

NOVEMBER 2013

A Summary Report of Perceptions of the Politics and Regulation of Hydraulic Fracturing in Colorado

Produced by the
School of Public
Affairs at the
University of
Colorado Denver

Authors

Jonathan Pierce, Post-Doctoral Scholar
Jennifer Kagan, Graduate Assistant
Tanya Heikkila, Associate Professor
Chris Weible, Associate Professor
Samuel Gallaher, Doctoral Candidate



Acknowledgements

We are grateful for the individuals in Colorado who volunteered their time to participate in this study. This research was funded by the Alfred P. Sloan Foundation, though the research design and results are the authors' alone. For their assistance in conducting this research, we also wish to thank Michael Jones, Elizabeth Shanahan, Deserai Crow, Benjamin Blair, Brian Gerber, and Alice Madden

Citing this Summary Report

Pierce, Jonathan J., Jennifer Kagan, Tanya Heikkila, Christopher M. Weible, and Samuel Gallaher. 2013. "A Summary Report of Perceptions of the Politics and Regulation of Hydraulic Fracturing in Colorado." Published November 25, 2013 by the School of Public Affairs University of Colorado Denver.

Questions, Comments, and Requests for More Information

For questions, comments, concerns, and feedback regarding this survey and research project please contact the following:

Tanya Heikkila Associate Professor
School of Public Affairs
University of Colorado Denver
1380 Lawrence Street, Suite 500
Denver, CO 80217
Phone: 303-315-2269
Fax: 303-315-2229
Email: Tanya.Heikkila@ucdenver.edu

Chris Weible
Associate Professor School of Public
Affairs
University of Colorado Denver
1380 Lawrence Street, Suite 500
Denver, CO 80217
Phone: 303-315-2010
Fax: 303-315-2229
Email: Chris.Weible@ucdenver.edu

Table of Contents

Executive Summary.....	4
Introduction to the Study	6
Hydraulic Fracturing in Colorado	7
Survey Methodology and Respondent Demographics	8
Objective 1: Positions on Hydraulic Fracturing	10
Objective 2: Political Activities, Resources, and Collaborative Networks	12
Objective 3: Problem Severity.....	17
Objective 4: Perceptions of and Preferences fo Regulations	20
Objective 5: Perceptions of Disclosure and Setbacks Regulation.....	24
Conclusions	26
References	30
Appendix: Survey Questions	33

Executive Summary

This report presents the findings from a survey conducted in the spring of 2013 of people directly or indirectly involved in the politics and regulation of oil and natural gas development that utilizes hydraulic fracturing in Colorado. A total of 398 people were administered a survey and 137 people responded. These respondents include people from local, state, and federal governments, oil and gas service providers and operators and industry associations, environmental and conservation groups, local citizen groups, and academics and consultants.

Five key objectives guided this study. The objectives and the main survey findings related to each objective are summarized immediately below.

Objective 1: To identify respondents' general positions about hydraulic fracturing used in oil and natural gas development in Colorado. The findings show that respondents can be grouped according to their position about whether hydraulic fracturing should be i) stopped or limited (n = 48), ii) continued at the current rate (n = 43), or iii) expanded (n = 46). These three groups are used to guide the analysis for the remaining objectives. All environmental and organized citizen groups are members of the *stop or limit* group. In contrast, the oil and gas industry make up the majority of respondents in the *expand* group. Local, state, or federal governments, and academics or consultants favor a range of positions.

Objective 2: To understand the political activities, resources, and network relationships of respondents based on their position toward hydraulic fracturing. The most frequent activities that respondents engage in are attending public meetings and building and maintaining coalitions. Across all activities, respondents favoring the status quo are less politically active compared to respondents who either favor expansion or the stopping of hydraulic fracturing. The resource that respondents have the greatest capacity to utilize is their connection with others who share their position. Those who oppose hydraulic fracturing report a higher capacity to utilize their resources to achieve their objectives compared to those who favor the status quo or expansion of hydraulic fracturing. Respondents frequently collaborate with local and state government officials in pursuit of their interests. The most important criterion for choosing with whom to collaborate on hydraulic fracturing issues is professional competency.

Objective 3: To understand the extent that respondents perceive issues associated with hydraulic fracturing-inclusive oil and gas development as potential problems. Problems related to the politics, information, and process of regulating oil and gas development that uses hydraulic fracturing are perceived as more severe by all respondents than those related to pollution, health risks or environmental degradation. Respondents disagree more about the severity of issues related to pollution, health risks, or environmental degradation than about problems related to politics, information and the process of regulation. The *stop or*

limit group perceived problems related to oil and gas development that uses hydraulic fracturing to be more severe than the other two groups. The *expand group* perceived problems related to politics and information as more severe than other problems. The *continue at the current rate group* aligned more with the *expand group*, but tended to be more moderate in many of their responses

Objective 4: To assess respondents' perceptions of the level of stringency of current regulations and their preferences for the role of government. Respondents regard the regulations pertaining to the construction and designing of wells as the most stringent, but have the greatest differentiation in their perceptions about the adequacy of regulations of public nuisances caused by well site operations. A vast majority of respondents support some level of regulation over hydraulic fracturing. When considering which level of government they prefer for regulating various issues related to oil and gas development and hydraulic fracturing, most respondents, particularly those who support hydraulic fracturing, prefer the state level of government. Among those who oppose hydraulic fracturing we found substantial variance in their stated preferences for the level of government addressing hydraulic fracturing issues.

Objective 5: To assess respondents' perceptions of rules adopted by the Colorado Oil and Gas Conservation Commission (COGCC) about disclosure and setbacks related to hydraulic fracturing-inclusive oil and gas development. Respondents held diverging opinions about the effectiveness of the Colorado Oil and Gas Conservation Commission's disclosure rule of 2011 and the setbacks rule of 2013. However, the overall effectiveness of the disclosure rule is higher than the setbacks rule. Most respondents agree that neither rule has resolved the issue of public distrust of the oil and gas industry.

Across the five objectives, the survey findings highlight notable areas of agreement and disagreement across the three groups of respondents based on their position towards hydraulic fracturing of *stop or limit*, *continue at the current rate*, or *expand*. Areas of agreement between the groups include (i) the recognition that public distrust of the oil and gas industry is a problem; (ii) a preference for increased local government regulation of the nuisance to the general public caused by well site operations; and (iii) satisfaction with current regulations for the construction of wells and well pads. In contrast, areas of disagreement include (i) the severity of the threat posed by hydraulic fracturing-inclusive oil and gas development in relation to the environment and public health; (ii) the level of government at which most issues related to oil and gas development and hydraulic fracturing should be regulated; and (iii) the perceived adequacy of the disclosure and setbacks statewide rules in Colorado.

Introduction

This report summarizes a survey administered in the spring of 2013 to individuals who are directly or indirectly involved with the politics, policies, and rulemaking concerning oil and natural gas development that utilizes hydraulic fracturing in Colorado. The survey was conducted through the School of Public Affairs at the University of Colorado Denver and funded by the Alfred P. Sloan Foundation.

The goal of this report is to provide an understanding of the politics surrounding the issue largely focused on the process of hydraulic fracturing and other oil and natural gas development processes in Colorado. We recognize that people relate to this issue from a variety of viewpoints that are impossible to describe entirely in a single report. Instead, this summary report provides a description of the opinions and perceptions of a sample of individuals who are actively involved in oil and natural gas development that utilizes hydraulic fracturing in Colorado. These individuals come from diverse professional and organizational affiliations including all levels of government, the oil and gas industry, businesses and trade associations, nonprofits, environmental groups, academia, consulting groups, and local citizen organizations.

In surveying this politically active population, we were guided by five objectives.

- Objective 1:** To identify respondents' general positions about hydraulic fracturing used in oil and natural gas development in Colorado.
- Objective 2:** To understand the political activities, resources, and network relationships of respondents based on their position toward hydraulic fracturing.
- Objective 3:** To understand the extent that respondents perceive issues associated with hydraulic fracturing-inclusive oil and gas development as potential problems.
- Objective 4:** To assess respondents' perceptions of the level of stringency of current regulations and their preferences for the role of government.
- Objective 5:** To assess respondents' perceptions of rules adopted by the Colorado Oil and Gas Conservation Commission (COGCC) about disclosure and setbacks related to hydraulic fracturing-inclusive oil and gas development.

In providing an understanding of the politics and regulations of oil and gas development that utilizes hydraulic fracturing in Colorado, the survey asks respondents to answer several value-oriented questions. We ask such questions not to push a political agenda or a position about hydraulic fracturing, but instead to measure the perceptions of the respondents and to identify areas of agreement and disagreement. Our hope is that through soliciting the perceptions of those actively involved in the issue, we might assist people inside and outside of government in understanding the differences in their positions and potentially find shared understandings that may be used to inform the governance of hydraulic fracturing in Colorado and elsewhere.

This Colorado survey is part of a larger research project that includes work in Texas and New York. In each state, researchers from the School of Public Affairs at the University of Colorado Denver explore the politics of hydraulic fracturing-inclusive oil and gas development through interviews, surveys, and document analysis.

Brief Overview of Hydraulic Fracturing in Colorado

Hydraulic fracturing, also referred to as “fracking,” “fracing,” or “hydrofracking,” is the process of pumping a mixture of water, sand or similar material, and chemical additives, under high pressure, into vertically or horizontally drilled wells. The process fractures rock formations thousands of feet underground to release oil and natural gas that travel through previously created wells to the surface. The combination of hydraulic fracturing and horizontal drilling allows for oil and gas recovery from formations with low permeability (COGCC, 2011a). Since 2009, hydraulic fracturing has been used in at least 90% of the approximately 13,000 well permits reviewed and approved in Colorado (COGCC, 2012a).¹

Intense political debates have emerged in Colorado, similar to other parts of the U.S., about the risks and benefits of hydraulic fracturing and how it should be regulated. These debates have focused on a range of issues related to oil and gas development, in addition to hydraulic fracturing, and have captured the attention of people inside and outside of government. The extent of media coverage in Colorado on topics related to oil and gas development that utilizes hydraulic fracturing underscores the saliency and diversity of these issues, a sample of which include the following:

- Concerns associated with the effects of oil and gas development inclusive of hydraulic fracturing on water contamination (Finley, 2013a), handling produced water (Wineke, 2012), seismic activity (Chang, 2013), public nuisance (Fissinger, 2012), air contamination (Bailey, 2012), and methane leakage (Jaffe, 2012a);
- Public distrust of the process of hydraulic fracturing (Wyatt, 2013) and of the oil and gas industry (Jaffe, 2012b);
- Benefits of oil and gas development that uses hydraulic fracturing for energy independence and security (McCurdy, 2011).

At the same time, media coverage has highlighted how these issues have captured the attention of the public and policymakers across Colorado. For example, we have seen some of these issues:

¹ When we use the term “hydraulic fracturing,” unless otherwise stated, we are referring to the technical process of fracturing rock formations. We use phrases like *hydraulic fracturing-inclusive oil and gas development* to refer to the set of upstream oil and gas processes that use horizontal drilling and hydraulic fracturing to recover oil and gas from low permeable formations. The set of processes includes pre-drilling activities such as lease negotiations for sub-surface mineral rights; well pad preparation; vertical and directional drilling; water, sand and chemical transportation; hydraulic fracturing; produced water processing; and post-drilling activities such as the transmission of gas or oil to consumers.

- Political activity including bans or moratoriums of hydraulic fracturing in Longmont (Finley, 2012), Boulder (Fryar, 2013), Fort Collins (Finley, 2013b) and subsequent lawsuits by the state (Jaffe, 2013) and industry (Finley, 2012);
- Public protests in opposition (Whaley, 2012) and in support (Robles, 2012) of hydraulic fracturing in oil and gas development;
- Regulatory processes, especially ones targeting disclosure of chemicals used in hydraulic fracturing (Jaffe, 2011) and setback distances from a well site to occupied buildings (Riccardi, 2013).

Despite the gravity of the issue for all of the citizens of Colorado, there has been little systematic research on the perceptions of individuals active in hydraulic fracturing politics and its governance in Colorado. As a result, many unexplored questions remain. What are the areas of disagreement on these issues? Are there areas of agreement? How should hydraulic fracturing and oil and gas development in Colorado be regulated? To what extent are individuals satisfied with recent government regulations? While a single report cannot offer unqualified answers to these questions, our hope is to provide insight into the different sides and positions on this issue.

Survey Methodology and Demographic Characteristics of Respondents

The content of the questions and answer categories are informed by information acquired from 14 interviews with experts representing various organizations and positions in Colorado. The survey consists of 23 questions with several subparts. A copy of the survey is available in the Appendix.

Survey respondents were identified through multiple sources, including the Colorado Oil and Gas Conservation Commission (COGCC) website list of recognized stakeholders during the 2011 disclosure and 2012-13 setback rule processes; attendees of state and local public hearings; attendees and presenters at academic, government, environmental, and industry sponsored conferences and meetings; organizers of public protests; and news media and online media covering events related to hydraulic fracturing and oil and natural gas development in Colorado. In total, the survey was emailed to 398 individuals and was completed by 137 people, resulting in a response rate of 34.42%.² Table 1 provides a summary of the demographic information for respondents.

² Out of the total sample surveyed per organizational affiliation type, the response rates are the following: academics (33%), environmental and conservation groups (36%), federal government (34%), industry and professional associations (38%), local government (38%), news media (0%), oil and gas service providers and operators (37%), organized citizen groups (53%), other (50%), regional government (33%), and state government (27%). Across the different types of organizations surveyed we received at least a 30% response rate from all except for media and state government. In the case of the media we received no responses and claim no representation of their viewpoints on this issue.

Table 1. Demographic Summary Information for Respondents

	Summary Responses
Highest level of formal education	
High school	2%
Some college	4%
Bachelor's degree	29%
Master's or professional degree	57%
Ph.D. or M.D.	8%
Age distribution	
18 to 29	5%
30 to 39	12%
40 to 49	20%
50 to 59	41%
60 or older	22%
Percent male and female	
Male	67%
Female	33%
Organizational affiliation	
Local Government	26%
State Government	7%
Federal Government	8%
Oil and Gas Service Providers and Operators	22%
Industry and Professional Associations	6%
Environmental and Conservation Groups	13%
Citizen Groups	6%
Academics and Consultants	8%
Other ³	4%
Years involved in hydraulic fracturing	
0 to 1 years	4%
2 to 4 years	31%
5 to 9 years	31%
10 to 20 years	18%
21 or more years	16%
Hour spent per week on hydraulic fracturing	
9 hours or less	49%
10 to 20 hours/week	22%
21 to 30 hours/week	10%
31 to 40 hours/week	14%
41 or more hours per week	5%

³ Other includes respondents from regional government, agriculture, and real estate developers and home builders.

Objective 1: To identify respondents' general positions about hydraulic fracturing used in oil and natural gas development in Colorado

We asked respondents whether their current position is most closely aligned with the belief that hydraulic fracturing should be *stopped*, *limited*, *continued at its current rate*, *expanded moderately*, or *expanded extensively*. The results are shown below in Figure 1. The distribution of responses is relatively balanced across the five categories, with the median respondent supporting continuing development at its current rate.⁴

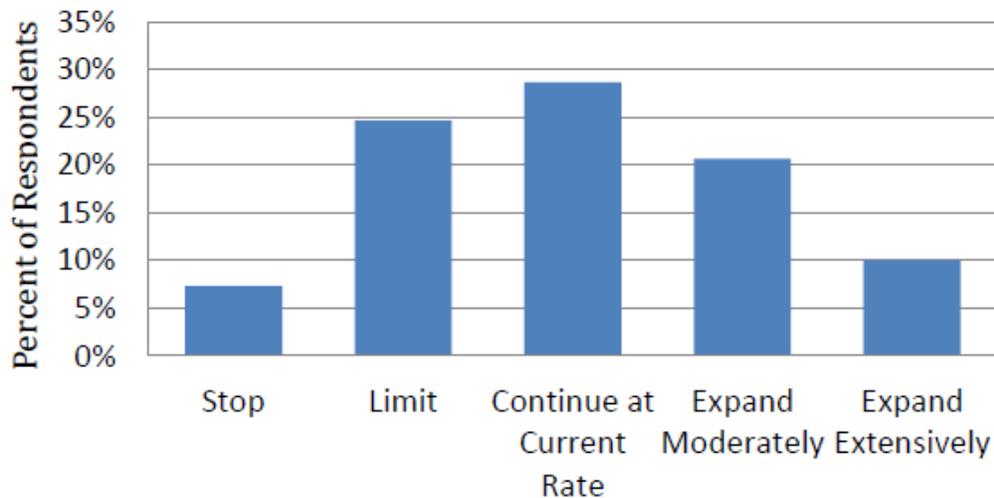


Figure 1. General positions regarding hydraulic fracturing

The positions on hydraulic fracturing in Figure 1 are used to categorize respondents in reporting the results for other survey items. Based on these general positions, we divided respondents into three position groups: the *stop or limit group* (n = 48); the *continue at current rate group* (n = 43); and the *expand group* (n = 46).

Each of these three position groups includes respondents representing various organizational affiliations. Figure 2 shows the distributions of these organizational affiliations among each position group. Government at all levels, as well as academics and consultants, are distributed fairly evenly among the three position groups. Oil and gas service providers and operators and industry and professional associations make up a majority of the *expand*

⁴ The mean was calculated by assigning numerical values to responses (1 indicates a belief that development should be stopped and 5 indicates a response that development should be expanded extensively). The mean response among respondents was 3.01, indicating an average response that development should continue at its current rate.

group (56%) and a large minority of those who comprise the *continue at current rate* group (28%). All respondents from environmental organizations and organized citizen groups believe that development should be stopped or limited, and they make up 57% of the *stop or limit* group.

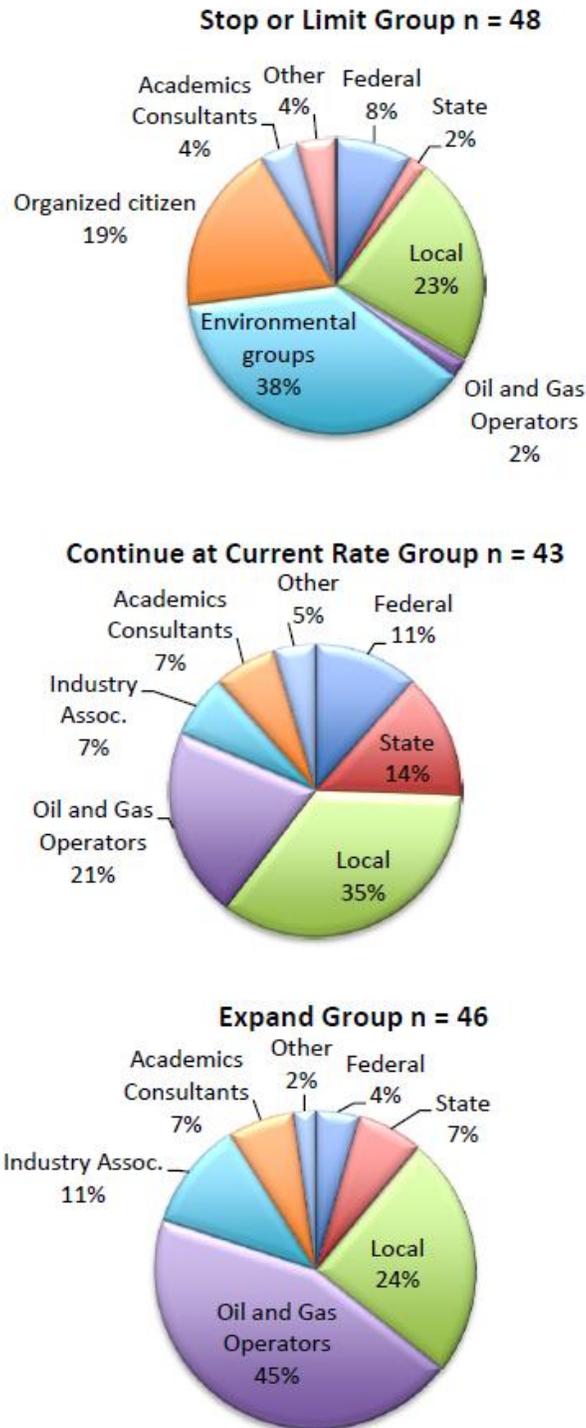


Figure 2. Organizational affiliations by position group

Objective 2: To understand the political activities, resources, and network relationships of respondents based on their position toward hydraulic fracturing

Political Activities

One section of the survey investigated the extent to which respondents are involved in advocacy related to hydraulic fracturing-inclusive oil and gas development. Specifically, questions asked whether respondents engage in a range of 10 different activities to achieve their organizational objectives related to natural gas development that uses hydraulic fracturing and, if so, at what frequency.

Overall, a majority of respondents report that their organization engages in the following activities: participating in public meetings (87%), forming and maintaining a coalition with allies (74%), generating and disseminating research and reports (71%), testifying at public hearings (69%), communicating with the news media (69%), and posting information or advocating online (63%). We compared these responses across the three position groups to identify differences or similarities among their activities. The results based on the frequency of the activity, ranging from daily to never or not reported, per position group can be found in Figure 3 (means reported).

On a daily basis, the activities most frequently engaged in by respondents of the *stop or limit group* are forming and building a coalition, posting and advocating online, and lobbying. On a monthly basis, they are most frequently engaged in public meetings. They participate least frequently in lawsuits and public protests.

Respondents of the *continue at current rate group* engage in fewer activities than any other position group. A majority of the respondents from this group only engage in the following activities at least annually: public meetings, generating and disseminating reports, and forming and building a coalition. Respondents from the *continue at current rate group* are most likely to attend public meetings at a weekly and monthly basis. Respondents in the *continue at current rate group* rarely engage in lawsuits and public protests.

Members of the *expand group* are active in a range of activities. A majority of the respondents on at least a monthly basis attend public meetings, form and build coalitions, attend public hearings, contact the media, post information and advocate online, generate and disseminate reports, and lobby. They are least likely to report lawsuits or public protests as activities.

The level of activity among the *stop or limit* and the *expand* position groups is higher than the activity of the *continue at current rate group*. All of the groups have a presence at public meetings and hearings, and all build and maintain coalitions.

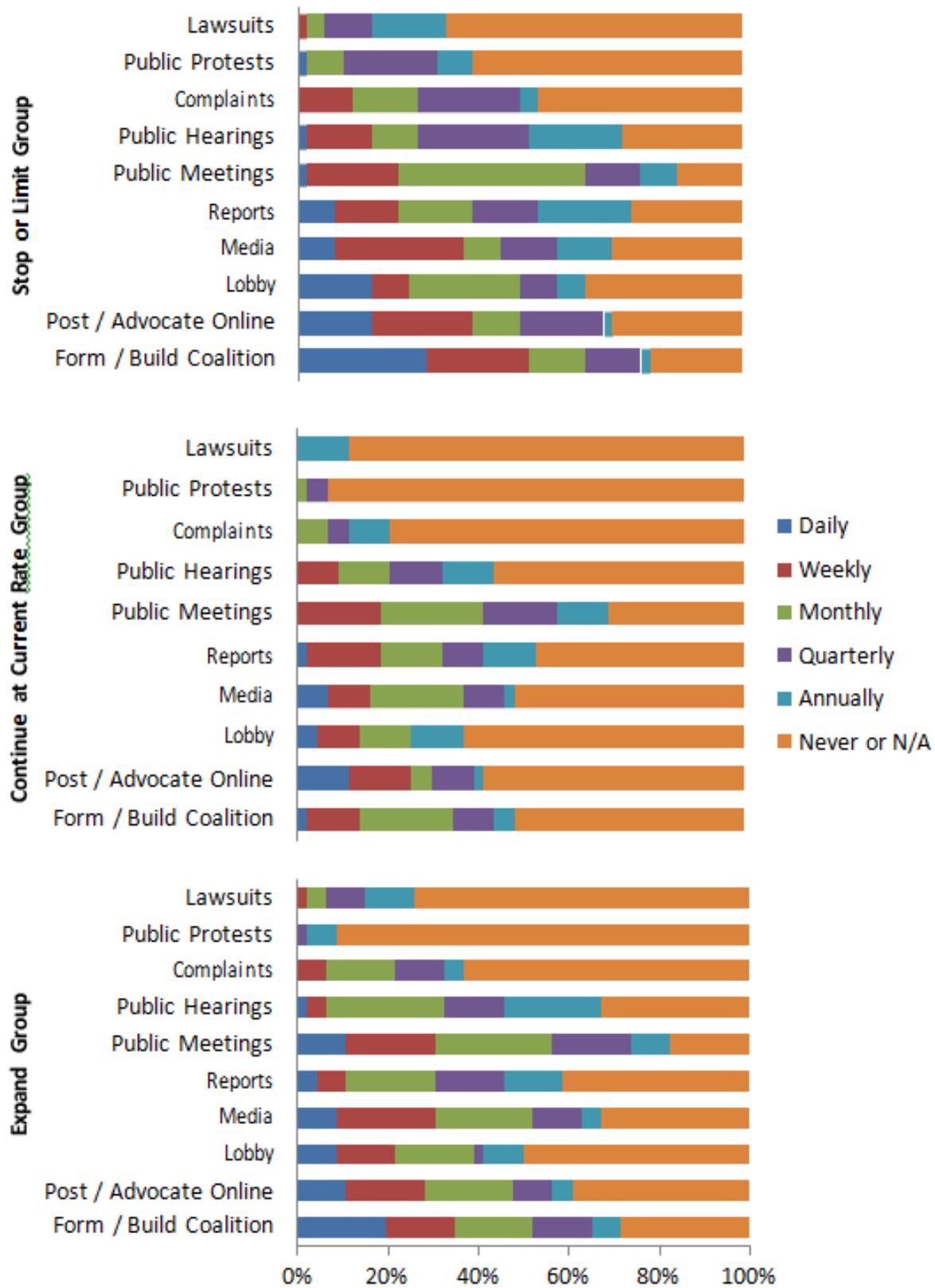


Figure 3. Activities by position group

Organizational Capacity

We asked respondents about the capacity of their organizations to use or mobilize 10 types of resources for achieving their objectives. Organizational capacities with respect to each of the 10 resources were asked on a four-point scale (from 1 = *no capacity* to 4 = *substantial capacity*).

Table 2 presents the means per capacity item by position group. The items measured for organizational capacity are ranked from the highest to lowest capacity for all respondents. We highlight in bold the resources that are significantly different between at least two of the three groups.

Table 2. Mean organizational capacity by position group⁵

	Stop or Limit Group n = 48	Continue at Current Rate Group n = 43	Expand Group n = 46
1. Access to people with a similar position on hydraulic fracturing	3.5	3.0	3.3
2. Access to government officials	3.3	3.2	3.2
3. Access to media	3.2	3.0	2.9
4. Access to people with a different position on hydraulic fracturing	3.1	2.9	2.7
5. Effective leadership in organization	3.2	3.1	3.1
6. Access to elected officials	3.1	3.1	3.0
7. Support from the general public	3.0	2.4	2.4
8. Technical support to generate and disseminate information online	2.9	2.9	2.6
9. Generate and disseminate scientific reports and analysis	2.6	2.6	2.3
10. Financial resources	2.2	2.5	2.6

1 = No Capacity, 2 = Limited Capacity, 3 = Moderate Capacity, 4 = Substantial Capacity. Statistically significant differences between groups are highlighted in bold.

Only two resources are significantly different between the position groups: support from the general public and generating and disseminating reports. In the case of getting support from the general public, the *stop or limit group* report more capacity compared to the others. In generating and disseminating reports, the *stop or limit* and *continue at current rate* groups have more capacity relative to the *expand group*. For the remaining capacity items, the *stop or limit group* report slightly higher levels of capacity with the exception of financial resources, but these differences are not statistically significant between the groups.

⁵ The differences in resources between the respondent groups are not significant except for support from the general public and the capability to generate and disseminate scientific reports and analysis which are significant to 0.01 using an ANOVA test.

Collaborative Networks

The survey included a roster of organizational affiliations for respondents to indicate the types of organizations they collaborate with to achieve their goals related to oil and natural gas development and hydraulic fracturing in Colorado. Respondents could check zero or all of the organizational affiliations with whom they collaborate. The results, divided by respondent group, are shown below in Table 3. The percentages indicate the proportion of respondents per group that cite a particular organization for collaboration. The top four cited organizational affiliation categories, by position group, are identified in bold and italicized.

Table 3. Percentage of respondents by position group who report collaboration with the following categories of organizational affiliations

	Stop or Limit Group n = 48	Continue at Current Rate Group n = 43	Expand Group n = 46
1. Local government	<i>79%</i>	<i>63%</i>	<i>70%</i>
2. State government	<i>69%</i>	<i>81%</i>	<i>80%</i>
3. Federal government	52%	51%	54%
4. Regional government	65%	49%	54%
5. Oil and gas service providers and operators	42%	<i>72%</i>	<i>87%</i>
6. Industry and professional associations	46%	<i>77%</i>	<i>83%</i>
7. Environmental and conservation organizations	<i>79%</i>	58%	52%
8. Organized citizen groups	<i>71%</i>	37%	30%
9. Academics and consultants	58%	35%	46%
10. News media	50%	35%	50%
11. Agriculture organizations	33%	40%	44%
12. Real estate developers and home builders	23%	16%	37%

The types of organizations that respondents in each position group cited most frequently as collaborators are local and state governments. Similarly, about half of respondents per position group collaborate with federal and regional governments. More than 71% of respondents in the *stop or limit group* report collaborating with environmental and organized citizen groups. In contrast, a minority of respondents from the *stop or limit group* collaborate with oil and gas service providers and operators and industry and professional associations (42% and 46%, respectively). For respondents in the *continue at current rate* or *expand* groups, 72% collaborate with oil and gas service providers and operators and 77% with industry and professional associations. The least cited organization categories include real estate developers and home builders for the *stop or limit group* and the *continue at the current rate group* as well as the organized citizens groups for the *expand group*.

We also asked respondents about the factors that are important to them in choosing

which organizations to collaborate with on issues related to hydraulic fracturing. We asked respondents to rate each factor on a five-point scale (from 1 = *not important* to 5 = *extremely important*). The mean scores per reason by the three position groups are shown in Table 4. The factors that are significantly different between position groups are in bold.

Table 4. Mean reported reasons for collaboration by position groups⁶

	Stop or Limit Group n = 48	Continue at Current Rate Group n = 43	Expand Group n = 46
1. They are professionally competent	4.5	4.0	4.2
2. I trust them to keep their promises	4.0	3.5	3.8
3. I have worked with them in the past	2.5	2.4	2.8
4. They have political influence	3.0	2.1	2.5
5. They share my position about major issues	2.8	1.9	2.7
6. They have access to financial resources	2.2	1.7	2.2

1 = Not Important, 3 = Modetarely Important, 5 = Extemely Important. Statistically significant differences between groups are highlighted in bold.

Respondents indicate that the most important factor in deciding with whom to collaborate is the professional competence of the collaborating party and the least important factor is financial resources. Professional competence and political influence were both significantly higher determinants of collaboration for the *stop or limit group* than the *continue at current rate* or *expand* groups. Shared positions are significantly more important for determining who to collaborate with for the *stop or limit* and *expand* groups in comparison to the *continue at current rate* respondents. In addition to professional competence, trust in their collaborative partners is reported as an important reason for collaboration.

⁶ The differences between the position groups on why they regularly collaborate are statistically significant for professional competence, and political influence at 0.01 and for sharing my position at 0.05 using an ANOVA test.

Objective 3: To understand the extent that respondents perceive issues associated with hydraulic fracturing-inclusive oil and gas development as potential problems

To understand the types of issues that respondents are most concerned about in relation to hydraulic fracturing, we asked them to rate the extent that 20 issues are problems. The range of response categories includes whether they believed each issue was *not a problem, a minor problem, a moderate problem, a serious problem, or a severe problem*. We assigned values for the response categories on a five-point scale (from 1 = *being not a problem* to 5 = *being a severe problem*). The results are divided by issues related to pollution and environmental degradation (Table 5), and issues related to information, politics, and economics (Table 6). We rank the issues from highest to lowest based on the total mean for the full sample of respondents. The mean scores across all issues are significantly different between at least two groups.

Table 5. Mean perceptions about the level of severity of potential problems related to pollution and environmental degradation by position group⁷

	Stop or Limit Group n = 48	Continue at Current Rate Group n = 43	Expand Group n = 46	Total n = 137
1. Public nuisance impacts from well site operations	3.9	2.8	2.8	3.2
2. Competition over water supplies	4.3	2.8	2.2	3.1
3. Air pollution from well site operations	4.3	2.6	2.1	3.0
4. Air pollution from methane	4.3	2.6	1.9	3.0
5. Destruction of public lands	4.1	2.5	1.8	2.8
6. Surface degradation at well site	3.8	2.5	1.9	2.8
7. Ground and surface water contamination from hydraulic fracturing fluids	4.0	2.4	1.5	2.7
8. Groundwater pollution from methane	3.7	2.3	1.6	2.6
9. Risks of induced seismic activity	3.2	1.7	1.4	2.1

1 = Not a problem, 3 = Moderate problem, 5 = Severe problem. Statistically significant differences between at least two position groups are highlighted in bold.

As shown in Table 5, perceptions of the problems diverge most widely between the *stop or limit group* from the *expand group*. The perceptions of the *continue at current rate group* lean toward the *expand group*. Of the three groups, the *stop or limit group* report perceiving the issues related to pollution and environmental degradation as most severe. Given the statistically significant differences between the groups, the areas where the show the least disagreement is on the public nuisance impacts from well site operations.

⁷ All of the issues listed in Table 5 are significantly different based on an ANOVA test to 0.001.

The largest differences (greater than two points on the 5-point scale; e.g. from a minor problem =2, to a major problem = 4) in perceptions between the *stop and limit group* and the *expand group* are for the following issues: competition over water supplies, air pollution from well site operations, air pollution from methane, destruction of public lands, ground and surface water contamination from hydraulic fracturing fluids, and groundwater pollution from methane.

Table 6 shows the mean perceptions by position groups for the level of severity of potential problems related to information, politics, and economics. The mean values per group and the total are provided with statistically significant differences between at least two groups highlighted in bold.

Table 6. Mean perceptions about the level of severity of potential problems related to information, politics, and economics by position group⁸

	Stop or Limit Group n = 48	Continue at Current Rate Group n = 43	Expand Group n = 46	Total n = 137
1. Misinformation among general public	3.6	4.3	4.6	4.2
2. Public distrust of industry	3.6	3.8	4.0	3.8
3. Distribution of biased information against hydraulic fracturing	2.5	4.1	4.7	3.7
4. Scare tactics against hydraulic fracturing	2.4	4.0	4.7	3.6
5. Conflict over mineral rights	4.1	3.1	3.0	3.4
6. Incomplete information by industry about effects	3.8	3.2	3.1	3.4
7. Patchwork of local regulations	2.8	3.0	3.3	3.0
8. Ineffective monitoring by the state	4.3	2.5	1.7	2.9
9. Political influence of industry	4.4	2.4	1.6	2.9
10. Boom-and-bust economic cycle	3.5	2.7	2.4	2.9
11. Burdens on local government	3.3	2.6	2.4	2.8

1 = Not a problem, 3 = Moderate problem, 5 = Severe problem. Statistically significant differences between at least two position groups are highlighted in bold.

The largest differences in perceptions of the issues identified in Table 6 are between the *stop or limit group* and the *expand group*. These differences in the perceptions of the severity of problems exceed two points (on the 5-point scale) on the following political issues: distribution of biased information against hydraulic fracturing; scare tactics against

⁸ The differences of all of the problems listed in Table 6 are statistically significant based on an ANOVA test to 0.01, except for a patchwork of local regulations and public distrust of industry, which are not statistically significant between groups.

hydraulic fracturing; ineffective monitoring by the state; and political influence of industry. Areas of the most agreement include perceptions of problems associated with a patchwork of local regulations and public distrust of industry.

Of the three position groups, the *expand group* expressed greater concerns about issues related to misinformation, distrust, and scare tactics whereas the *stop or limit group* expressed greater concern for conflict over mineral rights, ineffective monitoring by the state, political influence by industry, a boom-and-bust economic cycle, and burdens on local governments. The *continue at current rate group* expressed more moderate perceptions of the issues, but leaned toward the *expand group* on most of the items.

Although we find statistically significant differences between the groups for most of the items in Table 6, respondents agree on average that the following issues are moderate problems (means at least > 3): misinformation about hydraulic fracturing among the general public; public distrust of industry; conflict over mineral rights; and incomplete information by industry about effects.

In comparing Tables 5 and 6, the results indicate three major trends. First, respondents overall perceive problems related to information, politics, and economics as more severe than problems related to pollution and environmental degradation from hydraulic fracturing. In other words, the total means in Table 6 tend to be higher than the total means in Table 5. Second, respondents disagree more about issues of pollution compared to politics, economics, and information; that is, the differences between the position groups are greater in Table 5 compared to Table 6. Third, the *continue at current rate group* and the *expand group* tend to share more similar perceptions of issues than with the *stop or limit group*.

Objective 4: To assess respondents’ perceptions of the level of stringency of current regulations and their preferences for the role of government

Perceptions of Current Regulations

We asked respondents a series of questions about their opinions regarding the leniency or stringency of regulations and enforcement in Colorado on nine issues. Respondents indicated their perceptions on a five-point scale (from 1 = *very lenient* to 5 = *very stringent*). For each category, responses are averaged and divided into position groups, and the results are shown below in Table 7. We find statistically significant differences between position groups for all items in Table 7.

Table 7. Mean perceptions of current regulations in Colorado by position group⁹

	Stop or Limit Group n = 48	Continue at Current Rate Group n = 43	Expand Group n = 46	Total n = 137
1. Designing and constructing wells	2.4	3.6	3.8	3.2
2. Constructing well pads	2.3	3.4	3.6	3.1
3. Setbacks of wells from occupied buildings or natural features	1.8	3.1	3.9	2.9
4. Disclosure of chemicals in hydraulic fracturing fluids	1.9	3.2	3.8	2.9
5. Monitoring of water quality	1.9	3.2	3.7	2.9
6. Disposing or treating produced water	1.8	3.3	3.7	2.9
7. Monitoring of air quality	1.8	2.9	3.6	2.7
8. Mitigating risks from induced seismic activity	2.0	3.1	3.4	2.6
9. Mitigating risks and nuisance to the general public caused by truck traffic, noise, and light from well site operations	1.8	2.9	3.4	2.6
Position group average	1.96	3.19	3.65	

1 = Lenient, 3 = Adequate, 5 = Very Stringent. Statistically significant differences between at least two position groups are highlighted in bold.

From Table 7, the total mean among respondents shows that regulations and enforcement related to designing and constructing wells are perceived as the most stringent, and that regulations and enforcement related to mitigating nuisances to the general public caused by truck traffic, noise, and light from well site operations are perceived as the most lenient. The results shown in Table 7 also indicate differences between the position groups in their perceptions of the adequacy of current regulations. The biggest difference is between

⁹ The differences in the perception of current regulations in Table 4 are statistically significant based on an ANOVA test to 0.001.

the *stop or limit* and the *expand groups*. The differences between these groups range from a minimum difference of 1.3 points on the 5-point scale for constructing well pads to a maximum difference of 2.1 points.

Preferences for the Role of Government

The survey investigated respondents' perceptions of the role of government in two ways: 1) by exploring if they have become more or less supportive of the role of government in relation to regulating the issues listed in Table 7, and 2) whether they have preferences for particular levels of government to play a dominant role in regulating these issues.

In relation to their level of support for regulation, we asked respondents whether they have generally *become less supportive* (1), *reported no change* (2), or *become more supportive* (3) of government regulation. The results are divided among each position group and reported in Figure 4 (below). Figure 4 shows that the *stop or limit group* differs from both the *continue at current rate group* and the *expand group*. The *stop or limit group* have become more supportive of government regulations for all categories of issues. In contrast, the *continue at current rate group* and the *expand group* have not changed their positions on government regulation. The only exception is that a near majority of members of the *expand group* have become less supportive of government regulation on setbacks.

To examine the preferences among respondents for the level of government at which different issues or problems should be regulated, respondents were asked the following: "If you were to select only one level of government to regulate the following issues related to natural gas development that uses hydraulic fracturing, which would you prefer, if any?" The choices are on a four-point scale (*no regulation* = 1, *local government* = 2, *state government* = 3, and *federal government* = 4). The issues used were the same nine issues from Table 7 and Figure 4. The results by position group are found in Figure 5.

Figure 5 highlights three key findings. First, in no cases did the majority of any respondent group support no regulation. Second, a majority of respondents from all of the groups favor local government regulatory authority for mitigating public nuisance. Third, other than mitigating public nuisance, a majority of the *continue at current rate* and *expand groups* support regulation of these issues by the state government, whereas the *stop or limit group* is mixed about the preferences for regulation at different levels of government.

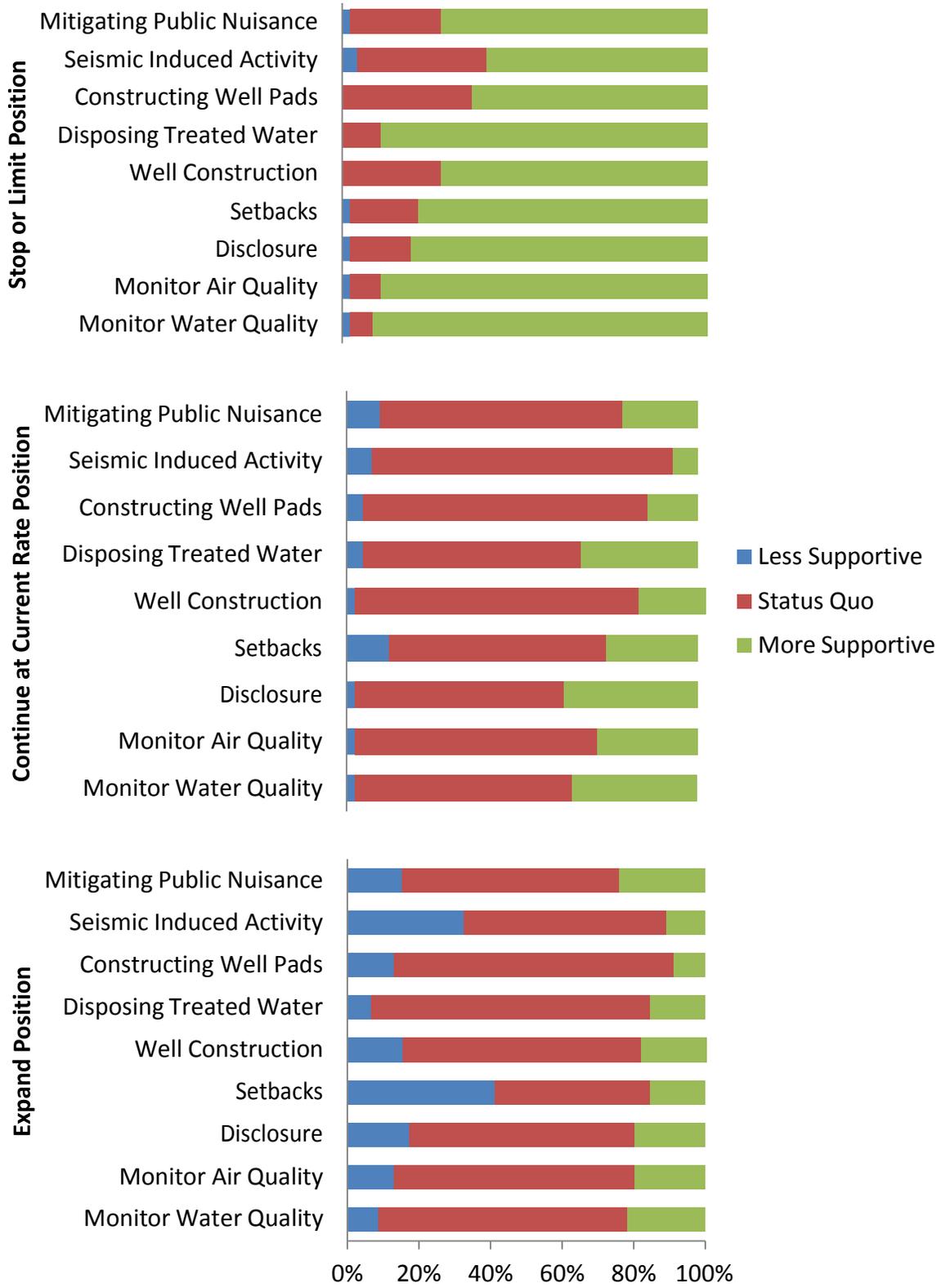


Figure 4. Changing perception for the level of government regulations by position group

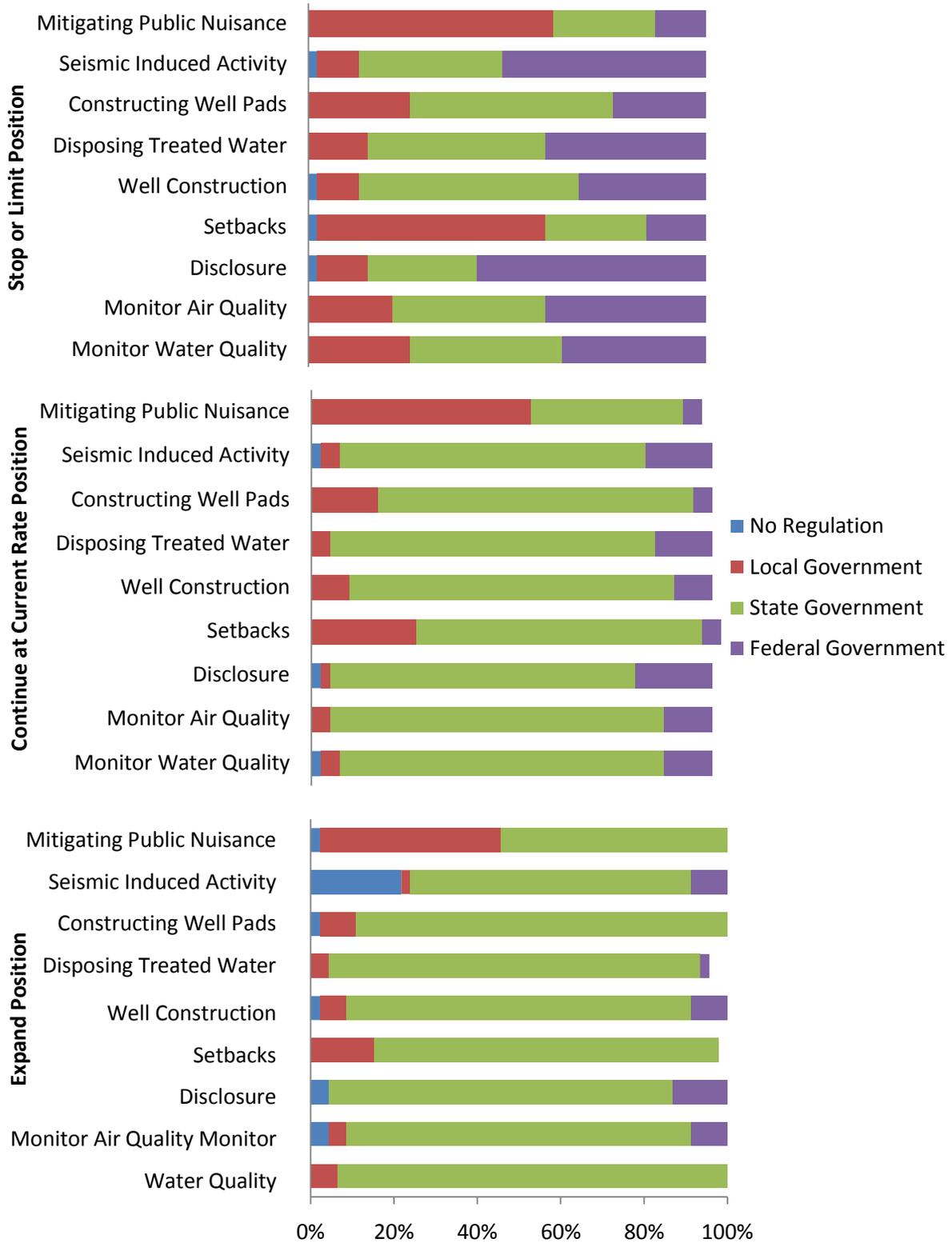


Figure 5. Preferences regarding level of government regulation by position group

Objective 5: To assess respondents’ perceptions of rules adopted by the Colorado Oil and Gas Conservation Commission (COGCC) about disclosure and setbacks related to hydraulic fracturing

The survey included questions to examine respondents’ perceptions of the two recent regulations established by the COGCC, which is the statewide agency that regulates oil and gas development. The first is the 2011 disclosure rule, which mandated the reporting of the chemicals used in hydraulic fracturing fluids on the fracfocus.org website while allowing for the protection of industry trade secrets. The second is the 2013 setback rule requiring a minimum distance of 500 feet between wells and occupied buildings. We asked respondents to indicate the extent to which they agreed that certain issues that were mentioned as key concerns during the respective rulemaking processes were resolved by the rules (COGCC, 2011b, 2012b). The responses are on a five-point scale (from 1 = *strongly disagree* to 5 = *strongly agree*). Table 8 shows results for the disclosure rule, and Table 9 presents the results for the setbacks rule.

Perceptions of the 2011 Disclosure Rule

Table 8. Mean perceptions of the following issues being resolved by the COGCC 2011 disclosure rule by position group¹⁰

Issues	Stop or Limit Group n = 48	Continue at Current Rate Group n = 43	Expand Group n = 46	Total n = 137
1. What chemical information must be disclosed	2.2	3.6	4.3	3.3
2. Where chemical information should be made available	2.3	3.7	4.2	3.4
3. Accessibility of chemical information to the public	2.0	3.6	4.2	3.2
4. Protection of trade secrets	2.4	3.5	4.1	3.3
5. Disclosure of chemical information in a health or other emergency	2.1	3.7	4.2	3.3
6. When disclosure of chemical information must be made	2.0	3.7	4.0	3.2
7. Public distrust of the hydraulic fracturing process	1.7	2.4	2.4	2.1

1 = Strongly Disagree, 3 = Neither Agree nor Disagree, 5 = Strongly Agree. Statistically significant differences between at least two position groups are highlighted in bold.

The results show statistically significant differences among the position groups in their perception of whether the disclosure rule resolved various issues that would have prompted

¹⁰ All of the problems listed in Table 5 are statistically significantly different based on an ANOVA test to 0.001.

the need for industry to disclose the chemicals in hydraulic fracturing fluids. On most of the issues, the *stop or limit group* disagree that the rule has resolved the problem. In comparison, the *expand group* agrees that the rule has resolved all of the above issues besides public distrust. The largest differences in perceptions of the effectiveness of the disclosure rule are between the *stop or limit group* and the *expand group* on addressing the following issues: what chemical information must be disclosed; accessibility of chemical information to the public; disclosure of chemical information in a health or other emergency; and when disclosure of chemical information must be made.

Perceptions of the 2013 Setbacks Rule

For the setbacks rule, the *stop or limit group* disagrees that the issues have been resolved, except with respect to the rights of mineral owners, on which they are somewhat satisfied. The *continue at current rate group* and the *expand group* are also more equivocal about whether the rule resolved the issues. The general consensus is that the rule was not highly effective in addressing issues that were discussed during the setbacks rulemaking process.

Table 9. Mean perceptions of the following issues being resolved by the COGCC 2013 setbacks rule by position group¹¹

Issues	Stop or Limit Group n = 48	Continue at Current Rate Group n = 43	Expand Group n = 46	Total n = 137
1. Public nuisance impacts	1.9	3.1	3.4	2.8
2. A patchwork of local regulations on setbacks	2.0	2.8	2.8	2.5
3. Priorities of surface owners	2.1	3.2	3.3	2.8
4. Priorities of mineral rights owners	2.8	3.1	2.7	2.9
5. Health impacts upon the population living in proximity to well pads	1.5	2.9	3.4	2.6
6. Impacts from open pits of wastewater	1.8	3.1	3.6	2.7
7. Public distrust of the hydraulic fracturing process	1.6	2.2	2.3	2.0
8. Communications between oil and gas operators and nearby communities	2.2	3.2	3.4	2.9

1 = Strongly Disagree, 3 = Neither Agree nor Disagree, 5 = Strongly Agree. Statistically significant differences between at least two position groups are highlighted in bold.

¹¹ All of the problems listed in Table 6 are statistically significantly different based on an ANOVA test to 0.01, except for rights of mineral owners, which is not significant.

Conclusions

This report presents results of a 2013 survey administered to people directly or indirectly involved in the politics of oil and gas development that utilizes hydraulic fracturing in Colorado. Below we summarize the key findings according to each of the five study objectives, as well as identify areas of substantial agreement and disagreement among respondents.

Objective 1: To identify respondents' general positions about hydraulic fracturing used in oil and natural gas development in Colorado. The findings show that respondents can be grouped according to their position about whether hydraulic fracturing should be stopped or limited (n = 48), continued at the current rate (n = 43), or expanded (n = 46). These three groups are used to guide the analysis for the remaining objectives. All environmental and organized citizen groups are members of the *stop or limit* group. In contrast, the oil and gas industry make up the majority of respondents in the *expand* group. Local, state, or federal governments, and academics or consultants favor a range of positions.

Objective 2: To understand the political activities, resources, and network relationships of respondents based on their position toward hydraulic fracturing. The most frequent activities that respondents engage in are attending public meetings and building and maintaining coalitions. Across all activities, respondents favoring the status quo are less politically active compared to respondents who either support the expansion or the stopping of hydraulic fracturing. The resource that respondents have the greatest capacity to utilize is their connection with others who share their position. Those who oppose hydraulic fracturing report a higher capacity to utilize their resources to achieve their objectives compared to those who favor the status quo or expansion of hydraulic fracturing. Respondents frequently collaborate with local and state government officials in pursuit of their interests. The most important criterion for choosing with whom to collaborate on hydraulic fracturing issues is professional competency.

Objective 3: To understand the extent that respondents perceive issues associated with hydraulic fracturing-inclusive oil and gas development as potential problems. Problems related to the politics, information, and process of regulating hydraulic fracturing are seen as more severe by all respondents than those related to pollution, health risks or environmental degradation. Respondents disagree more about the severity of issues related to pollution, health risks, or environmental degradation than about problems related to politics, information and the process of regulation. The *stop or limit group* perceived problems related to hydraulic fracturing to be more severe than the other two groups. The

expand group perceived problems related to politics and information as more severe than other problems. The *continue at the current rate group* aligned more with the *expand group*, but tended to be more moderate in many of their responses

Objective 4: To assess respondents' perceptions of the level of stringency of current regulations and their preferences for the role of government. Respondents regard the regulations pertaining to the construction and designing of wells as the most stringent and regard the adequacy of regulations of public nuisances caused by well site operations as the least stringent. A vast majority of respondents support some level of regulation over hydraulic fracturing. When considering which level of government they prefer for regulating various issues related to hydraulic fracturing, most respondents, particularly those who support hydraulic fracturing, prefer the state level of government. Among those who oppose hydraulic fracturing we found substantial variance in their stated preferences for the level of government addressing hydraulic fracturing issues.

Objective 5: To assess respondents' perceptions of rules adopted by the Colorado Oil and Gas Conservation Commission (COGCC) about disclosure and setbacks related to hydraulic fracturing-inclusive oil and gas development. Respondents held diverging opinions about the effectiveness of the Colorado Oil and Gas Conservation Commission's disclosure rule of 2011 and the setbacks rule of 2013. However, the overall effectiveness of the disclosure rule is higher than the setbacks rule. Most respondents agree that neither rule has resolved the issue of public distrust of the oil and gas industry.

Drawing generalized lessons across the objectives, we find a number of areas of agreement and disagreement among respondents. As summarized in Table 10, there are a few areas of agreement that could prompt opportunities for public or private action and possibly negotiations and consensus. Respondents are not against regulation of hydraulic fracturing and other aspects of oil and gas development but rather the amount of regulation, the particular focus of the regulation, and from what level of government regulators intervene. Outside of regulations for well and well-pad design and construction, the position groups do not agree on which other areas surveyed are adequately regulated or not. While the *continue at current rate group* and the *expand group* believe regulations for water and air monitoring and disposing of produced water is more than adequate, they report, along with the *stop or limit group*, a slight increase in support for future regulations in these areas. Respondents across the position groups also agree that public nuisance from well site operations are a moderate problem and the local government is the appropriate level for dealing with public nuisance problems related to well site activity. Finally, respondents agree that public distrust of hydraulic fracturing and of the oil and gas industry is a severe problem that is not being resolved through the current state regulations.

Table 10. Areas of substantial agreement and disagreement between position groups

Areas of Substantial Agreement	Areas of Substantial Disagreement
<i>Perceived Severity of Environmental Pollution and Degradation Issues</i>	
<ul style="list-style-type: none"> - Public nuisance impacts from well site operations are a moderate problem 	<ul style="list-style-type: none"> - The perceived severity of problems related to contamination of water sources; air pollution; competition over water supply; and destruction of public lands
<i>Perceived Severity of Information and Politics Issues</i>	
<ul style="list-style-type: none"> - Public distrust of industry and misinformation among the public are serious problems; - Local government issues related to regulation, boom-and-bust economic cycles, and burden on services are moderate problems 	<ul style="list-style-type: none"> -The perceived severity of problems related to distribution of biased information against hydraulic fracturing; scare tactics against hydraulic fracturing; ineffective monitoring by the state; and political influence by industry
<i>Perception of Current and Future Regulation</i>	
<ul style="list-style-type: none"> - hydraulic fracturing should be regulated; - Well and well pad design/construction regulations are adequate 	<ul style="list-style-type: none"> - The perceived stringency of current regulations and preferences for future regulation
<i>Perception of Regulation at Various Levels of Government</i>	
<ul style="list-style-type: none"> - Mitigating the public nuisance caused by well site operations is best regulated by the local government 	<ul style="list-style-type: none"> - The preferred level of government for regulating most issues related to hydraulic fracturing
<i>Effectiveness of 2011 Disclosure Rule in Addressing Issues</i>	
<ul style="list-style-type: none"> - Public distrust of hydraulic fracturing was not resolved by the 2011 disclosure rule 	<ul style="list-style-type: none"> - Whether the 2011 Disclosure rule resolved i) what and when chemical information must be disclosed; ii) accessibility of the information to the general public; or iii) disclosure of chemical information in an emergency
<i>Effectiveness of 2013 Setbacks Rule in Addressing Issues</i>	
<ul style="list-style-type: none"> - Public distrust of the hydraulic fracturing process was not resolved by the 2013 setbacks rule; - The rule had relatively no effect on local regulations, priorities of mineral rights and surface owners, and communication between operators and local communities 	<ul style="list-style-type: none"> - Whether the 2013 setbacks rule resolved public nuisance by well site operations; health impacts upon those living nearby well pads; or impacts from open pits of wastewater

In summary, these findings may help clarify the underlying concerns, preferences, and resources of a diverse range of people involved in the issues surrounding oil and gas development that utilizes hydraulic fracturing. We recognize that this survey offers only a partial representation of the politics at a specific point in time and that it does not apply to the preferences and opinions of all citizens in Colorado. Despite these limitations, we hope to offer interested individuals and organizations a better understanding of one of the most politically contentious environmental issues today in Colorado.

References

- Bailey, K. (April 26, 2012). Guest Commentary: The dangers of hydraulic fracturing in Colorado. *Denver Post*, http://www.denverpost.com/opinion/ci_20478569/columns?IADID=Search-www.denverpost.com-www.denverpost.com
- Chang, A. (July 11, 2013). Study: Distant quakes can affect oil, gas fields. *Denver Post*, http://www.denverpost.com/ci_23641728/study-distant-quakes-can-affect-oil-gas-fields?IADID=Search-www.denverpost.com-www.denverpost.com
- Colorado Oil and Gas Conservation Commission. (2011a). Hydraulic Fracturing Information. <http://cogcc.state.co.us/>
- Colorado Oil and Gas Conservation Commission. (2011b). Rulemaking 2011: Hydraulic Fracturing Chemical Disclosure. <http://cogcc.state.co.us/>
- Colorado Oil and Gas Conservation Commission. (2012a). Staff Testimony for Setback Rulemaking, December 11, 2012. <http://cogcc.state.co.us/>
- Colorado Oil and Gas Conservation Commission. (2012b). Setback Rulemaking 2012: Establishing New and Amended Rules for Statewide Setbacks. <http://cogcc.state.co.us/>
- Finley, B. (December 17, 2012). Colorado oil and gas industry sues to kill Longmont fracking ban. *Denver Post*, http://www.denverpost.com/environment/ci_22211514/colorado-oil-and-gas-industry-sues-kill-longmont?IADID=Search-www.denverpost.com-www.denverpost.com
- Finley, B. (February 14, 2013a). Water fouled with fracking chemicals spews near Windsor. *Denver Post*, http://www.denverpost.com/environment/ci_22586154/water-fouled-fracking-chemicals-spews-near-windsor?IADID=Search-www.denverpost.com-www.denverpost.com
- Finley, B. (March 5, 2013b). Threat of Colorado lawsuit looms as fracking ban OK'd in Fort Collins. *Denver Post*, http://www.denverpost.com/breakingnews/ci_22724633/threat-state-lawsuit-looms-fort-collins-votes-fracking?IADID=Search-www.denverpost.com-www.denverpost.com
- Fissinger, K. (October 26, 2012). Guest Commentary: In Longmont, protecting our families from fracking is our right. *Denver Post*, http://www.denverpost.com/opinion/ci_21856556/protecting-longmont-families-from-fracking-is-our-right?IADID=Search-www.denverpost.com-www.denverpost.com
- Fryar, F. (June 18, 2013). Boulder County extends oil and gas moratorium for 18 months. *Longmont Times-Call*, <http://www.timescall.com/news/longmont-local->

[news/ci_23487702/boulder-county-extends-oil-and-gas-moratorium-18](http://www.denverpost.com/news/ci_23487702/boulder-county-extends-oil-and-gas-moratorium-18)

Jaffe, M. (August 2, 2011). Colorado moving to require full disclosure on drilling industry fracking fluids. *Denver Post*,

http://www.denverpost.com/breakingnews/ci_18601083?IADID=Search-www.denverpost.com-www.denverpost.com

Jaffe, M. (March 19, 2012a). Colorado study finds fracking risks for nearby residents. *Denver Post*, http://www.denverpost.com/breakingnews/ci_20206688/colorado-study-finds-fracking-risks-nearby-residents?IADID=Search-www.denverpost.com-www.denverpost.com

Jaffe, M. (August 16, 2012b). Hickenlooper: Colorado drilling regulations need more work. *Denver Post*, http://www.denverpost.com/business/ci_21323355/hickenlooper-colorado-drilling-regulations-need-more-work?IADID=Search-www.denverpost.com-www.denverpost.com

Jaffe, M. (July 11, 2013). Colorado joins in suit to knock down Longmont fracking ban. *Denver Post*, http://www.denverpost.com/breakingnews/ci_23643679/state-joins-suit-knock-down-longmont-fracking-ban?IADID=Search-www.denverpost.com-www.denverpost.com

McCurdy, D. (July 10, 2011). Hydraulic fracturing is a safe process that results in needed energy. *Denver Post*, http://www.denverpost.com/opinion/ci_18436002?IADID=Search-www.denverpost.com-www.denverpost.com

Riccardi, N. (February 27, 2013). As energy boom nears Colorado cities, a backlash grows. *Denver Post*, http://www.denverpost.com/breakingnews/ci_22680620/energy-boom-nears-colorado-cities-backlash-grows?IADID=Search-www.denverpost.com-www.denverpost.com

Robles, Y. (November 13, 2012). Protestors show up at Capitol rally in support of hydraulic fracturing. *Denver Post*, http://www.denverpost.com/breakingnews/ci_21988642/protestors-rally-against-patchwork-local-oil-and-gas?IADID=Search-www.denverpost.com-www.denverpost.com

Whaley, M. (March 7, 2012). Anti-fracking protest casts shadow over jobs promise in Commerce City. *Denver Post*, http://www.denverpost.com/breakingnews/ci_20121571/anti-fracking-protest-casts-shadow-over-jobs-promise?IADID=Search-www.denverpost.com-www.denverpost.com

Wineke, A. (April 30, 2012). Drilling oil in Colorado makes water, takes water. *The Colorado Springs Post Gazette*, http://www.denverpost.com/breakingnews/ci_20513019/drilling-oil-colorado-makes-water-takes-water?IADID=Search-www.denverpost.com-www.denverpost.com

Wyatt, K. (March 21, 2013). Debate over Colorado drilling regulations begins. *Denver Post*, http://www.denverpost.com/ci_22837905/oil-gas-drilling-debates-begin-colorado?IADID=Search-www.denverpost.com-www.denverpost.com

Appendix. Survey Questions

Q1A. Please indicate the extent to which the following issues are current problems related to natural gas development that uses hydraulic fracturing.

	Not a Problem	Minor Problem	Moderate Problem	Serious Problem	Severe Problem
- Misinformation among the general public about the risks, benefits, and effects of hydraulic fracturing.	<input type="radio"/>				
- Contamination of ground and surface water supplies from chemicals in hydraulic fracturing fluids.	<input type="radio"/>				
- A patchwork of local regulations on hydraulic	<input type="radio"/>				
- Conflict between mineral rights and property rights owners.	<input type="radio"/>				
- Contamination of ground water from methane migration.	<input type="radio"/>				
- Degradation of air quality from fugitive methane emissions.	<input type="radio"/>				
- Degradation of air quality from flares, diesel exhaust, and dust from well site operations.	<input type="radio"/>				
- Competition for available water supplies from hydraulic	<input type="radio"/>				
- Nuisance to the general public caused by truck traffic, noise, and light from well site	<input type="radio"/>				
- Surface degradation and erosion from access roads at well site operations.	<input type="radio"/>				

Q1B. Please indicate the extent to which the following issues are current problems related to natural gas development that uses hydraulic fracturing.

	Not a Problem	Minor Problem	Moderate Problem	Serious Problem	Severe Problem
- Public distrust of the oil and gas industry.	<input type="radio"/>				
- Ineffective monitoring by state regulatory agencies of hydraulic fracturing.	<input type="radio"/>				
- Scare tactics and demonizing of the oil and gas industry by opponents of hydraulic fracturing.	<input type="radio"/>				
- Influence of the oil and gas industry over state administrative and legislative branches.	<input type="radio"/>				
- Boom-and-bust economic cycles from natural gas development.	<input type="radio"/>				
- Burdens on local government services from temporary employees for well site operations.	<input type="radio"/>				
- Risks of induced seismic activity caused by hydraulic fracturing.	<input type="radio"/>				
- Inadequate or incomplete communication by the oil and gas industry about the risks, benefits and effects of hydraulic fracturing to the general public.	<input type="radio"/>				
- Distribution of biased information against hydraulic fracturing.	<input type="radio"/>				
- Destruction of public lands by well site operations, processing facilities, and pipelines.	<input type="radio"/>				

Q2. Please indicate what comes closest to your current position in relation to natural gas development that uses hydraulic fracturing. It should be...

- Stopped
- Limited
- Continue at Current Rate
- Expanded Moderately
- Expanded Extensively

Q3. Please indicate your general opinion of the **current regulations** in Colorado, and their enforcement, in relation to natural gas development that uses hydraulic fracturing.

	Very Lenient	Lenient	Adequate	Stringent	Very Stringent
- Monitoring of water quality	<input type="radio"/>				
- Monitoring air emissions	<input type="radio"/>				
- Disclosure of chemicals in hydraulic fracturing fluids	<input type="radio"/>				
- Setbacks of wells from occupied buildings or natural features	<input type="radio"/>				
- Designing and constructing wells	<input type="radio"/>				
- Disposing or treating produced water	<input type="radio"/>				
- Constructing well pads	<input type="radio"/>				
- Mitigating risks from induced seismic activity	<input type="radio"/>				
- Mitigating risks and nuisances to the general public caused by truck traffic, noise, and light from well site	<input type="radio"/>				
- Other:	<input type="radio"/>				

Q4. Since you have become aware of issues related to natural gas development that uses hydraulic fracturing, to what extent have you **changed your position** on the need for government regulation on the following issues?

	Have become <i>less supportive</i> of government regulation	No Change	Have become <i>more supportive</i> of government regulation
- Monitoring of water quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Monitoring of air emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Disclosure of chemicals in hydraulic fracturing fluids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Setbacks of wells from occupied buildings or natural features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Designing and constructing wells	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Disposing or treating produced water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Constructing well pads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Mitigating risks from induced seismic activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Mitigating risks and nuisances to the general public caused by truck traffic, noise, and light from well site operations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Other:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5. If you were to select only one level of government to regulate the following issues related to natural gas development that uses hydraulic fracturing, which would you prefer, if any?

	No Regulation	Local Government	State Government	Federal Government
- Monitoring of water quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Monitoring of air emissions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Disclosure of chemicals in hydraulic fracturing fluids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Setbacks of wells from occupied buildings or natural features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Designing and constructing wells	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Disposing or treating produced water	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Constructing well pads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Mitigating risks from induced seismic activity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Mitigating risks and nuisances to the general public caused by truck traffic, noise, and light from well site operations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Other:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6. During the Colorado Oil and Gas Conservation Commission (COGCC) disclosure rule making process of 2011 the following issues were mentioned. To what extent do you agree that these issues have been resolved by the **disclosure rule of 2011**?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
- What chemical information must be disclosed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Where chemical information should be made available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Accessibility of chemical information to the public	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Protection of trade secrets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Disclosure of chemical information in a health or other emergency	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- When disclosure of chemical information must be made	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Public distrust of the hydraulic fracturing process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7. During the Colorado Oil and Gas Conservation Commission (COGCC) setbacks rule making process of 2012-13 the following issues were mentioned. To what extent do you agree that these issues have been resolved by the **setbacks rule of 2013**?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
- Public nuisance impacts (i.e. traffic, noise, lights, odors, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- A patchwork of local regulations on setbacks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Priorities of surface owners	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Priorities of mineral rights	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Health impacts upon the population living in proximity to well pads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Impacts from open pits of wastewater	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Public distrust of the hydraulic fracturing process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Communications between oil and gas operators and nearby communities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8. Please identify the extent that your organization has engaged in the following activities for achieving its objectives in natural gas development that uses hydraulic fracturing.

	Daily	Weekly	Monthly	Quarterly	Annually	Never
- Posting information or advocating online	<input type="radio"/>					
- Communicating with the news	<input type="radio"/>					
- Forming and maintaining a coalition with allies	<input type="radio"/>					
- Formal complaining to regulatory commissions	<input type="radio"/>					
- Lobbying elected officials	<input type="radio"/>					
- Participating in public meetings	<input type="radio"/>					
- Generating and disseminating research and reports	<input type="radio"/>					
- Taking legal action (e.g. lawsuits)	<input type="radio"/>					
- Organizing or participating in public protests	<input type="radio"/>					
- Testifying at public hearings	<input type="radio"/>					
- Other:	<input type="radio"/>					

Q9A.



Photo by David Zalubowski, Associated Press 2008

Q9B. Above is a picture of a well pad utilizing hydraulic fracturing. Please identify the response that best corresponds to your interpretation of this picture.

Provides **strong evidence of the negative effects** that hydraulic fracturing has on the environment.

Provides **weak evidence of the negative effects** that hydraulic fracturing has on the environment.

This picture is **vague and does not demonstrate** any evidence of the effects that hydraulic fracturing has on the environment.

Provides **weak evidence of the harmony** between hydraulic fracturing and the environment.

Provides **strong evidence of the harmony** between hydraulic fracturing and the environment.

Q10. To what extent does your organization have the capacity to use or mobilize the following resources to achieve its objectives?

	No Capacity	Limited Capacity	Moderate Capacity	Substantial Capacity
- Financial resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Generate and disseminate scientific reports and analysis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Support from the general public	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Access to elected political officials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Access to government officials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Access to people with a different position on hydraulic fracturing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Access to people with a similar position on hydraulic fracturing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Access to media	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Technical support to generate and disseminate information online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Effective leadership in	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Other:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q11. Over the past three years, how effective has your organization been in increasing its capacity to achieve its goals in relation to natural gas development that uses hydraulic fracturing?

- Very Ineffective
- Ineffective
- Neither Effective nor Ineffective
- Effective
- Very Effective

Q12. Please indicate whether you regularly collaborate with any of the following organizations to achieve your goals related to natural gas development that uses hydraulic fracturing.

	Check all that apply
- Federal Government including elected	<input type="checkbox"/>
- Regional Government	<input type="checkbox"/>
- State Government including elected	<input type="checkbox"/>
- Local Government including elected	<input type="checkbox"/>
- Oil and gas service providers and operators	<input type="checkbox"/>
- Industry and professional associations	<input type="checkbox"/>
- Environmental and conservation	<input type="checkbox"/>
- Real estate developers and home builders	<input type="checkbox"/>
- Agriculture organizations	<input type="checkbox"/>
- Organized citizen groups	<input type="checkbox"/>
- Academics and consultants	<input type="checkbox"/>
- News media	<input type="checkbox"/>
- Other	<input type="checkbox"/>

Q13. In general, what factors are important in choosing what organization(s) you collaborate with on issues related to natural gas development that uses hydraulic fracturing?

	Not Important	Somewhat Important	Moderately Important	Very Important	Extremely Important
- They share my position about major issues	<input type="radio"/>				
- I trust them to keep their promises	<input type="radio"/>				
- They are professionally competent	<input type="radio"/>				
- I have worked with them in the past	<input type="radio"/>				
- They have access to financial resources	<input type="radio"/>				
- They have political influence	<input type="radio"/>				

Q14. The following statements reflect general attitudes. Please indicate whether you agree or disagree with each statement.

	Strongly Disagree	Moderately Disagree	Moderately Agree	Strongly Agree
- Government should put limits on the choices individuals can make so they do not get in the way of what is good for society.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Sometimes government needs to make laws that keep people from hurting themselves.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- It is not the government's business to try to protect people from themselves.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- The government should stop telling people how to live their lives.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- The government interferes far too much in our everyday lives.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- We need to dramatically reduce inequalities between the rich and the poor, as well as between men and women.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Our society would be better off if the distribution of wealth was more equal.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15. Please indicate the type of organization you represent.

- Federal Government
- Regional Government
- State Government
- Local Government
- Oil and gas service providers and operators
- Industry and professional associations
- Environmental and conservation groups
- Real estate developers and home builders
- Agricultural organizations
- Organized citizen groups
- Academics and consultants
- News media
- Other _____

Q16. Please indicate your gender.

- Male
- Female

Q17. Please indicate your age.

- 18-29
- 30-39
- 40-49
- 50-59
- 60 or older

Q18. Please indicate the highest level of education you have attained:

- Not a High School Graduate
- High School Graduate
- Some College
- Bachelor's Degree
- Master's or Professional Degree
- Ph.D. or M.D.

Q19. How many years have you been involved in natural gas development that uses hydraulic fracturing?

- 0-1 years
- 2-4 years
- 5-9 years
- 10-20 years
- 21 or more years

Q20. On average, how many hours per week do you spend on issues related to natural gas development that uses hydraulic fracturing?

- Less than 9 hours
- 10-20 hours
- 21-30 hours
- 31-40 hours
- More than 40 hours

Q21. Please indicate your professional expertise.

	No knowledge	Little knowledge	Some knowledge	Moderate knowledge	Expert knowledge
Law	<input type="radio"/>				
Policy, Planning and Management	<input type="radio"/>				
Public Relations	<input type="radio"/>				
Ecology or Biology	<input type="radio"/>				
Geology	<input type="radio"/>				
Chemistry	<input type="radio"/>				
Engineering	<input type="radio"/>				
Mining	<input type="radio"/>				
Business Administration	<input type="radio"/>				
Other	<input type="radio"/>				

Q22. If you have any additional thoughts, considerations, or opinions you would like to share with us about natural gas development that uses hydraulic fracturing, please provide them below.

Q23. Do you want a copy of the final report?

Yes

No