

DISSERTATION

THIS BUDWORM'S FOR YOU: HOW FRAMING, TRUST AND PARTICIPATION AFFECT
ATTITUDES ON NATURAL RESOURCE MANAGEMENT ISSUES IN ATLANTIC
CANADA AND NEW ENGLAND

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ABSTRACT

THIS BUDWORM'S FOR YOU: HOW FRAMING, TRUST AND PARTICIPATION AFFECT ATTITUDES ON NATURAL RESOURCE MANAGEMENT ISSUES IN ATLANTIC CANADA AND NEW ENGLAND

Forest management is a policy issue that is value-laden, and evokes controversy. This is especially true in New Brunswick, a province of Canada that is heavily reliant on the forest industry for the economic health and well-being of its residents. This reliance shifts the balance of political power, by placing a large degree of decision-making power in the hands of private interests, who are able to influence the direction of policy even over the protests of the public. This dissertation aims to examine three separate, yet interrelated aspects of forest management in New Brunswick, with the purpose being to uncover how these relationships influence the political environment in New Brunswick, and how they affect issues of representation and democracy throughout the province. Specifically, it focuses on a naturally occurring insect outbreak that is currently threatening the region, the spruce budworm, and offers three separate chapters on individual levels of trust, media framing, and public involvement in decision-making.

First, using an original public opinion survey, Chapter Two identifies the main determinants of levels of trust for the provincial government, scientists and academics, and the forest industry. Chapter Three then turns to a comparison of national and local news media, to assess whether the industry-owned local media offers a biased framing of forestry issues in their news articles, an accusation that has been laid against them several times over the last four

decades. Chapter Four then turns to the issue of public involvement in decision-making regarding the management of the spruce budworm outbreak; a comparison is made between New Brunswick and Maine, USA, to identify how issue definition and related factors shape decisions on whether to include the public in decision-making, what form that takes, and why.

Findings from these chapters inform the final discussion in Chapter Five, which identifies the themes of power, trust and control as the threads that bind together the issues of trust, media framing and public involvement. This conclusion suggests that the power the forest industry wields in forest management policy and implementation essentially removes the power citizens are meant to have in a representative democracy. Citizens are not unaware of this close relationship, and place their trust in scientists to help right the wrongs they see in forestry in the province; this is seen particularly among the citizens most vulnerable to shifts in the fortunes of the forest industry, who seem to identify science as the means through which they can gain stability. However, even scientists are constrained by the political and information environments in which they operate. Efforts to keep the public informed are constrained by the narrow presentation of forestry issues in the local media, which not only eliminate the media's role as watchdog, but also eliminates the media as a vital linkage institution, providing the information the public needs for keeping the major powers in society accountable. There is also the need for control that is inherent in the aspects of forest management presented here, even in the methods of public communication which have the potential to empower the public. In choosing a strategy of informing the public through one-way communications, scientists and administrators are maintaining control of the message, and the decision-making power within the program. This calls into question whether scientists, or anyone else within the province, have the capacity to place power back in the hands of the public. It appears that without a force powerful enough to

dislodge the place of the forest industry in the policy process, citizens will continue to be disempowered and placated, and the province will continue to be held hostage by the forces of nature and the needs of those who try to tame them.

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Chapter 1: Introduction and Background

This dissertation has as its focus three distinct but interrelated aspects of forestry in New Brunswick, Canada: the elements of political trust affecting attitudes regarding government, scientists and industry in regards to a cyclical insect disturbance in the forests of New Brunswick with a politically contentious past; an exploration of media framing of forestry issues by industry-owned media in New Brunswick, Canada; and the differences in the design of public involvement processes between forestry officials facing a natural resources threat in New Brunswick and Maine, USA. This is done with the primary purpose of gaining a better understanding of the role of the individual citizen in an issue environment that is complicated by the primacy of major industry players, and ultimately to distinguish the effects this has on several of the underlying tenets of democracy. I begin with a brief description of the political context of forestry in New Brunswick, followed by a description of each of the three main chapters.

Forest Dependency in New Brunswick

New Brunswick is the epitome of a staples-dependent economy, inexorably tied to the natural dynamics of forest resources and at the mercy of a globalized market. The province is home to 50 of the 300 most forest dependent communities in Canada, with most of these being small, rural communities that are especially vulnerable to the economic shifts of the forest products market (Walker 2012). The province is both geographically and politically isolated from the federal capital of Ottawa, Ontario; residents in New Brunswick, along with the other Atlantic provinces, have chronically struggling economies, lower rates of education and literacy, and a

more rural population that tends to feel politically marginalized by the larger and more urban provinces to the west (Henderson 2004). Historically, the relationships between the provincial government, local communities and the forest industry have been complex and fraught with conflict. Walker (2012) identifies New Brunswick as an example of a client state model, which she defines as

...external capital's exploitative relation to resource, state and citizen as the primary cause of a regional underdevelopment that is as ideological as it is economic...by which provincial governments desperate for revenue use abundant Crown [public] land... to forge uneven relationships with foreign and domestic capital. Both state and citizen are subsequently locked into a cycle of dependency as capital makes demands of its own even as it provides the revenue that often sustains the community. Mill workers and small contractors are pitted against independent producers and cast in an uneasy alignment with large monopolistic forestry firms, rendering resistance difficult (Walker 2012, 363).

These conditions create a delicate balance of interests, a tenuous series of shifting short-term alliances; a threat to any aspect of the New Brunswick forests can be enough to shatter the balance and erupt into conflict.

Every 30-40 years, that threat comes in the form of the spruce budworm (*choristoneura fumiferana*), a small caterpillar that feeds on balsam fir and spruce species, defoliating the tree as a result. The insect is native to North America, and typically exists as a normal part of forest ecology; when populations expand exponentially, as occurs cyclically, the increased level of defoliation causes widespread tree mortality. Outbreaks can last a decade or more before spruce budworm populations return to normal levels. For a forest industry dependent on these softwood tree varieties, as is the case in New Brunswick, epidemics can be disastrous (Irland 1980; Sandberg and Clancy 2002).

In the 1950s, the provincial government was willing to engage in a widespread, prolonged aerial insecticide spray program to ensure a stable supply of wood for industry. The Canadian government had approved the use of *dichlorodiphenyltrichloroethane* (DDT) for use

by provincial governments; this was employed throughout New Brunswick, with environmentally disastrous effects (Irland 1980). As Rachel Carson detailed in her 1962 book, *Silent Spring*, DDT devastated wildlife in the areas sprayed, and virtually destroyed salmon in the Miramichi region of New Brunswick. Public outcry against the use of DDT throughout North America, led in part by scientists who had realized the severity of its effects, resulted in the product being banned in Canada and the United States (Carson 1962). However, the next outbreak of the 1970s brought new controversy, with the use of the insecticide *fenitrothion* linked to an outbreak of Reye's syndrome in areas of New Brunswick that had been treated for spruce budworm. The New Brunswick government refuted these claims, believing that the demonstrated correlation was spurious, and insisted that there was not enough evidence to suggest the risk to human health was enough to outweigh the risk to the provincial economy should spruce budworm be allowed to spread. Even in a forestry-dependent region, this was enough to allow underlying tensions to erupt, and "jolted an otherwise placid New Brunswick public into protest" (Sandberg and Clancy 2002, 167).

Public dissatisfaction and protest had limited effects on policy and monitoring in the short term (Wallace 2012), but the legacy of these controversies continues to echo in forest management today. The next cycle of a spruce budworm outbreak has begun in New Brunswick, which never fully recovered from the economic downturn the nation experienced in 2008, and which still relies on the whims of the market and the cooperation of major industry players whose influence on government policy remains strong (Walker 2012). Within this environment, the government has once again partnered with industry to attempt to mitigate the spruce budworm, and minimize the effects seen in New Brunswick. Rather than focusing on a widespread aerial spray program, which has proven costly in terms of government funds and

political capital, this program is being led by scientists at the Canadian Forest Service who have devised an Early Intervention Strategy (EIS) focusing on targeted treatment of outbreak epicenters. Efforts have shifted to minimal spray strategies using narrow spectrum insecticides, including *bacillus thurigiensis kurstaki* (Btk) and *tebufenozide* (Mimic) (Healthy Forest Partnership 2014). This new generation of scientists and foresters have acknowledged that previous spray programs have resulted in a damaged relationship with the public, a loss of trust and confidence that has implications beyond forestry in New Brunswick (Personal communication 2014).

Research Focus: The Individual, the Media, and Public Involvement in Natural Resources

New Brunswick offers a rich context for political science research, one that has thus far been rarely addressed, particularly by researchers outside of the Atlantic region. To try to encapsulate the full story of forestry in New Brunswick would be a fool's errand; thus, this dissertation provides only a partial, though highly compelling, analysis of forest politics in the region. It is presented in three main chapters, designed as discrete pieces of research, each of which engages an aspect of forestry that informs the overall picture of the context in which citizens engage and are engaged by the political environment.

Chapter two focuses on political trust in New Brunswick. Trust is the currency of a representative democracy, in which citizens place their faith in those elected to government to serve as representatives of the public will. That faith is contingent on elected officials serving in the interest of the public good, and should that faith be lost, the mechanisms of democracy can

be undone. A trusting public acknowledges the tradeoffs that must be made in governance, and recognizes that even when decisions do not benefit them personally, they are made for a purpose. This understanding gives elected officials the discretion to act in accordance with the priorities of all constituents in mind, with the knowledge that their elected position is not contingent on any one policy decision. Essentially, trust legitimizes government authority.

As a policy area, trust regarding forest policy and management plays an unusually large role in shaping the political relationships in New Brunswick. It encompasses several actors, with the provincial government only one of three main players in policy development and implementation: industry plays a significant role, harnessing its revenue-producing power as leverage in arguing policy positions; and scientists and academics attempt to influence decisions through scientific research, as a basis for policy direction. This triumvirate are occasionally at odds, but more often than not, are forced to cooperate to keep the province operating. As such, public attitudes on all three actors are vital to forest policy, in both development and implementation.

Using an original public opinion survey, the attitudes of individuals from three New Brunswick towns were analyzed to ascertain the individual- and community-level factors influencing trust in the provincial government, scientists and academics, and the forest industry. Focusing on the issue of spruce budworm, and using Hetherington and Rudolph's (2008) theory focusing on the influence of government performance, efficacy in the policy process, and judgments on integrity as a result of controversy and scandal (probity), survey results are analyzed in a multilevel model adapted from Rahn and Rudolph's (2006) model of local governmental trust. Analysis reveals that trust attitudes are shaped in part by perceptions of

forest policy and management, knowledge of the risk of spruce budworm as well as treatment options, and community dependence on the forest industry.

Individual trust attitudes are constantly evolving based on new information, but that evolution is not balanced: it is far easier to lose trust than to regain it (Hetherington 1998). The consequence of this is that the information environment of any issue becomes crucial, in both quality and legitimacy. Chapter three engages this through a content analysis of local and national news coverage of forestry in New Brunswick, by focusing on article framing. Local New Brunswick newspapers are part of a media monopoly, owned by *Brunswick News*, a subsidiary of J.D. Irving, Inc. (JDI), the largest forestry business in the province. JDI has been accused repeatedly of interfering with news content, by placing pressure on journalists to present content in a way that aligns with industry interests. Chapter three puts these accusations to the test by analyzing the frames used in local and national news articles focused on forestry over a five-year span. By focusing on framing, this research establishes whether local news media is, in fact, more likely to present a narrower view of forestry issues, and more likely to choose frames that minimize the role of the public in identifying who is to blame and who should be involved in the solution.

This research provides an illustration of the frames in communication in New Brunswick, which research has shown directly influences how individuals perceive the issues that make up the world around them. Individual attitudes are the sum of the inputs received through the information environment, made stronger by higher saliency; this information is how individuals are able to form opinions, and assess the actions of government, providing them the basis for holding officials accountable (Ajzen and Fishbein 1980; Druckman 2001; Jacoby 2000; Nelson, Clawson and Oxley 1997). If the citizens of New Brunswick are receiving limited information

from a source whose legitimacy is contested, on an issue that shapes the context of their political landscape, this has the strong potential to strip them of the power to self-govern effectively. Results indicate that, rather than performing the role of watchdog and public informer, local news media constricts the viewpoints and values included in forestry articles, relying on frames that imply forestry issues are to be addressed by industry and other experts, rather than the public through its elected representatives.

The last of the three main chapters moves to the role the public is given in natural resource decision-making, specifically when addressing the threat of a spruce budworm outbreak. Spruce budworm has the unique qualities of a “chronic crisis,” in which vulnerability to the threat builds up over many years, but is a cyclical, endemic threat that is ongoing and presents no obvious solution (McConnell 2008). The question, then, is whether responses to this crisis can include the public in decision-making, and if so, how and to what extent? Chapter three addresses this question through a comparative case study, by comparing decisions made by administrators within programs in New Brunswick and Maine, regarding their approach to involving the public, assessing whether that involvement was part of the decision-making process, or if the public was given a more passive role. Because both regions are experiencing an identical threat, this provides a starting point to assess how differences between overall program responses to the threat may influence decisions on the role the public receives.

Through semi-structured interviews with administrators in each case, qualitative analysis provides the basis for a discussion of how each program has responded to the threat of spruce budworm, and the effect this had on the public involvement components of the program. Information received from these interviews identified several factors that influence administrators’ decisions, including timing, resources, and mandated roles and responsibilities of

those involved. While neither case had legal requirements for public involvement, both groups felt that the responses to previous outbreaks necessitated some level of communication and outreach to try to rebuild and maintain public trust. New Brunswick has chosen to inform citizens of what is being done to understand and treat spruce budworm, with the stated intent of providing transparency to decisions that have already been made. Maine has been able to take an approach that allows for more integration of public views and values into recommendations for action, but ultimately the decision on what to do about spruce budworm is in the hands of private landowners. Both programs have stressed the importance of the communication aspect of the public involvement component of their programs, to ensure the public has access to the best information available. However, based on the research findings of the preceding two chapters, low levels of trust for industry and its control over messaging in the media may make this an uphill battle.

Each chapter of this dissertation is meant to illuminate a distinct and important element of the relationships between the public, provincial government officials, scientists and the forest industry. The democratic ideal includes elected representatives serving in the public interest and a public that trusts, but verifies, through an informative and independent media. The research detailed in subsequent chapters indicates this ideal is complicated in New Brunswick by the shifting dynamics of the environment and the market, and the interconnected fates of the province and the industry it relies on. There is far more to this Atlantic province than has yet been uncovered, and future research should aim to do just that.

Chapter 2: A Model of Local Trust Regarding Spruce Budworm in New Brunswick, Canada

Rachel Carson's *Silent Spring* (1962) proved to be a watershed piece in the United States' environmental movement, with her eloquent and detailed revelations about environmental problems – of which many, if not most Americans had been previously unaware. One chapter, entitled “Rivers of Death,” detailed the grisly effects that dichlorodiphenyltrichloroethane (DDT) – once thought the silver bullet of insecticides – had had on the salmon of the Miramichi River in New Brunswick, Canada. The province, in cooperation with members of the forest industry, had undertaken a large and rather indiscriminate aerial spray program, using DDT, to combat the *choristoneura fumiferana*, commonly known as the *spruce budworm*. The spruce budworm is a native insect that has no detrimental effect on New Brunswick forests when population levels are normal, but on a 30- to 40-year cycle wreaks havoc on spruce and fir trees when populations explode to outbreak levels. During the 1950-60s, the negative effects DDT had on non-target species was not well understood, and so applications of the agent were widespread and liberal throughout North America. As a result, the salmon of the Miramichi had been all but obliterated, along with many other species of both flora and fauna in the region. Carson's work brought attention to what had previously been a localized issue, and as a result of demands from both the public and the scientific community, DDT was no longer considered a viable option for fighting the spruce budworm.

As has been well documented (Rashid 2006; Sandberg and Clancy 2002), the aerial spraying of DDT did not serve as a final solution to the problem of spruce budworm, which reappeared in untenable numbers in the 1970s and 1980s, and is currently in the earliest stages of

outbreak levels in Atlantic Canada. The removal of DDT from the province's arsenal also did not satisfy a concerned public, who had seen the negative non-target effects firsthand and who now worried about how the continued spraying of insecticides might be affecting not only wildlife, but human health as well. The spray program in Atlantic Canada during the spruce budworm outbreak of the 1970-80s was again spearheaded by a combination of government and forest industry officials, who now relied on a number of other insecticides that had been registered and approved by the federal government as acceptable to spray within certain parameters to once again try to mitigate the destruction by the spruce budworm.

During this outbreak, a number of families with children diagnosed with Reye's Syndrome in New Brunswick felt there was a connection between the spray program and their children's illness, and brought their concerns to a local doctor, whose tests indicated a correlation between the condition and exposure to the aerial sprays. His findings were contested by provincial officials, and a committee created to investigate the connection found that there was insufficient evidence that the spray program and incidents of Reye's Syndrome were connected (Spitzer et al 1982). These results did not satisfy many members of the public, who now publicly criticized the government for putting the economic needs of industry ahead of the health of its citizens (Sandberg and Clancy 2002). Public trepidation spread to other provinces, leading the community of Cape Breton, Nova Scotia – led by Elizabeth May, currently a Green Party member of the Canadian Parliament – to engage in a successful grassroots effort to discontinue all spraying in their area due to concerns regarding the chemicals being used. Spruce and fir forests were all but destroyed in that area, much to the consternation of local forestry businesses (May 1982).

These events throughout the outbreak of the 1970-80s solidified a contentious relationship between citizens and government over the strategies employed to try to control the spruce budworm. Citizen concerns ranged from negative health effects resulting from pesticide exposure, decreased wildlife numbers affecting both recreational and subsistence hunting and fishing, and adverse effects on local agriculture (McLaughlin 2011). Citizen discontent could be found throughout Atlantic Canada, with some communities going so far as to force local governments to discontinue any spray activities, as seen in Cape Breton, resulting in massive timber losses in some areas. These past activities have led the current officials and forest industry representatives to reevaluate how they approach the problem of spruce budworm, and in particular, how to improve relations between citizens and government even as they begin to deal with the current outbreak. Scientists and administrators in the Atlantic Forestry Centre of the Canadian Forest Service, located in Fredericton, New Brunswick, have expressed the opinion that they have lost the trust of the public when it comes to dealing with the spruce budworm problem, and that citizens believe industry interests are being placed ahead of the well-being of the public (Personal Communication 2014). Historically, New Brunswick residents have expressed the lowest levels of political trust in Canada (as per the 2011 Canadian Election Studies), however, sample numbers for the less-populated province have always been small, making it difficult to draw any inferences.

It is often assumed that Canadians have a more trusting culture, particularly compared to US citizens (Brooks 2011), which may be why there has yet to be a truly comprehensive study on determinants of political trust in Canada, let alone one focusing on a single province. The present study is meant to begin to fill this gap; in the case of New Brunswick it is important to understand the determinants of political trust, particularly as it relates to an issue that officials

believe serves as the foundation for a contentious political relationship. This study presents a cross-sectional snapshot of New Brunswick residents' attitudes, and seeks to establish whether there is evidence to support citizens' beliefs that industry interests are paramount, and if so, to what degree do attitudes resulting from the spruce budworm program affect trust? Is the loss of trust an issue for government officials only, or does it also pertain to others involved, such as scientists/academics and industry? What other factors are most important? Seeking to answer these questions will provide a dual role: first, it will add to the theoretical understanding of political trust in Canada; second, it will also help to serve as a guide for officials seeking to conduct their research and mitigation strategies in a way that at minimum, does not add to a distrustful relationship, and at best, begins to repair past grievances. A great deal has been learned in studies of political trust in the United States that can guide research on what factors are most important for trust regarding the forests of New Brunswick, particularly if we look to research on trust at the local and regional level.

Local Political Trust

Rahn and Rudolph (2006) identified an overlooked but increasingly important aspect of research on political trust. In the federalist system of the United States, political trust had received attention primarily at the national level, despite an increasing level of responsibility being placed on local governments to provide basic services to its residents, even as budgets became tighter, while also crafting policies regarding issues ranging from civil rights to the environment. Having recognized this major gap in the literature, Rahn and Rudolph constructed a hierarchical model, a statistical technique which allows the researcher to better understand the

relationship between an individual's attitudes and the contextual factors which help shape them. Research focusing on federal trust focused on individual attitudes towards a single entity – the federal government – and accounted for individual differences through sociodemographic and political variables. When assessing attitudes of individuals experiencing multiple entities – say, local government – these varying experiences must be accounted for in addition to individual variation. By employing a hierarchical model, Rahn and Rudolph were the first to address local government attitudes in a way that allowed for generalizable conclusions. Their model is driven by a theoretical framework drawn from the findings of political trust writ large, ranging from the effects of local service delivery (DeHoog, Lowery and Lyons 1990) to the political relevance of trust on a broader scale (Hetherington 1998; Hetherington 1999; Hetherington 2005).

Theoretically, they expected local levels of political trust to be driven by four factors: quality of policy outcomes; policy congruence; procedural considerations of fairness and justice; and the attributes of office holders. Based on their findings, the condition that stood out most was heterogeneity: as cities became more ethnically and racially diverse, as ideological views became more polarized, and as income inequality increased, local governments saw lower and lower levels of trust. They surmised the causal mechanism behind this was either of two of their four proposed theoretical expectations: “institutional performance and outcomes” or “policy congruence.” Essentially, the more diverse a city was, the more likely the government was producing policies that did not meet the approval of a greater number of citizens in the community, because of the diversity in personal and political viewpoints challenging government officials in many different directions.

A trusting relationship between citizens and government provides city officials with leeway in policy development, as well as discretion in policy implementation; this relationship is

crucial at the local level because of the increased and broadening responsibility local governments are tasked with (Rahn and Rudolph 2006). That leeway and discretion are put in jeopardy of being diminished, if not destroyed, when there is a lack of trust from the public. Essentially, *the expertise of local politicians and administrators is contingent on the willingness of laypersons to accept that expertise as legitimate, and acknowledge that even if decisions made do not benefit them personally that they have good reason to be made.* Without this relationship, the normative foundation of local democratic government breaks down, and can have meaningful results in terms of electoral choices and policy compliance (Bélanger and Nadeau 2005; Hetherington 1999; Marien and Hooghe 2011).

Theory and Expectations

Theoretical Contribution

New Brunswick offers a unique region for research on trust attitudes, but one that can inform other areas that exhibit similarly high levels of resource dependence. Overall, forestry plays a large role in provincial life, as a major resource of provincial GDP, and as a major employer. This level of dependence is not experienced uniformly across the province, and many small towns rely almost exclusively on forest industry businesses for employment and tax revenue (Walker 2012; White and Watson 2004). Since the economic downturn of 2008, towns throughout New Brunswick have become increasingly vulnerable to fluctuations in the global markets, as well as the natural dynamics of the province's natural resource industries. In applying Rahn and Rudolph's hierarchical model to trust attitudes regarding the three major players in forestry – the provincial government, scientists and the forest industry – the differing

experiences and perceptions based on varying levels of dependency can be accounted for, while also accounting for individual differences in a common experience with these three entities. The four factors they identify as theoretical drivers are encompassed by the findings of Hetherington and Rudolph (2008), who identified performance, process and probity as the drivers of individual levels of trust in the federal government, which are used as the theoretical foundation of the present study.

Using original survey data, this study offers several contributions, both for theories of political trust as well as for the practical implications faced by administrators and scientists who are currently making decisions on how to deal with a complex, contentious natural resource issue. First, by applying Rahn and Rudolph's hierarchical model to a specific issue, it adds to the theoretical understanding of the factors most relevant to the development of political trust, particularly performance, process and probity (Hetherington and Rudolph 2008). Performance encompasses both the quality of policy outcomes as well as policy congruence, by considering how well policy reflects and is accepted by the public (particularly in terms of economic conditions); process mirrors procedural considerations, wherein citizens' perception of the fairness of government actions drives their attitudes; and finally, probity considers any scandals or major contention, encompassing the attributes of officeholders, whose perceived characteristics are shaped by their public actions. Using these three factors as a framework rather than the four put forth by Rahn and Rudolph allows for a more comprehensive understanding on the influence of economic factors (considered as performance indicators) as well as specific instances of scandal and discord, two highly salient issues for spruce budworm because of the underlying tensions of public well-being versus industry's economic health, as well as the

missteps taken by the province in the downplaying of pesticide risks and effects during past outbreaks.

While political trust has been shown to have electoral implications at the federal level, by looking at a single issue at the local level, we can develop a more nuanced understanding of how concepts such as performance, process and probity drive trust among the public by allowing individual respondents to focus on a single issue, thus minimizing any noise from the wide range of issues that may be interacting, canceling one another out, or being ignored based on whatever issue may be most salient (Hetherington and Rudolph 2008). By focusing on a single issue, the survey utilized for this study has primed respondents to the issue of theoretical interest, and gives a more distinct understanding of the theoretical drivers of trust attitudes.¹

In addition, a single-issue test of the model allows for the incorporation of literature on the interactions of trust with levels of knowledge and perception of risk, understood herein to serve as the means by which individuals can assess both performance and process, which have both been shown as crucial to the understanding of public attitudes for insect disturbances (McFarlane, Parkins and Watson 2012). This provides not only an expansion of theoretical understanding for how these variables interact, but also a foundation for officials and administrators in adapting their approach for the current spruce budworm outbreak. Using city-level survey data collected in New Brunswick, Canada, this study can also allow for both community-level and personal evaluations of the economic aspects of spruce budworm and how that affects issues of trust, with the respondent cities providing individuals living in communities exhibiting low, medium and high dependence on the economic outcome of the current outbreak.

¹ While this could result in responses that are skewed towards individuals that are more interested in the issue than the general population, this is a necessary tradeoff in order to obtain responses from individuals who are also most likely to have more robust, stable attitudes regarding what is a rather narrow issue.

Hypotheses

Community heterogeneity. Rahn and Rudolph's findings suggest that the level of heterogeneity found in each community will have an effect on levels of trust, with their study showing increased levels of racial, economic and political heterogeneity resulting in a decrease of trust in local government. Communities in New Brunswick offer little variation in race (the province being 96 percent white²), thus negating the ability to test the racial heterogeneity assumption. Also, since all three surveyed communities are in the same province, the standard measurement for economic inequality (the GINI score) does not provide enough variance to test for economic heterogeneity in a meaningful way.³ However, there is an alternative way to assess economic differences between communities, by using the level of dependency of the forest industry. While this cannot serve as a direct proxy measure for income inequality, it does show the level of economic vulnerability each community has regarding the economic health of the forest industry, with the assumption that a greater reliance on the forest industry will put a larger proportion of the community at risk should there be negative forestry effects. While it does not show evidence of income heterogeneity, it does show the level of heterogeneity of economic risk. Based on what research shows for local political trust, an increased level of dependency seems likely to decrease levels of trust in the provincial government; it could also be surmised that the more economically dependent a community is on one industry in particular, the greater their loyalty to that industry as well as the trust invested in them. Therefore,

² 2011 Canadian Census.

³ GINI scores: Campbellton: 0.36; Edmundston: 0.38; Fredericton: 0.42. Scores obtained from www.censusmapper.ca.

H1: Individuals living in communities with higher levels of forest industry dependence will have lower levels of provincial government trust, but higher levels of trust for industry.

In addition, Rahn and Rudolph suggest that political heterogeneity also serves as a factor in trust attitudes. They base this on the logic of the median voter theorem in which local government will generally act in accordance with the preferences of the median voter, thus those who are farther from the median in terms of ideology and policy preference will have lower levels of trust in local government (Rahn and Rudolph 2006). The survey supplying the data for the current study did not include an ideology question⁴, and instead focuses on policy congruence (overall attitude alignment with government policy) to test the assumption of political heterogeneity, with the assumption that individual alignment with forestry policies will increase trust in the three entities involved with forestry policy in New Brunswick. Previous research indicates that New Brunswick residents hold diverse views on forestry, ranging from highly anthropocentric views that see forests primarily as a human resource, to biocentric views that see nature as having value in its own right, regardless of community dependence (McFarlane et al. 2011); from this we can determine that there will be variation among and between the three cities in value orientation, and so agreement on policy direction is not a foregone conclusion.

Therefore, it is hypothesized:

⁴ The decision to exclude a question for ideology was made by those involved in survey design in order to reduce the length of the survey, and based on information from local political scientists that New Brunswick residents are largely non-ideological, and tend to adopt political parties based on socialization rather than ideological position. These political scientists still suggested an ideology question be included, but the decision was made to exclude it by the majority of those involved, not including the author of the present study.

H2: Individuals with higher levels of approval of policy outcomes (higher policy congruence) will have a higher level of trust for provincial government, scientists/academics and industry.

Because the present study is focused on forestry and spruce budworm, it is also likely that those in communities with a higher dependence on forestry are more likely to have their trust perceptions – particularly those for provincial government and the forest industry – influenced by the degree to which they approve of the direction of forest policy. If their community is more dependent on the forest industry, and they believe that forest policy in New Brunswick is positive, their levels of trust should increase, and if their community is more dependent on the forest industry and their views are less congruent with policy, the levels of trust should decrease; if their community is less dependent on the forest industry, their levels of trust should not see any significant change in either direction.

H3: An individual's levels of trust for provincial government, scientists/academics and the forest industry will be contingent on their community's level of forest dependency and their own level of policy congruence, such that higher dependency will interact with higher congruence to increase levels of trust, while higher dependency will interact with lower congruence to decrease levels of trust.

Individual efficacy. Increased perceptions of political efficacy increase levels of political trust at the local and national level in the United States (Hetherington 1999; Rahn and Rudolph 2006), and so may increase individuals' trust in the regional Canadian government as well. If individuals believe the public interest is included in government decision-making, they should be more likely to trust politicians, scientists and industry in their efforts to manage New Brunswick forests.

H4: Higher levels of individual political efficacy will have a greater positive effect on provincial political trust than trust in scientists/academics or the forest industry.

Knowledge and risk. Literature on risk perceptions has indicated that risk judgments receive the greatest influence from trust in experts, industry and agencies when individuals have little knowledge of a particular risk (Earle 2010; Siegrist and Cvetkovich 2000; Sjoberg 1999). In these situations, those who lack knowledge are most likely to rely on sources of information they already trust; conversely, when individuals are knowledgeable about a risk, they rely on their own knowledge rather than information coming from experts. Wanting to investigate this finding further, McFarlane, Parkins and Watson (2012) examined the relationship between knowledge, risk and trust in the context of the Mountain Pine Beetle (MPB) disturbance in Alberta, Canada, and found that as knowledge of MPB increased, concern over the risk it posed decreased, along with support for land managers' efforts to mitigate the infestation. However, the authors did not take the additional step to see how knowledge or risk perception may or may not have independent effects on levels of trust. Studies suggest that when an issue is perceived as having a higher risk, individuals will only have high levels of trust in agencies or entities who they trust to adequately handle the situation (Jeleva and Rossignol 2009; Slovic, Flynn and Layman 1991). Thus, an evaluation of risk perception in the study of spruce budworm offers a unique investigation into which of the three entities – government, scientists and academics, or industry – are trusted to address this specific issue. Because the outbreak is a complex ecological issue, and one with broad impacts for the public, the environment and the economy, we can hypothesize that

H5: An increase in the perception of risk will lead to higher levels of trust in scientists and academics, but no change in levels of trust for provincial government and industry.

An additional consideration for this study is that a spruce budworm outbreak involves two dimensions of knowledge: knowledge of the issue, and knowledge of the treatments. In New Brunswick, many individuals are aware that spruce budworm is a problem for forestry, but may not know much else about the insect or how it affects local forests. The results from McFarlane, Parkins and Watson (2012) suggest that the more knowledgeable about spruce budworm an individual is, the less they would trust politicians, scientists and industry. Conversely, much of the controversy in New Brunswick has come from the aerial insecticide programs that have occurred during past outbreaks, particularly since an understanding of the adverse impacts of some of the products used only came after their widespread application. Current insecticide treatments in use by Canadian officials are Btk (*bacillus thuringiensis kurstaki*) and Mimic (*tebufenozide*), which scientific studies show are not harmful to the environment or non-target fish and wildlife, as assessed by Health Canada, the agency tasked with approval of all chemical treatments throughout Canada (Health Canada 2013; 2015). When individuals are informed about the current treatment options, thus with higher levels of knowledge, trust in all three entities to adequately address the issue using the current treatments is likely to increase. Thus, there is reason to believe that each dimension of knowledge acts independently, and will have independent effects on levels of trust.

H6: An increase in issue knowledge will lead to lower levels of trust in provincial government, scientists/academics and industry, while an increase in treatment

knowledge will lead to higher levels of trust in provincial government, scientists/academics and industry.

Given the interactions seen in McFarlane, Parkins and Watson (2012), there is also reason to believe that levels of both issue and treatment knowledge are conditioned by the level of perceived risk. If spruce budworm is perceived to be higher in risk, necessitating action to overcome it with as many means as possible, it may overcome the hypothesized relationship between higher issue knowledge and levels of trust, and increase trust as both variables increase. Relatedly, if the perception of risk is higher, and individuals have a higher level of knowledge of treatments and therefore perceive them as low risk, then levels of trust for government, scientists/academics and industry, as it pertains to spruce budworm, would increase. We can then hypothesize that

H7: Risk perception will moderate both issue and treatment knowledge such that higher values for perception of risk will positively interact with levels of issue knowledge and treatment knowledge to produce higher levels of trust in government, scientists/academics and industry.

Data and Methods

The main data source for this study comes from a public opinion survey distributed by the University of New Brunswick in Fredericton, New Brunswick, Canada.⁵ The survey was designed with input from scientists and administrators at the Atlantic Forestry Centre involved in the current program focusing on spruce budworm. The survey targeted three towns in New

⁵ An example of the invitation letter (English language version) and mail-formatted survey appear in Appendix A. Data set of responses available upon request.

Brunswick: Fredericton, Campbellton, and Edmundston. These towns were chosen to provide variation in one of the key independent variables discussed below, dependency on the forest industry. Fredericton, with a population of 58,220, is one of only three urban areas in the province, and is the provincial capital. Even as an urban center, Fredericton has ties to forestry: it is home to the Atlantic Forestry Centre, a branch of the Canadian Forest Service; the Maritime College of Forest Technology; and the main campus of the University of New Brunswick. Campbellton, more rural in nature, has a population of 7,385 and sits along the northern border of New Brunswick along the Restigouche River. As the spruce budworm outbreak has moved into New Brunswick from Quebec, both public and private forestland in and around Campbellton has been some of the most affected in the province. Edmundston is a mid-point between the other two towns in size and level of urbanity, with a population of 16,032 in the northwestern corner of the province, sharing borders with Quebec and the state of Maine. The largest employer in town is the Twin Rivers pulp mill, which is paired with a Twin Rivers paper mill directly across the border in Madawaska, Maine. New Brunswick is the only province in Canada that is officially bilingual, and has a large French-speaking population, particularly in the northern part of the province; because of this, surveys were constructed in both English and French. A total of 1500 surveys, 500 to each city, were mailed at random through Canada Post in the three selected cities along with a letter of explanation that also included a web address to take the survey online through SurveyMonkey. A total of 274 surveys were returned through the mail and online, for a response rate of 16 percent⁶.

⁶ As the descriptive statistics of all variables in Table 1.3 indicate, the sample has a higher proportion of males, and is also older and more educated than the population of New Brunswick according to the 2011 Canadian Census. This is most likely a result of the mode of the survey, 97 percent of responses having been received through the mail (Dillman, Smyth and Christian 2014). Demographic controls are included as part of the statistical analyses detailed below, and while all conclusions based on survey samples should be accepted with a degree of caution, Rahn and Rudolph (2006) show that gender, age, education and income are not significant predictors of variations in trust.

Dependent Variables

Rahn and Rudolph's model is constructed to explain a single dependent variable: citizen-level trust in local government. Because this is a policy issue that is not limited only to government officials and agencies, the current study adapts their model for three separate dependent variables which comprise three related but distinct indicators of trust: trust in the provincial government (provincial rather than municipal because that is the level of government that is implementing the spruce budworm program), trust in scientists and academics (because the program is based on an effort to pursue scientific understanding in addition to mitigation and control), and trust in industry (the other major entity involved in spruce budworm). Details of dependent variable construction are provided in Table 2.1.

Table 2.1: Construction of Dependent Variables

Variables	Measurement
Provincial government trust	Q25 index: On a scale of 1 to 7, with meaning strongly disagree and 7 meaning strongly agree, please tell us how much you agree with each statement: a) Most of the time we can expect people in the New Brunswick government to do what is right; b) Many people in the government in New Brunswick are dishonest [response values flipped]; c) Most of the people running the government in New Brunswick are smart people who know what they are doing; d) People in the New Brunswick government waste a lot of the money we pay in taxes [response values flipped]
Trust in scientists/academics	Q21: Using a scale from 1 to 7, where 1 means great distrust and 7 means great trust, please indicate how much you trust the information coming from the following sources: Scientists
Trust in industry	Q21: Using a scale from 1 to 7, where 1 means great distrust and 7 means great trust, please indicate how much you trust the information coming from the following sources: Large forest companies

The variable for *provincial government trust* was constructed from a series of Likert questions modeled after the trust battery asked in the Canadian Election Surveys, which ask how

much respondents agree that: most of the time New Brunswick government officials can be expected to do what is right; many people in the New Brunswick government are dishonest; most of the people running the government in New Brunswick are smart people who know what they are doing; and people in the New Brunswick government waste a lot of the money we pay in taxes. Responses ranged from one, meaning strongly disagree, to seven, strongly agree; if necessary, response values were flipped to standardize all four items. Responses were then averaged to create a political trust index ($\alpha = 0.63$).

The dependent variables for *trust in scientists/academics* and *trust in industry* come from two identically worded questions appearing on the survey: “Using a scale from 1 to 7, where 1 means great distrust and 7 means great trust, please indicate how much you trust the information coming from the following sources: [scientists/large forest companies].” Descriptive statistics for all three dependent variables are listed in Table 2.2, and distributions of all three dependent variables are shown in Figure 2.1.

Independent Variables

Individual-level variables of interest. Descriptive statistics for the independent variables are listed in Table 2.2; descriptions of each independent variable can be found in Table 2.3. *Policy congruence* was calculated as an indexed average of level of agreement on a seven-point Likert scale with a series of eight statements regarding views on forest management, economic and environmental forest values, and the role of public and industry input on forest management ($\alpha = 0.68$; see Table 2.2 for full list of statement wording). *Local political efficacy* is the indexed level of agreement on a series of four statements modeled from political efficacy questions used in the Canadian Election Studies. Respondents are asked to respond on a scale of one, meaning strongly disagree, to seven, meaning strongly agree, to statements including: those

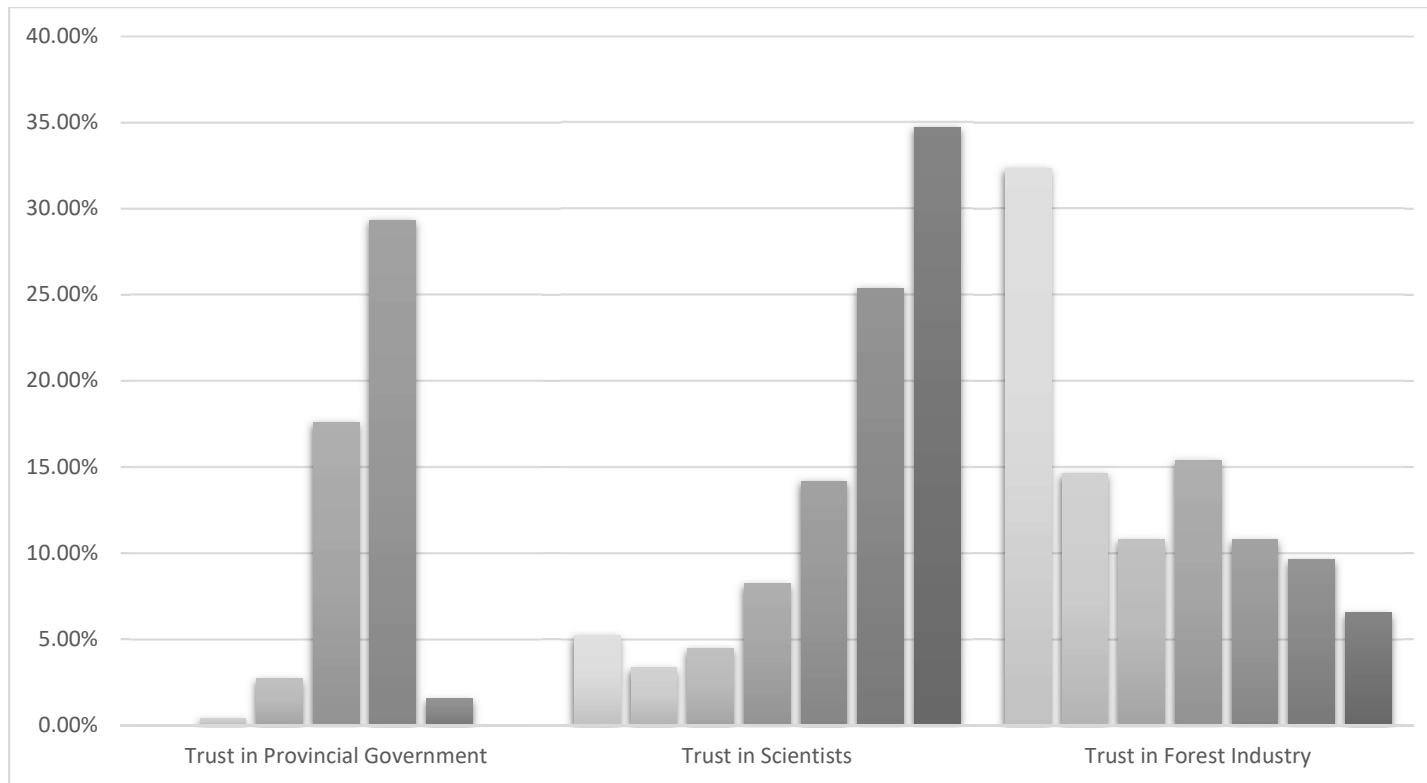


Figure 2.1: Relative Frequencies of Dependent Variables

Table 2.2: Descriptive Statistics of Variables; New Brunswick median values obtained from the 2011 Canadian National Census

Variable	Minimum	Maximum	Median	New Brunswick Median	Mean	Standard Deviation
Trust in provincial government	1.75	6.5	4.5	-	4.412	0.77
Trust in scientists	1.0	7.0	6.0	-	5.475	1.72
Trust in industry	1.0	7.0	3.0	-	3.127	1.98
Policy congruence	2.0	6.25	4.0	-	4.025	0.90
Political efficacy	1.25	7.0	4.25	-	4.22	0.86
Issue knowledge	0	3.0	2.0	-	1.682	0.85
Treatment knowledge	-8.0	2.0	0	-	-0.823	2.17
Risk perception	1.0	7.0	5.0	-	5.177	1.67
Forest dependency	44.3	86.3	72.10	-	67.85	18.09
Partisanship	0	1.0	1.0	-	0.744	0.43
Age	1.0	6.0	5.0	43.7 Category 3	4.926	1.29
Gender	0	1.0	0	Female Category 1	0.278	0.44
Education	1	9.0	5	Completed high school Category 3	5.154	2.22
Income	1	5.0	3.0	\$69,290 Category 3	2.967	1.23
Interpersonal trust	1.0	7.0	5.0		4.423	1.24
Trust in federal government	1.0	7.0	4.0		4.096	1.48

Table 2.3: Construction of Independent Variables

Variables	Coding	Measurement
Policy congruence	Scale: 1 (strongly disagree) to 7 (strongly agree)	Q20 index: On a scale of 1 to 7, with 1 meaning strongly disagree and 7 meaning strongly agree, please tell us how much you agree with each statement: a) The forest industry is the most important industry for the New Brunswick economy; b) The economic contributions of the forest industry outweigh environmental impacts; c) Forests are being managed for an appropriate mix of values and uses; d) Environmental groups have too much influence over forest management in New Brunswick; e) The forest industry has too much influence over forest management in New Brunswick; f) Not enough is being done in New Brunswick to deal with spruce budworm; g) Public input is important to forest management in New Brunswick; h) Forests should be protected from pest outbreaks at any cost
Political efficacy	Scale: 1 (strongly disagree) to 7 (strongly agree)	Q25 index: On a scale of 1 to 7, with meaning strongly disagree and 7 meaning strongly agree, please tell us how much you agree with each statement: a) Generally, those elected to the New Brunswick legislature soon lose touch with the people; b) I think the New Brunswick government cares about what people like me think [response values flipped]; c) Sometimes, New Brunswick politics and government seems so complicated that a person like me can't really understand what's going on; d) People like me have a say about what the government in New Brunswick does [response values flipped]
Issue knowledge	All statements true, respondents receive value of 1 for each one checked, scores range 0-3 Range 0-3	Q7: To the best of your knowledge, spruce budworm: (indicate any that are correct) a) Is native to North America; b) Is the most destructive pest of fir and spruce forests; c) Causes severe branch kill and often kills trees
Treatment knowledge	1 point each for correctly identifying option 1 for Btk and Mimic, -1 for any other option, 0 if none chosen Range: -8 - 2	Q11 index: To the best of your knowledge, please indicate what species can be harmed by Btk and Mimic: 1) Spruce budworm and other caterpillars; 2) Other insects (mosquitoes, beetles, etc); 3) Birds; 4) Human beings; 5) Don't know

Risk perception	Scale: 1 (not serious at all) to 7 (very serious)	Q3: How serious of a problem would you rate spruce budworm in New Brunswick? (1= not serious at all, 7 = very serious)
Forest dependency	Campbellton: 72.1 Edmundston: 86.3 Fredericton: 44.3 Possible range: 0-100	Dependency calculated by the percentage of GDP attributed to forestry practices for each town based on the 2011 Canadian Census, using the equation found in White and Watson (2004)
Partisanship	Binary: 0 if None of the above, 1 if any other response	Q38, 39: Of the following political parties, which most closely shares your views? [Liberal, Conservative, New Democratic Party, Green, Something else, None of the above]
Age	6 categories: 1: 18-24 2: 25-34 3: 35-44 4: 45-54 5: 55-64 6: 65 and over	Q44: What is your age?
Gender	Binary: 0 if male, 1 if female	Q45: What is your gender?
Education	Nine categories: 1: Grade 9 or less 2: Some secondary/high school 3: Completed secondary/high school 4: Some technical, community college, 5: Completed technical, community college, 6: Some university 7: Bachelor's 8: Some post-graduate 9: University post-graduate degree	Q40: What is the highest level of education that you have completed?

Income	Five categories: 1: Less than \$20,000 2: \$20,000-39,999 3: \$40,000-59,999 4: \$60,000-99,999 5: \$100,000 or more	Q46: What is your household's annual income before taxes?
Interpersonal trust	Scale: 1 (never) to 7 (always)	Q24: Generally speaking, how often would you say that most people can be trusted? (1 = never, 7 = always)
Federal government trust	Scale: 1 (no confidence) to 7 (great confidence)	Q26: On a scale of 1 to 7, where 1 means no confidence at all, and 7 means a great deal of confidence, how much confidence do you have in: The federal government

elected to the New Brunswick legislature soon lose touch with the people; the New Brunswick government cares about what people like me think; New Brunswick politics and government seems so complicated that a person like me can't really understand what's going on; and people like me have a say about what the government in New Brunswick does. If necessary, responses were flipped to standardize all four items. The average of the four values was then taken to create the political efficacy index ($\alpha = 0.57$).

Two separate variables were created to calculate knowledge variables. The first, *issue knowledge*, is based on a survey item that provided three facts about spruce budworm; respondents then indicated which of these statements were correct. All three statements are correct statements about budworm, so respondents were given a score based on the number chosen, ranging from zero to three. The second knowledge variable, *treatment knowledge*, asked a series of questions regarding the use and effects of the two pesticide treatment options being used in New Brunswick: Btk (*bacillus thuringiensis kurstaki*) and Mimic (tebufenozide). Correct identifications of the effects of each treatment were given a value of 1, while incorrect identifications were given a value of -1; skipped responses were given a value of 0. These were added to create a single score of treatment knowledge, with values in the survey sample ranging from -8 to 2. To measure for *risk perception*, individuals were asked to rate how serious of a problem a spruce budworm outbreak in New Brunswick is, on a scale from one, not serious at all, to seven, very serious.

Community-level variable of interest. The primary variable of interest at the community level is *forest industry dependence*, which is calculated by the percentage of GDP attributed to forest practices for each town based on the 2011 Canadian Census, using the

equation found in White and Watson (2004), provided by David Watson, field economist at the Northern Forestry Centre in Edmonton, Alberta, Canada (Personal communication 2015b). This is used as a measurement of the economic status of a community, as a stand-in for economic heterogeneity.

Demographic and control variables. Survey respondents reported their age, gender and levels of both education and income, which were included as control variables. Because of the role generalized *interpersonal trust* plays in political trust (Hetherington 1998), and the impact of *federal political trust* on local political trust (Rahn and Rudolph 2006), a seven-level scale for each of these was included in the survey. Lastly, partisan identification was included as a control. This study departs from most studies of political trust, and does not include identification with a particular party as a variable of interest. This is because of the unique role of partisanship in Canada, and New Brunswick in particular; Canadians, by and large, do not identify with one party over another so strongly as to consider it part of their personal identity (Cross and Young 2004; Merolla, Stephenson and Zechmeister 2008). Cross and Young (2004) found that few Canadians belong to official political parties, and those that do are not representative of voters in general. This is particularly true of New Brunswick, where ideology and partisanship do not neatly overlap, and those who do consider themselves part of a party do not do so strongly (Personal communication 2015a). To account for this, partisanship is included as a binary control variable, to account for those who identify with a party as opposed to those who do not.

Methods

The present study adapts Rahn and Rudolph's (2006) multilevel model of local political trust to accommodate for both individual and community factors that may influence trust in local politicians, scientists and academic, and the forest industry. The model has two levels –

individual and city-level – to account for individual attitudes as they occur within their community context. To overcome the statistical challenges inherent in a multilevel model with data that could include non-constant variance and clustering within contextual units (Steenbergen and Jones 2002), the present study employs a hierarchical model. A hierarchical model allows the researcher “to account for variance in a dependent variable that is measured at the lowest level of analysis by considering information from all levels of analysis” (Steenbergen and Jones 2002, 219), providing the ability to create a comprehensive model, explore causal heterogeneity and provide a test of the generalizability of findings between contexts. The first level, the individual structural model, can be expressed using the equation as follows for each of the three dependent variables (DV) discussed above:

$$DV_{ij} = \beta_{0j} + \beta_{1j}POLEFF_{ij} + \beta_{2j}ITRUST_{ij} + \beta_{3j}PECON_{ij} + \beta_{4j}ENGAGE_{ij} + \beta_{5j}EDUC_{ij} + \beta_{6j}INCOME_{ij} + \beta_{7j}FEMALE_{ij} + \beta_{8j}AGE_{ij} + \beta_{9j}NATTRUST_{ij} + \beta_{10j}PID_{ij} + \beta_{11j}POLDIST_{ij} + \beta_{12j}ISSEFF_{ij} + \beta_{13j}KNOW_{ij} + \beta_{14j}RISK_{ij} + \beta_{15j}PAST_{ij} + r_{ij}$$

In this equation, DV_{ij} stands in for each dependent variable as detailed above for the i th respondent living in the j th city. β_{kj} represents the individual-level effect associated with the k ($k = 1, 2, \dots, 15$) explanatory variables as described above, while β_{0j} is an intercept and r_{ij} is a level-1 disturbance term.

The second level, the city structural model, can be expressed using the following equation for each of the three dependent variables (DV) discussed above:

$$DV_{0j} = \gamma_{00} + \gamma_{01}GINI_j + \gamma_{02}CITYPOP_j + \gamma_{03}CRIME_j + \gamma_{04}INCOME_j + \gamma_{05}EDUC_j + \gamma_{06}CIVCAP_j + \gamma_{07}PIDPOL_j + \gamma_{08}DEPENDENCY_j + u_{0j}$$

In this equation, the DV_{0j} represents the mean level of each trust variable in city j , with Y_{00} representing the average intercept across all three cities, the Y 's representing the fixed effects of the city-level factors, and the u_{0j} term acting as the city-level disturbance term to avoid the assumption that the model accounts for all possible sources of contextual heterogeneity (Steenbergen and Jones 2002). The hierarchical model, and all other tests have been analyzed using the computer software, R.

Nested Analysis of Variance. To establish variation in the dependent variables (Steenbergen and Jones 2002), the first test was a nested analysis of variance (ANOVA) model. This model controls for all possible individual-level variance to establish whether community-level variance has an independent effect on each of the three dependent variables. Because individual factors – individual respondents – can only occur within one level of community factors – the town in which they live – there can be no interaction with alternate levels of the community factors – the towns in which they do not live. Therefore, the nested ANOVA model accounts for this nested relationship with the equation

$$Y_{ijk} = \mu + \alpha_i + \beta_{ij} + \varepsilon_{ijk}$$

which indicates that community level variance is the result of μ , the overall mean of the dependent variable, α_i , the effect of the i th level of community, β_{ij} , the individual-level variance for the j th individual in the i th community, and ε_{ijk} representing random error.

Table 2.4 details the results of the nested ANOVA model for each dependent variable. The city-level variance component for the first dependent variable, trust in provincial government, does not quite reach the more liberal threshold of statistical significance of 0.10, however, this is not surprising. With only three communities included in the study, each located

in the same province, it stands to reason that individuals within each city would have similar levels of trust in provincial officials. However, as this study is issue-specific, focusing on the spruce budworm outbreak in the province, this does not negate further exploration into the factors that influence these attitudes. This is particularly true considering the results for the other two dependent variables, trust in scientists/academics and trust in industry, which both exhibit statistically significant city-level variance.

Table 2.4: Nested ANOVA for Community-level Effects on Dependent Variable; * $p < 0.01$, ** $p < 0.001$

Dependent variable	F-value	p-value
Trust in provincial government	2.03	0.11
Trust in scientists	4.66	0.003*
Trust in industry	6.34	0.000**

Results

Bivariate correlations

Prior to running the multivariate models, dependent variables were run with all independent variables to assess whether any significant bivariate correlations were present, thus whether there was any basis to believe multivariate models would provide significant results. As Table 2.5 shows, trust in provincial government, scientists and academics, and industry, each have variation in the independent variables showing significance. Policy congruence is significant and in the expected direction for trust in government and trust in industry, which provides some initial support for the second hypothesis. Industry receives a higher correlation, and a higher level of significance, than government, which is most likely the result of a policy

congruence measure that is forestry-specific; since policy congruence is calculated using attitudes on forest management, this measurement is directly linked to the purview of industry. Interestingly, the correlation for science is small and negative, and not significant, suggesting that scientists may not be viewed as actors in the forest policy process, since attitudes for scientists as a group in the context of forest management are not strong. Oddly, counter to H4, the script is flipped and only scientists show a significant correlation with political efficacy; even more surprising, higher efficacy appears to result in a negative effect on trust in scientists. This may also be connected to how scientists are viewed as part of the policy process – one separate from political and policy influence, beyond the personal political reach of individual citizens. If citizens believe they have an impact on their political environment, the negative level of trust may be the result of the objective aspect of scientists’ nature, beyond the influence of the average citizen, and thus individuals are wary of scientists by nature.

Table 2.5: Bivariate Correlations Between Independent and Dependent Variables; *p < 0.05, **p < 0.01, *p < 0.001**

	Provincial trust	Science	Industry
Policy congruence	0.19*	-0.07	0.50***
Political efficacy	-0.04	-0.2*	0.00
Issue knowledge	0.07	0.1**	0.03
Treatment knowledge	-0.04	0.13	0.30***
Risk perception	0.08	0.22*	0.24**
Forest dependency	0.02	0.15**	0.25**
Partisanship	0.14	0.15	0.08
Age	0.06	-0.03	-0.07
Gender	0.04	-0.01	-0.04
Education	0.11	0.06	0.03
Income	0.09	0.22***	0.18**
Interpersonal trust	0.21***	0.26***	0.27***
Federal trust	0.42***	0.20***	0.17**

Scientists, do, however, benefit from higher values of issue knowledge, risk perception and forest dependency. This appears to support the concept of scientists as advocates for those who are vulnerable: those who know more about spruce budworm and the effects an outbreak can have, who see it as a higher risk and who live in communities that are more vulnerable to the risk, in these initial results, place more trust in scientists. Industry receives similar benefits from higher risk perception and dependency, but receive significant results from knowledge of treatment options rather than knowledge of spruce budworm itself. Because of the history New Brunswick has with the ill effects of past treatment options, it seems that a greater knowledge of what is being used may serve as assurance that the actions of industry are not detrimental to the interests of the public. Essentially, scientists receive greater discretion from individuals when they understand the mechanics of spruce budworm and believe it to be a risk to them and their community; industry receives greater discretion from individuals when they understand that industry efforts to mitigate the problem are not harmful to humans or wildlife, and are meant to address an issue that is a high risk for both industry and New Brunswick communities.

We also see from Table 2.5 that interpersonal trust and federal trust have isolated effects on all three dependent variables, as one might expect. Income, which does not appear to have a significant effect on local government when assessed in multivariate models (Rahn and Rudolph 2006), similarly shows no independent effect on provincial government, though does appear to be positive and significant for scientists and academics, as well as industry. It could be that individuals who are more economically stable may give additional discretion to scientists and industry, but it remains to be seen whether this effect holds once all other variables are accounted for.

Multivariate Correlations

Two models were run for each dependent variable, the first being a random intercept model with no interactions, the second including three interaction variables to address H3's interaction between community dependency and individual policy congruence, and H7's interaction between levels of issue and treatment knowledge and perception of risk. As seen in Table 2.6, models for provincial government and scientists are presented with interactions, while the model for industry is presented without interactions. The reported p-values for the AIC model fit indicate that there are significant differences between the interaction and no-interaction models for government and scientists; the model for industry did not present any significant differences. For all three dependent variables, only the models with lower AIC levels⁷ (Burnham and Anderson 2002) are presented in Table 2.6 for discussion. The alternative models are shown in Appendix B.

One other issue that must be addressed is the attrition rate for survey responses; while 274 surveys were returned, many had questions that had been skipped over by respondents, so that the multivariate models had an N of 162 to 164 (as specified in Table 2.6). While a greater sample size would have offered even greater statistical power, these data still allow for preliminary conclusions that can be replicated with future research.

Interpersonal and federal trust. Prior to turning to the variables of interest, it is both interesting and important to note the significance of the variable for interpersonal trust on levels of trust for scientists and academics, as well as the variable for trust in the federal government

⁷ The AIC offers an estimate of the information lost, with the preferred model being the one with the minimum AIC value. For example, the models for trust in science offer AIC values of 627.92 (with interactions) and 630.87 (without interactions). By calculating the relative likelihood ($\exp((627.92-630.87)/2)=0.23$) we see that the second model is 0.23 times as probable as the first to minimize information loss. Thus, I chose to show the first model for its greater explanatory power.

Table 2.6: Hierarchical Models of Trust; Coefficient presented with standard error in parentheses; [†] p < 0.1, *p < 0.05, **p < 0.01

Parameter	<u>Provincial Government</u> N = 164	<u>Scientists/Academics</u> N = 162	<u>Forest Industry</u> N = 163
Policy congruence	0.20 (0.23)	-1.40 ** (0.52)	0.89 ** (0.16)
Political efficacy	0.04 (0.07)	-0.16 (0.16)	0.00 (0.17)
Issue knowledge	0.03 (0.23)	-0.70 (0.52)	-0.09 (0.07)
Treatment knowledge	-0.25* (0.09)	0.33 (0.21)	0.21 ** (0.07)
Risk perception	0.00 (0.09)	-0.09 (0.20)	0.13 (0.09)
Forest dependency	0.01 (0.01)	-0.06 [†] (0.03)	0.01 (0.01)
Partisanship	0.13 (0.14)	0.16 (0.31)	-0.13 (0.33)
Age	0.03 (0.05)	-0.10 (0.11)	0.02 (0.11)
Gender	0.07 (0.13)	0.06 (0.29)	-0.34 (0.31)
Education	0.05 (0.03)	0.01 (0.06)	0.01 (0.06)
Income	0.04 (0.05)	-0.01 (0.12)	0.06 (0.13)
Interpersonal trust	0.06 (0.05)	0.34 ** (0.12)	0.19 (0.13)
Trust in federal government	0.21 ** (0.04)	0.09 (0.10)	0.09 (0.10)
Dependency x policy congruence	0.00 (0.00)	0.02 * (0.01)	
Risk perception x issue knowledge	0.00 (0.04)	0.15 (0.10)	
Risk perception x treatment knowledge	0.04 * (0.02)	-0.05 (0.04)	
Model Fit Statistics			
AIC	367.31	627.92	652.06
Log likelihood	-164.65	-294.96	-309.15
Chi-square p-value	0.06 [†]	0.03 *	0.62

and its significant relationship with trust in government, with all other correlations for these two indicators washing out in the multivariate models. The result for federal trust on government is both statistically and substantively significant, with a one-unit increase in federal trust leading to an increase of 0.21 in trust for the provincial government; this result confirms that there is a clear correlation between provincial and federal levels of trust, but by including it as a control variable on the right side of the model equation, the model ensures that the results only capture the provincial dimension of individuals' underlying construct of political trust (Rahn and Rudolph 2006). It is also interesting that the coefficient for the effect of interpersonal trust on scientists is both substantively and statistically significant. Each one-unit increase in interpersonal trust results in an increase of 0.34 in trust for scientists at the 0.01 level, an even greater effect size than the effect of federal trust on provincial government trust. This suggests that scientists receive greater trust from the public because they are seen as peers, even advocates, rather than as adversaries, the way industry and government are conceptualized. While this is only supposition, it does suggest that scientists are granted leeway in decision-making that government and industry cannot currently hope to match. If this supposition is true, levels of trust for scientists are being constructed on a different dimension than that of government or industry, which has interesting implications for the role of scientists in policymaking overall, and specifically for spruce budworm. If scientists are perceived as champions of the public, working for the public interest in a way unrelated to governmental trust, this could be leveraged both by scientists and those working with scientists. It could also be the means to achieve a larger consultative role in policy issues, and may be the key for resetting the balance of power between the public, government and industry.

Variables of Interest

Beginning with the variable for forest dependency, Model 1 does not show a significant effect for provincial government, either statistically or substantively. This provides no support for the first part of H1, which suggests that higher dependency as a measurement for heterogeneity would decrease levels of trust; in light of the finding in the nested ANOVA for government trust, indicating that the three surveyed communities did not exhibit significantly dissimilar levels of trust in their provincial government, this does not come as a surprise. What is a surprise, however, is that dependency does not exhibit any effect on trust in industry; when accounting for all other variables, the positive and significant bivariate relationship disappears, providing no support for H1. The lack of any effect suggests that residents are more wary of the industry than might be supposed. An additional, yet unexpected, result seen under Model 2 is that dependency has a small but marginally statistically significant effect on trust in scientists, but with a *negative* effect, completely reversing the correlation seen in bivariate tests. It is difficult to attribute much theoretical relevance to a decrease of 0.06 in trust in scientists, but the fact that it is significant at the 0.10 level suggests there is something else influencing this result, which will be discussed below.

As seen for scientists and industry, policy congruence is statistically significant at the 0.01 level, with substantive coefficients; however, only industry's effects are in the expected direction. Model 2 for scientists shows a negative relationship in which each additional unit of agreement with forest policy results in a -1.4 unit decrease in trust in scientists; for industry, the relationship is positive, as shown in Model 3, with trust in industry increasing 0.89. These are not insignificant changes in trust, considering that trust is measured on a seven-point scale, and it provides mixed support for the second hypothesis. The positive relationship for industry makes

intuitive sense, however the incredibly strong effect for scientists is puzzling. There is, of course, the possibility that the reduced power of the statistical model due to the high attrition rate is causing the unusual effect; however, considering the size of the coefficient and its high level of statistical significance, this seems somewhat less likely.

There appear to be two possibilities for this relationship. One possibility for this finding is that scientists are seen as weakly connected with forest management, and thus considered irrelevant for those who are more satisfied with how forests are being managed in New Brunswick; another possibility is that scientists are actually seen as hostile to the forest management status quo. As forest management is viewed more positively, the fact that industry receives an increase in trust while scientists suffer a significant decrease in trust suggests the perception of forest management as a zero-sum game. Those who express higher levels of policy congruence are more likely to express agreement with statements such as “The forest industry is the most important industry for the New Brunswick economy;” “Forests are being managed for an appropriate mix of values and uses;” “Environmental groups have too much influence over forest management in New Brunswick;” and “Forests should be protected from pest outbreaks at any cost,” (see Table 2.2 for complete list of statements). Higher agreement suggests an acceptance of forest policy in New Brunswick, which is perceived to place a high value on the needs of the forest industry; thus, higher policy congruence may see scientists and academics as the foils to the needs of industry, thus a hazard to the needs of New Brunswick.

Coupled with the above findings, the result for the interaction between forest dependency and policy congruence sheds some light on this relationship, providing support for the third hypothesis. As Models 1 and 2 in Table 2.6 indicate, there is no interaction effect on trust in provincial government, while the interaction effect on trust in scientists for dependency and

policy congruence appears substantively small. However, we must consider what a change of 0.02 means in the context of the data. An additional test for the marginal effects of this interaction help demonstrate the moderating effect community dependency has on trust in scientists. To test this relationship, the policy congruency variable was split at the median value of 4 to create a binary variable of low versus high policy congruency (low policy congruency, coded as 0, contains values less than or equal to 4, high policy congruency, coded as 1, contains values greater than 4). By running the regression first with only the low congruency cases, and again with only the high congruency cases, we obtain the slope for each, which is illustrated in the diagrams included in Figure 2.2. The slope for those with low policy congruence is 0.037; high policy congruence has a slope barely distinguishable from 0. Community-level dependency on the forest industry is measured on a scale of 0 to 100; the three towns surveyed have dependency levels of 44.3 (Fredericton), 72.1 (Campbellton) and 86.3 (Edmundston). Therefore, among individuals with low policy congruence, moving from Fredericton to Campbellton results in a one-point increase in trust in scientists; moving from Campbellton to Edmundston gives a 0.53 point increase in trust in scientists. Individuals with high policy congruence, moving across the entire spectrum from Fredericton to Edmundston, only increase in level of trust for scientists 0.02 points. So, while dependency and policy congruence exhibit isolated negative effects on trust in scientists, by interacting the two we see that community dependency moderates the effects of policy congruence to a degree that scientists see a net positive gain in trust when policy congruence is low, and no visible effect when policy congruence is high.

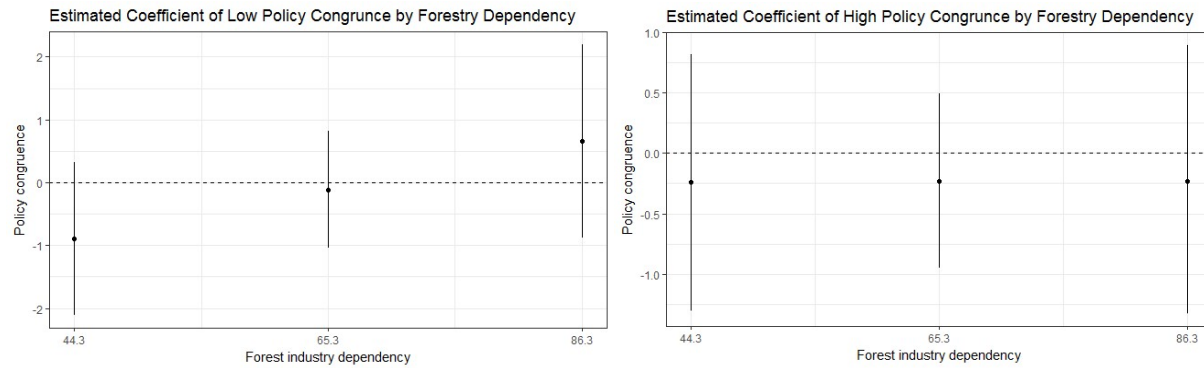


Figure 2.2: Interaction Between Forest Dependency and Policy Congruence

This contradicts the expectations of H3, which does assume that dependency will moderate the effects of policy congruency, but suggests that high congruency would increase levels of trust for government, scientists and industry, while lower congruency would decrease levels of trust. The model for scientists is the only one showing significant effects for the interaction; the model presented for industry does not include the interaction variables, and no effect was seen in the alternative model which did include interactions. Surprisingly, no effect is seen for government either, with the interaction providing no noticeable effect. It seems that policy congruence, which one might assign to the purview of attitudes on government, instead exists in the realm of attitudes on scientists and industry; dependency, which one might attribute to the realm of industry, is instead assigned to the realm of scientists; and the interaction between policy congruence and dependency belongs solely to attitudes on scientists. This suggests that as vulnerability to the tides of forestry economics increases, scientists' role in forest management moves from antagonist to advocate, but only for those whose views diverge from current forest management practices.

Hypothesis 4 suggests that individuals with higher levels of political efficacy will have higher levels of trust in provincial government, but will exhibit no effect on levels of trust for scientists or industry. Efficacy in terms of political decision-making regarding the spruce

budworm is connected directly to the role of the individual in political decisions, and the political efficacy variable was constructed to demonstrate the degree to which individuals felt that connection was present. It is interesting, then, that there was no statistically significant effect on trust in government, despite political efficacy being a strong predictive factor for trust in government in the United States at the local level (Rahn and Rudolph 2006). To date, there do not appear to be any Canadian studies that include issues of political efficacy as they pertain to trust, and so the reason it does not have a significant effect could be that efficacy does not have the same effect in Canada as it does in the United States, or it could simply be that the data and/or the model in use for this study do not properly capture any influence that may be there. All that can be said for certain with these results is that H4 is not supported by the data.

As shown in all three models in Table 2.6, the results for risk perception do not support the hypothesized relationship in H5, with the bivariate correlation disappearing once taking all other variables into account. This suggests that on its own, the perceived risk of spruce budworm does not determine which of the three entities is most trusted to handle the problem. Individuals' knowledge of treatment effects, however, does have an effect that provides mixed support for the sixth hypothesis. Model 1 shows that treatment knowledge is significant, with a negative coefficient indicating that as treatment knowledge increases, trust in the provincial government decreases by 0.25; Model 3 shows that as treatment knowledge increases, trust in the forest industry increases, with a significant coefficient of 0.21. Interestingly, trust in scientists receives no significant effect from treatment knowledge at all. Issue knowledge does not reach significance for any of the three dependent variables; while knowledge of treatment appears to decrease trust in government and increase trust in industry, knowledge of the spruce budworm does not appear to do anything for trust in those who are responsible for addressing it.

When assessing whether risk perception moderates knowledge of either the issue of spruce budworm or knowledge of treatment options, H7 receives limited and weak support. As shown in Model 1, the interaction between risk perception and treatment knowledge is significant at the 0.05 level; however, a coefficient of 0.04 means that for each additional unit change in both risk perception and treatment knowledge, trust in government increases by less than four hundredths of a point. No other interaction variable in any of the models reaches significance, even at the lower threshold of 0.1, and the coefficients are equally miniscule. This suggests that while risk perception may have some moderating effects for trust in government, it does not do so to a degree that is functionally significant. Thus, the independent effects of treatment knowledge are not attenuated to any significant degree by the level of risk assigned to spruce budworm.

Discussion and Conclusions

These results present three different stories, one for each dependent variable. In New Brunswick, Canada, when citizens are primed to consider spruce budworm and its impact on themselves and their communities, trust in the provincial government is a function of treatment knowledge, trust in the federal government, and to a slim degree, the combination of risk perception and knowledge of treatment options. When citizens consider the impending spruce budworm outbreak, their trust in provincial government is still largely decided by forces beyond the control of officials in the New Brunswick legislature: how much individuals trust the federal government, which is itself driven by economic perceptions as well as who is in power (Bélanger and Nadeau 2005). The only other significant independent effect comes from knowledge of

treatment options, which provides individuals the means to judge the trustworthiness of government by providing the means to assess both performance and process. The negative effects of treatment knowledge on trust in government suggests that with increased knowledge, the legitimacy of decision-making by government officials is found wanting. *When it comes to assessing the drivers of trust in the provincial government when focused on a natural resource issue, it appears that governmental officials are not seen as the entity best equipped to handle the situation.* Considering the legacy of government-public relations regarding the spruce budworm, the implications of this cannot be overstated. When primed to think about the present outbreak, the public does not place their trust in the hands of those that have been elected to represent them. Even additional knowledge of treatment options does not positively impact trust for government officials. Officials currently working on the response to spruce budworm assume that trust has been lost as a result of the DDT and *fenitrothion* debacles of the past; these results indicate that trust has been lost, and the public does not perceive government as the means to addressing the problem. When it comes to spruce budworm, the provincial government of New Brunswick cannot rely on citizens' federal trust and overall goodwill to provide legitimacy for governmental actions regarding spruce budworm.

As mentioned above, an increase in risk perception combined with an increase in knowledge of treatment options also provides a positive bump to provincial trust, but the small increase in trust does not suggest that providing information that emphasizes both the risk to the province and the benign nature of the treatments will perceptibly increase trust in the provincial government. Specific to provincial government trust, it should be noted that economic heterogeneity, as operationalized through forest industry dependency is not a part of this story, despite the expectation that the model would mirror the findings of Rahn and Rudolph.

Provincial government, in the context of spruce budworm, is not seen as a panacea to the vulnerability of communities reliant on the forest industry.

Trust in scientists, already receiving higher levels overall, appears to benefit from factors along a different dimension than government, and distinct from industry, in a way that suggests science and those who wield it are perceived as integral players in the outcome of forest policy, in a way that is dependent on the degree of vulnerability of the community in which an individual lives. There is a weak negative relationship between a community's dependency on the forest industry and trust in scientists, and a strong negative relationship between policy congruence and trust in scientists. The interaction effect between the two is deceptively small, but by examining the marginal effects of diverging policy congruence when moving between communities, the role of science to those more vulnerable to the health of the forest industry becomes apparent, where more trust is placed in scientists the more forest management is perceived as less congruent with individual attitudes. The fact that individuals in Edmundston, the most forestry dependent of the communities surveyed, are more likely to report trust scores for scientists that are on average 1.5 points above individuals in Fredericton, has significant implications for the role of scientists in forestry in New Brunswick.

Individuals who are more vulnerable to the fortunes of the forest industry are significantly more likely to put their faith in scientists if they do not believe forest management is going in the right direction, perhaps indicating a belief that a greater reliance on science is the way to achieve adequate policy. The positive effect of interpersonal trust suggests that scientists are given a degree of discretion from the outset, which may be the result of the image of scientists as disinterested, knowledgeable individuals working for the greater good; even if an individual generally does not place much trust in other people, they will still place more trust in

the scientific process than in government or industry officials. However, the level of dependency on the forest industry can make or break that positive relationship. Dependency acts as a moderator for trust attitudes, but the key to that relationship is the perception of science as part of the decision-making process and the outcome of that process.

As Figure 1 suggests, industry starts out at a disadvantage when it comes to trust, with a median value of 3 and overall values skewing to the lower end of the trust spectrum. Industry does not receive any boost from individuals living in communities that are more dependent on them economically, instead, policy performance in the form of forest policy congruence exhibits the largest significant increase in trust in industry, followed closely by knowledge of current treatment options, which straddles the line between performance and process. Forest policy in New Brunswick is seen as favoring the interests of industry, and the largest forest company in the province has publicly stated that the most recent plan coming from the New Brunswick government benefits their business by ensuring a steady supply of wood for its mills (CBC News 2014a). Logically, individuals who approve of this direction in forest policy would have more favorable views of the forest industry, and would therefore place their trust in the industry to address an insect outbreak that threatens the industry at large. In addition, greater knowledge of the treatments being used would assure individuals that the means through which industry is addressing the problem are not at odds with the interests of the public. This suggests that individuals who perceive industry interests as one in the same with their own interests are those who place the greatest trust in industry in the context of spruce budworm.

Given the factors that exhibit a positive effect on trust in each of these three entities, there are a few additional factors that stand out for the absence of any effect. Because personal interest appears to undergird attitudes regarding industry, the lack of significance for political efficacy

for all three dependent variables, on its face, is somewhat befuddling. Political efficacy proved to be a positive significant factor for increases in local political trust with the assumption being that individuals want a hand in political processes affecting them (Rahn and Rudolph 2006), and political efficacy has long been considered a driving factor for political trust overall (Citrin 1974). Based on this, it was expected that individual efficacy, the belief of an individual that his or her opinion matters in the political processes that result in how spruce budworm is managed, would also increase trust. However, when considered alongside the significant effects that were present, this does appear to make sense. The lack of significance for efficacy suggests that for a natural resource issue such as spruce budworm, it is less important for individuals that there is a direct process linking their interests and how the issue is managed, and more so that others whose interests align with their own are addressing the issue. As discussed, greater trust in industry occurs when individuals perceive an overlap in public and industry interests; when scientists are perceived to have a beneficial part in crafting forest management, individuals choose to put their faith in scientists' ability to address the issue in the public interest, which serves as an indirect process for public interests to play a part in spruce budworm management. While government does not receive the expected increase in trust from political efficacy, this is likely to be issue-specific because government is only one of several players and so perceptions of interest are dispersed and personal efficacy can be relegated to the background of individual attitudes.

An additional area that showed no statistical significance is that of partisanship, which is surprising given the relationship it has on local and federal trust in the United States (Hetherington 1998; Rahn and Rudolph 2006); a relationship between partisanship and trust in provincial government is one that might have been expected. This could be a result of the

operationalization of the partisanship variable, in that it does not allow for representation of the various parties identifiers align themselves with, only the presence or absence of a partisan identification. However, post hoc tests (not shown) with dummy variables for each of the four major parties (Liberal, Conservative, New Democratic and Green) used in place of the partisanship variable also did not show any statistical significance. The lack of significance could indicate that spruce budworm, while potentially politically contentious, is not an issue viewed through party lenses, and so does not act as a contributor to attitudes of trust. It is also possible that Canadians, particularly those in New Brunswick, simply do not exhibit enough of an identification with parties for that relationship to register, particularly in a limited sample of citizens. As with all the findings discussed, it is likely that a larger sample size will provide stronger statistical models that will allow more conclusive results, and thus provide a more complete view of how each of these variables contributes to trust.

Taken as a whole, these results indicate that trust for the provincial government, scientists and the forest industry, in the context of spruce budworm can be theoretically linked to political performance and outcomes, and economic vulnerability to some degree, as well as the knowledge and risk perceptions that provide individuals the ability to assess whether political outcomes and the process leading to them was in their best interest. There are also practical implications for administrators currently working in New Brunswick to mitigate the effects of the spruce budworm. Provincial governmental agencies, scientists and academics, and the forest industry are working in tandem to find ways to curb the effects of the outbreak, but it seems that placing scientists and the work they are doing at the forefront has the greatest likelihood of helping to regain and maintain the public's trust, particularly as the link between scientific findings and their application to forest management are made transparent. Being open about the

risk of an unchecked infestation in New Brunswick forests – the risk to not only the economy but the environmental and social risk as well – and the evidence and reasoning for using Btk and Mimic as treatment options would provide transparency from a source that already has high public trust. Citizens appear to give scientists a degree of discretion to make decisions that is not shared by either government or industry, and so could help override the inherent distrust of the forest industry and somewhat ambivalent attitudes directed towards government.

Chapter 3: Who Watches the Watchers? Framing by an Elite-Owned Media Source

A media free from government influence is lauded as a mainstay of democracy; however, concentration among privately-owned media sources has been identified as a concern which parallels state interference, particularly for private owners who are seen as having close ties to the government (Price and Krug 2002). The implication is that private interference will affect how issues are presented, and thus how the public comes to understand them. When choosing the sources and viewpoints included in a news story, media can control the *framing* of an issue, the “interpretation or evaluation of an issue, event, or person that emphasizes certain of its features or consequences” (Chong and Druckman 2011, 238). As the “watchdog” of democracy, the way in which media frames an issue directly influences the ability of the public to assess its implications; thus, the need for a plurality of frames for media to serve its intended purpose of informing the public. It is assumed that when media outlets are owned by multiple entities, a pluralism of the views and vantage points of owners will produce a media environment that is similarly pluralistic, allowing for a greater diversity of interests receiving representation on an open playing field. In doing so, the media provides one of the ways in which democracy is achieved and maintained (Price 2002). If competition among media outlet owners fosters pluralism and democracy, is the converse true? In other words, does the concentration of private ownership discourage a plurality of viewpoints? Even limited competition among owners generates a degree of competition in media representation of viewpoints (Price 2002), but how does the substance of media frames change when controlled by a single interest?

By focusing on the unique case of New Brunswick, Canada, this research begins to address these questions. The bilingual province has only three daily newspapers, all in English,

whose circulations reach the majority of New Brunswick residents; there are also a number of weekly circulars in both French and English. A single company, Brunswick News, owns all three daily newspapers, and a large number of weekly newspapers, a total of 29 publications throughout the province. The newspaper publishing company is notable for its extensive control of publications, but is equally notable for being a subsidiary of J.D. Irving, Inc. (JDI), a company privately owned and operated by the highly influential Irving family of New Brunswick. Collectively, the Irvings have a hand in industries encompassing shipping, transportation, construction and oil refining and distribution; JDI, in addition to ownership of Brunswick News, is also the province's largest conglomeration operating in forestry, lumber, pulp and paper.

In a province whose history is steeped in forestry, an issue which has been fraught with controversy and decline (Howlett and Rayner 1995), the inclusion of Brunswick News and forestry under the same JDI umbrella has led to allegations against the Irvings of editorial interference, supported by decades of anecdotes and observation, but thus far a charge that has received scant systematic analysis. This study seeks to fill this gap through an examination of media framing of forestry issues in New Brunswick by comparing news coverage of forestry by local New Brunswick papers to online coverage by the New Brunswick section of the national media corporation, the Canadian Broadcasting Company (CBC). As will be discussed in detail below, this is accomplished by a content analysis concentrating on the level of conflict presented in each article, as an assessment of the presence of a plurality of viewpoints, as well as an assessment of whether forestry issues are presented as an elite issue (and therefore the purview of experts and industry) or a public issue.

Specifically, this research attempts to answer five main research questions. First, how have forestry issues in New Brunswick been framed in the media; second, relatedly, does the

media source – Irving-owned local newspapers versus national newspapers – affect how the story is framed? Third, does the specific forestry issue being covered affect how the story is framed? Fourth, the province’s most recent forest plan, released in March of 2014, was met with a great deal of opposition; does the inclusion of the forest plan in news articles have an impact on framing? Lastly, what is the substance of the frames used in the media; is the substance of articles framed as the domain of elites – science and industry – or the public, or both?

This analysis will be preceded by an overview of the accusations laid against Brunswick News and a discussion of current forestry issues in New Brunswick, as well as a discussion of media framing research.

Brunswick News

Brunswick News has received attention from three federal inquiries, with accusations of monopolization and censorship of coverage of issues that are contrary to the interests of the Irving businesses. The 1981 report from the Royal Commission on Newspapers (known as the “Kent Commission”) included among its recommendations – never implemented – new legislation that would "require the break-up of regional monopolies, such as that of the Irving family in New Brunswick, by prohibiting the ownership of two or more newspapers having 75% or more of the circulation, in one language, in a defined geographical area" (Jackson 1999, section 2a). In 2006, the Canadian Senate’s Final Report on the Canadian News Media (known as the “Bacon Commission”) summed up the complicated relationship of the Irvings’ business interests:

The Irvings’ corporate interests form an industrial-media complex that dominates the province ... it includes more than 300 companies, has an estimated

net wealth of \$4 billion and employs 8 per cent of the New Brunswick labour force. And because the Irving interests are privately owned, they do not even have to provide the level of public reporting that publicly traded corporations are required to provide. This situation is, as far as the Committee could determine, unique in developed countries. (Final report on the Canadian News Media 2006, 59)

Evidence of editorial control has accumulated over the years, illustrating a trend of editorial influence, with the use of Brunswick News' "editorial clout to influence provincial policy and shape public opinion on matters that stand to benefit the Irving group as a whole" (Couture 2013). Evidence has come from testimony at federal committee hearings from academics and professional journalists (Jackson 1999), scholarly research on New Brunswick forestry and media messages (Couture 2013; Jobb 2008; Wallace 2012), and independent investigative journalism of Irving-owned newspaper culture and editorial pressure (Chung 2009; Poitras 2014). The direct connection between newspapers and the forest industry, both owned by JDI, is of particular importance when it comes to the representation of information regarding forestry in the province, which is one of the most economically important sectors in the province (McHardie 2016). This means that decisions made by the provincial government are uniquely linked to the interests of the Irving companies: "Given its extensive business holdings in New Brunswick, and the fact that it employs approximately 8% of the population, the Irving group benefits from a uniquely privileged relationship with the government of the day, as the overall economic prosperity of the province is intimately linked with its own success" (Couture 2013, 61). Couture (2013) emphasizes the ability of Irving papers to use their editorial abilities to voice support for policies that benefit Irving businesses, suggesting that "the Irving group has achieved a highly advantageous position, being able to use its own considerable editorial and advertising clout to lobby the government, and to advocate for particular policies and regulations that support both its short and long-term business interests," (Couture 2013, 61). This has at least the

appearance of truth, based on changes in regulations impacting energy markets and forestry rules that influence the size of protected forest areas, the use of herbicides or access to Crown land forests, all typically aligning with Irving interests, and receiving enthusiastic support from the editorial boards of the local daily newspapers (Couture 2013).

One example of this comes from 2002, with the fierce debate over the Jaako Poyry Report, the product of a Finnish consulting firm's recommendations to intensify tree-planting activities to balance increased allowable cut limits in Crown forests, a proposal which would double the limit for companies leasing Crown forestland. Implementing these recommendations would have benefitted JDI, but the opposition to the report was fierce, with private woodlot owners, foresters, environmental and public groups voicing considerable concern. "However, the Irving papers published a series of supportive editorials throughout the debate, scarcely mentioning the parent company's extensive forestry holdings, and once again without a clear acknowledgment of a potential conflict of interest" (Couture 2013, 72).

Poitras (2014) takes this a step further, suggesting that control goes beyond the editorial section to the content of news stories, with reporters receiving implicit, and occasionally overt, pressure to protect the Irving image as New Brunswick benefactors. He follows the development of Brunswick News over the last five decades, finding connections between Irving business ventures and their portrayal in New Brunswick newspapers, and emphasizing that while the Irvings have stressed a policy of nonintervention, there is a member of the Irving family currently serving as publisher for the company (Poitras 2014). As an investigative journalist, Poitras follows the most controversial events connected to the Irvings and JDI. His conclusions suggest that local newspapers cannot be trusted to provide a plurality of viewpoints and interests to the citizens of New Brunswick. To what extent is this true? Is forestry in New Brunswick

covered in a way that exposes citizens to a full range of information? Does pressure from working for an Irving-owned newspaper lead to the stifling of conflict, or the suggestion that forestry issues are best left to the forestry experts? The importance of forestry to the province of New Brunswick, and the conflictual nature of forest management lend themselves to an investigation of media framing.

Forestry in New Brunswick

While Canada trails only Russia for world's largest forest cover, making it an unsurprising contender in forest product exports (Luckert and Salkie 1998), shifts in the global forest industry have resulted in increased competition with other nations, and job losses as Canadian forest companies' share of the global market has decreased (Wallace 2012). While the brunt of scholarly attention on the changes in Canadian forestry have focused on the larger province of British Columbia, Wallace (2012, 367) notes the importance of including New Brunswick in the forestry conversation: "Coupled with its traditional political and economic marginalization, the province's current forest sector dependence makes it the epitome of a rural staples economy in transition," one whose natural resource businesses are often placed in competition with one another to obtain a piece of a shrinking economic pie. These shifts in the market have placed small businesses and members of the public at odds with larger, more commercial businesses (particularly JDI) who not only own forest land themselves, but also lease publicly-owned Crown land, the rights to which are fiercely negotiated and often criticized for seeming to place timber production over conservation objectives (Anderson and MacLean 2015).

In March 2014, the New Brunswick Department of Natural Resources (NBDNR), the agency tasked with managing the province's forests, unexpectedly released a new forest strategy, *A Strategy for Crown Lands Forest Management: Putting our Resources to Work* (New Brunswick Department of Natural Resources 2014). This new plan reduced harvest restrictions in designated conservation areas, increased the annual allowable harvest of spruce and balsam fir by nearly 20 percent, and placed minimal restraints on the forest industry while specifying many detailed obligations of the provincial government, actions the forest industry had lobbied for over the previous 15 years. Reactions to this new plan were swift, with stakeholder groups including environmental nongovernmental organizations, local conservation groups, academics and the public at large raising concerns over the new plan. Unsurprisingly, the forest industry enthusiastically endorsed the new plan as a way to spur economic growth, maintain current jobs and create new employment as well (Anderson and MacLean 2015). Accusations of secrecy and collusion were immediately brought against the New Brunswick government and JDI, with many claiming the new plan's objectives went farther than the Jaako Poyry Report had recommended, and placed smaller, private woodlot owners at a disadvantage while placing the health of the forest at risk (CBC News 2014b).

At the same time, the province is also facing a potentially damaging outbreak of the spruce budworm, a native insect that in large numbers can destroy millions of acres of spruce and fir trees. The spruce budworm rapidly expands in population every 30-40 years, and should the current outbreak reach the level of the last one, it could result in economic losses in the billions of dollars over the next several decades (Healthy Forest Partnership 2014). As the largest forestry business in the province, JDI has guaranteed its cooperation in working to treat forestland for spruce budworm, to control its losses, and is active in the scientific research program currently

underway in New Brunswick (Healthy Forest Partnership 2014). This issue has been a contentious one, because of the use of aerial insecticide spray programs, as well as a scientifically and technologically complex one.

Media Framing: Theory and Expectations

As Chong and Druckman (2011, 238) observe, “In a democracy, a strong and independent public voice depends on the existence of a free media that represents the diversity of viewpoints in society... More than any other source of communication, the news media shape the considerations that people use to understand and evaluate political events and conditions.” The integral nature of forestry for the province necessitates the open exchange of issue positions and motivations, making an examination of New Brunswick media a worthwhile endeavor. While trends in media coverage have received some attention, a systematic analysis of media framing in New Brunswick has not yet been attempted; however, a large body of literature on the factors driving framing, effects of framing and the presence or absence of conflict in a story have received extensive attention.

Framing theory states that an issue can be viewed from multiple standpoints, allowing for various evaluations among individuals as they learn to interpret and evaluate an issue by focusing on certain features and implications of the issue over others (Chong and Druckman 2011). Framing can be understood to occur on two dimensions: a frame in communication, or media frame; and a frame in thought, or individual frame (Druckman 2001; Jacoby 2000). In frames in thought, an individual’s attitude regarding an issue can be expressed by the expectancy value model, $Attitude = \sum v_i * w_i$, with v_i being the evaluation of the issue on attribute i , and w_i

being the salience weight of that attribute (Ajzen and Fishbein 1980; Nelson, Clawson and Oxley 1997). Essentially, an individual's attitude consists of any number of positive and negative evaluations based on the dimensions of *i* for a policy, weighted by how salient the issue and evaluative dimensions are. In frames in communication, the way an issue is framed by the media influences frames in thought, and can have a substantial impact on public opinion; even when presented information on the same issue, different media frames can substantially alter the direction of an individual's evaluation of that issue (Nelson, Clawson and Oxley 1997). As such, political elites have the incentive to control how an issue is framed whenever possible, by highlighting certain features that are beneficial to their own positions, linking them to important values, and thus encouraging members of the public to adopt a particular attitude by thinking along those lines.

While elite construction of frames has dominated media framing research, particularly in regard to contentious environmental issues such as climate change, the research presented here adds a new dimension by addressing direct control of the news by an elite stakeholder. With control of all English-speaking newspapers in the province, *Brunswick News* has been challenged in the courts based on Canadian monopoly laws, but because New Brunswick residents have multiple sources for news – including the CBC – there have been no legal repercussions (Poitras 2014). As news organizations become more concentrated in Canada and the United States, this study hits on a vital aspect of the impacts of media control. In 2011, the media watchdog Fairness and Accuracy in Reporting (FAIR) found that only five companies in the United States receive the majority of newspaper revenue, 54 percent, while two companies receive 56 percent of all radio revenue, and four companies receive 70 percent of all television advertising revenue (Morrison 2011). Concentrated control of the media continues to be a global concern,

particularly when those controlling the media have vested interests in content (Chomsky 2002; Downing 2011; Hitchens 1994). The integral nature of forestry in New Brunswick, and the ownership of JDI of both forestry and newspaper businesses provides a unique opportunity to evaluate to what degree stakeholder viewpoints shape the information the public receives, and to what degree the medium is, in fact, the message (McLuhan 1964).

Frames in communication can be constructed to mobilize public opinion for a particular point of view; those with a stake in an issue can use the media's norms of balance and objectivity as a means through which they can express their views. For example, the journalistic desire to include all relevant viewpoints has allowed industry lobbies, special interest groups and public relations firms to portray issues such as climate change as one of intense controversy, providing for the continued impression that scientific opinion of climate change is evenly divided and inherently conflicted (Zehr 2000; also see Putnam and Shoemaker 2007 for a discussion of conflict media in an aquifer controversy). Media reports subsequently provide a narrative emphasizing the "scientific debate" these elite stakeholders wish the public to adopt, through the "[selection of] some aspects of a perceived reality, [making] them more salient in communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (Entman 1993, 52).

This "balanced" presentation of conflict in the US media has divided public opinion on the hazards, solutions, and even the existence of climate change, allowing for "both discursive and real political space for the US government to shirk responsibility and delay action regarding global warming" (Boykoff and Boykoff 2004, 134). Working as "claims-makers," these elite stakeholders will, consciously or unconsciously, exclude competing or contradictory viewpoints from their discussions of the issue, much as any actor with a desire to expand or contract the

scope of an issue based on their need to expand or diminish attention would aim to do (Pralle 2006; Schattschneider 1960). Because of the reliance of journalists on those with the most knowledge on an issue, those with expertise and/or vested interests, this means that each source they use is telling their own story, from their own viewpoint, and providing one frame in particular to the journalist (Miller and Riechert 2000). Should a journalist be constrained in their options – again, consciously or unconsciously – this can affect which frames are presented, and by whom.

Sheufele (1999), in his review of decades of framing research, was able to identify five major factors that may potentially influence the frames journalists use in a given issue: social norms and values, organizational pressures and constraints, pressures of interest groups, journalistic routines, and ideological or political orientations of journalists. While the current study is unable to account for all five of these, three in particular are of interest.⁸ The first has already been discussed, journalistic routines, which can manifest as a desire for objectivity and balance, which can lead to several frames being included; the other two are organizational pressures and constraints, and the pressures of interest groups. These two are particularly compelling because of the charges that have been laid against the local newspapers of New Brunswick, that organizational pressures and the pressures of one particular interest are one in the same. If these two are combined to constrain journalistic reporting, as some have claimed, we can surmise that news articles reporting on forestry will frame stories in a way that suggests only one point of view is relevant – that of the forest industry. Different actors are likely to emphasize different aspects of an issue – scientists tend to emphasize problems and causes, while politicians

⁸ The other two – social norms and values, and the ideological or political orientation of journalists – would require moving beyond the current examination of framing to assessing both public and individual journalists' attitudes, and so are beyond the scope of the present study. However, this is an area ripe for additional research with the current study serving as a foundation.

and interest groups tend to emphasize judgments and remedies (Trumbo 1996) – and without varying viewpoints, there is likely to be little to no discussion of variations in each of these. A single frame allows for control of the story: in defining a problem, as well as its causes, solutions, and where the blame should be laid. If this is occurring in newspapers owned and operated by a subsidiary of J.D. Irving, Inc., we can hypothesize:

H1: News articles coming from local media sources focusing on forestry in New Brunswick will exhibit lower levels of conflict than news articles coming from a national news source focusing on forestry in New Brunswick.

Assuming the first hypothesis holds true, additional expectations can be surmised based on the specific issue being addressed in news stories. First, the NBDNR forest plan has been both highly controversial and highly salient, especially in the months immediately following its release in March of 2014. This level of salience and controversy meant that many voices and viewpoints were eager to reach out or make themselves available to the media, thus increasing the likelihood of additional viewpoints. From the experience of the Jaako Poyry report receiving editorial support from local newspapers, however, it is assumed that a discussion of the forest plan will have a greater likelihood of increasing the level of conflict in national media as opposed to local media.

H2: News articles with a reference to the NBDNR forest plan will exhibit higher levels of conflict overall; it is more likely that this relationship will be present for news articles appearing in the CBC than in local news sources.

If journalists receive pressure from organizational interests, the content of news articles is likely to differ based on whether the media source is local or national. Framing forestry issues as within the public domain should be expected from national news media, which are more likely to

be governed mainly by the journalistic norms of balance and objectivity, thus serving its role as an informer of the public. If local news media is receiving pressure from ownership by a private organization with a vested interest in forestry, as has been charged, news articles from local sources will rely on framing that favors industry interests, by placing blame on non-industry entities and suggesting that the solution lies with industry representatives who know best how to address the issue

H3: The odds that national media will frame the sources of blame and solution of forestry issues as in the public domain will be greater than for local media.

By highlighting the scientific and technological complexity of an issue, particularly in regard to the causes and solutions, a frame can subsequently control the viewpoint of the appropriate solutions and who should be applying them. If a problem is presented as technical, divorced from any sort of public value, the implication is that it is only appropriate for someone well-versed in that technical aspect to be involved, rather than a layperson. For issues steeped in the complex ecological processes of forest management – such as the current spruce budworm infestation – the assumption then becomes that it is a scientific issue that must be addressed by those most knowledgeable about spruce budworm: scientists from the agency tasked with forest management – NBDNR and its affiliated agencies – and the forest industry. Even though this is an issue with widespread implications for the province, in terms of economics, policy and sociocultural values, it has massive implications for the ability of the forest industry to remain competitive and profitable. In the current program to mitigate the effects of the spruce budworm, JDI has been instrumental in lobbying for research funding and providing technical resources, and so has a significant interest in controlling how mitigation efforts proceed. Thus, we can expect a reliance on elite framing for articles regarding spruce budworm.

H4: The odds that spruce budworm will be framed as an elite issue in terms of both blame and solution will be greater than for general forestry issues in both local and national media.

The controversial nature of the NBDNR forest plan should lend itself to a more publicly oriented framing. The opposition to the plan has come from many individuals and groups in the public sector who criticize the benefits industry receives, and this vocal opposition should produce a more public-centric framing in articles with a reference to the forest plan than those without.

H5: A mention of the forest plan will increase the odds of an article being more public-centric than articles without any reference to the forest plan.⁹

Data and Variables

Data

The data were gathered from the New Brunswick-focused section of the CBC and all three English-speaking daily New Brunswick papers beginning in January 2011 up through the date of collection, June 2016, using a search engine provided by the University of New Brunswick that enables access to gated online newspapers. The CBC was the only national paper chosen for this study because it was the only one from which articles could be collected in the chosen time frame using identical methods. This 2011-2016 timeframe was chosen to ensure the collection of articles that would include forestry in general, spruce budworm, and the 2014

⁹ Ideally, hypotheses proposing interactions between source of media and issue, and source of media and mention of the forest plan would also be included. They have not been, because of complications in data analysis, as detailed in the discussion of methods and results.

release of the NBDNR forest plan. Articles were selected using the search terms “spruce budworm” OR “forestry” AND “New Brunswick”; forestry and insect infestations are also a large presence in British Columbia, and these search terms ensured that the focus remained on forestry in New Brunswick. Only news articles were selected; editorials, personal advertisements, event announcements, and corrections were eliminated from the population of articles. To ensure forestry was a focus of the article, at least two paragraphs had to directly discuss a forest issue. This search yielded 355 articles.¹⁰

Coding

The unit of analysis is a single newspaper article, which was coded for news media source (national or local) and the issue being reported (spruce budworm specifically or forestry in general), whether it pertained to the NBDNR forestry plan, as well as the month and year in which it was published. Articles were coded manually using the content analysis software NVivo for the presence of frames on three dimensions: the central issue, attribution of blame, and sources of solutions. The central issue dimension (see Table 3.1) provides a full view of the frames employed, thus providing a basis for answering the first research question regarding how forestry issues are presented in New Brunswick, and to determine the level of conflict and thus the plurality of views. The attribution of blame (Table 3.2) and sources of solution (Table 3.3) dimensions provide a more focused examination of the viewpoints included in the causes of and solutions to the issue(s) presented in each article; these serve as a basis from which we can ascertain whether frames provide a more public or more elite frame in communication. Frames were modified from Nisbet’s (2010) frames for science policy debates, as well as Fahey’s (2013) adaptation of Nisbet’s frames for an examination of print media framing of climate change.

¹⁰ Data available upon request.

Table 3.1: Central Issue Frames

Frame	Description	Coding
Environmental	Refers to mostly ecological, environmental or “green” issues, such as forest health, biodiversity, conservation and forest protection, CO ₂ emissions/sequestration/stocks in relation to deforestation, forest degradation	0 (not present) or 1 (present)
Socio-cultural	Lifestyles, practices of individual and community living, enjoyment/appreciation of natural environment, popular culture, quality of life	0 (not present) or 1 (present)
Scientific/technical	Scientific discoveries, innovative studies, scientific reports, new/existing technologies, scientific findings/debates, matter of expert understanding, known versus unknown, falsifiability, peer-review process	0 (not present) or 1 (present)
Economic	Economic investment, market benefits or risks, local/national/global competitiveness, industry, markets, business groups or interests, economic impacts on society, (un)employment/job growth (top-down processes affecting the public)	0 (not present) or 1 (present)
Political/policy	Individuals/processes/claims of government or other political actors (parties), policy design and implementation, public ownership and accountability to the public	0 (not present) or 1 (present)
Other	Any other central issue	0 (not present) or 1 (present)

Table 3.2: Attribution of Blame Frames

Frame	Description	Coding
Human-caused	Human interference with nature, mismanagement, anthropogenic environment, human-centered actions affecting environment (includes general public, natural resource managers, etc – NOT business/industry or political/policy actors)	0 (not present) or 1 (present)
Political or policy actions	Consequences as the result of political actions, including policy design or implementation, use or abuse of political power, driven by actors within a political institution (federal or provincial politicians/candidates)	0 (not present) or 1 (present)
Industry	Environmental actions driven by wants/needs of business/industry impacting current situation, need for profit, bottom line, economic drivers (markets, employment, etc)	0 (not present) or 1 (present)
Natural/environmental	Natural cycles, mention of specific environmental factors driving environmental changes/issues (insects killing trees, old stands dying off naturally, drought, climate change, etc, only if not linked to anthropogenic causes)	0 (not present) or 1 (present)
Other	Any other attribution of blame	0 (not present) or 1 (present)

Table 3.3: Source of Solution Frames

Frame	Description	Coding
Science/technology	Scientific discoveries, innovative studies, scientific reports, new/existing technologies, scientific findings/debates, matter of expert understanding, known versus unknown, use of science/technology to affect environmental change	0 (not present) or 1 (present)
Public/government	Local/provincial/national involvement by government individuals/agencies, policy design and implementation, public pressure for government action, specific policies ideas from other areas or used in past, public/governmental decision-making power, costs assumed by public	0 (not present) or 1 (present)
Environmental/natural	Let cycle play out, no need for human intervention	0 (not present) or 1 (present)
Industry	Private involvement by interested entities (with economic stake in outcome), costs assumed by industry/business, given decision-making power of how to address issue	0 (not present) or 1 (present)
Other	Any other source of a solution	0 (not present) or 1 (present)

Each article was coded for the presence (coded as 1) or absence (coded as 0) of each frame. It is important to note that this does not indicate that frames were represented equally within the unit of analysis, simply that some aspect of the text represented that particular frame. Determining the equality of coverage of a frame is somewhat subjective, and would require a more in-depth analysis with multiple individuals coding the sample. For the purpose of this study, only one individual coded the articles and so the presence/absence method was utilized in order to minimize subjectivity. To validate this method as reliable, 50 articles were randomly selected from the full sample, and the autocoding feature in NVivo was run as a comparison. This feature automatically groups content by recurring themes it identifies in the words used throughout the samples, and does so without any prerecorded prompts for individual words or phrases. Using this feature, the manual coding was compared to the top 20 results of the autocode results, to simulate a calculation of intercoder reliability. Using Krippendorff's alpha (Krippendorff 1980), reliability was calculated at 0.70.¹¹

Variables

Dependent Variables.

Level of conflict. Using this coding system, each dimension has a series of potential frames that have been assigned a value of 1 (present) or 0 (not present). Hypotheses 1 and 2 relate to the level of conflict present in each article, with the assumption that local sources will present fewer frames, indicating lower levels of conflict than the national source, and a mention of the forest plan will lead to the presence of more frames, but more so for national sources. To test this assumption, the values assigned to each frame are added together to create a single value

¹¹ There is no single standard for an acceptable level of agreement, though Krippendorff (2004) suggests the reliability coefficient should be at least 0.67, with 0.80 or above considered ideal. However, Krippendorff's alpha is considered a conservative measure (per Nisbet 2010), allowing for some flexibility in what is considered appropriate.

for the central issue dimension, and then divided at the natural cut point to create a binary value. The cut point for the central issue dimension is 2, thus dimension values less than or equal to 2 are considered low conflict (coded as 0), while values of 3 and above are considered high conflict (coded as 1). For example, if an article's central issue dimension has been coded for the presence of the economic frame (given a value of 1) and a scientific/technical frame (given a value of 1), and the absence of all other frames (each given a value of 0), the level of conflict for the central issue dimension for that article is 2, and thus assigned a value of 0 in the binary dependent variable.¹² Ultimately, the goal of this research is to ascertain which factors, if any, lead to a more conflictual description of forestry issues rather than a less conflictual description, thus the choice of a binary dependent value for the examination of conflict. Descriptive information for this variable and all subsequent variables can be found in Table 3.4.

Table 3.4: Descriptive statistics for all variables; N = 355; Unemployment given in percentages, value given at time of article publication

	Minimum	Maximum	Median	Mean	Standard Deviation
Level of conflict	0	1	0	0.29	0.45
Elitism in source of blame	-1	2	0	0.40	0.61
Elitism in source of solution	-1	2	0	0.01	0.92
Media source	0	1	0	0.29	0.44
Issue: forestry or SBW	0	1	0	0.17	0.38
Mention of forest plan	0	1	0	0.28	0.45
Unemployment rate	7.1	12.8	9.8	10.1	1.29

¹² If this was a standard count variable, the full range of variation would be retained, and the data would be analyzed using a Poisson regression on the full range of the frame count. However, this research is not dependent on an exact level of conflict, it is more interested in relative differences. The method of coding – the presence of a frame rather than the extent to which it is employed – does not provide a consistent and meaningful value to the intervals between counts, and so would not give an accurate representation of statistical magnitude and significance.

Elite-centric versus public-centric. To address the other three hypotheses, the elitism dependent variables have been constructed to establish the degree to which an article presents frames that are public-centric or elite-centric. These frames, which rely on the attribution of blame and the source of solution, essentially create a causal narrative which establishes where responsibility for the issue lies – with elites or with the public at large (Stone 1989). An elite-centric article will rely on frames that present forestry issues as complex problems that can only be addressed through technical/scientific or industry-led means (thus, inaccessible to public understanding). Specifically, the attribution of blame will be framed as an uncontrollable, inescapable result of natural forces (no one is to blame, least of all industry), or the meddling of non-experts through political or policy actions; the source of the solution will be those who best understand the issue, i.e. scientists and members of industry who are experts in the field. Conversely, a public-centric article will rely on frames presenting forestry issues as public issues which require public (and by extension, political) involvement. This will take the form of attributions of blame encompassing the actions of industry; and solutions that are centered on the political will of the public. Elite frames and public frames within a single unit of analysis may coexist, when multiple sources are seeking to control the story: “In politics, causal theories are neither right nor wrong, nor are they mutually exclusive” (Stone 1989, 283). Therefore, an ordinal range of values was constructed by assigning each publicly-oriented frame identified within an article with the value of -1, and each elite frame receiving a value of 1, and adding these values together to create an additive index; thus, articles with a positive value are more elite-centric, those with a negative value are more public-centric, and those with a value of 0 can be considered neutral. A value will be reported independently for the attribution of blame dimension and the source of solution dimension.

Independent variables. Articles pulled from the CBC (n=95) are coded as 1, and 0 if from a New Brunswick daily news source (n=260), including the *Telegraph-Journal*, the *Times & Transcript*, and the *Daily Gleaner*. The subject of the article is coded 1 if the subject of the article is spruce budworm (n=59), and 0 if the subject of the article is forestry in general (n=296). Because it is likely that references to the NBDNR forest plan will overlap with both general forestry and spruce budworm issues, a separate dummy variable was constructed, with a value of 1 indicating the forestry plan receives attention in an article. In addition, a control variable for contextual economic conditions is included using the province's monthly unemployment rate. New Brunswick has historically been the most economically depressed province in Canada (Wallace 2012), which could influence the level of economic coverage relating to all news reports, not just those regarding forestry. The data for this variable come from Statistics Canada, and is based on their monthly Labour Force Survey.¹³ All statistical analyses were done using the software program R.

Methods and Results

Univariate and Bivariate Explorations

Figure 3.1 illustrates the overall use of frames in local and national news media concerning forestry in New Brunswick. Here we see the leading frame for local news sources is the economic frame, garnering a third of the total frames, followed by the political policy frame with approximately 26 percent of the frames, environmental with less than 20 percent, and scientific/technical and socio-cultural both receiving less than 20 percent. The political/policy

¹³ Additional details on Labour Force Survey data and methodology can be found on the Statistics Canada website at <http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3701>.

frame receives the most use from CBC articles, with environmental frames barely edging out economic frames with just under 22 percent each. Socio-cultural and scientific/technical frames again bring up the rear. This suggests that in both local and national news media, there is an emphasis on the economic and political implications of forestry in New Brunswick, as one might expect from the province's economic reliance on, and controversial history of, forest management and use.

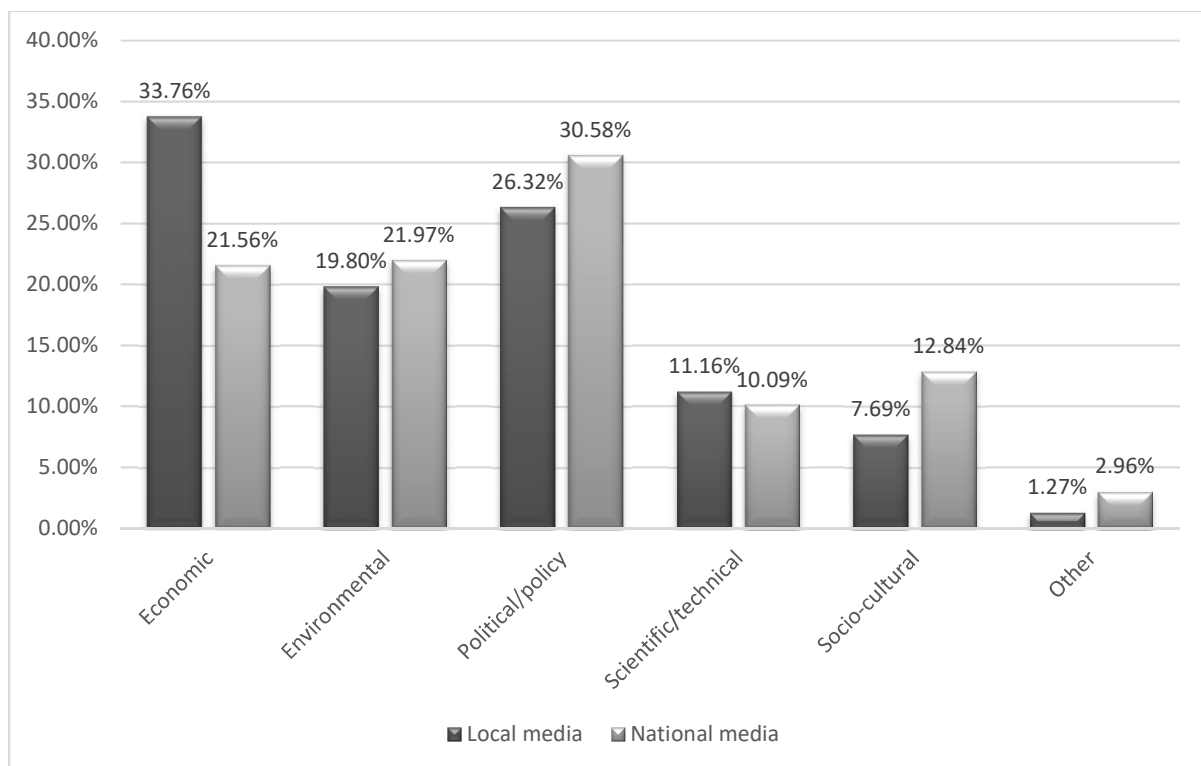


Figure 3.1: Distribution of Frames by Media Source; Bars represent percentage of total articles within media source category

Bivariate correlation tests provide support for the proposed relationships between the independent variables of interest and the dependent variables. As Table 3.5 shows, prior to controlling for other variables, media source shows significant correlations with all three dependent variables, while the issue of the news articles shows a significant relationship with the

elitism dependent variables, and a reference to the forest plan shows a significant relationship with the level of conflict and elitism in the source of the solution. The signs of these relationships also provide initial evidence for the state hypotheses: media source and level of conflict show a positive relationship, such that moving from a local source to the national source increases the level of conflict, and therefore the plurality of interests, while the same movement between sources results in a decrease in the elitism variables, thus a more publicly-oriented focus. The correlations between the forestry issue and the elitism variables are also in the expected direction, with the more complex issue of spruce budworm correlated with an increase in elitism. While the source of blame does not show a significant relationship with references to the forest plan, it does appear that level of conflict is positively affected by a reference to the forest plan, and the source of solution sees a negative relationship, such that the level of elitism decreases.¹⁴

These initial correlations provide evidence of the proposed relationships between media source, forestry issue and consideration of the forest plan with the interests presented and the elite or public nature of the article substance. A few other correlations shown in Table 3.5 also require mention. First, there is correlation between the two elitism variables, which are being considered as related but independent variables. It is likely that elite sources of blame beget elite sources of solutions, and vice versa, but there is no evidence to suggest a causal relationship.¹⁵ In addition, there is a correlation between the elitism variables and the level of conflict. This suggests that the number of viewpoints included in a news article may have a relationship with the degree to which an article is framed as being more of an elite or more of a public issue. This

¹⁴ Correlation coefficients shown are Kendall rank coefficients. The Pearson correlation coefficient was also obtained to check for robustness, with similar values and level of significance of coefficients. These correlations are presented in Appendix C.

¹⁵ Post hoc testing of the multivariate models presented below did not indicate a significant relationship between the two.

Table 3.5: Kendall rank correlations between variables; N= 355; *p < 0.10; **p < 0.05; *p < 0.01**

	Level of conflict	Elitism in source of blame	Elitism in source of solution	Media source	Issue	Mention of forest plan	Unemployment
Level of conflict	1.0	0.09 *	-0.09 *	0.16 ***	-0.02	0.12 **	-0.02
Elitism in source of blame		1.0	0.12 ***	-0.11 **	0.31 ***	0.03	-0.01
Elitism in source of solution			1.0	-0.26 ***	0.21 ***	-0.21 ***	0.06
Media source				1.0	-0.15 ***	0.03	0.04
Issue					1.0	-0.20 **	0.12 ***
Mention of forest plan						1.0	0.03
Unemployment rate at time of article publication							1.0

relationship is not tested as part of this research, but suggests there is cause for future research in this direction. Finally, there are significant correlations between several of the independent variables. The interrelated nature of these variables makes these correlations unsurprising; the far more surprising result here is that media source and a reference to the forest plan are not significantly correlated. There is theoretical reason to believe that these two variables have a relationship, however, and so interaction terms between the two are included in the models used for the level of conflict, discussed in detail below.

Based on these bivariate relationships, the means of the dependent variables were tested based on the independent variables. As Tables 3.6, 3.7 and 3.8 show, the level of conflict showed significant differences between media sources, and mentions of the forest plan; as might be expected, national media exhibits a higher level of conflict than local media, at the 0.01 level, and a reference to the forest plan shows a higher level of conflict than articles without such a reference, at the 0.05 level. Interestingly, the elitism variables only showed significant differences based on the issue; however, these means also took on values in the expected direction, with the more technically complex issue of spruce budworm showing a higher mean for both source of blame and source of solution, indicating a higher level of elitism than general forestry issues. Overall, these initial explorations of the data provide initial evidence of the hypothesized relationships, which are investigated more in-depth with multivariate analyses.

Multivariate analysis

Level of conflict. A logit regression model was used to accommodate the binary conflict dependent variable (see Table 3.9). Two separate models were run: the first (Model 1) included only the main variables of interest and the control variable for unemployment; the second (Model 2) was run with each of these variables, as well as an interaction term for media source and a

Table 3.6: Means Comparison for Media Source; N= 355; *p < 0.10; **p < 0.05; *p < 0.01; Means have not been standardized; Level of conflict has a range of 0 to 1, elitism variables have a scale of -1 to 2**

	Level of conflict	Elitism in source of blame	Elitism in source of solution
National media source (CBC)	0.41	0.27	-0.42
Local media source	0.25	0.45	0.16
T-test p-value	0.00 ***	0.99	0.99

Table 3.7: Means Comparison for Issue; N= 355; *p < 0.10; **p < 0.05; *p < 0.01; Means have not been standardized; Level of conflict has a range of 0 to 1, elitism variables have a scale of -1 to 2**

	Level of conflict	Elitism in source of blame	Elitism in source of solution
Forestry	0.29	0.32	-0.08
Spruce budworm	0.27	0.82	0.45
T-test p-value	0.67	0.00 ***	0.00 ***

Table 3.8: Means Comparison for Forest Plan Mention; N= 355; *p < 0.10; **p < 0.05; *p < 0.01; Means have not been standardized; Level of conflict has a range of 0 to 1, elitism variables have a scale of -1 to 2**

	Level of conflict	Elitism in source of blame	Elitism in source of solution
No mention	0.25	0.39	0.13
Forest plan mention	0.38	0.44	-0.32
T-test p-value	0.01**	0.24	0.99

mention of the forest plan. The bivariate correlation made it unclear whether this interaction would be useful in specifying the model, so the two regressions were run separately as a validity check. As Table 3.9 illustrates, inclusion of the interaction term increases the pseudo R^2 by 0.02 – a not insignificant increase considering the starting value for Model 1 is 0.03. Coefficients for

Table 3.9: Logit Regression for Binary Level of Conflict; N= 355; *p < 0.10; **p < 0.05; *p < 0.01; Marginal effect value presented for each value with all other variables held at their median value; unemployment is held at its mean; additive values may differ due to rounding**

	Model 1			Model 2		
	Coefficient	Z	Marginal effect <i>Net effect</i>	Coefficient	Z	Marginal effect <i>Net effect</i>
Constant	-0.57 (0.93)	-0.62	0.21	-0.92 (0.95)	-0.97	0.21
Media source	0.79 ** (0.26)	3.03	0.36 <i>0.16</i>	1.24 *** (0.32)	3.25	0.42 <i>0.21</i>
Issue	0.21 (0.34)	0.63	-	0.25 (0.35)	0.42	
Mention of forest plan	0.62 * (0.26)	2.36	0.32 <i>0.12</i>	1.07 *** (0.31)	3.38	0.39 <i>0.18</i>
Unemployment rate at time of article publication	-0.08 (0.09)	-0.83		-0.05 (0.09)	-0.52	
Media source x Mention of forest plan				-1.41 *** (0.56)	-2.53	(See Table 10)
Log likelihood	-206.45			-203.19		
LR Chi-square	14.71			21.24		
Pseudo R²	0.03			0.05		

media source and mention of the forest plan prove statistically significant in both models, however Model 2's inclusion of the interaction term brings both to a 0.01 threshold of significance. To interpret the coefficients, the marginal effects for each statistically significant independent variable is calculate. The marginal effect measures the change in probability when moving from the lowest value to the highest value of each dichotomous predictive factor, calculated by holding all other variables of interest at their median value, and the value of unemployment at its mean. The *Net effect* showing in Table 3.9 provides the value of each marginal effect minus the constant marginal effect. In Model 1, the net effect of media source is 0.16, indicating that the predicted probability of having a higher level of conflict is 0.16 greater for national media than local media. The marginal effect for media source in Model 2 is even larger, indicating the probability increases to 0.21 greater that an article from the CBC focusing on forestry in New Brunswick will have a higher level of conflict, and therefore a greater plurality of interests and viewpoints. This provides strong support for the first hypothesis. The first part of the second hypothesis also receives strong support, based on the marginal effects for the mention of the NBDNR forest plan. This part of the hypothesis suggests that articles that include some discussion of the forest plan will be more likely to have a higher level of conflict; Model 1 shows that a mention of the forest plan increases the probability of a higher level of conflict by 0.12, at a marginally significant threshold, however the marginal effect increases to 0.18 in Model 2, indicating the chance of a higher level of conflict is greater when the forest plan receives discussion in a new article when the interaction term is included as part of the analysis. The second part of the second hypothesis states that the effect of a mention of the forest plan is conditional on the media source, such that a national news article will be more likely to exhibit a higher level of conflict than a local news source. The partial marginal effects for this interaction

term are specified in Table 3.10, which shows three combinations of values for the two independent variables.

Table 3.10: Partial Effects of Interaction between Media Source and Mention of the Forest Plan; N= 355; *<0.10; **<0.05; *<0.01; Marginal effect value presented for each value with all other variables held at their mean, values may differ due to rounding**

Source x Forest plan	Coefficient	Z	Marginal effect <i>Net effect</i>
Local, mentions forest plan	1.07 ** (0.31)	3.39	0.40 <i>0.21</i>
National, no mention	1.24 *** (0.32)	3.94	0.44 <i>0.26</i>
National, mentions forest plan	0.89 * (0.45)	2.01	0.36 <i>0.17</i>
Constant	-0.92 (0.95)	-0.97	0.19

An interesting effect is evident from the values of the marginal effects. Moving between an article published by a local newspaper without a mention of the forest plan to an article published by a local newspaper with a mention of the forest plan, the probability of a higher level of conflict is 0.21 greater. Moving between a local paper without a mention of the forest plan to a national paper without a mention of the forest plan, the probability of a higher level of conflict is 0.26 greater. However, moving from a local newspaper without a mention of the forest plan to a national newspaper with a mention of the forest plan only results in the probability of a higher level of conflict being 0.17 greater, and this term is only marginally statistically significant. In terms of a greater probability of a higher level of conflict, then, national papers mentioning the forest plan see the *least* increase in probability, while national papers without a mention of the forest plan have the *greatest* increase; local papers with a mention of the forest plan fall in between.

This provides partial support for the second part of H2: a mention of the forest plan does increase the probability of a higher level of conflict in local news articles. However, the opposite is the case for national newspapers, with the probability of a higher level of conflict in national news articles actually being less with a mention of the forest plan than without. This result could be an artifact of the data – with only 95 national news articles, and only 29 of them discussing the 2014 forest plan, the number of articles may simply not be enough to provide an accurate picture. This could be solved in future iterations of this research by including additional national newspapers. This speaks only to the number of viewpoints that are included – more frames indicating more viewpoints versus fewer frames indicating fewer viewpoints – and so it could be that the nature of the forest plan is itself the cause of this discrepancy. The forest plan controversy was divided over the distribution of costs versus benefits, with the costs seeming to fall on the side of the provincial government and the citizens it represented, and the benefits accruing to major forest industry players, particularly the Irvings. While those opposing the forest plan came from several groups, including environmentalists, native communities and private woodlot owners, these oppositional attitudes could be approached by journalists as a single anti-Irving voice; essentially, the forest plan stands in as a symbol of the Irvings versus everyone else, thus additional viewpoints may serve at a rate of diminishing returns. This suggestion may stretch the beyond the reasonable interpretation of the current data, but an in-depth analysis with a larger sample size could provide a solution to this puzzle. For now, we turn to the substance of news articles and their level of elitism.

Elitism in framing. Turning to the hypotheses concerning elitism in article substance, the level of elite-centric and public-centric framing was assessed through a proportional odds logistic regression to account for the ordered factor responses of the dependent variables (results

shown in Table 3.11), which included all three variables of interest.¹⁶ Two models were run for each elitism dependent variable, one including the control variable for unemployment, one without. There is no strong theoretical basis to suppose that unemployment would affect the degree to which articles framed forestry as a public versus elite issue, however it was included in Models 2 and 4 to provide an indicator of contextual conditions at the time that articles were published. As Table 3.11 illustrates, inclusion of this variable provided little explanatory utility; thus, the results discussed here focus primarily on Models 1 and 3.

Regression results for the level of elitism in the frames attributed to the source of blame within a news article show the three main variables of interest are statistically significant, with issue showing the greatest strength at the 0.01 level, followed by mention of the forest plan and media source, the latter of the three only reaching a marginal level of significance. As with the logit regression discussed above, interpretation of the coefficients requires some additional calculations. Interpretation of the results requires the calculation of the percent change in odds ratios, which are obtained by exponentiating the negative value of each coefficient and multiplying by one hundred. This allows us to interpret the odds that a one unit change in the independent variable will result in the lowest value of the dependent variable relative to all higher values (Long 1997; Monogan 2015). The elitism dependent variables have values beginning with -1, indicating a public-centric framing, to a maximum value of 2, indicating an elite-centric framing.

¹⁶ While necessary for accommodating the design of the dependent variables, this method of analysis does not lend itself to the inclusion of interaction effects: extant research discourages the use of interaction terms when using odds ratios due to the complexity of interpretation leading to findings with little practical application for drawing conclusions (Karaka-Mandic, Norton and Dowd 2012; Norton, Wang and Ai 2004). The limitations in analysis could therefore be hiding interaction effects that could be parsed out with further data collection and/or an alternative definition of coding and variable construction, which could then disentangle any additional relationships that are not evident here.

Table 3.11: Proportional Odds Logistic Regression (Ordered Logit) of Elite versus Public Framing; N= 355; *p < 0.10; **p < 0.05; *p < 0.01; level of significance based on z values; unemployment rate given at time of article publication**

	Source of Blame				Source of Solution			
	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Odds Ratios (% change)	Coefficient	Odds Ratios (% change)	Coefficient	Odds Ratios (% change)	Coefficient	Odds Ratios (% change)
Media source	-0.36 * (0.24)	43.2	-0.33 * (0.25)	39.4	-1.13 *** (0.23)	210.1	-1.18 *** (0.24)	226.0
Issue	1.89 *** (0.33)	-84.8	1.94 *** (0.34)	-85.7	0.75 *** (0.28)	-52.9	0.67 *** (0.28)	-49.1
Mention of Forest Plan	0.48 ** (0.24)	-38.0	0.49 ** (0.24)	-38.9	-0.85 *** (0.23)	134.7	-0.88 *** (0.24)	143.2
Unemployment			-0.10 (0.08)	10.1			0.16 * (0.08)	-14.4
AIC	623.64		624.34		814.53		812.67	

Thus, in Model 1, we are able to say that a one-unit change in media source – in other words, going from a local news article to a national news article – the odds that the value of the dependent variable will be in the lowest category (-1, a publicly oriented framing) relative to any of the higher categories increases by 43 percent, *ceteris paribus*. This percentage change in odds remains constant between lower and higher categories, such that the odds of a news article resulting in elitism values of -1 or 0 (publicly oriented or neutral) relative to a higher value (thus more elite-centric) when the source of the article is national rather than local, also increase by 43 percent. Model 3 suggests the same positive trend for media source, with the odds of a national news source over twice as likely to exhibit a lower value for the source of solution variable, relative to all higher values, all else being equal; the effect of media source on the source of solution is also highly statistically significant. This supports H3, which suggested that national news media would have a higher likelihood of more public-centric articles regarding forestry; it appears that for both sources of blame and sources of solution, articles from the CBC have significantly higher odds of framing forestry as a more public issue than articles from the local news media. This alone suggests a focus by local newspapers on framing that comports with the interests of the forest industry, and thus their owners.

The issue of the news article proves highly statistically significant for both dependent variables, with each exhibiting a negative change in odds ratios. This means that when the issue of a news article is spruce budworm, the odds of the source of blame and source of solution exhibiting lower values relative to higher values decreases by nearly 85 percent for the source of blame, and nearly 53 percent for the source of solution. Essentially, we can expect that articles focusing on spruce budworm will have a more elite oriented framing, supporting the expectations proposed in H4, which assumed the scientific and technical complexity of the issue would lend

itself to a more elite-centric framing. The variable addressing references to the forest plan provides some support for the final hypothesis, which assumed that a mention of the NBDNR forest plan would have a more public-oriented framing in both the source of blame and the source of solution. Model 1 shows that this does not hold true for the source of blame, which indicates that a reference to the forest plan in a news article decreases the odds of a lower public-centric value relative to a higher elite-centric value by 38 percent. However, this same variable in Model 3 indicates a large and highly significant positive change in odds, indicating that a reference to the forest plan increases the odds of a lower public-centric value relative to a higher elite-centric value for the source of solution by 134 percent. Essentially, news articles concerned with the forest plan appear to be framing the source of the blame as the result of processes that are not the result of elite behavior (natural processes or political meddling), and the public's political will as a solution. This could be the result of the nature of the forest plan, which was designed and implemented by the New Brunswick government. These results indicate that the forest plan is framed as a collusion between government and industry, an accusation that was made by environmental groups, small woodlot owners, and the lone Green Party member of the New Brunswick legislature (CBC News 2014c). While the model does not allow for a test for interactions, future research should be designed to investigate whether this is more evident in national news sources than local news, as one might expect based on the more publicly-oriented framing seen for national media sources.

Discussion

These results offer the means for addressing the research questions posed at the outset. As Figure 1 illustrated, the distribution of frames in local and national media suggest a heavy reliance on the economic and political policy/frames, more so than the environmental frame and to a much larger degree than any other frames. It is not surprising that newspaper articles on forestry issues, so ingrained in both the economic and political landscapes of New Brunswick, include these two frames the most. However, citizen views on forestry and forest management do not begin and end with economics and policy; throughout the province, surveys reveal that New Brunswickers hold a plurality of views on the province's forest, suggesting they place value on the roles forestland plays as an environmental, recreational, cultural, and research resource (McFarlane, Parkins and Watson 2012). Thus, there are several viewpoints of interest available for consideration in the presentation of forestry issues in newspapers. The question then becomes one of how media source, the specific forestry issue covered, and the presence or absence of a reference to the 2014 NBDNR forest plan affect the presentation of these viewpoints. The analyses detailed above begin to provide some explanation.

Analysis on the level of conflict presented in each news article suggests that, *ceteris paribus*, local media sources, owned and operated by members of the Irving family, are significantly less likely to include a higher level of conflict. Less conflict is defined as fewer frames, indicating a narrower focus for forestry issues covered in the three local daily newspapers, and a narrower representation of viewpoints. While *Brunswick News* claims their coverage "[reflects] views in the community" (Livesy 2016), the data appear to suggest this is not entirely accurate. The independent effects seen for a reference to the forest plan suggest that

this also results in a higher level of conflict. However, the combination of the two suggest an interesting relationship. When the partial effects of this interaction are disentangled, it appears that local news articles that refer to the forest plan, and national news articles that do not contain a reference, both have marginal effects that are equal to or greater than the independent effects of media source and forest plan mention. This suggests that when local newspapers cover aspects of the forest plan, the controversial nature of the subject requires additional frames and therefore additional viewpoints. Essentially, when forestry becomes a salient and controversial issue, journalistic norms of objectivity may overwhelm other institutional pressures; in addition, a lack of additional frames and viewpoints regarding a highly debated subject would appear out of place, and so could also garner pushback from the public and organized interests whose views are being excluded.

Interestingly, and somewhat counterintuitively, articles from the CBC that contain a reference to the forest plan are more likely to have a higher level of conflict than local papers that do not have a reference, but less so than CBC articles without a reference or local papers with a reference. As already mentioned, the nature of the forest plan may be the cause of this: without the institutional pressures that may be shaping journalistic choices on frames at the local level, those covering the issue for the national media may see the forest plan as an issue with two primary viewpoints that can each be summed up in fewer frames. If positions on the 2014 NBDNR forest plan are viewed as pro-industry (and therefore pro-Irving) and anti-industry, this could engender a less clear need to provide multiple frames. With the data currently available, this conjecture cannot be substantiated. This possibility does, however, suggest that with additional research this initial result could be explored in more depth. Investigation into all five factors identified by Scheufule (1999) – social norms and values, organizational pressures and

constraints, pressures of interest groups, journalistic routines, and ideological or political orientations of journalists – for the local and national media sources would serve as an excellent starting point for future research on this topic.

When turning to elitism in the content of news articles, framing choices regarding the source of blame and the source of solution provide a glimpse into how the substance of articles differ. The results of the proportional odds logistic regression indicate that the odds for public framing are higher for national news articles than local news articles; the more complex issue of spruce budworm increases the odds of elitist framing; and references to the forest plan decrease the odds of a public orientation when attributing blame, but increase the odds of a public orientation when framing the solution.

These results support some initial inferences regarding the content of forestry news in New Brunswick. Local news media appears to have less of a reliance on public frames than national new media. While the separate testing for level of conflict and the elitism in framing do not allow for a direct connection, the combined results do tend to support a supposition that local media are constrained in the level of plurality they offer in their framing choices, and that narrower focus is more reliant on the viewpoints that remove blame from industry while simultaneously offering their expertise as the solution. This is evident with all other things being equal, which means that this is true whether the story is one regarding forestry as usual, or a controversial matter. All told, this provides evidence that journalistic choices are not being made based on the “balanced and objective” norms of journalism, and that forestry is not being presented as a public issue.

It was expected that a complex, technical issue such as spruce budworm would provide a more elitist framing, but the finding is interesting nonetheless. A large research project has been

underway in the province since 2014 to attempt an early intervention strategy that would reduce the need for aerial insecticide spraying (Healthy Forest Partnership 2014). A large component of that project is a concerted effort to communicate with the public, and involve them in a citizen science effort that allows private citizens to trap spruce budworm moths and provide data to the scientists at the Canadian Forest Service (Healthy Forest Partnership 2014). Despite this public outreach effort, the issue of spruce budworm is still framed as one that is the purview of scientists and forestry experts. This suggests that when the direction of a response to a forestry threat concerns the forest industry, the message to the public is one that frames the threat as one that is under control by those who know best. This framing may not be an overt effort to conceal the public aspects of the issue – it may be the result of organizational pressures that manifest in implicit ways – but the absence of public framing in local news media removes power from the citizens of New Brunswick, who rely on the news media to provide the information necessary to not only make judgments, but act on those judgments through political action. If citizens are unaware of the impact an issue will have on their community, the balance of power is placed in the hands of private entities, which has ramifications with the potential to upset the democratic foundation of a community.

However, the mixed elitism results for a mention of the forest plan suggest that the Irvings, as a representative of the forest industry, cannot always count on control of the message when an issue is highly salient and controversial. The forest plan had a significant impact on increasing the plurality of viewpoints for local news media, most likely the result of an inability to keep the controversy out of the public eye. This, coupled with the elite framing of sources of blame, and the public framing of sources of solution, suggests that there are non-industry voices able and willing to point the finger at what they see as a cozy relationship between the provincial

government and the forest industry. The 2014 NBDNR forest plan was met with loud and sustained disapproval, and as a product of government decision-making and actions, the blame was placed on the New Brunswick legislature. The solution is presented as the need for public intervention, suggesting that this is the way to hold both public officials and members of the forest industry accountable. Even when events favor the interests of the Irvings, they must still suffer the slings and arrows of active public dissent.

Conclusions

The incentives for elites to control the framing of issues in which they have a vested interest are clear: individual attitudes are the sum of the positive and negative evaluations of an individual receives on an issue, with additional weight given to highly salient issues. Forestry in New Brunswick is an issue that is always in the background, and frequently comes to the foreground of public attention with events that cause concern, such as the current spruce budworm outbreak and the controversial NBDNR forest plan. The role of the media is to provide the information necessary for citizens to form attitudes and opinions as circumstances warrant; thus, the framing of forestry issues in New Brunswick has a significant impact on the ability of the public to adequately assess issues that have a direct effect on their lives. When organizational pressures are combined with the pressures of an interest group, these influences can constrain journalists on who they seek out, who they listen to, and whose point of view to include in their article. Essentially, organizational interests can overwhelm the journalistic norms of balance and objectivity, narrowing the presentation of conflict and debate, and allowing for a tighter control of the message being communicated to the public.

Accusations against the Irvings have suggested that the content of Irving-owned newspapers conform to the interests of the Irving businesses, in both editorial and news content (Couture 2013; Poitras 2014). The research presented here has attempted to see whether this was evident in non-editorial content, ranging from standard forestry issues to controversial issues such as the NBDNR forest plan. Based on the findings for the level of conflict, there is strong evidence that local New Brunswick papers provide a narrower framing of forestry issues than the CBC. There is also reason to believe that local media errs on the side of forest industry interests in framing their content, and that complex issues important to industry receive an elite framing. It does appear, however, that high salience and controversy cannot keep viewpoints critical of industry out of the newspapers. The forest plan leads to a higher level of conflict in local newspapers, and a framing of content that appears to highlight the close ties between government and industry.

To date, it has not been proven conclusively that journalists working for *Brunswick News* are explicitly constrained in their journalistic choices – this would be difficult to prove with a high degree of certainty for any media source, but as a privately-owned company *Brunswick News* is an especially difficult case to examine. However, what this research shows is that there is a difference in the choices journalists make on how to frame forestry issues in New Brunswick. If an independent news media reflects the community it serves by presenting a plurality of views representing the interests of that community, this research suggests that New Brunswick media cannot claim to be independent. New Brunswick is unique in the level of monopolization a single media company has obtained in the region, but this case has implications that go beyond New Brunswick. Media concentration in Canada has seen a substantial rise in the last three decades (Winseck 2015), and similar trends have been seen in the

United States (Morrison 2011; Winseck 2015) as well as throughout other developed nations (UNESCO 2012). Media-specific antitrust laws exist in many of these countries, including Canada and the United States, but concerns have been raised over their (Price 2002). These concerns may be warranted, as evidenced by the ability of *Brunswick News* to survive a federal antitrust suit in 1972, which originally received a ruling in favor of the prosecution, but was later overturned on appeal (Livesy 2016). In addition, despite three federal inquiries into the Irvings' media practices – the Davey Commission in 1970, the Kent Commission in 1981 (Jackson 1999) and the Bacon Commission in 2006 (Couture 2013) – there have been no regulatory changes implemented that would impact the Irvings' media empire.

Future research should focus on how media source, issue and a focus on controversial issues such as the forest plan interact with the elitist framing of forestry issues in New Brunswick, a plan that will benefit from additional national news sources. In addition, this analysis has not included a measurement for sentiment in news articles, to code for content that is presented as positive, neutral or negative.¹⁷ Doing so would provide additional evidence to assess whether non-editorial content in New Brunswick newspapers differs in how Irving family interests are presented. This research has only taken the first step in systematically analyzing local media content, but has laid the groundwork for further investigation into media concentration in New Brunswick and beyond, an issue critical to democratic institutions in North America and beyond.

¹⁷ The autocoding option for this method was not available in the version of NVivo used for coding, and manual entry of this analysis by a single coder was determined to be too subjective. Multiple coders and/or the autocode option would allow for this method in future analyses.

Chapter 4: Degrees of Participation: Participation Program Differences in New Brunswick, Canada and Maine, USA

Forest management is an inherently conflict-laden policy area, engendering debate over the use and misuse of resources which can lead to tense relationships between forestry stakeholders and a disillusioned public (Buchy and Hoverman 2000). It is also a policy area which has increasingly seen demands from local communities for greater public involvement in decision-making as a way to ensure that the values and priorities of the public are reflected in forest management decisions (Beckley et al 2006). Federal requirements for public participation typically only apply to development projects requiring an environmental review, and so generally do not apply to the ongoing process of forest management (USFS 2014). In Canada and the United States, policy power has been largely devolved to provinces and states, providing regional and local administrators a large degree of discretion over whether to accede to demands for public involvement, and if so, what form that involvement takes.

Involvement can take the form of informing the public with “decide, announce, defend” strategies, which has been likened to a “tokenism” form of participation (Arnstein 1969). Involvement can also be designed for full and rigorous public participation which results in decisions based on the negotiation of a plurality of *public values*. These are defined as normative assessments which guide behavior, considered “public” when they are used to provide “normative consensus,” particularly regarding “the principles on which governments and policies should be based” (Bozeman in Nabatchi 2012, 700). Public involvement can fall somewhere between these two extremes; however, the latter is often identified as the ideal for cooperative natural resource management (CNRM). CNRM stresses the use of public deliberation as the way

to achieve collaboration between experts and representatives of the community (Beckley et al 2006; Bradshaw 2003; Creighton 2005; Koontz 1999). While collaboration is often touted as the ideal, others argue that issues of technical complexity, often an aspect of forest management, are not appropriate issues for public involvement in decision-making (Fung 2006). However, the degree to which an issue is considered complex comes about as part of the narrative that it receives from those who are seeking to develop policy to combat it. Motivations for technical and administrative experts vary when making the decision of whether to include the public in any way (Poliakoff and Webb 2007; Handley and Howell-Moroney 2010), but are preceded by the definition and framing of a problem, which constrains the perceived causes and solutions that are considered (Stone 1989). When formal requirements for public participation are absent, how does the definition of the issue influence the motivations and decision-making of those involved in forest management when deciding how to approach the public?

This research examines the form public involvement takes when forest management is confronted by an ecologic threat with the potential to increase the level of conflict within forest management. It does so by examining two cases, New Brunswick, Canada and Maine, USA, which are both responding to the threat of the spruce budworm (SBW), an insect which every 30-40 years expands in population to numbers that threaten to destroy much of the spruce and fir trees in northeastern forests. The cyclical nature of this threat allows for a comparison of these two cases: both New Brunswick and Maine have a history of responses to this issue that have led to public controversy and disillusionment, and both are now including a public involvement component in the programs that have been developed to address the current cycle. The overall goal of this research is to ascertain whether these public involvement components differ in the way program administrators conceptualize the issue of spruce budworm, as well as the strategies

that have been designed to combat it, and if so, how. In addition, it seeks to explore the factors that influence this issue definition, and how decisions on the design of public participation and outreach strategies differ as a result.

To address this area of inquiry, this research will first discuss variations in types of public participation, as well as the role of issue definition in both science and public policy. Following a presentation of the background for the cases of New Brunswick and Maine, Nabatchi's (2012) elements of participatory design will be explained, and then utilized as the framework for assessing how issue definition and its related factors influence the decisions on whether and how to involve the public to identify public values for decision-making. This framework, which serves as the foundation for the International Association for Public Participation's IAP2 continuum of public values identification (discussed in detail below), is one of the most widely utilized and accepted models of public participation. Consideration of these design elements is necessary in public administration because of the nature of public policy controversies, which are value-based and require trade-offs in priorities (Nabatchi 2012). To reconcile these value conflicts, Nabatchi suggests a process "in which citizens are directly and actively involved in identifying what constitutes public value, articulating what needs to happen to create public value... and making decisions about trade-offs to achieve those ends" (Nabatchi 2012, 700).

Using this framework, we can assess to what extent the public is involved in informing value-based trade-offs in decision-making in each case, and how this has been shaped by differing issue definitions. As with many frameworks, "The point of the typology is not to decide which level of the scale is 'better' or 'worse' but rather to provide an analytical frame to enable distinction between processes" (Buchy and Hoverman, 17).

This study contributes to two important, yet understudied areas. First, it provides a comparative study between the US and Canada on responses to a natural resource disturbance that has proven politically contentious on both sides of the border. The last SBW outbreak occurred in the 1970-80s, and the pesticides used at that time gave rise to citizen concerns regarding public health in Atlantic Canada (Rashid 2003), as well as non-target effects and post-spraying salvage practices leading to clear-cutting in Maine (Wagner, Strauch and Denico 2016). The spruce budworm problem touches on issues of environmental protection, economic impacts, scientific understanding, and human health, in addition to political and policy issues, and is a compelling issue that deserves additional consideration.

Second, this research provides a missing piece of participation studies by examining how issue definition contributes to decisions on public participation. While extant research has addressed the motivations of scientists and administrators to involve the public, these analyses have focused on general scientific outreach, and administrator actions to adhere to formal participation requirements (Handley and Howell-Moroney 2010; Poliakoff and Webb 2007). To date, there has been no research investigating motivations for participation and outreach when there are no formal requirements, and when the scope of the outreach is narrowed to a particular program or policy rather than general scientific communication. In addition, best practices for participation strategies have been identified depending on the *reason* for seeking out participation as well as the *type* of issue that is being addressed, with the assumption that the interaction between these two factors can be used to guide officials regarding the mode of participation best suited for their purposes (Walters, Aydelotte and Miller 2000). Walters, Aydelotte and Miller organize the reasons for seeking out participation using the stages of policy development, working from the initial problem definition stage through recommendation of

alternatives, and recommending participatory strategies based on how this reasoning interacts with the nature of the issue – whether it is well-structured, moderately-structured, or ill-structured. In doing so, they do not acknowledge the possibility of a relationship between those seeking out participation practices and how their own approach to defining the issue affects not only their reasons, but also the structure of the issue. The nature of the issue is characterized based on such factors as the number of stakeholders, the reliability of the information on the issue, the identification and understanding of the alternatives – each of which, in a policy area, is defined by those who are tasked with addressing the issue to begin with.

Past SBW mitigation efforts have proven politically contentious, and so current efforts have the potential to increase an already conflictual area of resource management. The issue of SBW presents itself as a “chronic crisis,” which appears slowly, is not bound to a discrete timeframe, has outcomes that are uncertain, and presents “occasions for decisions” (Rosenthal and Kouzmin 1997, 10) regarding environmental, economic and social tradeoffs. Through the cases of New Brunswick and Maine, participation strategies can be examined to better understand how issue definition influences each occasion for decision, isolated by examining participation strategy decision as categorized by Nabatchi’s framework, and so better understand how participation is shaped.

Participation as a Norm and a Method

Public participation has been construed as an ethos, with “participation” meaning different things to different people; often as either an end in and of itself, or the means to an end (Buchy and Hoverman 2000; Nabatchi 2012). Participation can be seen as a normative ideal that

builds social capital and thus a stronger democracy. Community involvement in decisions over a public good are assumed to provide the necessary ties for trust and reciprocity that allow for the democratic process of self-government (Putnam 2000). The importance of public participation and the potential for it to fall short of expectations for effectiveness have been engaged in research on urban planning for nearly fifty years, with scholars considering whether participatory efforts within planning indicate non-participation, tokenism or legitimate citizen empowerment. Arnstein's (1969) "Ladder of Citizen Participation," consists of eight "rungs" showing a progression from "manipulation" to "citizen control," with the implicit assumption that the higher rungs are preferred as more participatory, while the lower rungs are systems of elite control used only to provide a "token" nod to citizen participation (see Figure 4.1). Arnstein's highly influential piece was revelatory at the time of publication, suggesting for the first time that urban planners did not always involve the public in ways that served to empower them in the decision-making process; the ladder was constructed to be deliberately provocative, with the argument that lower levels of the ladder were inadequate and unacceptable.

Arnstein's ladder of participation has also served as the point from which other arguments regarding participation have diverged, with more recent explorations in urban planning serving as a place to challenge the normative aspect of public participation in complex policy areas. As Fung (2006) suggests, Arnstein assumes that citizen involvement is an appropriate part of any public program, an assumption that Fung contests. He claims that the role of the public – whether that is as consumers, clients or citizens – depends on the context and problem in question, particularly as both become increasingly complex. "There may indeed be contexts in which public empowerment is highly desirable, but there are certainly others in

which a consultative role is more appropriate for members of the public than full ‘citizen control’” (Fung 2006, 67).

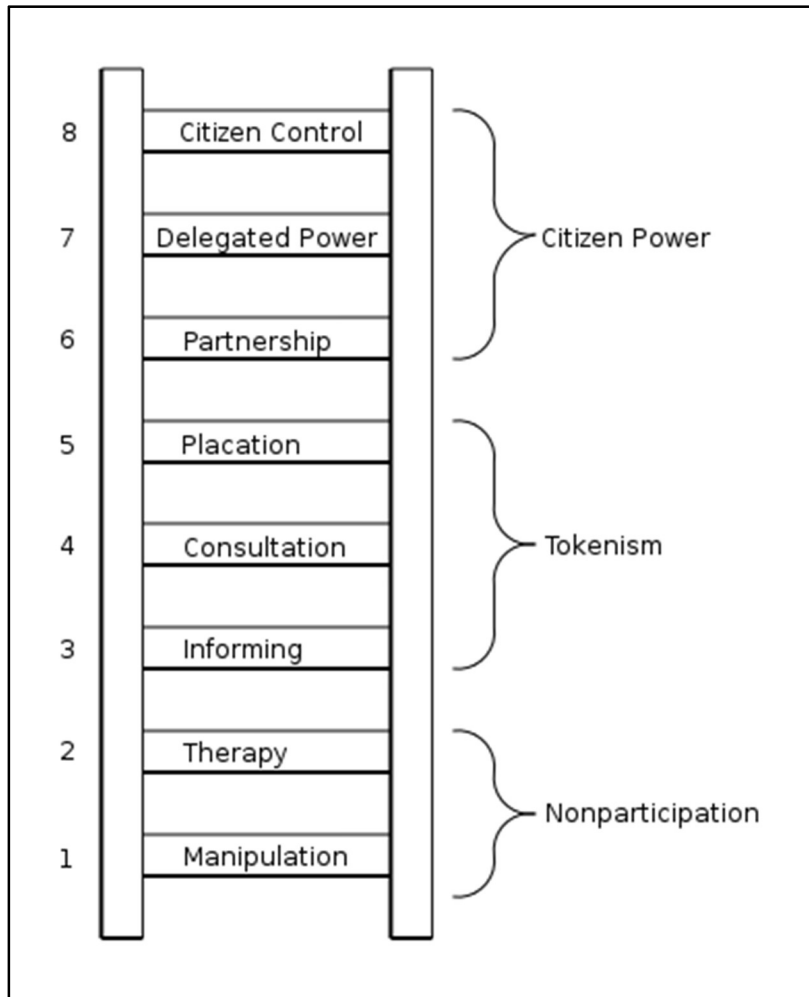


Figure 4.1: Arnstein’s Ladder of Participation, reproduced from Arnstein 1969, p. 217

Participation is not solely a normative ideal; it can also be seen as a management method. Buchy and Hoverman (2000) suggest that participation can take many forms in forest management, stressing that informing and educating the public has merit that may differ from full citizen decision-making power, but that should not be discounted because it does not reach the normative ideal of citizen empowerment. They use the example of the Canadian Model

Forest program, which brought together a diverse set of stakeholders to develop more sustainable forest practices by identifying priorities and management practices. “There are no mechanisms within the process for stakeholder groups to influence the integration of their findings into policy and practice, nor has the program been set up for this purpose. However, this process has been acclaimed for providing the opportunity for traditional enemies to collaborate and learn from each other... and the educational dimension of the experience seems important and beneficial” (Buchy and Hoverman 2000). Often, participation is equated with empowerment, commonly assumed to be the devolution of power so that individuals have more of a say in the running of public affairs, but Buchy and Hoverman (2000) suggest with their Canadian Model Forest example that this term can also have different meanings. If empowerment is understood as a learning process in which an individual gains knowledge as the means to a more critical awareness of policy issues, this too serves as a public good, even without direct decision-making power.

Nabatchi (2012, 700) acknowledges the normative dimension of participation efforts, but also suggests that it has a management benefit, by “help[ing] administrators better identify and understand public values, and, consequently, improve policy decision making processes and outcomes.” Controversies in public policy can typically be boiled down to competing values and fundamental disagreements over priorities. These competing values, which Nabatchi defines as *public values pluralism*, “simultaneously exist in society, all of which may be equally valid, correct and fundamental” (Nabatchi 2012, 700). Thus, administrators must be able to identify, understand, and reconcile competing public values, which can only be achieved through participatory efforts. This public values pluralism speaks to the underlying motivations for CNRM, and is inherent in the SBW programs of New Brunswick and Maine: these forest

management programs seek to balance the environmental impacts of the outbreak, the economic impacts of a decreased yield for spruce and fir trees, and the social impacts of the decisions regarding when and to what degree aerial insecticide spraying will be used to mitigate the outbreak. While there are many ways to identify, understand and reconcile the plurality of public values for any policy issue, Nabatchi insists that doing so “requires a continuing process of social inquiry, discussion, and dialogue within the public sphere – it requires public participation” (Nabatchi 2012, 700).

Even if accepted as a worthwhile endeavor, several barriers to public participation in decision-making exist. Studies have suggested that efforts to include the public in decision-making occur less often at the state level in the US, because of the lack of rules and requirements on areas outside of large-scale environmental projects; Layzer (2002) suggests that in the absence of stringent federal regulations, local officials are less likely to collaborate with community members because of both policy and fiscal constraints. As Koontz’s (1999) study on state-level forest management illustrates, officials at the state level in the United States typically do not incorporate public outreach and input as often as federal officials, partly because of a lack of codified requirements to do so at the subnational level. Limited resources are also a barrier to Arnstein’s higher rungs of participation: each decision-making point costs both time and money, and administrators have to make cost-benefit calculations to confront the feasibility of public interactions.

In addition, if public administrators have negative attitudes towards the public, or do not view them as a primary stakeholder, this can inhibit the chances of more inclusive participatory actions (Handley and Howell-Moroney 2010; King and Stivers 1998; King, Feltey and Stusel 1998); studies have also shown that administrators’ trust in the public is a valid and relevant

predictor of proactive efforts to involve citizens (Yang 2005). A significant group of actors in forest management, scientists' reasons to engage the public in scientific outreach are also influenced by their individual attitudes and perceptions. Poliakoff and Webb (2007) analyzed survey data from scientists in the natural and physical sciences regarding their motivations for choosing to engage the public, or not, in some form of scientific communication and outreach. Using Azjen's (1991) theory of planned behavior, the authors found four factors that influenced scientists' decisions on whether or not to engage the public: scientists' past engagement activities; positive or negative evaluations of public engagement; how much they believed their colleagues were engaging the public; and their perceived behavioral control, which related to whether they felt they had the necessary resources, abilities and opportunities to be capable of engaging the public. Unsurprisingly, if scientists had engaged with the public previously, they were more likely to engage in similar behaviors in the future. In addition, positive perceptions of public engagement, along with perceptions that their colleagues were engaging the public and that they had the necessary resources to do the same were the primary motivations for engaging in future public engagement behaviors. Interestingly, normative beliefs regarding a duty to the public did not exert a significant effect on plans for future engagement behavior, nor did fear – the majority of scientists did not express anxiety or concern about public interactions. Poliakoff and Webb looked specifically at intentions to engage in broad scientific communication and outreach, but the explanatory elements they identified can inform the motivations of scientists in the application of science as part of a specific policy, as in the case of the SBW treatment programs.

Nabatchi (2012, 700-701) also acknowledges that while direct citizen participation has many potential benefits, it can also have intense resource costs and can appear risky in

contentious situations; in addition, trying to find consensus in controversial policy areas is a process fraught with the potential for failure. As she states, “While current empirical research does little to resolve the debates about the potential benefits and pitfalls of citizen participation, it is likely that the outcomes (good or bad) are, in part, a function of how public participation is designed,” and it is important to realize that the *outcomes* of participation in any form – including efforts to establish CNRM – are a function of the *design* of the participation. Her modified spectrum of public participation (see Figure 4.2) provides a partial summary of participation strategies moving from informing the public with one-way communication, to empowering the public with full deliberation. This is based on the eight participatory design elements she identifies as being key choices for establishing where on the spectrum participation falls: 1) level of cooperation, 2) communication mode, 3) level of shared decision authority, 4) participatory mechanisms, 5) informational materials, 6) participant selection, 7) participant recruitment, and 8) recurrence and iteration. While she does not guarantee a beneficial process when moving from *inform* to *empower*, she does suggest that doing so will improve the ability of administrators to identify and understand the plurality of public values in their community.

This research seeks to compare the public involvement components of the SBW response programs in New Brunswick and Maine to establish whether each strategy is designed towards the understanding and reconciliation of a plurality of public values, and what factors – issue definition, in particular - may be influencing that. By assessing how the programs differ in their response to SBW, and using Nabatchi’s design elements as a framework, this study can assess where differences between the programs exist, and can use the IAP2 framework to isolate the ways in which issue definition and motivations interact to influence how public participation is designed.

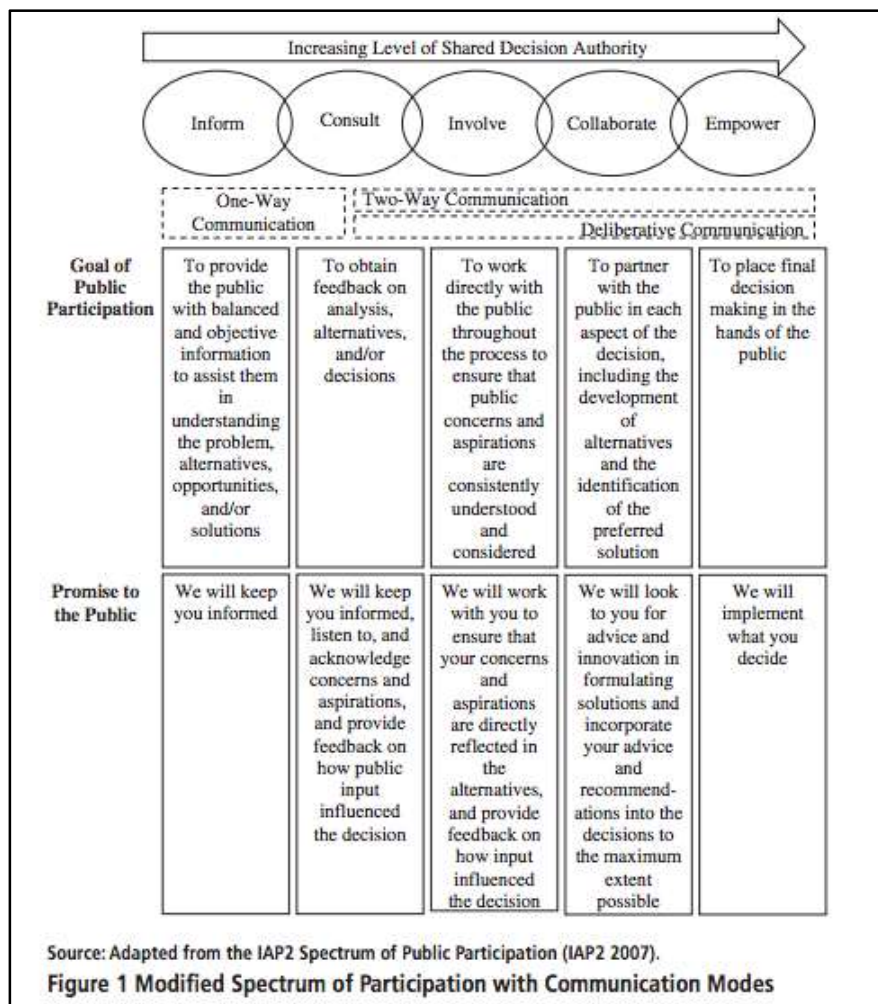


Figure 4.2: Nabatchi's IAP2 Spectrum, reproduced from Nabatchi 2012, p. 26.

Data and Methods

The primary data source for this research comes from semi-structured phone interviews with scientists, researchers and administrative personnel for the two programs under consideration.¹⁸ Individuals from Canada were identified by contacting the scientist in charge of

¹⁸ Hereafter, individuals who have been interviewed are described as interviewees, administrators and officials; these terms are used interchangeably, regardless of the individuals' specific role within the program. The only distinction made otherwise is to note those with a background in science, as opposed to those without a science background.

the SBW research strategy, while individuals in Maine were identified by listed authorship in the report “Coming spruce budworm outbreak: Initial risk assessment and preparation & response recommendations for Maine’s forestry community,” a SBW task force report discussed in detail below. Each individual identified as part of the public involvement component of the program was then emailed a request to participate in a brief interview. Out of ten possible Canadian individuals, six responded to consent to an interview; in Maine, four of the five individuals contacted agreed to be interviewed. While the sample for each case represents a small number, it represents two-thirds of an already small pool, and presents a variety of perspectives.

Individuals’ roles in the program included scientists, communications specialists, foresters, administrative management and forest advocates. Interviews lasted for an average of 30 minutes, and included questions regarding: funding sources; the reason for public interactions (administrative, legislative or otherwise); individuals’ perceptions of the public; and reasons for strategy decisions including who to talk to, what information to provide, information and feedback mechanisms and the frequency of interactions (see Appendix D for interview script and related materials). These interviews are supplemented with primary documentation such as budget descriptions and other policy documents, as well as secondary documentation such as task force reports and informational websites regarding the program(s).

Methodological Framework

The framework used for analysis comes from the design elements noted above that serve as the foundation for Nabatchi’s (2012) spectrum of public involvement. These elements are not linear, or completely discrete, but allow for components of the decision-making process to be examined independently. In doing so, the influence of issue definition can be ascertained, and additional factors of interest such as motivations and some causal relations, can be identified.

Level of Cooperation. Nabatchi identifies a number of aspects of the decision-making process that influence the degree to which public values are part of the participation process. Drawing on conflict resolution theory, Nabatchi's (2012) first proposition concerns whether the communication process is focused on positions – what a person or group wants – or interests – why a person or group wants something. Essentially, “an interest-based process centers on helping participants to clarify, articulate, and stand up for the interests and values that shape their view of an issue... the nature of cooperation engendered by a process, that is, whether it tends to be adversarial or collaborative, is partly a function of whether the process focuses on positions or interests” (Nabatchi 2012, 701).

Communication Mode. The appropriate mode of communication can vary by context, but not all share the same ability of identifying and understanding public values. One-way communication is the unidirectional flow of information, often used in public participation processes in order to complete information-sharing requirements; this can take the form of websites, information packets and media briefings, which do not offer a feedback mechanism. Two-way communication is the bidirectional flow of information, which often takes the form of public hearings and meetings; however, these are often used to defend decisions that have already been made, and may degenerate into one-way communication. Deliberative communication generally requires a diversity of participants who take part in an open discussion that takes values and emotions, as well as technical considerations, into account to arrive at a final decision; Nabatchi identifies several processes that take this form, including the New England Town Meeting format, as well as the Citizens Jury (see Gastil and Levine 2005 for a discussion of deliberative processes).

Level of Shared Decision Authority. As presented in Figure 4.2, decision-making authority begins with *inform*, increasingly moving the balance of decision-making towards the public at each step, with the final level of decision-making favoring the public with *empower*. Decision-making authority is influenced by the other aspects of participation, as the figure illustrates, including mode of communication and goals of participation. The spectrum of decision making power spans five levels: *inform*, to “provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities, and/or solutions;” *consult*, or “obtain public feedback on analysis, alternatives and/or decisions;” *involve*, or “work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered;” *collaborate*, or “partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution;” to *empower*, or “place final decision-making in the hands of the public.”

Participatory Mechanisms. The most common participatory mechanism is the large group format, such as the traditional public meeting, which “by its very nature... tends to foster one-way or limited two-way communication; it precludes the possibility of deliberative communication because deliberation requires adequate speaking opportunities for all participants” (Nabatchi 2012, 703). However, the inherent challenge in the small table format, where small groups break off to deliberate prior to reporting back to the whole room, is integration, whereby recommendations are synthesized to represent the collective work of all participants at all levels. Because large group formats are prone to adversarialism, Nabatchi proposes the use of small table formats with integration processes as the means by which public

values can be identified and communicated to administrators; in addition, she also proposes the use of neutral facilitators to ensure equal opportunities to participate and guide discussion.

Informational Materials. In general, citizens can make reasonably good decisions based on limited information; however, the quality of those decisions can be improved if more and better information is made available to them (Delli Carpini 2000). According to Nabatchi, the decision of what sort of information is provided to the public influences their ability to effectively participate. Information should provide “sufficient context and history on the issues, be neutral and fair to all perspectives, leave room for citizens to create new options, and have credibility with all audiences” (Lukensmeyer and Brigham in Nabatchi 2012, 704). Considering the scientific complexity of SBW, the quality and quantity of information is especially important.

Participant Selection and Recruitment. The assumption in creating channels of public value communication is that broader participation is more likely to provide a plurality of voices and viewpoints that can be integrated into policy decision-making. Nabatchi proposes that when choosing between stakeholder participation and public participation, selecting participants from the broader public will provide greater utility for increasing viewpoints and allowing administrators to understand broader sets of public values. Once the pool of participants is selected, recruiting individuals can be done through voluntary self-selection, random selection, targeted demographic recruitment and incentives. Each recruitment effort has tradeoffs: voluntary self-selection is the easiest, but typically only draws individuals who already have strong positions and/or more time and resources to participate; random selection and targeted demographic recruitment require some additional work, particularly the latter which requires examining Census or other profile data to identify the correct individuals, but increase the potential range of viewpoints; and incentives, which have clear costs but can allow individuals

who might not otherwise be able to participate the means to do so. Selection and participation are influenced by the abilities and resources of the administrators designing their strategy, but Nabatchi proposes that as much effort to minimize participation bias as possible should be undertaken to increase the identification and communication of public values.

Recurrence and Iteration. The frequency of a participatory process is a decision that depends greatly on the issue. As Fung (2003, 345) states:

The participatory democratic impulse is that more is better. But this intuition is incorrect, for the frequency of minipublic meetings should follow from their purpose. If a minipublic is convened to... form or ascertain public opinion on a nearly static issue... then one conclusive round... may be enough. Further rounds would be justified if new information surfaced or relevant conditions changed. Minipublics devoted to participatory problem solving or democratic governance should be convened more frequently, perhaps many times per year, because their decisions must be frequently updated and because monitoring officials is an ongoing endeavor.

Thus, decisions about the frequency of participation should be made with the goals of the process as a driving factor.

Presentation of Cases

New Brunswick

Following the last SBW outbreak in the 1970s and 1980s, Atlantic Canada and the northeastern United States have remained vigilant in their monitoring of SBW populations. The province of New Brunswick is highly reliant on forestry, which is one of a handful of natural resource industries driving the provincial economy, and provides jobs to tens of thousands of New Brunswick residents. Because of this heavy reliance on forestry, industry interests have an outsized role in policy decisions; this situation has led to the categorization of New Brunswick as a client state model, in which the provincial government and the citizens it represents have a role

subservient to industry interests (Wallace 2012). Because of this reliance on forestry, any threat to the health of the forest has major repercussions for citizens throughout the province, regardless of whether they are directly linked to forestry. In the mid-2000s, when entomologists in Quebec saw their SBW populations rising drastically, the rest of the region knew that based on previous outbreak patterns, the same trend would begin to appear in spruce and fir trees in adjacent areas. In New Brunswick, the majority of forestland is publicly owned (called “Crown land”), and so SBW poses a threat to forests that are the responsibility of the provincial government (Crown Lands and Forests Act of 1980, 2003). With the early warning signs coming from Quebec, forestry researchers and officials began to develop an early intervention strategy (EIS). The EIS is based on the epicenter theory, which assumes that SBW populations rise to outbreak levels in isolated “hot spots,” rather than migrating from other areas with increased populations; therefore, if these hot spots can be identified early and treated with targeted pesticides on a small scale, spruce and fir mortality will be minimized with only limited need for pesticide application (Healthy Forest Partnership 2014).

This strategy had not been attempted previously with SBW, and the consensus among officials from government, science and academia, and industry was that federal support was going to be necessary to enact such a large, multi-year research and treatment project. In 2014, the Canadian legislature designated \$18 million over four years for the EIS, with 70 percent coming from the federal budget and 30 percent coming from the provincial budget (Government of Canada 2014). These funds are managed by the Atlantic Canada Opportunities Agency (ACOA), a federal agency whose purpose is to “strengthen the Atlantic economy through enterprise development... community development... [and] policy, advocacy and coordination” (ACOA 2016). ACOA is well-known throughout the Atlantic provinces, including New

Brunswick, and by funneling the money through an agency with a reputation for encouraging opportunities in the economically sluggish province, the program was already being designed with public perception in mind.

According to each of the interviewees from New Brunswick, the only formal requirement for public involvement comes from the New Brunswick Pesticides Board, which requires public notice of any chemical treatments applied in a given area, and the right for individuals to opt out of treatment on their own property (Pesticides Control Act of 2011, 2012). However, all six interviewees from New Brunswick claimed that once the EIS research program had been established, the need to communicate with the public about what was being done in the province was identified as a necessary step, in order to avoid the communication mistakes that had been made during the previous SBW outbreak of the 1970-80s.

Each of the interview subjects from New Brunswick acknowledged that during previous outbreaks, the lack of transparency, as well as poor and sometimes conflicting information provided by the government-industry efforts to treat SBW led to widespread distrust among the public. Several administrators spoke of the “legacy of the DDT conversation” (NB comm member 1), another saying “we have regulations now, both federal and provincial, those controls are in there, Health Canada regulates the use of any pesticide product in the country, it has to go through a rigorous process... That’s changed but we’re still faced with what happened prior to that system being in place” (NB comm member 2). Others acknowledged the haphazard communication attempts during the 1970s and 1980s, when spokespersons for both government and industry gave the public conflicting information about the purpose of the spray programs, the frequency of applications and intended effect. One scientist explained that the spokespeople who were placed in front of the public had a fundamental misunderstanding of the purpose of the

aerial spray program, explaining to the public that the purpose was to stop the outbreak, when in fact the outbreak could not be stopped. The true purpose, as the interviewee explained it, was to try to protect trees on sites of high-value stands so that it would not lead to tree mortality in those sites. When the stated purpose of the aerial spray program was to stop the outbreak, yet the public continued to see trees dying and SBW spreading, “the assumption was that [industry and government] were lying, and they were spraying for no reason” (NB comm member 1). In addition, one interviewee claimed that EIS program partners wanted to find a way to engage the public in order to avoid “another Cape Breton” (NB comm member 1). This was a reference to a grassroots movement during the SBW outbreak of the 1970s and 1980s, in Cape Breton, Nova Scotia, in which residents were able to enact a ban on aerial insecticide spraying, due to concerns about the effects on human and environmental health. Spruce and fir mortality was overwhelming, and resulted in the loss of millions of dollars for local forest industry, and altered the very composition of the forest as it regenerated. While dissatisfaction in New Brunswick following the last outbreak was widespread, the province had not seen an organized public reaction like the one in Nova Scotia. EIS partners wanted to ensure they were able to continue their research, and industry representatives wanted to minimize their losses as a result of SBW; all saw an effective communication strategy as the way to keep the public from foiling their intervention efforts.

Their strategy was to coordinate among and between those involved in the research program, in government, academia and industry, to ensure information regarding the EIS was internally cohesive, and provided to the public with the intended purpose of establishing trust: “For any area-wide management program, you need to have social license. If you don’t have social license, if you don’t have public acceptance of what you’re doing, they’re not going to be

supportive” (NB comm member 1). Once funding was made available, the clock had already begun ticking, with monitoring of SBW numbers on the border with Quebec steadily gaining pace. This meant that the communications strategy did not materialize fully formed, but evolved in the subsequent years. Interviewees claimed there was no time to set out a strategic document identifying goals and the means to achieve them: “It really wasn't that structured to begin with, it just kind of flowed as the need was there and we found the people who could help with the different pieces” (NB comm member 3).

Maine

The development of Maine’s program follows a somewhat different trajectory, but was also driven by the legacy of past outbreaks. All four interviewees from Maine emphasized how the SBW outbreak of the 1970-80s had shaped forestry in Maine. “The last outbreak, it caused such a political controversy on a wide variety of areas, the salvage cutting and the insecticide spraying and the subsequent herbicide spraying that went on after the outbreak... All the research for the next 40 years was driven by the sequence of events that happened after the budworm... [it] really set up the forest, not only biologically, but also politically” (ME comm member 1).

Following the last outbreak, clear-cutting became the primary method for removing dead trees, which caused public backlash; the result of the public outcry was the Maine Forest Practices Act of 1989, legislation regulating the practice of clear-cutting (Maine Forest Practices Act of 1989). As all Maine interviewees explained, this act fundamentally changed forest practices throughout the state by defining how stands must be set up, and how trees must be harvested. This was followed by a series of public referenda in the 1990s on clear-cutting, which created an even more contentious relationship between the public, environmental groups, the

forest industry and the state government. The initial referendum was proposed by environmental groups that wanted a complete ban on clear-cutting; the forest industry felt this was too extreme, and spent millions of dollars on advertising opposing the ban. In addition, persuaded by industry to intervene, the sitting governor of Maine, Angus King, convened the state House and Senate to propose a bill that was meant to serve as a less extreme alternative, one which further regulated harvesting practices and set aside funding for research on various harvesting practices. The referenda failed, with many charging King and the forest industry with collusion to undermine the democratic process (Steelman and Ascher 1997).

The outbreak in the 1970s and 1980s changed the composition of the forest, and fluctuations in the wood market have changed priorities in Maine; the collapse of the softwood market resulted in paper mill closures and a lower priority for fir trees (Maine Forest Products Council 2013). The outbreak also produced the Maine Spruce Budworm Management Act, which defined who would be involved in managing SBW outbreaks, including their roles and responsibilities (Maine Spruce Budworm Management Act 2015). In 2013, as researchers in Maine were seeing how SBW populations were increasing in Quebec, the Cooperative Forestry Research Unit (CFRU) at the University of Maine contacted several forestry stakeholders throughout the state to form the Spruce Budworm Task Force, led by representatives from the University of Maine, the Maine Forest Service and the Maine Forest Products Council. As one interviewee from Maine explained, based on the Spruce Budworm Management Act, these organizations each had a legislated responsibility for a response to SBW: the Maine Forest Service, as a state forestry agency; the University of Maine as educators; and the Maine Forest Products Council, as a representative of private landowners, including industry operators. Membership of the task force was limited to representatives coming from these areas only;

interviewees explained that because of the antagonistic relationships resulting from the previous outbreak and the subsequent conflict over clear-cutting in the 1990s, it was determined that it was vital to manage conflicts between these three main groups prior to inviting any other interests to join.

The key word coming from this meeting was “proactive:” the goal of the task force was to have a plan in place to address the technical, biological and political issues that would need to be dealt with should SBW reach outbreak levels once again in Maine. One of the key differences between Maine and New Brunswick has been timing: administrators in New Brunswick had to move quickly to get their program up and running, because the SBW was already beginning; Maine, on the other hand, has had far more advanced warning and at the time of this writing has yet to experience defoliation because of SBW. Because of this advantage, the Maine administrators sought to identify the necessary measures that would need to be addressed to prepare for the SBW ahead of time. The Spruce Budworm Management Act would need to be revised to reflect changes in financial and management responsibility: the original act was designed to use state funds in cooperation with private landowners, but as one interviewee explained, “the state made it clear that the cupboard was bare” (ME comm member 1). While funds are difficult to come by in the best of scenarios, the state also placed the onus of responsibility on private landowners, who control nearly 95 percent of the forests in the state of Maine (Maine Forest Products Council 2013; Wagner, Strauch and Denico 2016). While the New Brunswick government has a duty to protect their three million hectares of forested Crown land, the state of Maine does not share this duty; however, Maine interviewees said that this did not remove the need to address how to involve members of the public. “One of the lessons learned from the ‘70s outbreak, back when the pulp mills were king, they owned all the land and they

didn't need to talk to anybody about anything, which led to the politics... [we asked ourselves], how can we be proactive, before this next outbreak happens, and learn from the past?" (ME comm member 1).

With the goal being a proactive response, the task force identified key facets of the issue, and created task teams to deal with each identified area; one of these appears in the task force report as "Public Communications and Outreach." One member of the communication task team wanted to make sure that the approach to SBW, both in attempts to treat it and in interacting with the public, was not the antagonistic approach of the previous outbreak: "The people who were involved in that, they called it the Battle of the Budworm, that was just how it was called, and the Battle of the Budworm in Maine was fought by World War II veterans, and they had an idea of how you went about fighting a war: a lot of equipment, go right after it, do all these things, and I don't think they were prepared for the fact that nature can take you in a direction you never anticipated" (ME comm member 3). Similar to what was communicated to New Brunswick residents during the past outbreak, those who were addressing the problem in Maine were out to win the war against SBW, and eradicate it from Maine's forests. After a decade of this battle, with thousands of acres of forest dead or dying, the public questioned the purpose and effectiveness of the resources being used in what appeared to be a fruitless endeavor.

In Maine, the previous failures of communicating with the public, both during the outbreak and later during the contentious referenda, served as a focusing point from which to decide what role the public should have in the upcoming outbreak. Administrators recognized that the previous haphazard and poorly executed format of informing the public was not effective, and that the information being presented was of poor quality. Their goals were to, first, "manage information flows better," and second, to "get the industry, the university and the state

government all on the same page... and figure out how we get the public involved” (ME comm member 1). In addition to the poor communications of the last outbreak, Maine officials also recognized the conflict of the 1990s was the result of a failure of the state and the forest industry to adequately explain their actions to the public. The referenda and the conflict it solidified between the public and industry was the result of a democratic process that was not supported by pertinent information, and was instead driven by passionate pleas from environmental groups. As stated by all Maine interviewees, the communications and outreach program was formed to ensure that this communications failure did not happen again: “It was to identify key communication issues that we were going to have to get across, to build a communications infrastructure which was based on no surprises, keep stakeholders updated, with what was going to happen and what was happening, and after the outbreak what was continuing to happen, and develop a proactive public and legislative communications strategy” (ME comm member 2).

Defining the Spruce Budworm Issue

The background of past conflicts in both Maine and New Brunswick, and their goals and motivations for engaging the public, already begin to suggest how each program conceptualizes the issue at hand. New Brunswick has launched a large, well-funded research project to try to combat the SBW, and administrators were focused on the scientific research and implementation of the EIS from the outset. For New Brunswick, public engagement was an afterthought, and was not included as an initial element of the project. Once the research program was established, scientists and administrators realized that the communications effort of the past outbreak had created a challenge for them, because it primed citizens of the province to be wary at best, and at worst, follow in the footsteps of their neighbors in Nova Scotia to keep EIS officials from implementing their treatment plans. This relationship with the public threatened their ability to

carry out the research and treatment strategies as planned, and their focus became a discussion of how to communicate to the various public stakeholders about their actions, to avoid the conflict and contentions of the past. For New Brunswick administrators, this was a scientific endeavor first, and an opportunity for public outreach second.

Maine administrators characterized the issue of SBW somewhat differently. While the task force was concerned about providing a proactive strategy that encompassed the technical and scientific aspects of SBW, they specifically included public, political concerns in their initial comments about the reason for creating the task force. They saw the conflicts of the 1990s as a direct result of the inability, or unwillingness, of forest experts to explain their actions during the outbreak and during the salvage practices that came in the decade after. Their motive for engaging public stakeholders was to avoid the consequences that came from a passionate, but uninformed public, which was what they saw in the Maine Forest Practices Act, as well as the referenda in the 1990s. Their strategy, from the outset, was to communicate, engage and reach out to the public and stakeholder groups, because they recognized SBW as a political and policy matter, as much as it was a scientific and technical matter.

Participatory Design Elements in New Brunswick and Maine

Level of cooperation

Administrators in New Brunswick have already finalized their position regarding the SBW research program: partner with forest industry representatives and local academic researchers to mitigate the SBW threat through their “hot spot” EIS strategy of targeted insecticide spraying. As Nabatchi (2012, 701) points out, “people may have only one position but

many interests, some more important than others, and, in many cases, interests are motivated by values.” Interviewees articulated many interests for the EIS overall, and discussed how the normally adversarial relationships of those included in EIS research (state agencies, academics and industry representatives) were overcome by recognizing that individual interests may differ, but everyone’s position was the same: “I think it’s rare that you have so many different interest groups working together efficiently, they’re often at odds, often in litigation with one another, over timber values and allotments, other hot button issues... But we can get together during these [EIS] meetings and work together on this topic... If the issue is detrimental enough to everybody, it doesn’t matter if we’re not all in agreement on what the dollar value of a linear foot of spruce is this week, we all recognize that nobody wants budworm” (NB comm member 6). This allowed for a high level of internal collaboration, which administrators said that prior to even considering the public, was an achievement on its own, and served as a solid basis from which they could establish how to approach the public.

As the research program progressed, they chose a public communication strategy which focused on informing the public of their actions and the reasons behind them, and providing opportunities for individuals and groups to share their questions and concerns. The emphasis was not on integrating external interests in the EIS process, but using various modes of communication to provide opportunities for external voices to share their own values and priorities, and engage researchers about how the values and priorities of the EIS did or did not support them. Administrators often spoke of an assumption by the public that SBW actions are motivated by industry interests to the exclusion of others. Because of this, interviewees wanted to inform the public on why actions were being taken, and address value conflicts early in the EIS process so that the decisions that had already been made were transparent and accessible.

Scientists have been placed at the forefront of the communications to the public, because of their perceived role as a neutral facilitator in communication efforts; they are there to “inject facts that should be part of the conversation” (NB comm member 1). Scientific information is perceived by interviewees as value-free, but the interpretation of that information and the decisions made using it are recognized as value-laden. Each of the scientists in New Brunswick talked about how the information they provide stakeholders and the public serves as a starting point that allows all parties to discuss not only their preferred actions, but the reasons behind them. While the research program is largely defined and in the process of being implemented, the belief on the part of program administrators appears to be that the science allows for the sharing and reconciling of differences in interests and values.

Much like New Brunswick, the first hurdle that administrators identified in Maine was bringing together the primary actors responsible for SBW response: industry, academia and government. Administrators stressed how important it was to achieve agreement between these three groups, who were often at odds over forestry practices in the state. Once again, SBW served as a common enemy that brought these actors together to then identify areas of agreement in designating priorities, and provide the opportunity to discuss the necessary tradeoffs in values and priorities. Once this was accomplished, a draft of the task report was completed, and then presented to stakeholders and the public throughout the state to receive feedback. The history of SBW in Maine motivated this strategy, as administrators knew that if they failed to make their values and priorities clear, and failed to engage the groups and individuals who were most vocally opposed to operations in the previous outbreaks, relations with the public and forestry in general could suffer. Their engagement efforts centered on outreach and collaboration. They

presented the draft report, solicited feedback, and integrated that information into the final draft of their SBW recommendations.

Interviewees stressed that they used science as a foundation for discussion, much like New Brunswick, but also made clear that the ranking of priorities in Maine has been a different process from their Canadian counterparts. The major difference comes from the composition of ownership of Maine's forests. Since the vast majority of forestland in the state is privately owned, either by individuals or forest companies, the understanding is that SBW is going to have different priorities for both the government and people of Maine than in New Brunswick. In Maine, the Maine Forest Service and researchers with the University of Maine are taking on an advisory role, as outlined in the final task force report. This means that the choice of what to do about SBW when it arrives in the state lies with the private landowners. As such, as interviewees explained, the roles and responsibilities that were negotiated at the outset of the task force in 2013 were done so deliberately to accommodate the fact that the responsibility to act, and to finance these actions, were no longer the purview of the state. Within the task force report, as a result of the initial debate over what went into the draft as well as the feedback received and used in the final report, positions and interests are outlined at length, along with the interests related to non-intervention. The report was not meant to persuade stakeholders and the public about decisions that had already been made, which has been the case to a large degree in New Brunswick, but to provide as much information as possible so that independent landowners can consider their interests and accompanying values as they make their own decisions.

Communication mode

The modes of communication in Maine have come in two stages: the period after the drafted version of the task force report was made available to the public, and the current period

that began once the final draft was released. The first period was a combination of one-way and two-way communication, but with an emphasis on two-way communication, particularly with groups perceived as being directly affected by SBW. The initial plan for addressing SBW was formulated by a small group of primary stakeholders - those with a legislated responsibility for SBW – but the guidelines and recommendations that were presented to groups during the comment period had not been formalized, let alone implemented. This meant that in addition to hearing questions and concerns from the groups and individuals that had been identified as having a stake in the issue, those questions and comments became the vehicle for revisions made to the initial plan. These processes were not as in-depth as would be necessary to meet the criteria of deliberative communication, particularly since the groups presented to were most often groups with a vested interest in the outcome of a SBW intervention (discussed at length below), but the two-way communication that was used had a measurable impact on the content of the final report.

Following the release of the final version of the task force report, communication has become rather static and is performed in a one-way direction. Because Maine is in what one administrator called a “holding pattern, the calm before the storm” (ME comm member 1) prior to an outbreak situation, communication with the public has taken the form of occasional media stories, and an informative website that provides information on research in Maine and Canada. The website has an interactive section where members of the public can submit questions they would like answered, but little else is being done at this time. The key focus now is to have information accessible for when the public does gain interest, and to be open and transparent about what is being done and why.

While time has been on the side of administrators in Maine, New Brunswick has felt its constraints in how administrators choose to communicate. A great deal of effort went into the early stages of the strategy to get information to groups identified as stakeholders, and to a lesser degree, the public, about what had already been planned for the research strategy. This took the form of a network of informed community leaders, informed stakeholder groups, and a proactive system of media outreach and information accessibility. As SBW population numbers began to rise in New Brunswick, and research efforts progressed, this network was kept informed of the progress, and often had the opportunity to raise concerns, but with little impact on the direction of research. Because decisions have already been made, questions and concerns are addressed in a one-way format, or in a two-way format that does not impact program decisions. This is done through informational meetings, media stories, educational science outreach (to schools or with the Budworm Tracker program, a citizen science program described below), and an informational website. The refrain from New Brunswick administrators, particularly non-scientists, was the desire to control the message, keep it fact-based and focused on the science, and in general “keep people informed.”

Level of shared decision authority

When consulting the levels of shared decision-making in the IAP2 spectrum in Figure 1, New Brunswick appears to fall between *inform* and *consult* with their communications strategy. They inform the public, using scientific information to “provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities, and/or solutions” (Nabatchi 2012, 703), and do so using a number of one-way communication techniques, as discussed above. The second level of the spectrum, *consult*, consists of a promise to “listen to and acknowledge concerns and aspirations, and provide feedback on how public

input influenced the decision” (Nabatchi 2012, 703). New Brunswick administrators have achieved only part of this, with their two-way communication techniques allowing for groups and individuals to express concerns and ask questions; however, these communication processes have occurred primarily with stakeholder groups, with the general public receiving less attention, and because decisions are already made for the research and treatment strategies, feedback is typically addressed with information on how the EIS will or will not assuage any concerns.

Maine administrators’ advantage over New Brunswick in relation to timing allows for their communication and outreach strategy to be firmly in Nabatchi’s *consult* category of shared decision authority. While the strategy set forth in the task force report is targeted primarily to forestland owners, the six-month period in which they presented their recommendations to groups throughout the state allowed them to “obtain feedback on analysis, alternatives, and/or decisions” (Nabatchi 2012, 702), which were then integrated into the final report, with specific recommendations and ideas being directly attributed to this process in the draft presented to the public. Comments from several Maine administrators also suggest the door to the next level of shared decision authority, *involve*, may be open once SBW begins to show outbreak-level numbers in Maine’s forests, with plans for additional comment periods and strategy revisions a possibility in the future.

Participatory mechanisms

The Maine task force report is intended to serve as a plan of action, a document that can be used as both guide and reference once SBW populations begin to rise and an outbreak becomes an issue of immediate importance. Maine interviewees credited their ability to prepare ahead of time to New Brunswick administrators, whose research and communication efforts had to be decided in the moment, giving Maine’s administrators a vantage point from which to learn

prior to an outbreak occurring. This temporal difference has proven to be key in terms of participatory mechanisms: the task force draft report was presented to a number of stakeholder groups, as well as several public groups, “anyone that would listen” (ME comm member 1), and through this months-long process the plan for a SBW outbreak evolved with the comments that were received. The final report was itself a product of a widely-cast net of mechanisms; these often took the form of large group presentations, in which administrators presented their recommendations, followed by individuals from the audience speaking one at a time, asking questions or providing comments. This meant that the recommendations in the final draft, which included information on forest management and harvesting, fish and wildlife impacts, policy considerations, and the communications strategy itself, all received input from stakeholders and interested members of the public prior to any research or mitigation efforts being put in place.

This was not the case in New Brunswick; a research plan was formulated first, funding was sought and obtained, and as the program operates, participatory mechanisms are typically given in a presentation format where the research and treatment plan has already been implemented and now the goal is to provide information and address questions and concerns. The outreach mechanisms usually take the form of booth displays, which are designed to reach as many people as possible, but with interaction happening with just a few individuals at a time. Otherwise, mechanisms are presentations to interested groups, and are typically targeted, either to stakeholders or public/interest groups that have communicated their concern. Interestingly, the preferred method in New Brunswick appeared to depend on the role of the administrator, with scientists more willing to engage with diverse crowds in a two-way conversation, while non-scientists preferred more controlled settings, eschewing open public forums for more targeted presentations. One administrator said “[it wasn’t] hey, everyone who has an opinion please come

to this town hall, because they can often fall apart very quickly, in some parts of the province... it can just get derailed very quickly” (NB comm member 3).

Regardless of the format, administrators have placed emphasis on scientists being the spokespersons for the project, essentially considering them as neutral arbiters who are there to provide information on the underlying science. This was a deliberate decision made early in the strategy, for several reasons. First, because this is a scientific research project, administrators felt that scientists should be placed at the forefront, since they had the necessary expertise to explain the decisions that had already been made. While other experts would often be made available to speak on issues of provincial support and involvement, health concerns and environmental concerns, scientists were placed in front to emphasize the scientific nature of the SBW efforts. As part of this, scientists are expected to be what Keller (2009) would consider “boundary observers,” able and willing to speak about scientific matters, but leaving social and political issues to others; several non-scientist interviewees volunteered opinions about how well the scientists in the group had assumed this role. Finally, several interviewees believed that because of the controversial history of SBW programs, scientists were in a position to capitalize on the trust and respect that citizens and stakeholders alike have for the profession, thus using that as a mechanism to build and maintain trust in the current program.

Serving as a dual component of the EIS, as both research strategy and public outreach, the New Brunswick team has also recruited private citizens as part of the Budworm Tracker citizen science project, which involves citizen volunteers placing and monitoring SBW pheromone traps on their property, providing data for the researchers and engaging them directly in the scientific process. The hands-on nature of this mechanism is part of the reason New Brunswick interviewees believed the citizen science effort had been successful: “If we were

spraying the pheromone, people might say ‘let’s stop spraying that,’ but because you can touch it, it’s become accepted that this is research... I think it has the feeling of, it’s safe, and this is good, we’re doing our part... [And] then you have a lot of advocates that are already engaged in the community” (NB comm member 2). Interestingly, one scientist described the initial attempts to move forward on the citizen science project as being poorly received by non-scientists in managerial positions. The idea was not intended as an outreach effort: initially, it was suggested as a way to more efficiently gather data across the province. However, management was wary of inviting any more attention to the EIS than necessary, fearing that additional attention would result in unwelcome conflict. Somewhat surreptitiously, scientists began setting up a limited trial of the Budworm Tracker program, and once positive feedback started to come in from outside the program administrators, the doubtful administrators finally became proponents.

Informational materials

With science being the core of the information that is being presented to stakeholders and the public, and scientists acting as spokespersons, EIS administrators each recognized a need for consistent, easily understood wording and terminology, and a need to be forthcoming about the level of uncertainty in the anticipated results; misunderstanding and confusion was identified as a failure on their part, and not on the part of the public. The complexity of the issue was acknowledged, but each of the New Brunswick scientists stressed that it could be explained using analogies, finding parallels, and not overburdening the public with unnecessary information: “When they ask a question, we do our best to answer it, but they don’t need a two-hour lecture about the mechanics of budworm, they just want an answer to their question” (NB comm member 6).

Consistency was also mentioned by several New Brunswick interviewees, in both message and wording, so that the public would not be confused by slightly different messages coming from multiple sources, and as a way to help those receiving the information better understand it: “You have to hear things more than once. Whenever you’re introduced to a topic, you hear a presentation, you’re going to pick up a few things. The next time, you’ve got those in the bag, you pick up a few more things, start paying attention to the details. At some point, you know enough to start asking questions. The first time you hear something, you’re not going to ask a question, you have no idea what question to ask” (NB comm member 2). This was important to the scientists, who each emphasized the need for the public to ask questions, and challenge their decisions: “It’s good we have those watchdogs out there, questioning what we do... we need people who question what we do, and we also need to be very proactive when we have something and we have to get out there” (NB comm member 2).

In communicating the science, New Brunswick interviewees also stressed that the information being provided needed to contain an explanation of the inherent uncertainty in scientific research, so that they were not repeating the mistakes made by the spokespersons for the last outbreak who gave a false sense of certainty to the defeat of the SBW. “The message is always tempered with, this is a research strategy we’re testing, we don’t know if it’s going to work... we’re not calling this a victory, and it’s probably never going to look like an outright victory, but: is this something that looks better than the alternative?” (NB comm member 6). Part of the goal of communicating the science, according to several interviewees, was to also explain the science of alternative scenarios where the SBW was allowed to spread naturally without any type of intervention attempt. This was done in a way that tied SBW to other issues of interest, such as fishing habitats, forests as carbon sinks, or dead trees as additional fuel for forest fires.

The goal was to find the “hot button” issue that would help them understand not only what was being done to address SBW, but why it was being done as well.

Responses from Maine administrators were similar, in their desire to make scientific information, as well as the political, economic and technical information, both available and accessible, by using language that could be understood by a layperson. Once again, the communication of uncertainty was stated as a priority: “We want to take people along with us, whether it’s good, bad, or whatever, so they see what we’re seeing... We’ve made the best plan we can, and we’re willing to change it if it comes to that... Now we have to see what’s coming and when” (ME comm member 3).

The most frequent theme in the communication of information in Maine was that the story needed to be reframed. Administrators did not want to suggest that this was going to be another “Battle of the Budworm;” information in the task force report and on the Maine website focuses on the fact that the SBW is a native insect, the expected outbreak is part of a natural cycle which ought to be managed, but not destroyed. “That’s what the environmental movement has taught us, that you don’t have a battle with Mother Nature – you can’t. You can’t have a battle on budworm and think you’re going to win it like a war... You have to roll with it and do your best, and I think that’s what people are trying to do this time” (ME comms member 3).

Participant selection and recruitment

Because of the lead time Maine has for an outbreak, selection and recruitment was done slowly and deliberately, since there was no immediate threat that needed to be addressed.

Administrators in Maine chose to first focus on the primary stakeholders: industry, landowners and university researchers. Three of the four interviewees from Maine stressed the often-antagonistic relationships between private landowners, industry, state agencies and university

scientists, whose own priorities and values are often at odds and frequently result in some form of litigation or contract dispute. Because achieving agreement between these groups was identified as the biggest obstacle, their voices were the first to be recruited. Following this initial core of the task force, incremental and deliberate choices were made about who would participate in creating a first draft of the task force report, so that agreement could be reached on what the technical, biological and political issues were that needed to be addressed.

Administrators recognized that other groups, particularly environmental groups, shared an interest in the issue of SBW, and the decision was made at the beginning of the task force efforts that once industry, landowners and researchers came to an agreement, the pool of participants would need to be widened. Once the first version of the report was drafted, administrators actively engaged environmental groups, non-governmental organizations and local and state Chambers of Commerce. They traveled throughout the state for approximately six months, addressing interest groups and holding public meetings where they presented the plan they had drafted, accepting feedback through both written and oral comments. Presentations were made primarily to stakeholder groups who had a direct interest in the effects of a SBW outbreak.

Members of the general public, according to Maine administrators, are thus far mostly uninterested in the issue because there has yet to be a visible indication of a problem. The opportunity for public recruitment was there, but only through a method of self-selection, which primarily included individuals for whom SBW was already a salient issue. Announcements for meetings with stakeholder and public groups were publicized through newspaper and radio, and on group and local government calendars, but other methods to advertise these interaction efforts were limited by financial resources. With the delayed onset of SBW, time was on the side of

Maine administrators, but public interest was not; administrators suggested that their goal of a proactive strategic document required decision-making prior to the public understanding their stake in a threat that had not yet materialized, and so participation in identifying external values and interests was limited as a result. Presentations to the public included sections regarding “How this Affects Me,” as an effort to raise interest in the issue, but as one administrator said, “Sometimes you can only reach the people that already want to be reached” (ME comm member 4).

Administrators in New Brunswick did not engage in a similar form of selection and recruitment, since, as one administrator said, “the outbreak was at our door, and we needed to get the information to the people that needed it, and fast” (NB comm member 3). From the outset, there was a priority on stakeholder engagement, with the communications team beginning by establishing who needed information, not only on the progression of the outbreak coming from Quebec but also on the research the New Brunswick team was doing, what that entailed and where it was going to be happening. Once stakeholders were identified, the next step was to engage each group through meetings and presentations, solicit questions to address any concerns they may have, and provide any pertinent information for tree growers and woodlot owners, foresters, camp owners, fishing and hunting groups, and smaller forestry businesses.

In addition, administrators engaged provincial officials and community leaders, especially in New Brunswick towns along the border of Quebec in areas that were most likely to see SBW effects. The intention was to provide information about the EIS to authority figures, either official or unofficial, so that when any group or individual with an interest or concern about SBW or the research activities being carried out looked to these community leaders for information, they would be able to address them. One administrator emphasized this strategy as

not only a way to get information to those who needed it, but also to eliminate the potential hazards of trying to address the public as a whole: “You get the information out early, as soon as you can, and you speak to the influencers in that community and have them understand it. There was an issue, and instead of just throwing it out to everybody, you go to the important voices” (NB comm member 3).

With the New Brunswick strategy, members of the general public receive some outreach, with members of the communications team setting up booths and giving presentations in schools and small communities. However, for the most part, members of the public are engaged in the same way researchers approach SBW epicenters – attention is given to the “hot spots,” communities that appear to have concerns, and so receive additional visits and presentations from scientists or additional media coverage in that area. Direct selection and recruitment remains focused on stakeholders that are directly affected, those “who *actually* care” (NB comm member 5), while a network of informed opinion leaders has been set up to prepare for those who *might* care.

Recurrence and iteration

Interviewees in New Brunswick characterized their communication strategy as one that was constantly in motion and constantly evolving. SBW outbreaks can last ten years or more, and as the four-year funding period for the EIS comes to a close in the next calendar year, new funding proposals are already being developed to submit to ACOA and the federal government, with support for public communications efforts now a part of those proposals. The goal is to keep SBW in the forefront, so that when circumstances require it, information and the experts who wield it are available and accessible: “We don’t take our foot off the pedal, it’s continuous stakeholder engagement... being highly responsive when we get questions from the public. The

whole group has not let off. I guess we could be coasting but we just haven't, as we've been going, staying tuned, continuous stakeholder communications... And it's a two-way dialogue, hearing what other people are saying, and how we should be adjusting our [communications] approach" (NB comm member 5).

To the New Brunswick administrators, this means a combination of proactive and reactive strategies. One member of the team with multiple media connections discussed the relationship achieved with journalists, whose frequent interactions with SBW administrators have given them the knowledge of who to come to when there is a new circumstance to cover. Other administrators are continuing to attend industry conferences, science outreach events, and scientific conferences to share their research, and will send experts and representatives to speak to organizations that request it.

Maine's frenzy of activity in the three years between the formation of the task force to publication of the final report has mostly come to an end. As news of the progression of the outbreak in New Brunswick makes its way to foresters and scientists in Maine, representatives from the University of Maine and the Maine Forest Service will give presentations and answer questions as needed, but all interviewees from Maine have said that there is little activity while Maine waits for SBW to begin to grow in numbers. "I think for the most part we kind of consider ourselves in waiting mode at this point: make resources available to people, make sure they can find stuff when they're interested in it, but not that kind of Peter and Wolf scenario, where we keep warning people... [and] no budworm shows up, and they just get tired of waiting for it and start to lose faith in the whole process" (ME comm member 2). Several administrators shared this view, that an alarmist tactic was not one they wanted to take.

Discussion

The two programs that have served as the basis of this research share several similarities. Serving as the main impetus behind each is the legacy of past SBW outbreaks, along with conflict over forest practices more generally. Administrators in both programs acknowledged the missteps of government and industry during past SBW outbreaks, in their approaches for treatment, as well as their misguided efforts to act first and inform the public later. Both programs sought to address this through communication efforts, beginning by gathering the primary actors who either had a legislated responsibility, or a vested interest in SBW mitigation – state agencies, industry representatives and academic researchers – and devising a strategy for how best to move forward. They focused their communications on providing scientific information when possible, and did so in a way that they perceived as being open and transparent about their intentions as well as their actions. The differences between the programs, however, are significant, and reveal several interesting insights.

First, as was discussed previously, each program conceptualized their efforts differently. In both New Brunswick and Maine, there was the obvious focus of a directed intervention in the spread of SBW, but the initial priorities of each group diverged. In New Brunswick, the EIS was developed and adopted with scientific research and application as the main concern. This was a large, complex and detailed research program that was set in motion rather quickly, in order to address the rising SBW populations seen on the province's border. It was only once this large research effort was put in motion, however, that the public component of the program was conceived. This was done with the “legacy of DDT” and communication failures of the 1970s in mind, but also as a response to the potential consequences of a public motivated to react, as seen

in Cape Breton during the last outbreak. EIS administrators focused on the need to create an environment in which they could perform their jobs as researchers, and as those responsible for managing Crown forestland. They did this by focusing on the scientific element of the program, perceiving the public in general as a group that needed to be kept informed, but also managed, so as not to upset their research strategy. Pertinent stakeholders were identified as those directly affected by SBW – woodlot owners, salmon fishers, and other groups that in some way utilized the forest as a resource. New Brunswick has focused on stakeholder engagement that involves a degree of two-way communication, but this is done more to inform and reassure, rather than use feedback to alter the research plan that drives the EIS: public values may influence the information that is shared by scientists and experts, but do not play a role in the decisions ultimately made in SBW management. If citizen groups or communities voiced concerns, this was addressed on an “as needed” basis in the “hot spot” style mimicking the research strategy. Town meetings and other community interactions were organized if necessary, with scientists leveraging their trusted position to address the values and priorities voiced in public concerns, but more often than not this format was avoided. To maintain control over the information and messaging, New Brunswick officials laid the groundwork for a network of opinion leaders, who could serve as the point contacts for members of the general public who required answers. Each element of public interaction was tightly controlled – the participatory mechanisms, the information that was shared, the methods of communication – for the EIS officials to continue their research and treatment strategy.

In contrast, from the outset Maine viewed their mission to be the creation of a proactive strategic document that encompassed the scientific, technical and social aspects of the upcoming SBW outbreak. While they also limited initial involvement to a select few – the University of

Maine, the Maine Forest Service and landowner representatives – this was done with the recognition that the issue was one which had to be expanded beyond that narrow scope. Maine interviewees frequently brought up the negative consequences resulting from the lack of an informed public following the outbreak of the 1970-80s. Administrators discussing the Maine Forest Practices Act and the contentious referenda of the 1990s recognized that these situations were created by treating the public as passive consumers. Prior to the changes in the forestry markets, as one interviewee explained, the “pulp mills were king, they didn’t think they needed to answer to anyone, be that the state or its citizens, they would just do as they like and the public would accept it” (ME comm member 4). Administrators expressed their belief that if there had been a channel of communication, if citizen concerns had been addressed directly rather than dismissed, and if SBW officials of the past outbreak along with industry officials had been willing to engage members of the public, much of the conflict could have been avoided, and forest practices might look very different today. Their current efforts are designed with this in mind, and that is what prompted the months-long public feedback process that informed their final report. There was still a measure of control, particularly in expanding the circle of stakeholders, but this was done less to restrict involvement but to allow for each circle of participants to come to agreement prior to expanding the range of possible concerns. The communication methods were more open, with two-way methods of communication, and broad sources of information ranging from the scientific unknowns, to issues of technical application of treatment and harvesting, to policy and engagement efforts. Public values and priorities were directly linked to the recommended strategies, and were clearly identified in the final task force report, which was made publicly accessible.

Conclusions

The goal of this study has been to disentangle the factors that influence whether, and how, public involvement in decision-making is being integrated in programs focused on the SBW in New Brunswick and Maine. Nabatchi (2012, 706) notes that design choices for participatory programs can help administrators identify and understand public values, however “identification and understanding are only the first hurdles in addressing values-based policy conflicts. Sometimes administrators must also rank, aggregate, or select among competing public values and connect those values to specific contexts for public action.” This aptly pertains to the competing values that each program brings to the concept of public involvement, which cannot be excluded when examining each of the participatory design elements identified by Nabatchi.

New Brunswick administrators have approached their SBW mitigation program, in the form of the EIS, as a scientific endeavor, one that requires a measured level of public outreach and engagement, with scientists leading the way as neutral arbiters. On the other side of the border, Maine administrators have engaged the scientific nature of SBW, but in a way that focuses on expanding the inclusion of public values beyond a narrowly defined group of stakeholders, to a larger, more pluralistic process of incorporating voices who wish to be heard. Each program has chosen to approach public participation as a method of management. New Brunswick is attempting to manage the public’s reactions and perceptions in order to avoid the conflict of the past, to allow themselves the latitude to complete their scientific and treatment goals. Maine is attempting to manage the underlying knowledge and understanding of the public, to engage as many groups as possible in a way that incorporates their values, and to publicize what they are doing to the largest degree possible so that an unchecked and ill-informed

democracy does not make the mistakes of the past. This is particularly interesting – possibly even counterintuitive – because of the differing roles of the two programs. With three million hectares of Crown forestland in the province, administrators in New Brunswick have a formal duty to manage this land in the interest of the public. The story is much different in Maine, because of the shifting roles of those with a legislated responsibility to respond to SBW and the fact that the vast majority of forestland that will be affected is privately owned. Ultimately it will be private landowners making decisions about how to approach the SBW when it arrives. Even with these responsibilities, New Brunswick has chosen a narrow definition of the issue that results in a one-way communication strategy of informing, primarily only when public concerns become “hot spots” that need to be attended to. Maine, without the public responsibility for treatment, has still worked to not only take their recommendations to as many groups as possible, but has plans to expand their efforts to members of the general public as soon as SBW numbers begin to rise.

Poliakoff and Webb (2007) did not find that fear served as a motivator for scientists in their decisions to engage the public, but it appears that in both cases fear is driving administrator efforts. It serves as an explanation for problem definition, and as the driving force of decisions made for each participatory design element. The primary goal of administrators in New Brunswick is to manage the public so that they are able to continue their planned strategy of research and treatment; the results of the public backlash in Cape Breton that forced officials to essentially abandon the forests of Nova Scotia to the natural dynamics of SBW has left its mark. They are driven by a fear of not being allowed to do their jobs, and have designed their strategy to placate concerns rather than integrate them, provide scientific information and only bring in other areas of knowledge (such as Environment Canada) when specifically prompted to do so.

The case of the Budworm Tracker program's uncertain beginnings is suggestive of managers' fear of bringing more attention than necessary to an issue that could result in uncomfortable confrontational experiences.

Administrators in Maine are also motivated by fear, but it is fear of democratic processes that are not supported by full information. They acknowledge that the decisions on how to address SBW will ultimately be decided by private landowners, but they recognize that regardless of who is making the decisions, the public will be watching, and has the power to act in a way that drives forest policy and management with repercussions that last far into the future. This fear has resulted in a different public involvement strategy, with each expansion of interested voices engaging new values and priorities that have a direct connection to the ultimate recommendations of the Maine SBW task force. Conflict has been managed, not by seeking to avoid it, but by managing the amount being engaged at any given time by slow and deliberate expansion of the groups involved in the discussion. Communication has been based on scientific information, but has also included recommendations for policy, and a detailed discussion of how to educate various groups among the public about the causes, consequences, and alternative options for SBW. The actions of Maine's administrators adhere to Buchy and Hoverman's (2000) idea of citizen empowerment, in which the public has a solid foundation of information received through education efforts, so that they have the basis to form attitudes regarding the program even if they are not directly involved in the ultimate decision-making process.

Interviewees in both programs have discussed the need to establish or reestablish trust with the public; the two cases diverge in the degree to which their actions support this idea. New Brunswick administrators have pointed to the lack of formal complaints to any government agencies as a mark of the success of their communication efforts. However, this only supports

that residents of the province have not been given enough of a reason to contact a government agency. Acceptance does not necessarily equate with approval, and no efforts have been taken to ascertain a comprehensive examination of public perceptions and attitudes regarding the program. Satisfactory service delivery has been connected to citizen trust of government administrators (DeHoog, Lowery and Lyons 1990), which would encompass this situation in that the program officials are engaging in a service that is not being contested by residents. However, trust is not an equally balanced resource: it takes far more effort to regain trust once it has been lost than it does to establish a high degree of trust from the outset (Hetherington 1999). Because of past experiences, as survey results seem to support (see Chapter Two), the public does not trust all of the actors involved in SBW mitigation. If administrators in New Brunswick truly wish to ascertain the views of the public, changes must be made in their methods of participation. They have chosen to limit the opportunities for two-way communication, which, in addition to being a way to understand the plurality of public values, is also the way to gain feedback on their actions. In their efforts to maintain their research strategy, they have accorded the public a passive role, which has the potential to derail their efforts of management and containment.

In addition to constraining themselves in receiving feedback, New Brunswick administrators have also taken a risk in their identification of relevant stakeholders; Maine administrators have taken deliberate steps to include groups of stakeholders that have typically been at odds with the initial task force members and other stakeholder groups, especially environmental groups. The New Brunswick EIS has many partners in industry, and academics from the local universities, but environmental groups are markedly absent from that list. Thus far, officials in New Brunswick have not seen the need to expand the partnership to environmental groups in the province – as part of the narrow definition of the problem and

relevant stakeholders, they do not wish to expand the level of conflict that additional partners could bring. Maine officials have actively engaged environmental groups in their conversations, and have essentially left the door open for changes in their strategies and recommendations as SBW events proceed, based on the feedback they receive.

The story that program administrators have crafted has a direct influence on how participatory practices are designed. New Brunswick has defined the problem as a technological matter that must be controlled by experts; Maine has defined the problem as a public policy issue which the public must be educated about to address it properly. Each of these definitions has resulted in a different participatory strategy, with New Brunswick strategizing based on public “hot spots,” and Maine constructing a foundation of public information that is openly and transparently documented, with public values and priorities integrated within. Ultimately, the definition of the issue interacts with motivations and decision-making to have a significant effect on democratic participatory opportunities, and requires additional scholarly investigation. This research has presented a tale of two regions, with the benefit of starting from an identical natural resource threat so that divergences in strategies could be clearly identified. Future research must expand beyond this exploratory case study approach, to ascertain the ways environmental programs are defined, and how this alters participatory efforts, particularly based on the roles and responsibilities of those involved. When formal requirements for participation are absent, as can be the case in long-term management issues, understanding how the issue itself does, or does not, lead to participation as both norm and method is crucial to the discussion of participatory decision-making.

Chapter 5: Conclusion

The primary purpose of this research has been to shed light on the complex and controversial issues inherent in forestry in New Brunswick, and to better understand how this relates to issues of representation and democracy in the province. The preceding three chapters offer only one part of the overall picture, but provide several interesting themes throughout. The story that one takes from these issues is one of trust, power and control. I conclude this dissertation with a discussion of how these themes tie together the separate issues of individual trust, media framing, and decisions for public involvement.

Chapter Two engaged literature on political trust at the national and local level to present a model of trust for provincial government, scientists and academics, and the forest industry in New Brunswick. These models were issue-specific, and examined several factors that could be expected to influence individual trust in these three groups when focusing on the spruce budworm outbreak. Trust in the provincial government appears to be the result of contextual political forces more than anything else, with federal trust serving as the strongest predictor. With only knowledge of treatments appearing as a substantively significant influence on trust in government, and only at a marginal level of statistical significance, it seems that citizens do not perceive elected officials as a significant player in spruce budworm management.

Industry clearly receives a boost from a higher level of policy congruence, which is not surprising given that forest management tends to err on the side of industry priorities. It is logical, therefore, that those who are satisfied with forest management are going to be the same who invest more trust in industry overall. Interestingly, despite the clear differences in trust for industry between communities, as exhibited in the nested analysis of variance, level of

dependency did not exhibit any significant influence on trust in industry. However, when industry interests do not appear to be at odds with public interests, as is the case with greater knowledge of treatment options, industry receives a greater level of trust. This gives some benefit to an entity that is already at a disadvantage in terms of public trust.

Scientists receive a greater level of trust than either government or industry from the outset. However, the most interesting relationship appears to be the moderating effects of community dependency and policy congruence. The interaction between these two shows that individuals living in communities that are more vulnerable to the dynamics of forestry place their trust in scientists more when they are *not* in agreement with forest management, suggesting that scientists are looked to as the source of correcting the problems the public perceives. The public's level of trust for all three entities is based on political performance and outcomes to a large degree, but knowledge also plays a part in their levels of trust – primarily in their knowledge of the actions being taken to treat the outbreak. From this, we can ascertain that the higher levels of trust for scientists places them in a position allowing for greater leeway in their actions, one which has the potential to play a large role in regaining public trust, but one that is also constrained by the environment in which they operate.

One of the constraining factors is illustrated in Chapter Three, concerning the frames in communication in the local, industry-owned newspapers of New Brunswick. The role of the media is to inform, and provide citizens with the necessary tools to adequately assess what is happening in the world around them. Newspapers are assumed to reflect the communities in which they operate, by providing a platform for a plurality of voices and viewpoints, and serving as a public resource. In New Brunswick, the relationship of the media and citizens has been complicated by the allegations of interference on the part of the Irving family, who not only own

the company that publishes all three local daily newspapers, but also control the largest share of forestry businesses in the province. The results from the framing analysis suggest that there is a trend in local newspapers for a narrow presentation of forestry issues, more likely to be framed in a way that indicates these issues are the purview of industry rather than issues that are open to public inspection and debate. The first serious allegations of a media monopoly were brought against the Irving-owned newspapers in 1971, and have resurfaced many times over through federal inquiries, investigative journalism pieces, and scholarly articles. Yet, there have been no consequences as a result of any of these investigations: recommendations to change laws and regulations have gone unheeded, and the Irvings continue to maintain control of all English-language news publications in the province.

This is the context in which early intervention strategy (EIS) program administrators are attempting to operate. As Chapter Four discusses, administrators in New Brunswick have chosen a public communication strategy that focuses on informing the public by placing scientists and their research at the forefront of their communications. This is a science-led solution that they have designed to address what they have identified as a science-based problem. Maine has embarked on a similar strategy, but has included an element of public involvement that allows for a direct and measurable public impact on their recommendations for treating spruce budworm. Ultimately, private landowners are responsible for addressing the outbreak in Maine when spruce budworm reach outbreak levels in the state, but the recommendations they are receiving from the spruce budworm task force have integrated the values of many stakeholder groups, including environmental and citizen groups. Because the administrators in Maine have defined spruce budworm as a social issue as well as a scientific issue, their strategy of communication seeks to engage and educate the public. While administrators in New Brunswick

believe their efforts allow them to understand public values through the questions and concerns they receive from stakeholder groups and members of the public, there are few concrete examples of this that can be presented to the public.

Power is what motivates this dissertation, as the nature of New Brunswick forest policy is built on a system of power that is subject to the needs of industry. Were this not a natural resource issue, it could be construed as an iron triangle, but iron triangles are powerful in and of themselves – here, we see government, industry and provincial agencies at the mercy of the global market, and the natural dynamics of the forest. As administrators from Maine explained in Chapter Four, you cannot engage in a war with nature and expect to win. EIS administrators are trying to change the trajectory of the relationship between citizens and those who manage a public resource, but if conditions remain as they are, it is hard to believe that measurable progress can be made. When the message of the scientists at the forefront of the communications program is that the EIS program is being done as a service to the province, and not as a handout to the Irving family, the policy decisions made at the provincial level appear contradictory. In a strange twist of fate in timing, the year in which the EIS began was the same year that the NBDNR forest plan was announced. The forest plan was controversial because of the lopsided benefits received by industry, to the point that even local media's narrow forestry news focus could not help but expand when the forest plan was covered in the three daily New Brunswick papers. When examining news content from those without interference from organizational pressures – in this case, the CBC – the forest plan is blamed on the public arm of policy actions, while the solution is also publicly-oriented. As discussed in Chapter Three, this has strong connotations for the presumption of government-industry collusion, the idea that government is rescinding its own power to regulate industry in order to please the entity with the most power

over the health of the province. From the outset of the EIS, scientists have been working against controversy.

The issue of trust runs through each chapter, from the explicit measurements in Chapter Two, to the recurring mention of it in Chapter Four. A stated goal of the EIS public communication strategy has been to gain the trust of the public, to rebuild the trust they acknowledge was lost in previous outbreaks. However, scientists have a myopic view of how to accomplish this, and are also not working alone. The presence of industry as a partner in these efforts is the albatross hanging about their necks, particularly with no citizen groups playing a major role in the EIS. Partners were chosen to suit the scientific research aspect of the EIS, without any thought given to incorporating environmental groups or other groups beyond forestry experts. This feeds the public perception that the power the forest industry wields over forest policy in New Brunswick results in decisions that place industry needs as a priority over the needs of the public. This appears to be particularly true for individuals living in communities that are most vulnerable to the winds of change in forestry, specifically when they do not agree with the direction forest management is taking, and they look to scientists to right these perceived wrongs. With the narrowly defined public communication strategy, however, scientists may be working against themselves. The shadow of these public perceptions loom throughout the political history of the province, as well as the levels of trust that are illustrated in this research.

Though not explicitly covered in Chapter Three, the implication of concentrated ownership in New Brunswick is certainly that the local media is a source that cannot be trusted. While the Irvings claim a policy of noninterference in their media enterprise, the framing of forestry in local newspapers suggests that there are internal organizational pressures operating on

the choices individual journalists make, and these pressures result in sources of information that are limited and lopsided in content. The accusations of interference have been made publicly, and it is hard to imagine that residents of New Brunswick are unaware of the monopoly the Irvings have on the information environment. Given the low levels of trust for industry overall, coupled with the fact that the only significant boost industry receives is from those who are already pleased with forest management practices, it seems plausible to say that the Irvings are not winning hearts and minds.

Control is perhaps the most pervasive theme within this research, but in a rather stealthy fashion. Of course, there is outright control seen in media framing. The content of local newspapers does not provide the full information citizens require to make informed decisions about the issues that are being presented. Whether that control is being directed through overt action by anyone in the Irving family is irrelevant, because the results are the same: local media stifles conflict when covering forestry issues, regardless of the specific issue being covered, and frames these issues as elite concerns. In addition, citizens of New Brunswick do not feel that they have control over the actions of government. The median score for political efficacy, as presented in Chapter Two, is 4.25 on a seven-point scale. While not abysmal, this level of reported efficacy is also not impressive in its strength. Though this measurement is not tied directly to the issue of forestry and spruce budworm, it comes after respondents were primed to think about these issues in New Brunswick, and it can be assumed that this level of political efficacy is their “top of the head” attitudes, suggesting a feeling of little control over forest policy in their own province.

What is perhaps least obvious on its face, but becomes clear when addressed in the full context of all aspects of this dissertation, is the element of control that appears in terms of public

involvement. New Brunswick and Maine face the same threat in the form of spruce budworm; each has a contentious history, with New Brunswick facing public protest and discontent over the use of pesticides, and Maine reeling from a political fight resulting from a series of public referendums to ban clear-cutting in the state. Administrators in Maine acknowledged that this came as a result of a discontented public who also had received poor and limited information, thus the administrators' desire to reframe the issue as one of mitigation and limitation rather than outright destruction. By informing the stakeholder groups most likely to be interested in the issue, Maine administrators were able to use the time they had to not only engage these groups in conversation, but reflect those conversations in the recommendations appearing in the final task force report. They recognize that while they cannot ultimately make the decisions private landowners will make on how to treat for spruce budworm, it is their duty to not only inform the public and public groups, but to be informed by them so that the options are fully representative of the values and viewpoints of many groups.

In New Brunswick, public communication came as an afterthought. The spruce budworm threat was identified early by both government scientists and industry members, whose priority was to get funding for the research and treatment plan they had devised in the form of the EIS. Administrators in New Brunswick claim that they did not have time to go through the resource-intensive process of receiving public feedback, and it is accurate that time posed a major constraint once the research project was established, but this was because the research strategy was designed without public involvement even being considered. It became part of it after funding had been received, and after research plans were already put in place. This was done not as a public service, but because of the need for control. The need was for a passive New Brunswick public to remain passive, because the alternative would mean that research and

treatment efforts would be hindered. Ultimately, the New Brunswick communication program was instituted so that scientists, researchers, and industry representatives could continue to do their job. There was no evidence of malice from the administrators – all felt that the public was capable of understanding what they were doing, and achieving public understanding counted as a successful communications effort. But they continue to operate in a province in which control is necessary for the forest industry to thrive. The public must be taken out of the equation to deal with what is perceived to be the greater threat – spruce budworm, and any other natural threats to forestry. Scientists were eager to communicate with the public, and listen to their concerns, and this seems to come from placing a genuine priority on informing the public, but non-scientists spoke often of controlling the message, controlling the way it was presented and the mode of communication. Provincial leaders were contacted to act as gatekeepers, so that they had the correct message to provide to concerned constituents. Stories were taken to local media, where the message continues to be one that is a message of control. There are no town meetings, no solicitations for improvements or any messages of fluidity based on public feedback. The focus is on one-way communication, to inform and therefore placate. There is a need to control the message, control the program, and control the budworm.

This offers a very complicated picture of the democratic processes of New Brunswick. Industry pervades all aspects of forest policy and management. Industry helps sustain the economic engine of the province, and provides for the livelihoods of a large number of New Brunswick residents. Major industry players, including the Irving family and their forestry company, J.D. Irving, Inc. (JDI), are aware of this, and are able to use this as leverage to influence the decisions made at the provincial and federal level. This can be seen in the NBDNR forest plan, and while there is no direct evidence, several sources for Chapter Four suggested the

Irvings were at least partially responsible for obtaining funding for the EIS. The outsized role of the forest industry places local news media in a direct conflict of interest based on their JDI ownership, and regardless of how pressure is brought to bear on journalists' decisions, that pressure is real and is evident in the way forestry news is framed. Science is perceived by a segment of the public as the means for the public will to be achieved in forestry, but scientists are constrained by the environment in which they operate, as well as their own perception of the spruce budworm issue as a purely techno-scientific matter. The New Brunswick public is, for the most part, shut out of the forestry conversation, and so their livelihoods and the wellbeing of their communities continue to be shaped by powers over which they have little control.

The resource-dependent nature of the province and its history makes a change in the balance of power difficult, maybe even unlikely. The ties between the provincial government and the forest industry undercut the role of the public in the province; the public receives only a limited voice through the election of representatives, because elected officials' hands are tied by their reliance on the cooperation of industry. The media is meant to serve as a linkage institution, a conduit of information that allows the public to hold representatives and major powers in the province accountable; this tie has also been weakened because of the control industry has over the content of the news. The pillars of democracy are thus undermined, and made vulnerable to exogenous threats, both natural and human-made.

This dissertation has shed light on some important questions of democratic power, but only provides a partial picture. It is the hope that this research will be the foundation for a greater exploration into New Brunswick, which is a unique region, but which serves as a microcosm that allows for inferences that expand beyond the province. The role of scientists in a resource-dependent economy, the frames in communication used as a result of media concentration, and

the program-level decisions on whether and how to involve the public in decision-making are issues that can be found in areas around the world. The consequences of each of these has the potential to shape the future of democratic institutions.

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Appendix A: Reproduction of Introduction Letter and Survey

Dear Campbellton Resident,

Approximately every thirty years, forests all over Atlantic Canada are threatened by damage from spruce budworm, a small caterpillar that feeds on the buds of spruce and fir trees. We are approaching the time when spruce budworm will once again be an issue in New Brunswick. Because forests provide so many benefits to the province, including jobs and recreation, we are asking people like you to provide your opinion on how best to manage this threat to our local forests.

We have sent surveys to a select group of households in Campbellton, and are asking you to help us improve our understanding of the opinions and priorities of those in your community. Spruce budworm affects everyone in New Brunswick; it has an impact on work, life and play for all citizens, and so we hope you will help us by sharing your knowledge and opinions. To make sure we hear from all different types of people, please have the adult (**age 18 or over**) in your household who has had the **most recent birthday** be the one to complete the survey. No personal identifying information is required, and all responses will be kept confidential. If you have any questions, please contact Stephen Heard by email at sheard@unb.edu or by telephone at 506-452-6047.

A printed survey has been enclosed for you to fill out and return in the postage-paid envelope included. If you prefer to access the survey online, type the following link into your internet browser:

<https://www.surveymonkey.com/r/SBW2015>

By taking the time to complete this survey, you will be adding greatly to our understanding of residents' opinions on managing spruce budworm. We look forward to receiving your responses!

Many thanks,

Stephen Heard
Project Coordinator
University of New Brunswick - Fredericton

*Au cours des **6 derniers mois**, avec qui avez-vous parlé de la tordeuse des bourgeons de l'épinette? (s.v.p. cocher (☐) la ou les cases concernées)*

- ☐ I have not talked about it / *Je n'en ai pas parlé*
- ☐ Family / *Famille*
- ☐ Friends and/or neighbors / *Amis et/ou voisins*
- ☐ Work associates / *Collègues de travail*
- ☐ Local government officials / *Fonctionnaires locaux*
- ☐ Provincial government officials / *Représentants des gouvernements provinciaux*
- ☐ Local forestry experts / *Experts en foresterie locaux*
- ☐ Provincial forestry experts / *Experts en foresterie provinciaux*
- ☐ Other (Please explain) / *Autre (veuillez expliquer)*

3. How serious of a problem would you rate spruce budworm in New Brunswick? (1 = not serious at all, 7 = very serious)

Quelle gravité accordez-vous à la tordeuse des bourgeons de l'épinette au Nouveau-Brunswick? (1 = pas grave du tout, 7 = très grave)

[illegible]

4. Please rank the **TOP 2** sources from which you get MOST of your information about the state of spruce budworm in New Brunswick. (Place a checkmark (☐) in the box under 1 for your primary source of information, and another under 2 for your secondary source of information)

Veillez classer les 2 principales sources d'information concernant l'état de la tordeuse des bourgeons de l'épinette au Nouveau-Brunswick. Ajoutez « 1 » à côté de la source primaire par laquelle vous obtenez l'information et « 2 » à côté de la source secondaire par laquelle vous obtenez l'information

	1	2
Forest-related agencies (such as the Canadian Forest Service) <i>Institutions liées à la foresterie (tels que le Service canadien des forêts)</i>		
Forest industry <i>Industrie forestière</i>		
Forest-related member groups of which I am a member (ex: woodlot owners associations) <i>Groupes forestiers dont je suis membre (associations de propriétaires de lots boisés)</i>		
Forest-related member groups of which I am not a member <i>Groupes forestiers dont je ne suis pas membre</i>		
Environmental or conservation groups <i>Groupes environnementaux ou groupes de conservation</i>		
National TV <i>Télévision nationale</i>		
Local TV <i>Télévision locale</i>		
Radio		

Radio <i>Radio</i>		
National newspapers <i>Journaux nationaux</i>		
Local newspapers <i>Journaux locaux</i>		
Internet <i>Internet</i>		
Family <i>Famille</i>		
Friends or acquaintances <i>Amis et connaissances</i>		

5. What efforts have you made to find information on spruce budworm? (Please check (□) all that apply)

Quelles démarches avez-vous entreprises pour trouver de l'information sur la tordeuse des bourgeons de l'épinette? (s.v.p. cocher (□) la ou les cases concernées)

- ☐ I have not looked for information on spruce budworm / *Je n'ai pas cherché d'information sur la tordeuse des bourgeons de l'épinette*
- ☐ Contacted local government officials / *J'ai communiqué avec des fonctionnaires gouvernementaux locaux*
- ☐ Contacted provincial government officials / *J'ai communiqué avec des fonctionnaires gouvernementaux provinciaux*
- ☐ Contacted a scientist or scientific organization / *J'ai communiqué avec un scientifique ou une organisation scientifique*
- ☐ Searched for information on the internet / *J'ai cherché de l'information sur Internet*
- ☐ Searched for information on government websites / *J'ai cherché de l'information sur les sites web du gouvernement*
- ☐ Searched for information on business websites / *J'ai cherché de l'information sur les sites web d'entreprises*
- ☐ Searched for information on environmental websites / *J'ai cherché de l'information sur les sites web sur l'environnement*
- ☐ Other (Please explain) / *Autre (veuillez expliquer)*

6. Have you had direct experience with spruce budworm outbreaks in New Brunswick?

Avez-vous eu une expérience directe avec des épidémies de tordeuses de bourgeons de l'épinette au Nouveau-Brunswick?

☐ Yes / *Oui*



(If Yes / Si oui) Please indicate the approximate years and locations / *s.v.p. indiquer le nombre approximatif d'années et où ces épidémies ont eu lieu*
Year(s) / *Années*: _____

Location(s) / *Lieu (x)*: _____

How satisfied or dissatisfied are you with how these outbreaks were handled? / *À quel point êtes-vous satisfait ou insatisfait de la façon dont ces épidémies ont été gérées?*

- ☐ Very satisfied / *Très satisfait*
- ☐ Somewhat satisfied / *Assez satisfait*
- ☐ Neither satisfied nor dissatisfied / *Ni satisfait ni insatisfait*
- ☐ Somewhat dissatisfied / *Assez insatisfait*
- ☐ Very dissatisfied / *Très insatisfait*

Additional comments / *Autres commentaires:*

☐ No / *Non*

7. To the best of your knowledge, spruce budworm:
(choose (☐) any that are correct)

À votre connaissance, la tordeuse des bourgeons de l'épinette: (choisir (☐) tout ce que sont corrects)

	Yes / <i>Oui</i>	No / <i>Non</i>
Is native to North America / <i>Est indigène à l'Amérique du Nord</i>		
Is the most destructive pest of fir and spruce forests / <i>Est le ravageur le plus destructeur du sapin et de l'épinette</i>		
Causes severe branch kill and often kills trees / <i>Cause de la mortalité importante des branches et peut souvent tuer les arbres</i>		

8. Have you heard of the following potential treatments for spruce budworm?

Avez-vous entendu parler des traitements potentiels suivants contre la tordeuses des bourgeons de l'épinette?

	Yes / <i>Oui</i>	No / <i>Non</i>
Btk (<i>Bacillus thuringiensis kurstaki</i>), a biological insecticide / <i>Btk (Bacillus thuringiensis kurstaki), un insecticide biologique?</i>		
Mimic (tebufenozide), a synthetic growth regulator / <i>Mimic (tebufenozide), un régulateur de croissance synthétique?</i>		

9. What other products are you aware of that can be used against spruce budworm? (If you are not aware of any, please leave this question blank and continue to question #10)

Quels autres produits pouvant être utilisés contre la tordeuse des bourgeons de l'épinette connaissez-vous? (Si vous n'en connaissez pas, veuillez laisser cette case vide et continuer à la question 10)

10. To the best of your knowledge, how safe are Bt and Mimic for the **environment**? (1= very harmful, 5 = very safe; if you do not know, please circle "Don't know")

À votre connaissance, le Btk et le Mimic sont-ils sécuritaires pour l'environnement? 1 = très dommageable, 5 = très sécuritaire; si vous ne savez pas, s.v.p. encercler « ne sais pas »

A. Bt: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Don't know / *ne sais pas*

B. Mimic: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 Don't know / *ne sais pas*

11. To the best of your knowledge, please indicate (☐) what **species** can be harmed by Bt and Mimic: (Please check all that apply)

À votre connaissance, veuillez indiquer (☐) quelles espèces pourraient subir des effets nocifs à cause du Btk et du Mimic (s.v.p. cocher la ou les cases concernées)

	Btk	Mimic
Spruce budworm and other caterpillars / <i>Tordeuse des bourgeons de l'épinette et autres chenilles</i>		
Other insects (mosquitoes, beetles, etc) / <i>Autres insectes (moustiques, coléoptères, etc...)</i>		
Mammals such as squirrels, cats, dogs, deer, or moose / <i>Mammifères tels que les écureuils, chats, chiens, chevreuils, ou orignaux</i>		
Birds / <i>Oiseaux</i>		
Human beings / <i>Humains</i>		
Don't know / <i>Ne sais pas</i>		

12. How much of an impact does spruce budworm and efforts to intervene in its spread have on your personal situation? (1 = no impact, 7 = a large impact)

Quel impact la tordeuse des bourgeons de l'épinette et les efforts d'intervention dans sa propagation ont-ils sur votre situation personnelle? (1 = aucun incidence, 7 = grande incidence)

(No impact) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 (Large impact)
(aucun incidence) (grande incidence)

13. In your opinion, in what order should forest types be protected from spruce budworm? (Please rank your first choice as 1, your second choice as 2, your third choice as 3, and your fourth choice as 4)

Selon vous, dans quel ordre devrions-nous protéger les types de forêt contre la tordeuse des bourgeons de l'épinette? Veuillez identifier votre premier choix avec (1), votre deuxième choix avec (2), votre troisième choix avec (3), et votre quatrième choix (4)

	1	2	3	4
Economically productive forests / <i>Forêts économiquement productives</i>				
Ecologically sensitive areas and wildlife habitat forests / <i>Zones écologiquement sensibles et habitats fauniques</i>				
Recreation forest sites / <i>Zones forêts récréatives</i>				
None – we should not protect the forest against spruce budworm / <i>Aucun – Nous ne devrions pas protéger nos forêts contre la tordeuse des bourgeons de l'épinette</i>				

14. Are you aware of any measures being taken to intervene in the spread of spruce budworm?

Connaissez-vous des mesures qui ont été prises pour intervenir contre la propagation de la tordeuse des bourgeons de l'épinette?

☐ Yes / *Oui*
☐ No / *Non*

15. Are you aware of any opportunities for the public to be involved in contributing to efforts to intervene in the spread of spruce budworm?

Êtes-vous au courant de possibilités pour le public de s'impliquer et de contribuer dans les efforts pour intervenir dans la propagation de la tordeuse des bourgeons de l'épinette?

☐ Yes / *Oui*

☐ No / *Non*



(If No / *Si non*) Please skip to question 17 / s.v.p. passer à la question 17

16. Have you chosen to participate in any of these efforts?

Avez-vous choisi de participer dans ces efforts?

☐ Yes / *Oui* – Please list the program / *veuillez indiquer*



(If Yes / *Si oui*) Why did you choose to participate? (Please check all that apply) / Pourquoi avez-vous choisi de participer? (s.v.p. cocher la ou les cases concernées)

☐ I am interested in/concerned about spruce budworm / *Je m'intéresse à/ je suis préoccupé par la tordeuse des bourgeons de l'épinette*

☐ I am interested in science / *Je m'intéresse aux sciences*

☐ I am concerned about forest health / *Je suis préoccupé par la santé des forêts*

☐ I am concerned about the impact forest health has on the economy / *Je suis préoccupé par l'impact économique des forêts en santé*

☐ It was easy for me to become involved / *C'était facile pour moi de participer*

☐ I have the time to participate / *J'ai le temps pour participer*

☐ I want to have an impact on efforts to deal with an important issue / *Je veux contribuer aux efforts pour traiter d'un enjeu important*

☐ I was asked to participate / *On m'a demandé de participer*

Who asked you to participate? / *Qui vous l'a demandé?*

☐ No / *Non*



(If No / *Si non*) Why have you chosen to not participate? / pourquoi avez-vous choisi de ne pas participer?

17. What information would you most prefer to better understand spruce budworm? (Check one)

De quels renseignements avez-vous besoin pour mieux comprendre la tordeuse des bourgeons de l'épinette? (cocher une seule réponse)

☐ Location and severity of any outbreaks / *Emplacement et gravité des épidémies*

☐ Pesticides or other products in use / *Pesticides ou autres produits utilisés*

☐ Environmental effects / *Effets environnementaux*

☐ Health and safety information / *Renseignements sur la santé et la sécurité*

☐ Other treatments being considered / *Autres traitements envisagés*

☐ Other (Please specify) / *Autre (veuillez préciser)*

18. Have you discussed any concerns you have about spruce budworm to any of the following: (Please check all that apply)

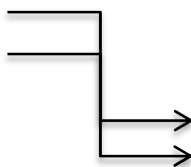
Avez-vous discuté de vos préoccupations concernant la tordeuse des bourgeons de l'épinette à l'un des éléments suivants? (s.v.p. cocher la ou les cases concernées)

- ☐ Local government officials / *Fonctionnaires gouvernementaux locaux*
- ☐ Provincial government officials / *Fonctionnaires gouvernementaux provinciaux*
- ☐ Scientists or a scientific organization / *Scientifiques ou organisation scientifique*
- ☐ Small forest-related companies / *Petites entreprises forestières*
- ☐ Large forest-related companies / *Grandes entreprises forestières*
- ☐ Forest-related member organization / *Groupes membres forestiers*
- ☐ Environmental organization / *Organisations environnementales*

19. Do you feel your interests are being considered when it comes to any decisions about intervention in the spread of spruce budworm?

Pensez-vous que vos intérêts sont pris en considérations lorsque les décisions sur l'intervention contre la propagation de la tordeuse des bourgeons de l'épinette sont prises?

- ☐ Yes / *Oui*
- ☐ No / *Non*



Whose interests are being considered the most? / *Quels intérêts sont considérés comme les plus importants?*

20. Here are some opinions some people hold about forest management in New Brunswick. On a scale of 1 to 7, with 1 meaning strongly disagree and 7 meaning strongly agree, please tell us how much you agree with each statement:

Voici quelques opinions que certaines personnes ont sur l'aménagement forestier au Nouveau-Brunswick. Sur une échelle de 1 à 7, 1 étant fortement en désaccord et 7 étant fortement d'accord, dites-nous à quel point vous êtes d'accord avec chacun des énoncés suivants :

The forest industry is the most important industry for The New Brunswick economy / <i>L'industrie forestière est l'industrie la plus importante pour l'économie du Nouveau-Brunswick</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
The economic contributions of the forest industry outweigh environmental impacts / <i>Les contributions économiques de l'industrie forestière l'emportent sur les impacts environnementaux</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Forests are being managed for an appropriate mix of values and uses / <i>Les forêts sont gérées avec un mélange approprié d'utilisations et de valeurs</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Environmental groups have too much influence over forest management in New Brunswick / <i>Les groupes</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7

<i>environnementaux ont trop d'influence sur l'aménagement forestier au Nouveau-Brunswick</i>							
The forest industry has too much influence over forest management in New Brunswick / <i>L'industrie forestière a trop d'influence sur l'aménagement forestier au Nouveau-Brunswick</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Not enough is being done in New Brunswick to deal with spruce budworm / <i>Au Nouveau-Brunswick, les efforts sont insuffisants pour faire face au problème de la tordeuse des bourgeons de l'épinette</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Public input is important to forest management in New Brunswick / <i>L'opinion du public est importante pour l'aménagement forestier au Nouveau-Brunswick</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Forests should be protected from pest outbreaks at any cost / <i>Les forêts devraient être protégées à tout prix contre les invasions de ravageurs</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7

21. Using a scale from 1 to 7, where 1 means great distrust and 7 means great trust, please indicate (☐) how much you trust the information regarding spruce budworm coming from the following sources:

Sur une échelle de 1 à 7, où 1 signifie très méfiant et 7 signifie très confiant, s.v.p. indiquez (☐) votre niveau de confiance dans l'information sur la tordeuse des bourgeons de l'épinette que vous recevez des sources suivantes :

Large forest companies / <i>Grandes entreprises forestières</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Small forest companies / <i>Petites entreprises forestières</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Canadian Forest Service / <i>Employés du Service canadien des forêts</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Environment Canada / <i>Employés d'Environnement Canada</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Politicians / <i>Politiciens</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Scientists / <i>Scientifiques</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7

For this next section, we ask some questions regarding your attitudes and opinions on how things are run in New Brunswick and Canada. Because the problem of spruce budworm in New Brunswick forests is being addressed by several groups, we want to know how people in your community view the people and organizations that are attempting to resolve this problem.

Pour cette section, nous vous posons des questions concernant vos attitudes et vos opinions sur la façon dont les choses fonctionnent au Nouveau-Brunswick et au Canada. Parce que plusieurs groupes examinent le problème de la tordeuse des bourgeons de l'épinette au Nouveau-Brunswick, nous voulons connaître le point de vue des gens de votre communauté envers les personnes et organisations qui tentent de résoudre ce problème.

First, a few general questions / Voici d'abord quelques questions générales:

2. Using a scale from 1 to 7, where 1 means no interest at all and 7 means a great deal of interest, how interested are you in politics generally?

Sur une échelle de 1 à 7, où 1 signifie aucun intérêt et 7 signifie beaucoup d'intérêt, quel est votre intérêt dans les affaires politiques?

(No interest) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 (Great interest)
(aucun intérêt) (beaucoup d'intérêt)

23. How likely is it that you will vote in the next federal election?

Quelle est la probabilité que vous voterez lors de la prochaine élection?

(Not likely at all) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 (Very likely)
(pas du tout probable) (fort probable)

24. Generally speaking, how often would you say that most people can be trusted?

En général, à quelle fréquence diriez-vous que l'on peut faire confiance à la plupart des gens?

(Never) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 (Always)
(jamais) (toujours)

25. Here are some opinions some people may hold about their government in New Brunswick. On a scale of 1 to 7, with 1 meaning strongly disagree and 7 meaning strongly agree, please tell us how much you agree with each statement.

Voici quelques opinions que certaines personnes ont concernant le gouvernement au Nouveau-Brunswick. Sur une échelle de 1 à 7, où 1 signifie fortement en désaccord et 7 signifie fortement d'accord, dites-nous à quel point vous êtes d'accord avec chaque énoncé.

Generally, those elected to the New Brunswick legislature soon lose touch with the people. / <i>En général, les personnes élues à l'Assemblée législative du Nouveau-Brunswick perdent vite contact avec le public</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
I think the New Brunswick government cares about what people like me think. / <i>Je pense que le gouvernement du Nouveau-Brunswick attache de l'importance à ce que les gens comme moi pensent.</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Sometimes, New Brunswick politics and government seems so complicated that a person like me can't really understand what's going on / <i>La politique au Nouveau-Brunswick paraît parfois si compliquée qu'une personne comme moi ne comprends pas ce qui se passe.</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
People like me have a say about what the government in New Brunswick does. / <i>Des personnes comme moi ont un mot à dire dans les activités du gouvernement du Nouveau-Brunswick.</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Most of the time we can expect people in the New Brunswick government to do what is right. / <i>Nous pouvons nous attendre à ce que les employés du</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7

<i>gouvernement du Nouveau-Brunswick feront ce qu'il faut la plupart du temps.</i>							
Many people in the government in New Brunswick are dishonest. / <i>Bon nombre de personnes dans le gouvernement du Nouveau-Brunswick sont malhonnêtes.</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Most of the people running the government in New Brunswick are smart people who usually know what they are doing. / <i>La plupart des gens qui travaillent pour le gouvernement du Nouveau-Brunswick sont des gens intelligents qui savent ce qu'ils font.</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
People in the New Brunswick government waste a lot of the money we pay in taxes. / <i>Les personnes qui travaillent pour le gouvernement du Nouveau-Brunswick gaspillent beaucoup de nos revenus d'impôts.</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7

26. On a scale of 1 to 7, where 1 means no confidence at all, and 7 means a great deal of confidence, how much confidence do you have in:

Sur une échelle de 1 à 7, où 1 signifie aucune confiance et 7 signifie beaucoup de confiance, quel est votre niveau de confiance dans :

The federal government / <i>Le gouvernement fédéral</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
The New Brunswick government/ <i>Le gouvernement provincial</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
The civil service / <i>La fonction publique</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
Big business / <i>Les grandes entreprises</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
The media / <i>Les médias</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7
The scientific community / <i>La communauté scientifique</i>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7

27. On a scale of 1 to 7, with 1 meaning a very strong distrust of government (an expectation they will almost always do the wrong thing) and 7 meaning a very strong trust of the government (an expectation they will almost always do the right thing), where would you place yourself?

Sur une échelle de 1 à 7, où 1 signifie une très grande méfiance envers gouvernement (une attente qu'ils feront toujours ce qu'il ne faut pas) et où 7 signifie une très grande confiance dans le gouvernement (une attente qu'ils feront toujours ce qu'il faut), où vous situez-vous?

(Strong distrust) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 (Strong trust)
(très grande méfiance) (très grande confiance)

The economy can be a factor in how people and organizations make decisions. Because of this, we would like to know your attitudes and opinions about the economy in New Brunswick.

L'économie peut contribuer dans la façon dont les gens et les organisations prennent leurs décisions. Pour cette raison, nous aimerions connaître vos attitudes et opinions concernant l'économie au Nouveau-Brunswick.

Que diriez-vous à propos de l'état de l'économie au Nouveau-Brunswick? Diriez-vous que l'économie est :

Maintenant, en réfléchissant sur l'économie au Nouveau-Brunswick au cours de l'année écoulée, diriez-vous que l'économie :

- Selon vous, au cours des 12 prochains mois, est-ce que l'économie*


- Financièrement, êtes-vous dans une meilleure situation, à peu près la même, ou pire que vous l'étiez l'an dernier?*

- Pensez-vous que dans un an, vous serez dans une meilleure situation, à peu près le même, ou pire que l'année dernière?*

- Enfin, nous aimerions savoir s'il y a des liens entre les antécédents d'une personne et leurs opinions. Une fois encore, toutes vos réponses resteront confidentielles et anonymes.*

33. Approximately how many acres of woodland do you or your family own?

Combien d'acres de terres boisées vous appartiennent, à vous ou à votre famille?

- ☐ 0-1  **(If 0-1 acres / si vous répondez 0-1) Please skip to question # 37 / s.v.p. passer à la question 37**
- ☐ 2-9
- ☐ 10-49
- ☐ 50-99
- ☐ 100-149
- ☐ 150-199
- ☐ 200 or more / *et plus*

34. How long has this woodland been owned by you or your family?

Depuis combien de temps vous ou votre famille est propriétaire de ces boisés?

- ☐ Less than ten years / *Moins de 10 ans*
- ☐ 10-24 years / *ans*
- ☐ 25-49 years / *ans*
- ☐ 50-74 years / *ans*
- ☐ 75-99 years / *ans*
- ☐ 100 years or more / *ans et plus*

35. What is your main occupation?

Quel est votre emploi principal?

36. On average, what part of your household income would you say comes from your woodland?

En moyenne, quel pourcentage de votre revenu familial provient de vos lots boisés?

- ☐ None / *Aucun*
- ☐ 1-9 %
- ☐ 10-29 %
- ☐ 30-49 %
- ☐ 50-74 %
- ☐ 75-100 %

37. What language do you most often speak at home?

Quelle langue parlez-vous le plus souvent à la maison?

- ☐ English / *Anglais*
- ☐ French / *Français*
- ☐ Both / *Les deux*
- ☐ Other (Please explain) / *Autre (veuillez préciser)*

38. Of the following political parties, which most closely shares your views?

Lequel des partis politiques suivants partage le mieux vos points de vues?

- ☐ Liberal Party / *Parti libéral*
- ☐ Conservative Party / *Parti conservateur*
- ☐ New Democratic Party / *Nouveau Parti démocratique*
- ☐ Green Party / *Parti vert*
- ☐ Something else (please specify) / *Autre (veuillez préciser)*

- ☐ None of the above / *aucune de ces réponse*

→ (If none of the above/ *si aucune de ces réponse*) Please skip to question #40 / *s.v.p. passer à la question 40*

39. If you chose a party for the previous question, how strongly do you consider yourself to be part of that party? (If you did not choose a party, please continue to question # 40)

Si vous avez choisi un parti à la question précédente, dans quelle mesure considérez-vous que faites partie de ce parti? (Si vous n'avez pas choisi un parti, vous pouvez continuer à la question 40)

- ☐ Very strongly / *Très fortement*
- ☐ Strongly / *Fortement*
- ☐ Not very strongly / *Pas très fortement*

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

Quel est le plus haut niveau d'éducation que vous avez atteint?

- ☐ Grade 9 or less / *9ème année ou moins*
- ☐ Some secondary/high school / *Secondaire (pas terminé)*
- ☐ Completed secondary/high school / *Secondaire (terminé)*
- ☐ Some technical, community college, CEGEP / *Collège technique, collège communautaire, CÉGEP, (pas terminé)*
- ☐ Completed technical, community college, CEGEP / *Collège technique, collège communautaire, CÉGEP, (terminé)*
- ☐ Some university / *Université (pas terminé)*
- ☐ Bachelor's degree / *Baccalauréat*
- ☐ Some post-graduate study / *Études universitaire supérieures (pas terminées)*
- ☐ University post-graduate degree / *Diplôme d'études universitaires supérieures*

41. Are you an aboriginal person (Status Indian, Non-Status Indian, Inuit, or Metis)?

Êtes-vous autochtone (Indien inscrit, Indien non-inscrit, Inuit ou métis)

- ☐ Yes / *Oui*
- ☐ No / *Non*

42. What is your current marital status?

Quel est votre état civil?

- ☐ Married / *Marié*
- ☐ Living with a partner / *Vivant en couple*
- ☐ Divorced / *Divorcé*

- ☐ Separated / Séparé
- ☐ Widowed / Veuf ou veuve
- ☐ Single / Célibataire

43. What is your current employment status?

Quel est votre situation professionnelle actuelle?

- ☐ Self-employed / *Travailleur indépendant*
- ☐ Working for pay / *Emploi rémunéré (à salaire)*
- ☐ Retired / *Retraité*
- ☐ Unemployed / *Sans emploi*
- ☐ Student / *Étudiant*

44. What is your age?

Quel est votre âge?

- ☐ 18-24 years / *ans*
- ☐ 25-34 years / *ans*
- ☐ 35-44 years / *ans*
- ☐ 45-54 years / *ans*
- ☐ 55-64 years / *ans*
- ☐ 65 years or over / *ans ou plus*

45. What is your gender?

Quel est votre sexe?

- ☐ Male / *Homme*
- ☐ Female / *Femme*

46. What is your household's annual income before taxes?

Quel est votre revenu familial annuel avant impôt?

- ☐ Less than \$20,000 / *Moins de 20 000 \$*
- ☐ \$20,000-39,999 / *Entre 20 000 et 39 999 \$*
- ☐ \$40,000-59,999 / *Entre 40 000 et 59 999 \$*
- ☐ \$60,000-99,999 / *Entre 60 000 et 99 999 \$*
- ☐ \$100,000 or more / *Plus de 100 000 \$*

47. Is the area in which you live:

Vivez-vous dans un milieu :

- ☐ Urban / *Urbain*
- ☐ Suburban / *En banlieue*
- ☐ Rural / *Rural*

48. Have you participated in, or donated to, an environmental organization?

Avez-vous participé à ou faits des dons à une organisation environnementale?

☐ Yes / *Oui*

☐ No / *Non*

49. Are you a member of a neighborhood association?

Êtes-vous membre d'une association de quartier?

☐ Yes / *Oui*

☐ No / *Non*

50. Do you have family members that work in forest-related sectors?

Est-ce qu'il y a des membres de votre famille qui travaillent dans le secteur forestier?

☐ Yes / *Oui*

☐ No / *Non*

Thank you for completing the survey!

Merci d'avoir complété ce sondage!

If you are willing to answer additional questions, please enter your name and contact information here:

Si vous êtes prêt à répondre à d'autres questions, veuillez inscrire votre nom et adresse ci-dessous :

Name / *Nom* _____

Address / *Adresse du domicile* _____

Address 2 / *Adresse du domicile 2* _____

City/Town / *Ville / Commune* _____

Postal Code / *Code Postal* _____

Email Address / *Adresse électronique* _____

Phone Number / *Téléphone* _____

Please return this survey in the postage-paid envelope provided.

Veuillez retourner le questionnaire dans l'enveloppe préaffranchie ci-jointe

Appendix B: Chapter 2 Supplementary Material

B.1: Alternative hierarchical models of trust; Coefficient presented with standard error in parentheses; [†] p < 0.1, *p < 0.05, **p < 0.01

Parameter	<u>Provincial Government</u>	<u>Scientists/Academics</u>	<u>Forest Industry</u>
Policy congruence	0.11 [†] (0.07)	-0.33 ** (0.15)	0.36 (0.56)
Political efficacy	0.02 (0.07)	-0.10 (0.16)	0.01 (0.17)
Issue knowledge	0.03 (0.07)	0.09 (0.16)	0.34 (0.56)
Treatment knowledge	-0.04 (0.03)	0.04 (0.06)	0.15 (0.22)
Risk perception	-0.04 (0.04)	0.21 * (0.09)	0.30 (0.22)
Forest dependency	0.00 (0.00)	0.01 (0.01)	-0.02 (0.04)
Partisanship	0.16 (0.14)	0.16 (0.32)	-0.13 (0.34)
Age	0.03 (0.05)	-0.09 (0.11)	0.01 (0.11)
Gender	0.04 (0.13)	0.16 (0.29)	-0.36 (0.31)
Education	0.04 (0.03)	0.00 (0.06)	0.03 (0.07)
Income	0.03 (0.05)	0.05 (0.12)	0.08 (0.13)
Interpersonal trust	0.06 (0.05)	0.37 ** (0.12)	0.19 (0.13)
Trust in federal government	0.21 ** (0.04)	0.06 (0.10)	0.09 (0.10)
Dependency x policy congruence			0.01 (0.01)
Risk perception x issue knowledge			-0.09 (0.10)
Risk perception x treatment knowledge			0.01 (0.04)
AIC	368.88	630.87	656.30
Log likelihood	-168.44	-299.96	-310.03
Chi-square p-value	0.06 [†]	0.03 *	0.62

Appendix C: Chapter 3 Supplementary Material

C.1: Pearson Correlations Between Media Framing Variables; N = 355; *p < 0.10; **p < 0.05; *p < 0.01**

	Level of conflict	Elitism in source of blame	Elitism in source of solution	Media source	Issue	Mention of forest plan	Unemployment
Level of conflict	1.0	0.11 **	-0.10 *	0.16 ***	-0.02	0.12 **	-0.03
Elitism in source of blame		1.0	0.16 ***	-0.13 ***	0.30 ***	0.04 **	0.00
Elitism in source of solution			1.0	-0.28 **	0.22 ***	-0.22 ***	0.10 *
Media source				1.0	-0.15 ***	0.03	0.05
Issue					1.0	-0.20 ***	0.15 ***
Mention of forest plan						1.0	0.04
Unemployment							1.0

Appendix D: Chapter 4 Supplementary Material

Date: November 10, 2016
To: Kyle Saunders, Ph.D., Political Science
Megan Ruxton, Political Science
From: IRB Coordinator, Research Integrity & Compliance Review Office
(RICRO_IRB@mail.colostate.edu)
Re: Degrees of Participation: Participation Program Differences in New Brunswick,
Canada and Maine, USA
Funding: Unfunded
IRB ID: 266-17H **Review Date:** November 10, 2016

This project is valid from three years from the review date.

The Institutional Review Board (IRB) Coordinator has reviewed this project and has declared the study exempt from the requirements of the human subject protections regulations with conditions as described above and as described in 45 CFR 46.101(b):

Category 2 - Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

The IRB determination of exemption means that:

- ☐ **This project is valid for three years from the initial review.** After the three years, the file will be closed and no further research should be conducted. If the research needs to continue, please let the IRB Coordinator know before the end of the three years. You do not need to submit an application for annual continuing review.
- ☐ You must carry out the research as proposed in the Exempt application, including obtaining and documenting (signed) informed consent if stated in your application or if required by the IRB.
- ☐ Any modification of this research should be submitted to the IRB through an email to the IRB Coordinator, prior to implementing any changes, to determine if the project still meets the Federal criteria for exemption.
- ☐ Please notify the IRB Coordinator (RICRO_IRB@mail.colostate.edu) if any problems or complaints of the research occur.

Please note that you must submit all research involving human participants for review by the IRB. **Only the IRB or designee may make the determination of exemption**, even if you conduct a similar study in the future.

Question Guidelines for Information Interviews in New Brunswick, CA and Maine, USA

- How and why was the full project (EIS or Task Force) formed? Who was included in the decision-making (what needed to be done, how implemented, who involved)?
- How is it funded (if funded)?
- Is there policy or legislation that applies to your program in any capacity? What about your communication/outreach efforts?
- What was the impetus for the creation of your communication/outreach program, and how was it designed?
- What are its goals and how have you tried to achieve them?
 - Potential follow-up questions:
 - Who do you talk to, and what information do you give them?
 - Why have you chosen this as your strategy design?
 - How often do you interact with members of the public?
- Do you think the public has a good understanding of the problem and solutions?