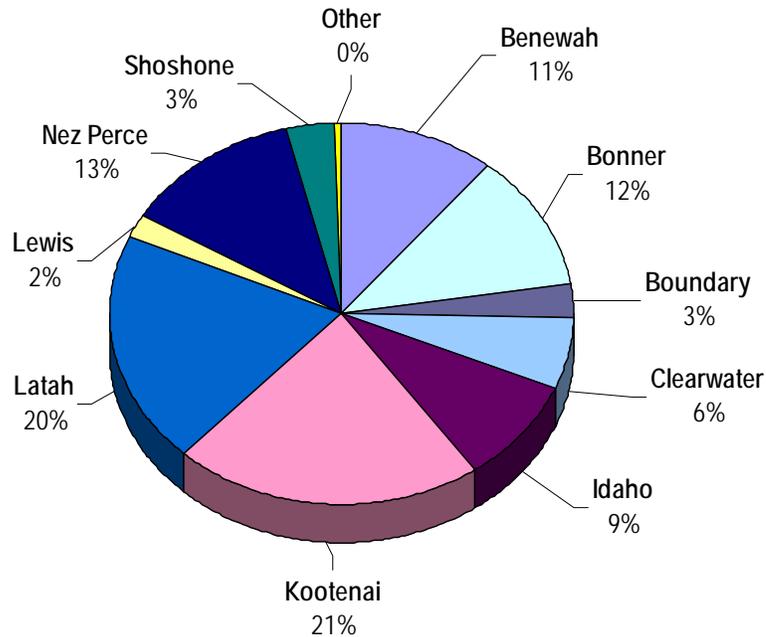


Figure 3. Respondents' County of Permanent Residence (n =2010).

Public Opinions about Air Quality

The first section of the survey asked a series of general air quality questions. The purpose of this section was to measure the perception of residents in northern Idaho to air quality, without making specific references to agricultural burning. The vast majority of respondents (85%) rank air quality as either 'good' or 'very good', with only 7% ranking the air quality in northern Idaho as 'poor' or 'very poor' quality (Figure 4).

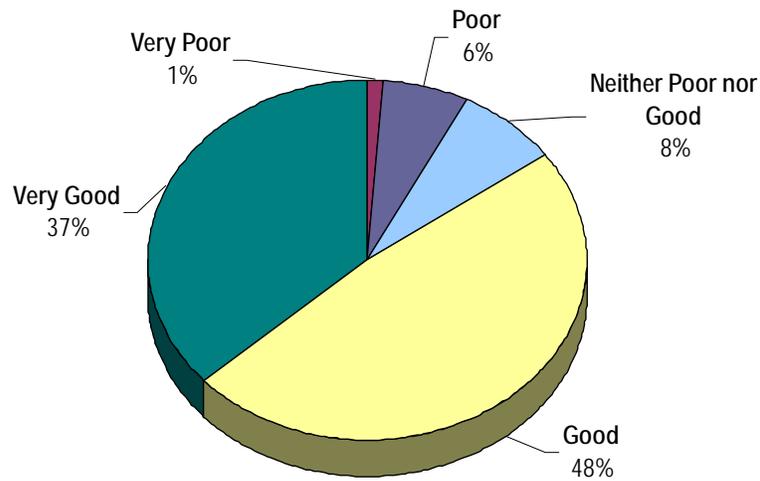


Figure 4. General Perception of Air Quality.

Respondents were asked to list the month or months of the year they perceived as having the best and worst air quality. Generally, the spring months (April, May, and June) were given favorable ratings, whereas August and September are overwhelmingly cited as the months with the worst air quality: 46% of respondents listing August as the worst month, with an additional 29% listing September as the worst month (Figure 5).

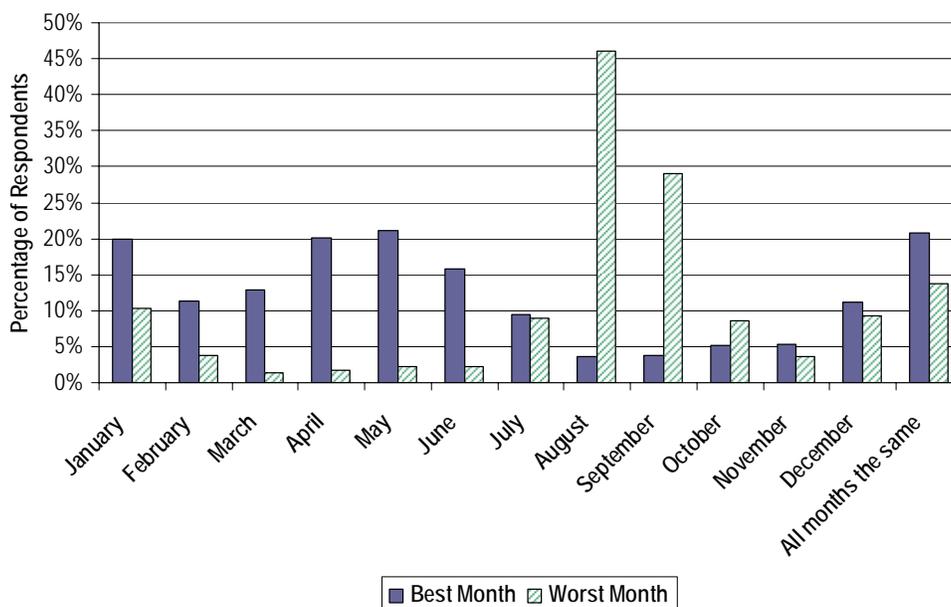


Figure 5. Perceived Air Quality by Month.

A list of seven potential contributors to poor air quality were read to each of the respondents, and they were asked to rank each item on a scale of one to five based on how much they perceived the item affected air quality. A rank of one was equivalent to “no contribution to poor air quality” and a rank of five was equivalent to “contributes a great deal to poor air quality.” Thus, items with a higher ranking score indicated a larger problem. The seven items included: emissions from industrial sources, exhaust from motor vehicles, dust from farm areas, smoke from wood burning stoves, smoke from agricultural burning, smoke from forest fires, and smoke from burning timber in slash piles. Agricultural burning and forest fires had the highest average rank, though there was no statistical difference in the rank for those two items. The error bars in Figure 6 represent the 95% confidence intervals: if the error bars overlap between two groups, no statistical difference exists in the rank of those two items. In other words, respondents rank agricultural burning and forest fires as equal contributors to poor air quality. Farm dust, smoke from wood burning stoves, and slash pile burning had the second highest rankings, and are not significantly different from each other. Vehicle emissions and industrial emissions rank 3rd and 4th respectively.

Respondents were also asked to rank the same seven items with regard to health effects on members of their family, with a rank of one indicating that the item had “no negative effect on health” and a rank of five indicating that item had an “extreme negative effect on health.” The results were very similar to the earlier question: smoke from agricultural burning and forest fires are perceived to have a statistically equal *negative* effect on family health (Figure 6). Again, farm dust, smoke from wood burning fires, and slash pile burning were ranked as the second worst contributors.

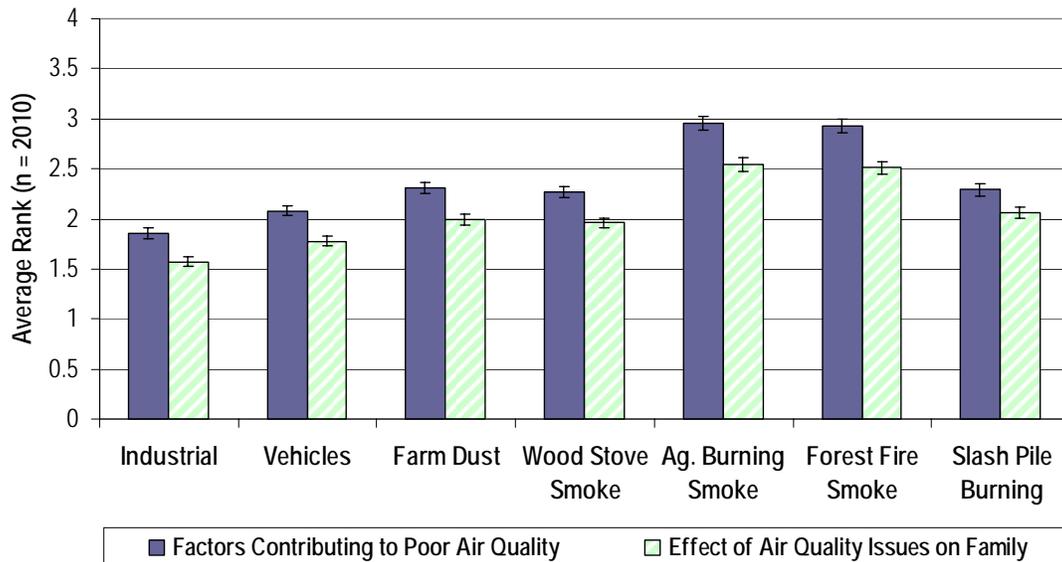


Figure 6. Contributing Factors to Poor Air Quality and the Effect of Air Quality Issues on Family.

The last question in this section asked respondents whether or not they were involved in an air quality interest group. Only 5% of the respondents stated they currently belonged to an organization that is concerned about air quality and public health.

Public Opinions about Agricultural Burning

The second portion of the survey included questions about agricultural burning in general with no reference to a specific type of agricultural burning. Almost a third of the respondents (32%) reported that either they or a family member had health issues aggravated by agricultural burning. However, when asked about impacts to normal family activities, only 14% of respondents reported that the smoke represented a “major problem” for their family. In this context, an additional 29% reported smoke from field burning was “somewhat bothersome,” but the majority of respondents (57%) were indifferent or found the smoke of little or no bother (Figure 7).

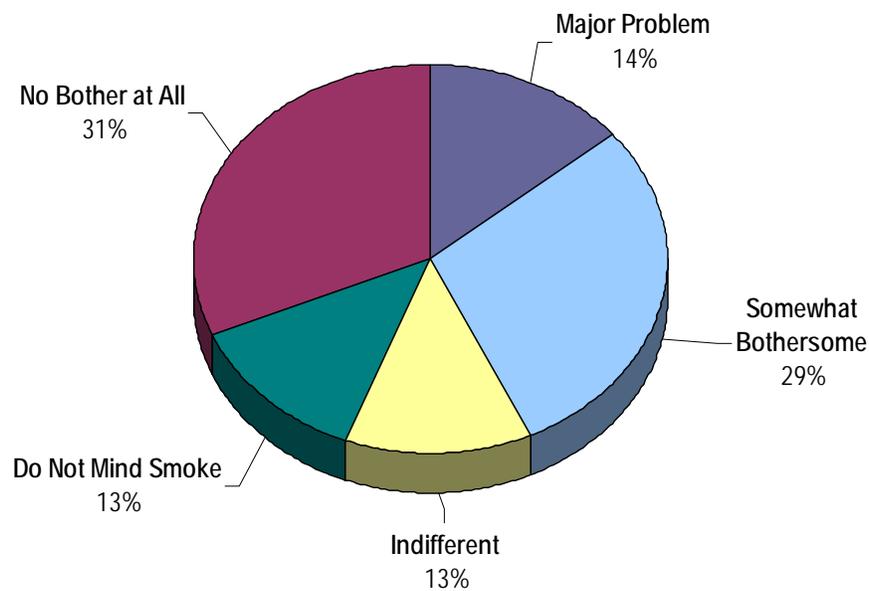


Figure 7. Level of Impediment to Daily Activities.

Respondents were also asked how many times in the past year they had modified their behavior in order to avoid air quality problems from agricultural burning. Specifically, they were asked how many times they had closed their windows, limited outdoor activity, skipped a day of work, called the toll-free air quality hotline to register a complaint, or left town to avoid poor air quality. The most commonly cited method to avoid poor air quality is shutting windows; almost half (42%) of residents reported shutting their windows at least once. Another 32% reported reducing their outdoor activity at least once. Far fewer people skipped work, registered a complaint, or left town, with 3%, 6%, and 9%, respectively, of respondents stating they had made those modifications at least once (Figure 8).

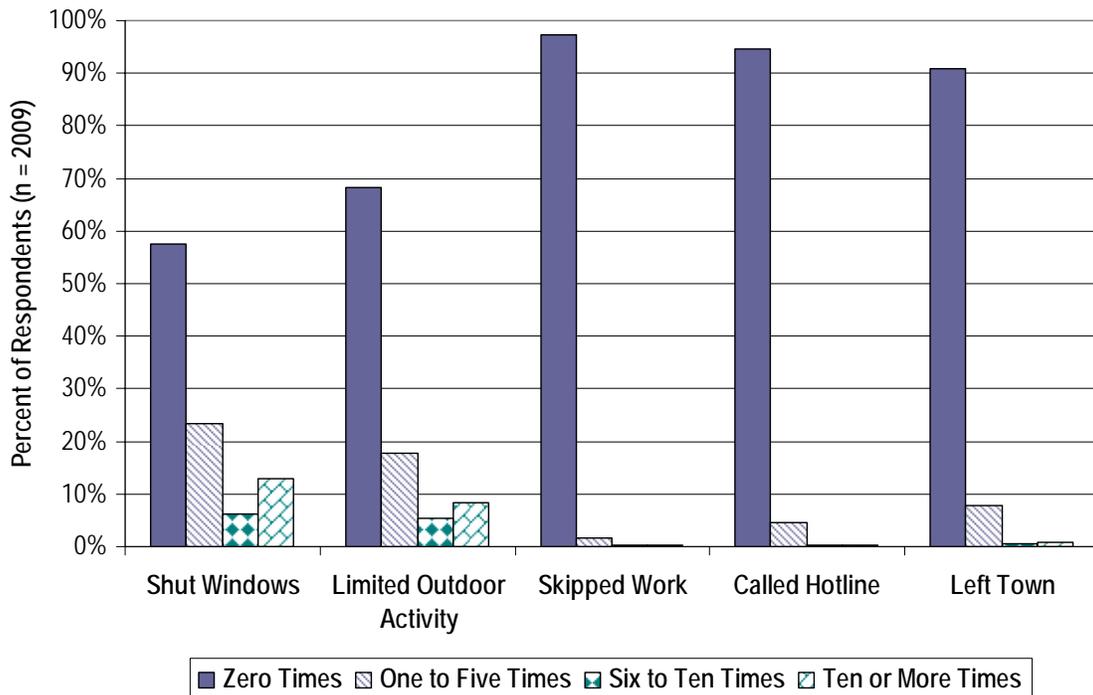


Figure 8. Behavioral Modifications to Reduce Exposure to Agricultural Smoke.

Environmental and Community Trade-Offs of Bluegrass Field Burning

Respondents were asked whether or not they could detect a difference in bluegrass burning from other agricultural burning (such as wheat stubble or ditches). Seventeen percent of the respondents stated they could detect a difference. Those respondents ($n = 340$) were then asked how smoke from burning bluegrass fields was different from smoke from other sources. Twenty-four percent of respondents state they could distinguish bluegrass smoke by its color; another 23% reported that bluegrass smoke odor was distinctive (Figure 9).

Each respondent was asked if they would prefer more burning on fewer days or, less burning on more days in order to assess how the general public feels about the amount of burning and length of time farmers are allowed to burn. Nearly half of the respondents would like to see the same amount of burning as the previous year (2003). Respondents were nearly equally divided between those who would like to see farmers allowed to burn more fields on fewer days (21%) versus those who would like to see farmers burn fewer fields on more days (16%). Another 7% did not want to see any burning at all, and 8% of respondents either do not know or did not want to respond (Figure 10).

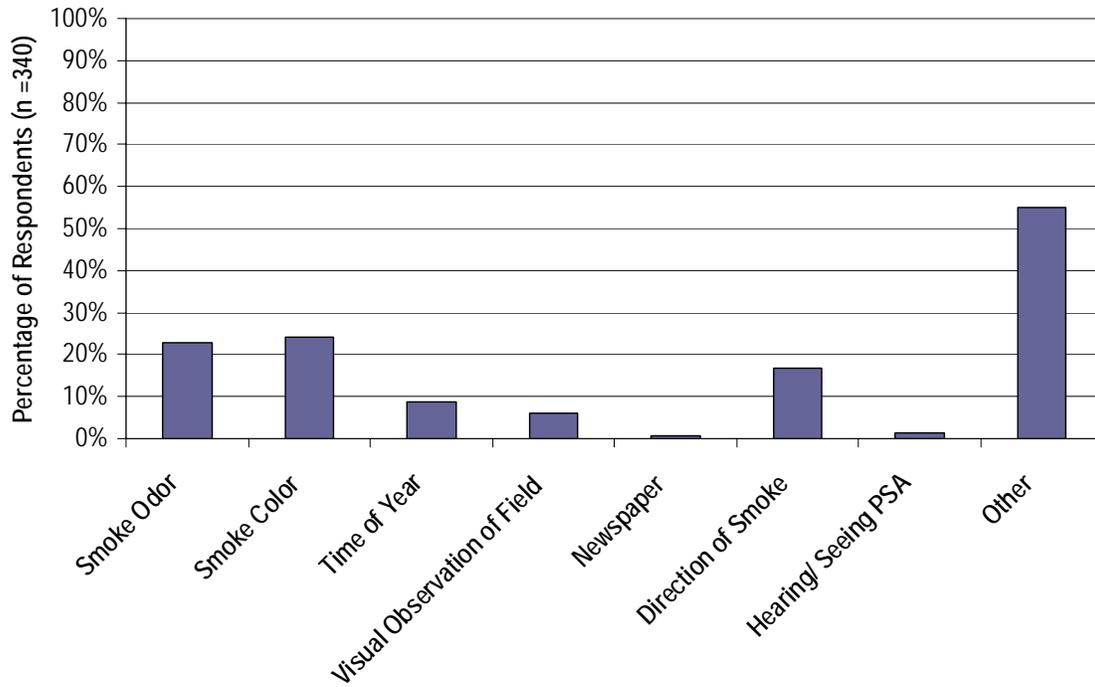


Figure 9. Distinguishing Features of Bluegrass Smoke.

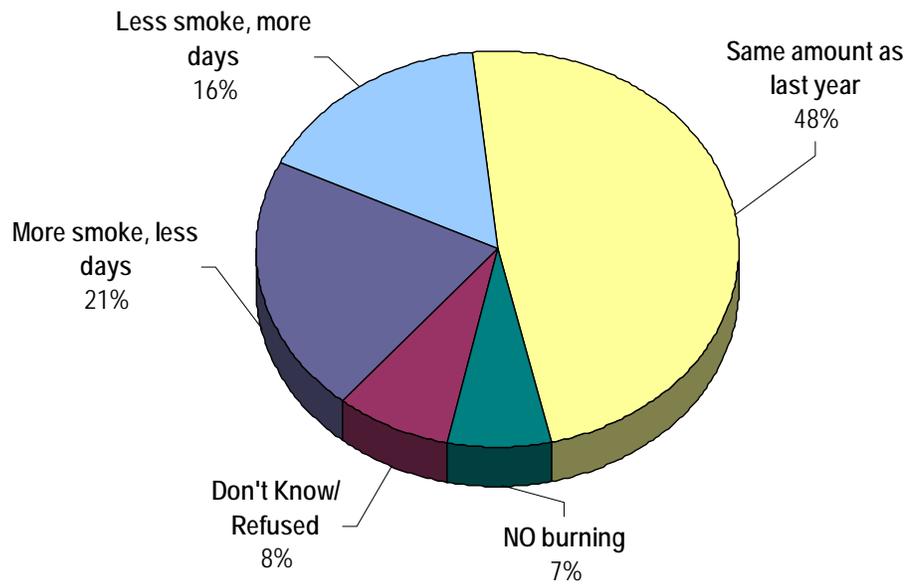


Figure 10. Duration and Amount of Burning.

Seventy-three percent of those surveyed believed that farmers would undergo moderate to severe financial stress if burning was banned. Very few people believed that bluegrass farmers would undergo little or no financial burden if burning was banned, although 14% of respondents indicated they did not know what the degree of financial risk would be for farmers (Figure 11), or refused to answer. By and large, respondents did not believe that the media reports all sides of the bluegrass industry controversy fairly, thus indicating that nearly three-quarters of those surveyed believe the media reports on this issue in a biased manner ($n = 1748$).

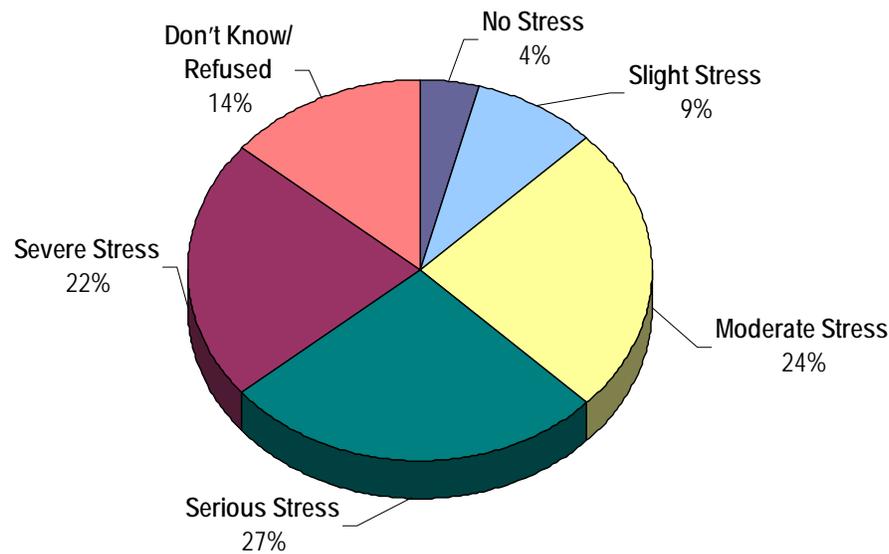


Figure 11. Degree of Financial Stress to Farmers if Bluegrass Burning Banned.

When asked to consider the effect of a ban on bluegrass field burning, many people indicated that a ban on bluegrass burning will create new problems or enhance existing problems. Sixty-three percent of respondents ($n=1515$) thought that farmers would grow different crops that might lead to more wind blown dust and soil erosion if restrictions were increased on bluegrass field burning. The same percentage of respondents (63%, $n = 1804$) believed that more restrictions would lead to an increase in the residential development of farm land. A smaller, but still sizable percentage of people (45%, $n = 1679$), believe that a ban on bluegrass burning would cause stream and lake water quality to deteriorate.

By the same token, many people believe that bluegrass farming (and the subsequent burning of bluegrass fields) is preferable to the alternatives. For example, 87% of those who answered a question on burning as an alternative to the addition of chemicals ($n = 1648$) believe that it is better for farmers to burn bluegrass fields than to apply more chemicals to the fields to manage crop residue. Similarly, 58% of respondents ($n = 1571$) believe it is worth the air quality deterioration caused by burning bluegrass fields to maintain undeveloped farmland. However, it should be noted that a large number of respondents either refused to answer the question or stated they did not know whether burning bluegrass

fields was preferable to more chemicals or increased development. This result might indicate that the public is generally uniformed about the pros and cons of a ban on bluegrass burning or is unable to evaluate environmental tradeoffs and ramifications related to this type of agricultural or environmental policy. Alternatively, the response pattern might also indicate the relative sensitivity of this issue which often has a tendency to affect respondents' willingness to acknowledge uncertainty.

The current regulations on bluegrass burning include:

1. Bluegrass farmers must register the acres to be burned;
2. Burn days are approved only when weather permits and are co-managed by the State of Idaho agencies (Departments of Agriculture and Environmental Quality) along with the Nez Perce and Coeur d'Alene Tribal Offices;
3. The numbers of acres that can be burned in a day is dictated by smoke management plans;
4. Agricultural burning is prohibited on weekends and holidays;
5. Burning standards must comply with the National Ambient Air Quality Standards.

Respondents were asked to consider the current regulations and decide, as if they were voting, whether to maintain the regulations as they stand now, partially reduce burning, or put a total ban on burning. A majority of individuals (58%) respond they would vote to maintain the current regulations. Almost a third of respondents (30%) would like to further restrict bluegrass burning, and 13% of respondents would like to ban bluegrass burning altogether. Although those who favor a total ban on bluegrass burning are in the minority, a relatively large fraction of the population would vote for a reduction in burning (Figure 12).

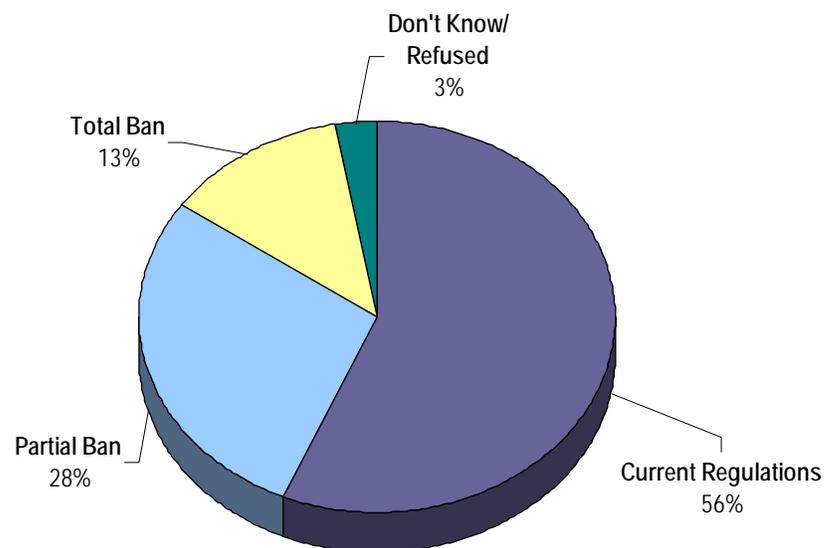


Figure 12. Bluegrass Burning Regulation.

Those individuals who stated they would like to reduce or eliminate bluegrass burning were asked a follow up question regarding how quickly they would like to see new regulations put into place. The largest percentage of respondents (44%) suggested that new restrictions be phased in within one to two years. The remaining individuals were divided between enforcing new regulations immediately (30%) and phasing in new regulations over a longer period of three to five years (26%). When the results were examined separately for those individuals supporting a total ban versus those individuals supporting increased restrictions, those favoring a total ban were more in favor of imposing restrictions immediately. Those individuals that favored increased restrictions on burning without banning it entirely suggested phasing in any new restrictions over a period of 1-2 years (Figure 13). The results from these questions appear to indicate that while most people do not want any changes in the current regulations, those individuals who want the most restrictions on burning also want to see those restrictions in place the quickest.

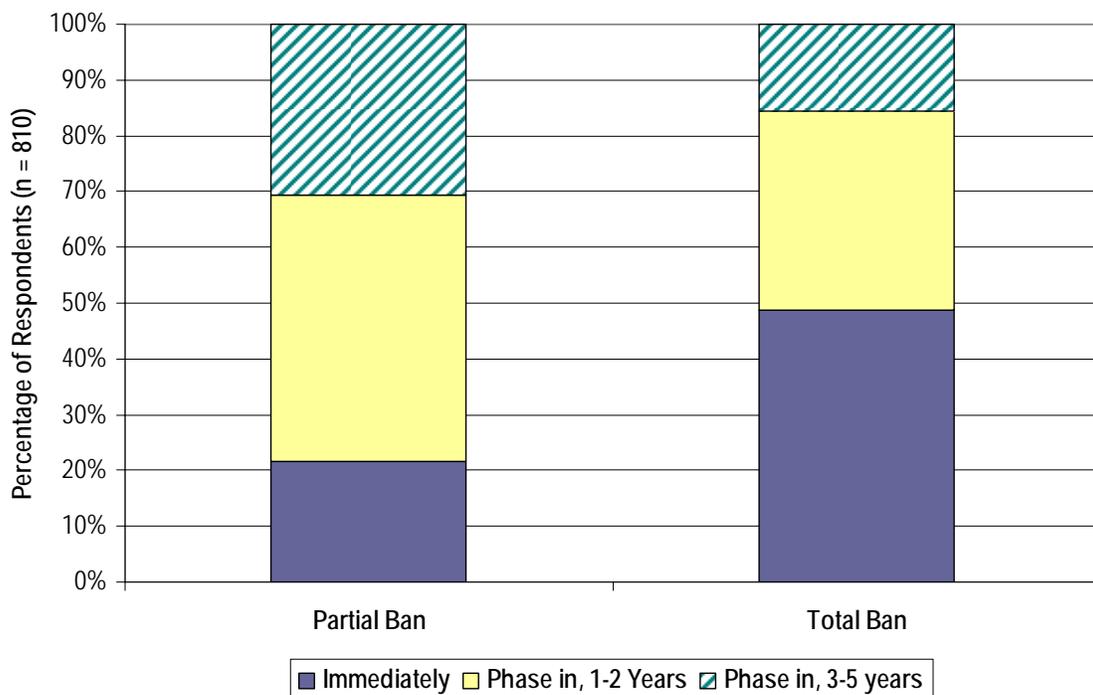


Figure 13. Timeline for New Restrictions.

In 2003, the management of smoke from bluegrass burning was controlled by the State of Idaho, the Nez Perce tribe, and the Coeur d’Alene tribe. Burning was only allowed on certain days and only if weather conditions were favorable to burning. Respondents were asked to comment on whether this co-management plan resulted in improved, reduced, or the same air quality in 2003 as in previous years. The majority of people (60%) felt that the air quality in 2003 was the same as in previous years. However, 23% of respondents feel that the air quality is somewhat better, while only 7% feel the air quality is somewhat worse. The difference in these two groups was statistically significant. In other words, significantly more people believe the air quality is somewhat better than somewhat worse. Furthermore,

significantly more individuals believe the air quality is much better (6%) than much worse (4%, Figure 14). This result may indicate that the co-management plan has had some success in reducing the air quality issues produced by bluegrass burning.

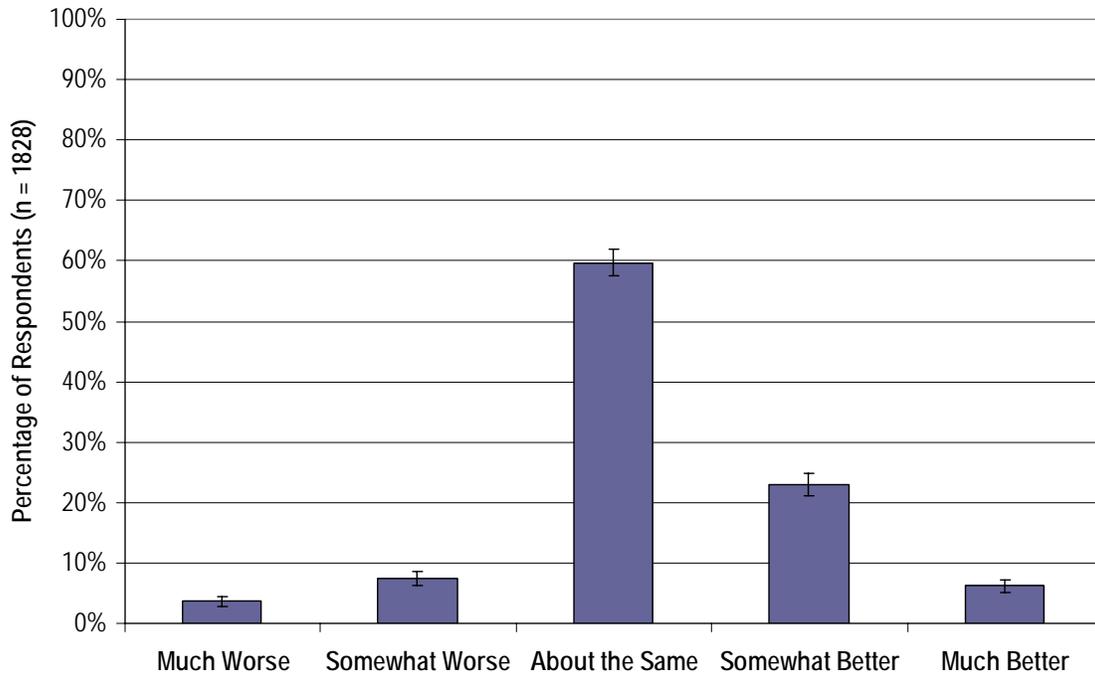


Figure 14. Effect of Co-management Plan on Air Quality in 2003.

Clearly, one of the key problems with increasing restrictions on bluegrass field burning or eliminating it altogether is that burning still represents the lowest-cost alternative to managing a highly profitable crop. This survey sought, in part, to assess the public’s understanding of the economic aspects of bluegrass burning and to determine the “willingness to pay” of the public to alternatives to bluegrass burning. When asked if they believed if farmers should be compensated for economic losses resulting from a ban on bluegrass burning, the public was almost evenly divided with a slight majority (54%) favoring economic compensation for the farmers.

Respondents were then asked which source should be responsible for compensating farmers (i.e. private organizations, federal tax dollars, or state tax dollars; respondents could choose more than one category). For those individuals that answered this question ($n = 995$), 43% thought it should be state tax dollars and 44% believed it should be federal tax dollars. A smaller percentage (26%) believed private organizations should be responsible.

We wished to determine if members of the public would still be willing to support a bluegrass ban in the event that it had a direct effect on their finances in the form of a state income tax increase. In this survey, a hypothetical annual income tax increase between \$5.00 and \$35.00 (in \$5.00 increments) was randomly assigned to each respondent. In other words, approximately 14% of the sample was asked if they would support a bluegrass ban if

it meant a \$5.00 increase in their annual income tax, 14% of the sample was asked if they would support a bluegrass ban if it meant a \$10.00 increase in their income tax, etc.

A logistic regression analysis was conducted to determine if a relationship existed between the amount of the tax increase and whether or not a person would be willing to support a ban given they would have to pay that amount. Logistic regression is analogous to linear regression, but is used in cases in which the outcome is binary (e.g. yes or no). We find a statistically significant relationship between the amount of the tax increase and the respondent’s willingness to support a ban: the higher the amount of the tax increase, the lower the probability the individual would support a ban with payment ($p = 0.0018$, $n = 1820$). Conversely, if the tax increase per year was very low, respondents would be more likely to support a ban with payment for bluegrass burning that also included financial compensation for the farmers. Thus, a clear relationship exists between the direct costs to the public resulting from a bluegrass ban and their willingness to support such a ban with financial compensation for farmers.

A number of resources are available to the public as part of the smoke management plan. It is unclear to what extent the public is a) aware of these sources, and b) makes use of these sources. In order to assess the utility of the website, public service announcements, and toll-free hotline that are maintained by the state, several questions were included in the survey that specifically asked about these resources. The public service announcements (PSA) were the most widely recognized source of information, with 59% of the public indicating they had heard of the PSA, with 50% of the respondents having actually heard the PSA on the television or radio. Over a third of respondents (37%) had heard about the toll-free hotline (Figure 15).

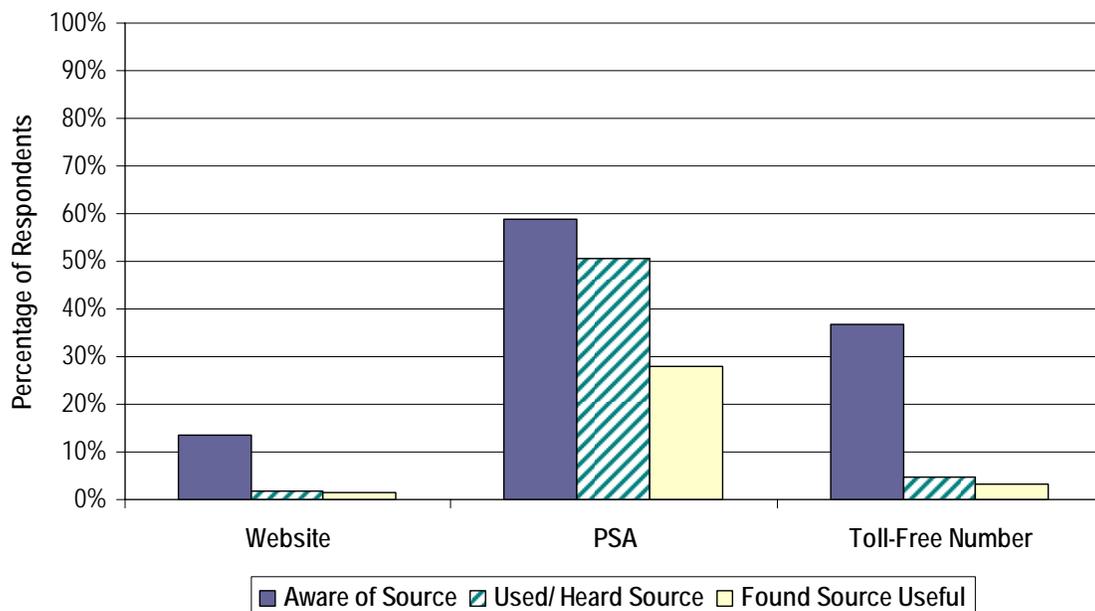


Figure 15. Sources of Information Regarding Bluegrass Burning.

Summary

While the social tension and political conflict about bluegrass field burning in northern Idaho have dominated media accounts in recent years, the general public expresses mixed opinions about the impacts to air quality from the field burning. Overall, a large majority of residents in the ten-county region surveyed perceive either good or very good air quality. Interestingly and perhaps related to the agricultural burning season as well as the most common period for smoke originating from forest fires, the months of August and September are perceived to be the worst air quality months in the region by many.

Based on data collected in this study, a larger percentage of respondents would elect to maintain the current smoke management plan and regulations than to change it to less smoke on more days or more smoke on fewer days. This result could serve as an indicator that the Idaho state management plan, co-directed by ISDA and the Nez Perce and Coeur d'Alene Indian tribes in the growing region, has had some positive impact on the mitigation of air quality concerns from bluegrass field burning. By and large, although the average citizen respondent does not appear to understand the full range of positive and negative ecological tradeoffs associated with bluegrass burning, the majority favors maintenance of the current regulations. Others suggest a partial burn ban would be a better compromise. If a change in policy were to result in economic losses to farmers forced to change their burning practices, most respondents indicated that either state and/or federal funds would be the appropriate source from which to compensate bluegrass seed producers.

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Appendix A

Public Survey on Bluegrass Field Burning University of Idaho Telephone Questionnaire 2004

Hello, is this the _____ household?
My name is _____ and I'm calling from the Social Science Research Unit at the University of Idaho. We are conducting a study to learn about air quality issues in your area. I would like to speak to an adult in the household who has had the most recent birthday, would this happen to be you? We sent you a postcard last week to notify you about the study. Did you receive the postcard? Is this a good time for a survey? This will take us about 15 minutes.

This interview is voluntary and if I come to any question you would prefer not to answer just let me know and I'll skip over it. I'd like to assure you that your responses will be kept confidential.

GENERAL AIR QUALITY

First, we have a few general questions about your perceptions of air quality in your area.

- Q1. Over the course of the whole year, how would you rate the air quality where you live? Would you rate it as...
- a. _____ VERY POOR
 - b. _____ POOR
 - c. _____ NEITHER POOR nor GOOD
 - d. _____ GOOD
 - e. _____ VERY GOOD
- Q2. In your community, what month of the year do you think generally has the **worst** air quality?
- a. _____
 - b. _____
 - c. All months are the same (don't read)

- Q3. Now, what month of the year do you think generally has the **best** air quality in your community?
- _____
 - _____
 - All months are the same (don't read)
- Q4. I am going to read you a list of items that **MAY** be a source contributing to poor air quality in your area. Please rate each item 1 to 5 with '1', **does not contribute at all** and '5', **contributes a great deal**
- ___ Emissions from industrial operations (i.e., manufacturing plants)
 - ___ Exhaust from motor vehicles
 - ___ Dust from farm areas
 - ___ Smoke from woodburning stoves
 - ___ Smoke from agricultural burning
 - ___ Smoke from forest wildfires
 - ___ Smoke from burning timber in slash piles
(branches and other wood waste from logging)
- Q5. Thinking about the effects on you and your family, please rate each of the following types of air quality issues from 1, no negative effect to 5, it has an extreme negative effect.
- ___ Emissions from industrial operations (i.e., manufacturing plants)
 - ___ Exhaust from motor vehicles
 - ___ Dust from farm areas
 - ___ Smoke from woodburning stoves
 - ___ Smoke from agricultural burning
 - ___ Smoke from forest wildfires
 - ___ Smoke from burning timber in slash piles
(branches and other wood waste from logging)
- Q6. Do you currently belong to an organization concerned about air quality and public health?
- ___ Yes
 - ___ No
- Q6a. If yes, which one? _____

AGRICULTURAL BURNING

Now I have some questions that ask more specifically about your perceptions of air quality issues related to agricultural burning.

Q7. Do you or any of your family members have health issues that are aggravated by agricultural burning?

- a. Yes
- b. No

Q8. Please indicate the overall level to which smoke from agricultural burning is a bother to your family's normal activities.

- a. The smoke is a major problems for us
- b. The smoke is somewhat bothersome
- c. We're indifferent to the smoke
- d. We do not mind the smoke
- e. The smoke does not bother us at all

Q9. Next I'll read a list of things people may do to reduce their exposure to outdoor air quality problems from agricultural burning. As a result of air quality issues, please tell me how often in the past year you have...

	0 Times	1-5 Times	6-10 Times	More Than 10 Times
Shut windows				
Limited outside activities				
Skipped a day of work				
Called the toll-free air quality # to register a complaint (1-800-345-1007 CID Dept of Environmental Quality OR 1-800-435-0490 ID State Dept. of Agriculture)				
Left town to avoid the poor air quality				

ENVIRONMENTAL AND COMMUNITY TRADEOFFS OF BLUEGRASS FIELD BURNING

Now I'd like to ask you some questions on your attitudes about bluegrass field burning which is a term commonly used to refer to the burning of after-harvest residue associated with Kentucky bluegrass seed crops.

Q10. Do you see much of a difference between the effects of bluegrass field burning and other types of agricultural burning, such as wheat stubble burning or ditch burning?

- a. Yes (Go to Q11)
- b. No (Skip to Q12)

Q11 How do you tell the difference between bluegrass field burning and other types of agricultural burning?

Possible answers for interviewers to check but DO NOT READ to respondents

- a. The way the smoke smells
- b. The color of the smoke
- c. The time of year
- d. Seeing that bluegrass residue is being burned
- e. Reading in the newspapers that bluegrass residue is being burned
- f. The direction the smoke comes from
- g. Hearing/seeing a radio or TV commercial that Bluegrass residue is being burned
- h. Other

Q11i. OTHERS _____

Q12. If farmers were allowed to continue to burn bluegrass fields, which of the following choices would you prefer?

- a. Produce more smoke for fewer days than last season
- b. Produce less smoke for more days than last season
- c. Same rate of burning as last season
- d. Don't know/ indifferent (Not to be read)

Q13. If bluegrass farmers were required to stop field burning, how would you rate the level of *financial* stress they would experience? Would you say...

- a. ___ None
- b. ___ Slight
- c. ___ Moderate
- d. ___ Serious
- e. ___ Severe
- f. ___ DON'T KNOW (do not read)

Now I will read some statements you **MIGHT** have heard about bluegrass field burning. Please answer 'yes' or 'no' to each of the following statements.

Q14. Do you think the news media report all sides of the bluegrass field burning issue fairly?

- a. ___ Yes (go to Q15)
- b. ___ No (go to Q14a)
- c. ___ Don't Know (don't read; go to Q15)

Q14a. If not, who is treated unfairly? _____

Q15. Do you think more bluegrass field burning restrictions will lead farmers to switch to growing crops that could cause more windblown dust and soil erosion?

- a. ___ Yes
- b. ___ No
- c. ___ Don't Know (don't read)

Q16. Do you think a ban on bluegrass field burning will lead to increased residential development of farmland?

- a. ___ Yes
- b. ___ No
- c. ___ Don't Know (don't read)

Q17. Is it better for bluegrass farmers to burn fields than to apply more chemicals to manage crop residue?

- a. ___ Yes
- b. ___ No
- c. ___ Don't Know (don't read)

Q18. Do you think a ban on bluegrass field burning will lead to water quality problems in local streams and lakes?

- a. Yes
- b. No
- c. Don't Know (don't read)

Q19. Do you think keeping open space, such as undeveloped farmland, is worth the air quality issues created by bluegrass field burning?

- a. Yes
- b. No
- c. Don't Know (don't read)

Q20. Now, suppose you were asked to vote on smoke management issues related to bluegrass field burning and air quality in Idaho. Would you vote to...

Idaho Agricultural Burning Regulations

1. *Bluegrass farmers must register acres to be burned*
2. *Burn days are only approved when weather permits and are co-managed by the State of Idaho agencies along with Nez Perce and Coeur d'Alene Tribal Offices*
3. *# of acres that can be burned in a day varies and is limited by the smoke management plans*
4. *Agricultural burning is prohibited on weekends and holidays*
5. *Burning must comply with the National Ambient of Air Quality Standards.*

- Continue to allow burning under current regulations (go to Q22)
- Partially reduce burning
- Put a total ban on burning

Q21. When would you suggest the changes in smoke management regulations should be made? Would you say new regulations should be...

- a. Put in place immediately
- b. Phased in over the next 1 to 2 years
- c. Phased in over the next 3 to 5 years
- d. Don't Know (DO NOT READ)

Q22. Should farmers be compensated financially if they are required to stop bluegrass field burning?

- a. Yes (go to Q23)
- b. No (go to Q24)

Q23. Please indicate which of the following sources should be responsible to help compensate the farmers who are required to adjust to non-burning policies? (Can answer more than one here)

- a. Private organizations
- b. Federal tax dollars
- c. State tax dollars
- d. No Opinion (Don't read)

Q23a. Which of these do you think should be **most** responsible for compensating bluegrass farmers?

The Nez Perce and Coeur d'Alene Tribes along with the State of Idaho co-manage smoke from bluegrass field burning in northern Idaho. Bluegrass farmers are allowed to burn on certain days when weather conditions permit.

Q24. What effect do you think the co-management plan had on the overall air quality for your community in 2003? Did the management make the air quality...

- a. Much worse
- b. Somewhat worse
- c. About the same
- d. Somewhat better
- e. Much better

Now suppose the State of Idaho

- ***Passes a law stopping additional bluegrass acreage from being burned, AND***
- ***Farmers only have the right to burn their existing bluegrass acres.***

Q25

If a referendum were introduced that would increase your annual household state income taxes by _____ to purchase the farmer's rights to burn bluegrass fields, would you vote FOR or AGAINST it?

Q26

- a. For (go to Q27)
- b. Against (skip to Q28)
- c. Don't know/don't have enough information (skip to 29) (don't read)

Q27. Would you pay more than \$_____(\$ in Q25)? YES___ NO___

Q27a What amount would you be willing to pay? \$_____(skip to29)

Q28. Would you pay less than \$_____(\$ in Q25) YES___ NO___

Q28a. What amount would you be willing to pay? \$_____

Q29. DO NOT READ: ***But, If no on Q28, please mark whether respondent makes either of the following comments:***

- a. I should not have to pay for clean air
- b. Farmers should have the right to burn
- c. NO comment
- d. Other

Q29e. Other:_____

The smoke management plan has three ways to both provide and receive information. These include a website, public service announcements, and a toll-free comment hotline on agricultural burning.

Q30. Before now, were you aware of the website?

- YES
- NO
- Don't know (do NOT read)

Q31. Did you USE the website?

- YES
- NO
- Don't know (do NOT read)

Q32. Did you find the website USEFUL?

- YES
- NO
- Don't know (do NOT read)

Q33. Were you aware of the public service announcements?

- YES
- NO
- Don't know (do NOT read)

Q34. Did you HEAR the public service announcements?

- YES
- NO
- Don't know (do NOT read)

Q35. Did you find the public service announcement USEFUL?

- YES
- NO
- Don't know (do NOT read)

Q36. Were you aware of the toll-free numbers??

- YES
- NO
- Don't know (do NOT read)

Q37. Did you USE the toll-free numbers?

- YES
- NO
- Don't know (do NOT read)

Q38. Did you find the toll-free numbers USEFUL?

- YES
- NO
- Don't know (do NOT read)

Q39. What other ways would be MORE useful in providing and giving information on Bluegrass field burning to Idaho residents.

DEMOGRAPHICS

Now I have a few questions about your background that will remain confidential and help with our data analysis.

Q40. What year were you born? _____

Q41. What is the highest level of education you have completed?

- a. _____ Some high school or less
- b. _____ High school graduate
- c. _____ Vocational school or some college
- d. _____ College graduate
- e. _____ Advanced college degree

Q42. How many children under 18 currently live in your household? _____

Q43. What county do you live in? _____

Q44. How long have you lived in Idaho?

Number of **YEARS** _____ (If more than 10 years go to Q36)

Q45. What state did you move from? _____

Q46. Were you raised on a farm?

- a. _____ YES
- b. _____ NO.

Q47. Are you currently involved in farming?

- a. _____ YES
- b. _____ NO.

Q48. Do you have close relatives (parents, siblings, or children) currently involved in farming?

- a. YES
- b. NO.

Q49. Do you have extended relatives involved in farming?

- a. YES
- b. NO.

Q50. Do you have close friends involved in farming?

- a. YES
- b. NO.

Q51. Which of the following categories best describes your total HOUSEHOLD income before taxes in 2003?

- Less than \$10,000
- \$10,000 to 19,999
- \$20,000 to 29,999
- \$30,000 to 39,999
- \$40,000 to 49,999
- \$50,000 to 59,999
- \$60,000 to 69,999
- \$70,000 to 99,999
- \$100,000 or MORE
- Prefer not to answer (don't read this)

Q52. Do you have any other comments you want to add about bluegrass field burning in Idaho?

Q53. Record sex of respondent (Don't ask)

- Female
- Male

Thank you for taking the time to answer our survey questions.

Q54. ID Number of respondent _____

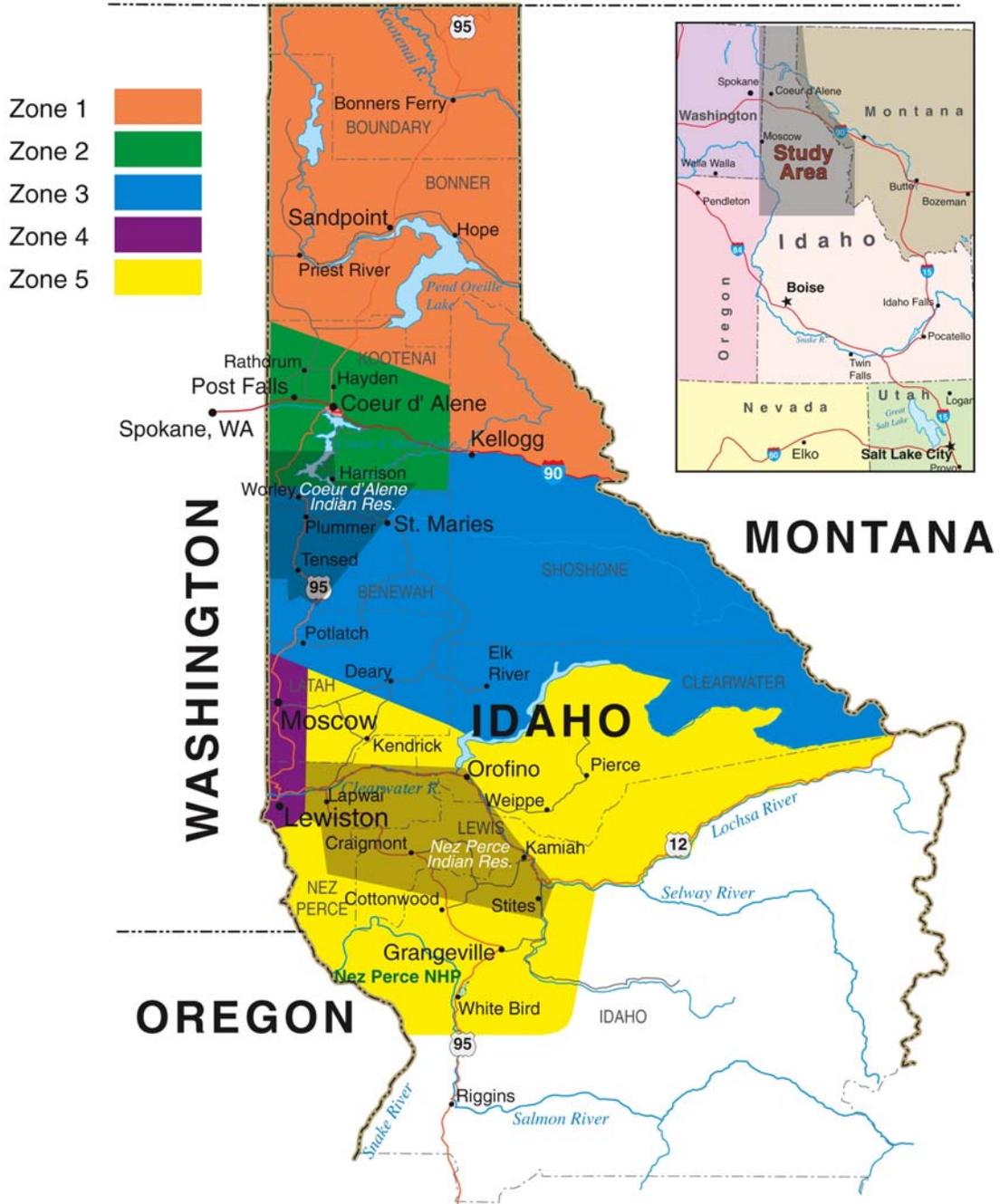
Q55. Enter Zip code from call log for respondent _____

Q56. Interviewer Number _____

Appendix B

Geographic Stratification

CANADA



Appendix C

Raw Frequencies for Qualitative Questions

Question	Responses	Frequency	Percent
Q1: Air Quality Rate	Very poor	24	1.2%
	Poor	124	6.2%
	Neither poor nor good	151	7.5%
	Good	966	48.1%
	Very good	734	36.5%
	Missing	11	0.6%
Q2: Month with Worst Air Quality	January	206	10.3%
	February	74	3.7%
	March	29	1.4%
	April	37	1.8%
	May	47	2.3%
	June	47	2.3%
	July	180	9.0%
	August	927	46.1%
	September	583	29.0%
	October	173	8.6%
	November	73	3.6%
	December	187	9.3%
	All months the same	278	13.8%
Missing	1	0.0%	
Q3: Month with Best Air Quality	January	402	20.0%
	February	228	11.3%
	March	259	12.9%
	April	404	20.1%
	May	425	21.1%
	June	317	15.8%
	July	188	9.4%
	August	72	3.6%
	September	77	3.8%
	October	105	5.1%
	November	109	5.4%
	December	223	11.1%
	All months the same	417	20.8%
Missing	0	0.0%	
Q6: Air Quality Organization	Yes	107	5.3%
	No	1902	94.6%
	Missing	1	0.0%

Question	Responses	Frequency	Percent
Q7: Health Issues from Agricultural Burning	Yes	651	67.5%
	No	1356	32.4%
	Missing	3	0.2%
Q8: Level of Effect of Smoke from Agricultural Burning on Family Activities	Smoke is major problem	276	13.7%
	Smoke is bothersome	583	29.0%
	Indifferent to smoke	259	12.9%
	Do not mind the smoke	256	12.7%
	Does not bother us at all	627	31.2%
	Missing	9	0.5%
Q9a: Number of Times in Past Year Smoke Caused Respondent to Shut Windows	Zero Times	1154	57.4%
	One to Five Times	469	23.3%
	Six to Ten Times	126	6.3%
	More than Ten Times	258	12.8%
	Missing	3	0.0%
Q9a: Number of Times Smoke Caused Respondent to Limit Outdoor Activity	Zero Times	1374	68.4%
	One to Five Times	356	17.7%
	Six to Ten Times	111	5.5%
	More than Ten Times	169	8.4%
	Missing	0	0.0%
Q9a: Number of Times Smoke Caused Respondent to Skip a Day of Work	Zero Times	1957	97.4%
	One to Five Times	34	1.7%
	Six to Ten Times	9	0.5%
	More than Ten Times	9	0.5%
	Missing	1	0.0%
Q9a: Number of Times Smoke Caused Respondent to Call Air-Quality Hotline	Zero Times	1896	94.3%
	One to Five Times	94	4.7%
	Six to Ten Times	9	0.5%
	More than Ten Times	8	0.5%
	Missing	3	0.0%
Q9a: Number of Times Smoke Caused Respondent to Leave Town to Avoid Air	Zero Times	1827	90.9%
	One to Five Times	154	7.7%
	Six to Ten Times	12	0.6%
	More than Ten Times	16	0.8%
	Missing	1	0.0%

Question	Responses	Frequency	Percent
Q10: Difference Between Bluegrass and Other Smoke	Yes	340	16.9%
	No	1615	80.3%
	Missing	55	2.7%
Q11: Distinguishing Features of Bluegrass Smoke	The way the smoke smells	77	3.8%
	The color of the smoke	82	4.1%
	The time of year	27	1.3%
	Seeing bluegrass burned	20	1.0%
	Newspapers	2	0.1%
	The direction of the smoke	57	2.8%
	Hearing a commercial	5	0.2%
	Other	187	9.3%
Missing	1	0.0%	
Q12: Preferences Regarding Changing the Amount or Duration of Smoke	More smoke, fewer days	424	21.1%
	Less smoke, more days	323	16.1%
	Same rate as last year	969	48.2%
	No smoke at all	135	6.7%
	Don't Know/ Missing	159	7.9%
Q13: Level of Financial Stress Experienced by Farmers Due to Ban on Bluegrass Burning	None	82	4.1%
	Slight	176	8.8%
	Moderate	490	24.4%
	Serious	543	26.6%
	Severe	447	22.2%
	Don't Know/ Missing	281	14.0%
Q14: Fair Reporting of Bluegrass Issues by Media	Yes	480	23.9%
	No	1268	63.9%
	Don't Know/ Missing	262	13.0%
Q15: More Windblown Dust with Reduced Burning	Yes	950	47.3%
	No	565	28.1%
	Don't Know/ Missing	495	24.6%
Q16: Increased Development with Reduced Burning	Yes	1143	56.9%
	No	661	32.9%
	Don't Know/ Missing	206	10.2%
Q17: Increased Chemical Use with Reduced Burning	Yes	1428	71.0%
	No	661	56.9%
	Don't Know/ Missing	206	10.2%

Question	Responses	Frequency	Percent
Q18: Increased Water Quality Problems with Reduced Burning	Yes	752	46.1%
	No	927	37.4%
	Don't Know/ Missing	331	16.5%
Q19: Farmland Worth Air Quality Issues	Yes	910	32.9%
	No	661	45.3%
	Don't Know/ Missing	439	21.8%
Q20: Idaho Agricultural Burning Regulations	Continue current regulations	1130	56.2%
	Partially reduce burning	569	28.3%
	Initiate total ban on burning	252	12.5%
	Missing	59	2.9%
Q21: Timing of New Regulations	Put in place immediately	244	27.7%
	Phase in over 1-2 years	354	40.2%
	Phase in over 3-5 years	211	24.0%
	Don't Know/ Missing	72	8.1%
Q22: Financial Compensation for Farmers	Yes	998	49.7%
	No	838	41.7%
	Missing	174	8.7%
Q23: Responsible for Compensating Farmers	Private organizations	258	12.8%
	Federal tax dollars	435	21.6%
	State tax dollars	431	21.5%
	No opinion/ Missing	85	4.2%
Q24: Effect of Co-management Plan on Air Quality	Air quality much worse	66	3.3%
	Air quality somewhat worse	136	6.8%
	Air quality about the same	1092	54.3%
	Air quality somewhat better	421	20.9%
	Air quality much better	113	5.6%
	Missing	182	9.1%
Q25/ Q26: Effect of Higher Taxes for Compensation	Vote for referendum	638	31.7%
	Vote against referendum	1182	58.8%
	Don't Know/ Missing	190	9.5%
Q27: Pay more	Yes	242	12.0%
	No	379	18.6%
	Missing	1389	69.1%

Question	Responses	Frequency	Percent
Q28: Pay less	Yes	193	9.6%
	No	971	45.6%
	Missing	1196	59.5%
Q29: Comments About Higher Taxes to Compensate Farmers	I shouldn't have to pay for clean air	192	9.6%
	Farmers should have the right to burn	223	11.1%
	NO comment	1313	65.3%
	Other	237	11.8%
	Missing	45	2.2%
Q30: Aware of Website	Yes	269	13.4%
	No	1716	85.3%
	Missing	25	1.2%
Q31: Used Website	Yes	36	1.8%
	No	232	11.5%
	Missing	1742	86.7%
Q32: Found Website Helpful	Yes	5	0.0%
	No	32	1.6%
	Missing	1973	98.2%
Q33: Aware of PSA	Yes	1167	58.1%
	No	812	40.4%
	Missing	31	1.5%
Q34: Heard PSA	Yes	1001	49.8%
	No	160	7.8%
	Missing	822	40.8%
Q35: Found PSA Helpful	Yes	551	27.4%
	No	392	19.5%
	Missing	1067	53.1%
Q36: Aware of Toll-Free Hotline	Yes	730	36.3%
	No	1256	62.5%
	Missing	24	1.2%
Q37: Used Toll-Free Hotline	Yes	92	4.6%
	No	636	31.6%
	Missing	1282	63.8%

Question	Responses	Frequency	Percent
Q38: Found Toll-Free Hotline Useful	Yes	64	3.2%
	No	25	1.2%
	Missing	1921	95.6%
<hr/>			
Q40: Age	18 – 25 years	73	3.6%
	26 – 35 years	189	9.4%
	36 – 45 years	340	16.9%
	46 – 55 years	454	22.6%
	56 – 65 years	427	21.2%
	Over 65	491	24.4%
	Missing	36	1.8%
<hr/>			
Q41: Education	Some high school or less	80	4.0%
	High school graduate	632	31.4%
	Vocational school or some college	606	30.1%
	College graduate	453	22.5%
	Advanced college degree	214	10.6%
	Missing	25	1.2%
<hr/>			
Q42: Number of children under the age of 18 live in the household	None	1363	67.8%
	One	232	11.5%
	Two	234	11.6%
	Three	96	4.8%
	Four	41	2.1%
	Five or more	44	2.2%
	Missing	0	0.0%
<hr/>			
Q43: County or residence	Benewah	219	10.9%
	Bonner	233	11.6%
	Boundary	58	2.9%
	Clearwater	119	5.9%
	Idaho	181	9.0%
	Kootenai	434	21.6%
	Latah	397	19.8%
	Lewis	38	1.9%
	Nez Perce	252	12.5%
	Shoshone	70	3.5%
	Other	9	0.4%
	Missing	0	0.0%
	Other counties of permanent residence: Bannock (1), Bonneville (1), Gooding (1), Jerome (2), Lemhi (1), Lincoln (1), Minidoka (1), Power (1)		

Question	Responses	Frequency	Percent
Q44: Length of Idaho residency	Less than two	68	3.4%
	Two to five	148	7.4%
	Six or seven	68	3.4%
	Eight or nine	63	3.2%
	More than ten	1663	82.7%
	Missing	0	0.0%
Q45: State or country of residence prior to Idaho (if applicable)	Alaska	11	0.5%
	Arizona	8	0.3%
	California	75	3.7%
	Colorado	13	0.6%
	Florida	5	0.2%
	Kansas	6	0.3%
	Montana	18	0.9%
	Nevada	7	0.3%
	Oregon	23	1.1%
	Texas	6	0.3%
	Utah	10	0.5%
	Washington	95	4.7%
	Other state or country	47	2.3%
	Not Applicable	1686	83.9%
	Other states or countries listed: AR (3), D.C. (1), GA (2), IL (3), KY (1), MD (1), ME (1), MN (3), MO (1), MS (1), NC (2), ND (1), NE (2), NJ (1), NM (2), NY (3), OH (1), PA (1), SC (1), TN (1), VA (1), VT (1), WI (3), WV (1), WY (3), Canada (3), Other country (3)		
Q46: Raised on a farm	No	1209	60.1%
	Yes	787	39.2%
	Missing	14	0.7%
Q47: Involved in farming	No	1700	84.6%
	Yes	293	14.6%
	Missing	14	0.7%
Q48: Close relatives farm	No	1442	71.7%
	Yes	554	27.6%
	Missing	14	0.7%
Q49: Extended family farms	No	1181	58.8%
	Yes	813	40.4%
	Missing	16	0.8%

Question	Responses	Frequency	Percent
Q50: Close friends farm	No	926	46.1%
	Yes	1070	53.2%
	Missing	14	0.7%
<hr/>			
Q51: Income	Less than \$10,000	84	4.2%
	\$10,000 to \$19,999	235	11.7%
	\$20,000 to \$29,999	291	14.5%
	\$30,000 to \$39,999	307	15.3%
	\$40,000 to \$49,999	248	12.3%
	\$50,000 to \$59,999	192	9.6%
	\$60,000 to \$69,999	112	5.6%
	\$70,000 to \$99,999	170	8.5%
	More than \$100,000	112	5.6%
	Missing	259	12.9%
<hr/>			
Q53: Gender	Female	951	47.3%
	Male	1057	52.6%
	Missing	2	0.1%

Appendix D

Raw Means for Quantitative Questions

Question	Option	N	Mean	Standard Deviation
Q4: Poor Air Quality Contributors 1=NO contribution 5=Contributes a great deal	Emissions from industrial operations	2010	1.86	1.37
	Exhaust from motor vehicles	2010	2.08	1.18
	Dust from farm areas	2010	2.31	1.32
	Smoke from wood burning stoves	2010	2.27	1.22
	Smoke from agricultural burning	2010	2.94	1.57
	Smoke from forest fires	2010	2.93	1.50
	Smoke from burning timber in slash piles	2010	2.29	1.36
	Missing	0		
Q5: Air Quality Effect on Family 1=No negative effect 5=Extreme negative effect	Emissions from industrial operations	2010	1.57	1.13
	Exhaust from motor vehicles	2010	1.78	1.09
	Dust from farm areas	2010	1.99	1.20
	Smoke from wood burning stoves	2010	1.96	1.16
	Smoke from agricultural burning	2010	2.54	1.54
	Smoke from forest fires	2010	2.51	1.43
	Smoke from burning timber in slash piles	2010	2.06	1.27
	Missing	0		