Understanding All-Terrain Vehicle User Behaviour: The Human Dimensions of ATV use in Northeastern New Brunswick, Canada

By

© Kaleb Daniel Smith McNeil

A thesis submitted to the

School of Graduate Studies

in partial fulfillment of the requirements for the degree of

Master of Science

Department of Geography

Memorial University of Newfoundland

August 2018

St. John's | Newfoundland & Labrador | Canada

Abstract

This study examined all-terrain vehicle (ATV) users in northeastern New Brunswick, Canada, providing a human dimensions approach to understanding the activity and inform future management decisions. A methodological comparison between self-classification and multivariate applications of Bryan's (1977) recreation specialization framework was conducted to assess variation in participant engagement within the activity. The impact of activity consumption on levels of recreation specialization was also examined to investigate how differences in ATV use affects user engagement. Self-administered questionnaires were randomly distributed to three New Brunswick communities (n = 144). Results suggest that both applications of the recreation specialization framework did not similarly classify participants as expected. Specialization levels were found to differ across three activity consumption sub-groups, suggesting different types of ATV use may impact user engagement. Resource managers should consider differences in user recreation specialization and activity consumption when designing strategies to manage the heterogeneous activity.

Acknowledgements

First, I would like to express my sincere thanks to my supervisor Dr. Alistair Bath for his guidance and support throughout this program. He gave me his unconditional trust, helped me through multiple crises phone calls and e-mails, and taught me the importance of understanding people. I would also like to extend my thanks to my committee members Dr. Jerry Vaske (Colorado State) and Dr. Rodolphe Devillers (Memorial University) for their insight and guidance throughout this research.

I would like to thank Nature Conservancy of Canada, Mitacs, and Memorial University of Newfoundland for providing funding for this project. Thanks to Jennifer White, Laurel Bernard, and other staff at Nature Conservancy of Canada's New Brunswick office for their support throughout the course of this project.

My gratitude goes out to the faculty and staff of the Geography Department at Memorial for their unwavering support, and to the Human Dimensions team for their guidance throughout my degree. Also, a special thanks to my research partner Jessica Hogan for her inspiration, motivation, and funky dance moves.

I would also like to thank the residents of Miscou Island, Pointe-Sapin, and Escuminac New Brunswick for their participation and hospitality. Their patience and kindness made my fieldwork memorable.

Finally, I would like to dedicate this thesis to Cori Meagan Brown for her friendship and support. It was my absolute pleasure to know you, and I hope you are resting in peace.

Table of Contents

List of Tables

List of Figures

Chapter 1: Thesis Overview

1.1 Human Dimensions of Natural Resource Management

Human dimensions (HD) of natural resource management provides a social science approach to resource management that aims to inform managers on the human aspect of natural resource management issues (Bennett et al., 2017; Decker, Riley, Siemer, 2012). Originating in the traditions of social psychology and sociology, HD has developed into an established, interdisciplinary field based on the notion that successful resource management equates to ten percent managing wildlife and ninety percent managing people (Decker, Brown, & Siemer, 2001). The field provides resource managers with information on stakeholder values, attitudes, and beliefs about specific resource issues that allow for human integration within management plans (Bath, 1998). Although much HD research has occurred in response to existing conflicts (Bath, 1998), the field's interdisciplinarity promotes the pairing of human and biophysical research to proactively prevent the likelihood of human-wildlife conflict from occurring (Bennett et al., 2017).

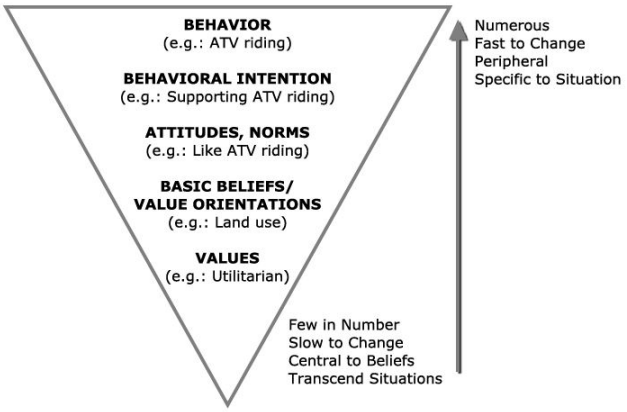
HD is unique in producing both theoretical and applied contributions to natural resource research. Theoretical contributions provide established frameworks, such as the cognitive hierarchy, that are used to examine how humans interact with their surrounding natural resources (see Ajzen, 1991; Bryan, 1977; Fishbein, 1980; Vaske & Donnelly, 1999). These frameworks are then applied to resource challenges all over the world, allowing for a continual evolution of underlying theories. Applied HD research has touched on a wide range of topics, including parks and protected areas (Ford-Thompson,

Snell, Saunders, & White, 2015; Heinen, Roque, & Collado-Vides, 2017; Moreto, Lemieux, & Nobles, 2016; Newman, Manning, Dennis, & McKonly, 2005; Wiener, Needham, & Wilkinson, 2009); predicting potential conflict (Jorgensen & Bomberger Brown, 2015; Kansky, Kidd, & Knight, 2016; Liordos, Kontsiotis, Georgari, Baltzi, & Baltzi, 2017; Mcgovern & Kretser, 2015; Pont et al., 2016); recreational management (Dickinson, Orth, & McMullin, 2015; Kuehn, Schuster, & Nordman, 2015; Miller, Vaske, Squires, Olson, & Roberts, 2017; Waight & Bath, 2014a); and wildlife conservation (Elliot, Vallance, & Molles, 2016; Engel, Vaske, Bath, & Marchini, 2016; Engel, Vaske, Marchini, & Bath, 2017; Frank, Monaco, & Bath, 2015; Meena, MacDonald, & Montgomery, 2014; Teel & Manfredo, 2010). These represent only a glimpse of potential HD applications that make the field vital to natural resource management success.

A contributing component of HD research is the organization of people's views toward a specific issue into a cognitive hierarchy. As depicted in Figure 1 this hierarchy is composed of values, value orientations, attitudes and social norms, behavioural intentions, and behaviours, which build on each other to explain how these views are formed (Vaske & Donnelly, 1999). Behaviours, such as riding an all-terrain vehicle (ATV), are the only cognition that can be physically observed and are often issue-specific, quickly adapted, and numerous in quantity. However, the hierarchy's other elements play a pivotal role in determining which behaviours occur. Attitudes are the positive or negative evaluations of a situation or behaviour (Whittaker, Vaske, & Manfredo, 2006; Zinn, Manfredo, Vaske, & Wittmann, 1998), while norms are standards to assess whether a behaviour should occur (Whittaker, Vaske, & Manfredo, 2006; Vaske

& Whittaker, 2004). Values, such as honesty, are foundational cognitions that inform all other aspects of the cognitive hierarchy. Being at the bottom of the hierarchy, values are the most resistant to change, few in number, and transcend situations (Rokeach, 1977; Whittaker, Vaske, & Manfredo, 2006).

Figure 1: The cognitive hierarchy model of human views (Waight, 2013; adapted from Vaske & Donnelly, 1999).



By understanding the components that contribute to a person's views, the cognitive hierarchy allows researchers to determine which cognitions inform conflict-prone behaviours. While behaviours are the only physically observed cognition, a series of methods are often used to predict the remaining latent components, including multivariate statistical analysis. Researchers are then able to inform managers on ways to modify their management approach, reducing the likelihood of future conflict to occur between humans and their environment.

1.2 The All-Terrain Vehicle

The all-terrain vehicle (ATV) is a relatively new and increasingly popular recreational phenomenon in North America. Developed in the 1970's, ATVs are motorized off-road vehicles with three to four low-pressure tires that can navigate a wide range of otherwise inaccessible terrain (Off-Road Vehicle Act, 1985). Commonly referred to as 'quads', 'side-by-sides', or simply 'bikes', ATVs are a member of the broader off-highway vehicle (OHV) family of motorized vehicles, which also include dirt bikes, dune buggies, and 4-wheel drive jeeps (Cordell, Betz, Green, & Owens, 2005; Waight, 2013; Smith, 2008). This activity's exponential growth is simultaneously creating new recreational opportunities and challenges for natural resource management (Albritton & Stein, 2011; Albritton, Stein, & Thapa, 2009; Cordell et al., 2005; Wilson, 2008). While ATVs provide users with unique opportunities to experience nature, they have increasingly gained a reputation of being a threat to conservation initiatives due to the destructive potential of motorized vehicles on their surrounding environment (Albritton & Stein, 2011; Havlick, 2002).

Despite the growing importance of outdoor recreational management, past academic research has favoured broader OHV activities, with ATVs being the focus of only a handful of studies. Existing research on OHVs mostly consists of impacts inflicted by motorized vehicles on their surrounding environment, including biophysical impacts (e.g. Barton & Holmes, 2007; Groom, McKinney, Ball, & Winchell, 2007; Jones, Anderson, Dickson, Bow, & Rubin, 2017; Kinsley, Gowan, Fenster, Didham, & Barton, in press; Switalski, 2018) and economic impacts (e.g. Deisenroth, Loomis, & Bond, 2009;

Hughes, Beeco, Hallo, & Norman, 2014). Research on OHV users has focused on their attitudes (Kuehn, D'Luhosch, Luzadis, Malmsheimer, & Schuster, 2011; Smith & Burr, 2011), management perceptions (Baker, 2007; Pierskalla, Schuett, & Thompson, 2011; Thompson, 2007; Vaske, Deblinger, & Donnelly, 1992), user displacement (Riley, 2013; Riley et al., 2015), and user recreation specialization (Smith, 2008; Smith, Burr, & Reiter, 2010). On the other hand, research pertaining to ATV users is further limited, focusing on social capital (Mann & Leahy, 2010), experience interpretation (Mann & Leahy, 2009), as well as attitudes and management preferences (Waight, 2013; Waight & Bath, 2014a; Waight & Bath, 2014b).

OHV and ATV management, like many contemporary resource management issues, can be conceptualized as being composed of two broad components: human and biophysical (Bath, 1998). While the importance of each component is often location and issue-specific, both must be addressed to achieve successful management outcomes. The absence of research addressing the human component of ATV use has left resource managers with knowledge of the activity's environmental impacts, but not of the participants themselves. Such an imbalance has challenged the co-existence of recreation and conservation, threatening ecologically significant habitats (Robinson, 2010; Roy, 2012) and endangered species such as the Piping Plover (*Charadrius melodus*), which is listed federally as a species at risk (SARA, 2002). As the potential for detrimental human-wildlife interactions among ATV users and their surroundings continues to increase, so does the need to understand ATV users. Integrating ATV users into the activity's existing body of research is vital to ensuring its successful management. As New Brunswick,

Canada, is experiencing rapid ATV growth and increasingly frequent human-wildlife interactions between ATV users and their surrounding environment, the province is an ideal setting to bridge this research gap. HD's social science approach to resource management contains the theoretical and applied foundation required to assist natural resource managers in maintaining a balance between recreational activities and environmental protection.

1.3 ATV Use in New Brunswick, Canada

ATV use has become a commonplace recreational and utilitarian activity across Canada, and the province of New Brunswick is no exception. Located on the country's east coast, New Brunswick has experienced more than a two-hundred percent increase of registered ATVs in the past decade, with over 21,000 units registered in 2016 (NBATVF, 2016). Since 1996, the New Brunswick ATV Federation (NBATVF), a non-profit organization headquartered in the provincial capital city of Fredericton, has been mandated as provincial ATV trail manager on behalf of the provincial government (Off-Road Vehicle Act, 1985). The federation oversees 55 affiliate ATV clubs across seven regions and manages 8,978 km of trails throughout the province (Ben Cyr, pers. comm., September 21, 2017). With increasing trends in both ATV registration (NBATVF, 2016) and annual sales (COHV, 2016), effective ATV management is necessary to maintain a balance between users and the protection of their surrounding environment.

Despite continuing efforts to expand the NBATVF trail network to accommodate the activity's growth, conflict between ATV users and their environment has developed into a province-wide controversy. In 2000, a government appointed ATV Task Force was

established to discuss and make recommendations on issues, including environmental impacts and trail networking, that involve ATV users. The resulting report (Task Force, 2001) concluded that ATV use posed a major risk to the province's fragile coastal ecosystems, threatening sensitive habitat and jeopardizing recovery attempts of the Piping Plover. In response, the report called for improved trail infrastructure to facilitate ATV use, improved educational campaigns to inform users of regulations and use restrictions, and a call for legislators to improve the effectiveness and enforcement of provincial ATV regulations (Task Force, 2001).

Escalating tensions between ATV users and resource managers reached new heights in July 2006, when Environment Canada banned a 200-person annual ATV rally in the northeastern community of Miscou Island in order to protect nesting Piping Plovers (CBC, 2006). The following year, residents of another northeastern community, Maisonette, blocked access to beaches with large boulders to protect Piping Plovers from perceived ATV threats (CBC, 2007). While some efforts have been made to address the ATV task force recommendations, including regulation strengthening legislative amendments in 2003 and 2016 (Off-Road Vehicle Act, 1985) and enhanced education initiatives (e.g. Public Safety, 2013), the report's impact on ATV management remains unclear. Nonetheless, ATV use continues to be accredited as a major threat to environmental management in New Brunswick (Environment Canada, 2012; Nature Conservancy Canada, 2017; Roy, 2009).

1.4 Research Objectives and Questions

Specifically, this research is focused on how differing specialization levels within the activity influence user attitudes, motivations and behaviours. In addition, this project seeks to provide methodological insight as to how specialization levels are determined among ATV users. Finally, this study examines how different types of ATV user consumption (consumptive vs. non-consumptive behaviours) impact user specialization levels. This project was the first in New Brunswick to study ATV use from a social science perspective, contributing to a limited number of similar studies in North America.

To achieve this purpose, the following objectives and related research questions were examined:

1. Determine whether ATV users in New Brunswick exhibit varying levels of recreation specialization based upon Bryan's (1977) theory of specialization.
    a. Does ATV use differ between levels of recreation specialization?
    b. What factors contribute to these variations in use?
2. Evaluate the effectiveness of existing recreation specialization methodologies.
    a. Is there a difference between self-reported assessment and multivariate assessment of recreation specialization?
    b. What factors contribute to these differences?
3. Investigate the effects of ATV user consumption on levels of recreation specialization.
    a. Can ATV users be classified by their degree of consumption?

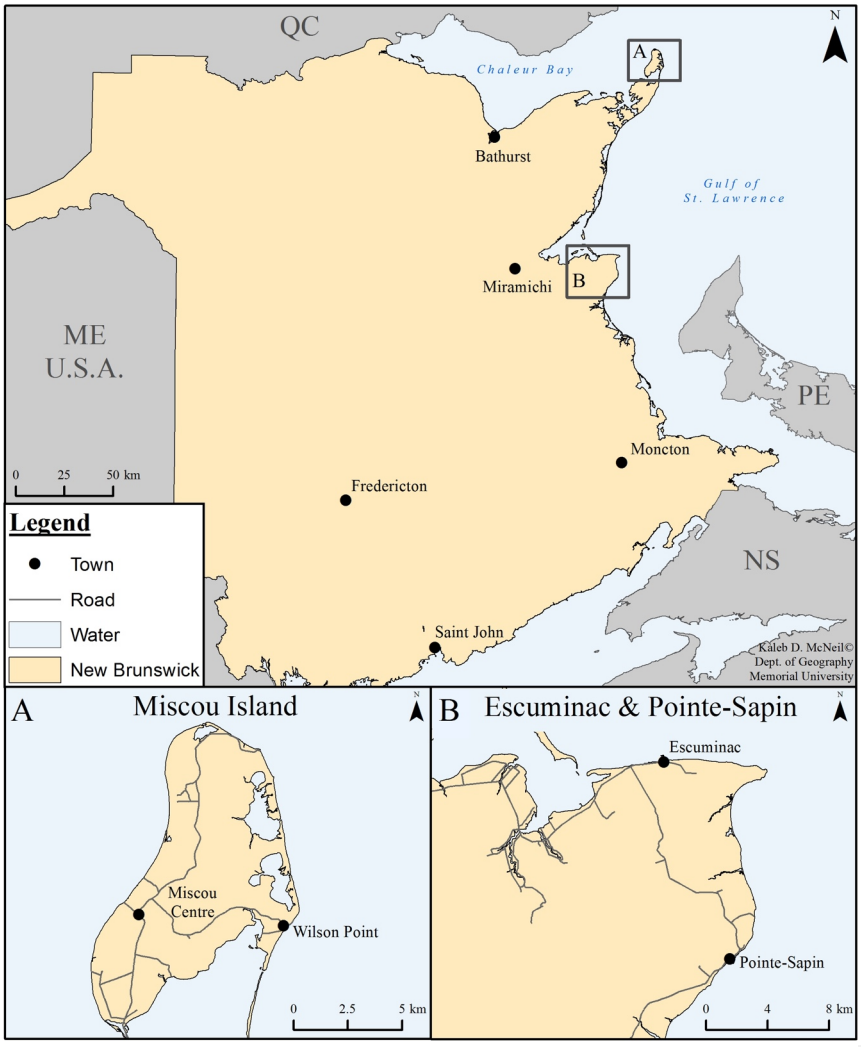
b. Do different degrees of consumption impact levels of recreation specialization?

1.5 Study Areas

This study was conducted in the northeastern New Brunswick communities of Miscou Island, Escuminac, and Pointe-Sapin (Figure 2). Miscou Island is situated on the northeastern tip of the Acadian Peninsula region of the province at the confluence of the Gulf of St. Lawrence and Chaleur Bay. This quiet 64 km^2 island has a permanent population of 530 people, as well as a seasonal cottage community residing in the summer months (Statistics Canada, 2016a). The island is home to 330 private households, 255 of which are occupied by permanent residents. Miscou Island's homes have an average occupancy of 2.1 people, a median age of 52.2 years old, and half of all households reported having children living in them (Statistics Canada, 2016a). Despite being located in the predominantly French Acadian Peninsula region, Miscou Island is locally known for its bilingualism; while roughly two-thirds of islanders are francophone, most can interchangeably communicate in French and English. With the exception of a volunteer fire station, all public services are located in the communities of Lamèque (5 km away) and Shippagan (30 km away), including a Université de Moncton campus.

The communities of Escuminac and Pointe-Sapin are located between Kouchibouguac National Park and the confluence of Miramichi Bay and the Gulf of St. Lawrence (Figure 2). With an area of 13 km^2 and a population of 166, Escuminac is home to 112 households, 80 of which are occupied by permanent residents. This community has

Figure 2: Location of Study Areas



an average occupancy of 2.1 people, a median age of 52.3 years old, and one-quarter of the households have children (Statistics Canada, 2016b). Point-Sapin is a 72 km^2 community of 477 people with 258 households, 219 of which are permanent residences. The average occupancy is 2.2 people, the median age is 53.1 years old, and half of the households contain children (Statistics Canada, 2016b). While both communities are located in a predominantly French region of New Brunswick, their language preferences contrast one another. Although a majority of residents in both communities are bilingual, most Escuminac residents are primarily anglophone, whereas most Pointe-Sapin residents are francophone (Statistics Canada, 2016b). Despite this, both communities strongly identify with the Acadian culture. While some public services are located in the town of Baie St. Anne (5 km away), most are located in Miramichi (55 km away).

Miscou Island, Escuminac, and Pointe-Sapin all have significant coastlines. Characterized by sandy beaches and dunes, these areas provide an ideal habitat for migratory shore-birds, that led Miscou Island and Escuminac to be nationally designated as Important Bird Areas (Important Bird Area, 2016a; Important Bird Area, 2016b). One migratory shore-bird that is of particular conservational concern is the Piping Plover (*Charadrius melodus*), which is federally listed as a species at risk (SARA, 2002) and can be found nesting on these beaches annually between May and August (Environment Canada, 2016; Roy, 2009; Tarr, Simons, & Pollock, 2010). However, these beaches and dunes also provide an attractive setting for recreational activities such as ATV use, elevating the likelihood of human-wildlife interactions and potential conflict to occur. As a result, ATVs have been identified as a major threat to the conservation of the Piping

Plover (Doody, 2013; Hanley et al., 2014; Important Bird Area, 2016a; Important Bird Area, 2016b; NCC, 2017).

An additional biophysical trait shared by these communities is their abundance of bogs and peatlands. While this terrain provides additional habitat to many coastal species, it also creates challenges in the creation and maintenance of local ATV infrastructure, such as trails. Due to the inherent surface instability of this terrain, ATV trail operation is often restricted to winter months when the frozen surface can adequately support the vehicles (R. Lanteigne, pers. comm., July 15, 2017). It is perceived that this lack of operational ATV infrastructure during summer months restricts ATV use to the surrounding beaches and dunes, creating additional challenges to resource managers and conservation initiatives alike, as mentioned during a Piping Plover Stewardship Meeting (pers. comm., April 26, 2017).

1.6 Organization of Thesis

This thesis has been prepared in manuscript format to facilitate the publication of results in two stand-alone yet interconnected articles in peer-reviewed academic journals. This introductory chapter introduces the field of human dimensions and the natural resource management of ATVs, followed by the project's overarching purpose and objectives. This chapter also includes contextual information pertaining to the research locations in the Canadian province of New Brunswick.

Chapter two, entitled *Recreation Specialization: Applying a Self-Classification Method on All-Terrain Vehicle Users in New Brunswick, Canada* is an article intended for

publication in the *Journal of Leisure Research*. This manuscript employed a methodological comparison between a self-classification and multivariate application of Bryan's (1977) recreation specialization framework. Discriminant analysis was used to examine whether the self-classification approach could classify ATV user specialization similarly to a multi-dimensional specialization index. The intent of this chapter is to explore ATV user specialization while simultaneously contributing to testing the best methods to measure recreation specialization.

Chapter three, entitled *Factors Affecting Recreation Specialization: The Case of the ATV* is an article intended for publication in the *Journal of Outdoor Recreation and Tourism*. This manuscript segments ATV users according to their position on Wagar's (1969) continuum of consumption, then examines how varying degrees of consumption impact levels of recreation specialization. K-means cluster analysis and one-way analysis of variance (ANOVA) are used to compare consumption sub-groups across a composite specialization index. Chapter three is intended to explore external factors that could impact the recreation specialization framework as well as provide further insight into ATV user characteristics.

The fourth and final chapter discusses the conclusions presented in the second and third chapters as they relate to the project's overarching objectives and research questions. This includes highlighting key findings, integrating results into existing literature on human dimensions of natural resource management, and providing direction for future research on ATV management.

1.7 References

Albritton, R., & Stein, T.V. (2011). Integrating social and natural resource information to improve planning for motorized recreation. *Applied Geography, 31*(1), 85-97.

Albritton, R., Stein, T.V., & Thapa, B. (2009). Exploring conflict and tolerance between and within off-highway vehicle recreationists. *Journal of Park and Recreation Administration, 27*(4), 54-72.

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behavior and Human Decision Processes, 50,* 179-211.

Baker, J.L. (2007). *Motivations, resource attribute preferences, and characteristics of off-highway vehicle riders in New York State* (Master's thesis). Available from ProQuest dissertation and theses database. (Document ID: 1447427).

Barton, D.C. & Holmes, A.L. (2007). Off-highway vehicle trail impacts on breeding songbirds in northeastern California. *Journal of Wildlife Management, 71*(5), 1617-1620.

Bath, A.J. (1998). The role of human dimensions in wildlife resource research in wildlife management. *Ursus, 10*, 349-355.

Bennett, N.J., Roth, R., Klain, S.C., Chan, K., Christie, P. Clark, D.A., Cullman, G., Curran, D., Durbin, T.J., Epstein, G., Greenberg, A., Nelson, M.P., Sandlos, J., Stedman, R., Teel, T.L., Thomas, R., Verissimo, D., Wyborn, C. (2017). Conservation social science: understanding and integrating human dimensions to improve conservation. *Biological Conservation, 205*, 93-108.

Bryan, H. (1977). Leisure value systems and recreational specialization: The case of the trout fisherman. *Journal of Leisure Research*, *9*(3), 174-187.

Canadian Broadcasting Corporation. (2007, Jul 31). ATV barrier on beach irks DNR officials. Retrieved from: http://www.cbc.ca/news/canada/new-brunswick/atv-barrier-on-beach-irks-dnr-officials-1.692882

Canadian Broadcasting Corporation. (2006, Jul 27). ATV rally moved to protect rare bird. Retrieved from: http://www.cbc.ca/news/canada/new-brunswick/atv-rally-moved-to-protect-rare-bird-1.605221

Canadian Off-Highway Vehicle Distributors Council. (2016). *Motorcycle, Scooter & Off-Highway Vehicle Annual Industry Statistical Report.* Markham, Canada.

Cordell, K.H., Betz, C.J., Green, G., Owens, M. (2005). *Off-highway vehicle recreation in the United States, Regions, and States: a national report from the National Survey on Recreation and the Environment (NSRE)*. Athens, GA: United States Forrest Service.

Decker, D.J., Brown, T.L. & Siemer, W.F. (2001). Evolution of people-wildlife relations. In D.J. Decker, T.L. Borwn, W.F. Siemer (Eds.), *Human Dimensions of Wildlife Management in North America* (3-22). Bethesda, MD: The Wildlife Society.

Decker, D.J., Riley, S.J. & Siemer, W.F. (2012). *Human dimensions of wildlife management* (2nd ed.). Baltimore, MD: John Hopkins University Press.

Deisenroth, D, Loomis, J. & Bond, C. (2009). Non-market valuation of off-highway vehicle recreation in Larimer County, Colorado: implications of trail closures. *Journal of Environmental Management, 90*(11), 3490-3497.

Dickinson, B.D., Orth, D.J. & McMullin, S.L. (2015). Characterizing the human dimensions of a hidden fishery: riverine trotline fishers. *Fisheries, 40*(8), 386-394.

Department of Public Saftey. (2013). *Off-road vehicles and you* [Brochure]. Fredericton, NB: Department of Public Safety.

Elliot, E.E., Vallance, S. & Molles, L.E. (2016). Coexisting with coyotes (Canis latrans) in an urban environment. *Urban Ecosystems, 19*(3), 1335-1350.

Engel, M.T., Vaske, J.J., Bath, A.J., Marchini, S. (2016). Predicting acceptability of jaguars and pumas in the Atlantic Forest, Brazil. *Human Dimensions of Wildlife, 21*(5), 427-444.

Engel, M.T., Vaske, J.J., Marchini, S., Bath, A.J. (2017). Knowledge about big cats matters: insights for conservationists and managers. *Wildlife Society Bulletin, 41*(3), 398-404.

Environment Canada. (2012). Recovery Strategy for the Piping Plover (*Charadrius melodus*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. 29 pp.

Fishbein, M. (1980). A theory of reasoned action: some applications and implications. *Nebraska Symposium on Motivation*, 27, pp. 65-116.

Frank, B, Monaco, A. & Bath, A.J. (2015). Beyond standard wildlife management: a pathway to encompass human dimension findings in wild boar management. *European Journal of Wildlife Research, 61*(5), 723-730.

Ford-Thompson, A.E.S., Snell, C., Saunders, G., White, P.C.L. (2015). Dimensions of local public attitudes towards invasive species management in protected areas. *Wildlife Research, 42*(1), 60-74.

Groom, J.D., McKinney, L.B., Ball, L.C., Winchell, C.S. (2007). Quantifying off-highway vehicle impacts on density and survival of threatened dune-endemic plants. *Biological Conservation, 135*(1), 119-134.

Hanley, M. E., Hoggart, S. P. G., Simmonds, D. J., Bichot, A., Colangelo, M. A., Bozzeda, F., ... & Trude, R. (2014). Shifting sands? Coastal protection by sand banks, beaches and dunes. *Coastal Engineering, 87*, 136-146.

Havlick, D.G. (2002). *No place distant*. Washington, D.C.: Island Press.

Heinen, J.T., Roque, A. & Collado-Vides, L. (2017). Managerial implications of perceptions, knowledge, attitudes, and awareness of residents regarding Puerto Morelos Reef National Park, Mexico. *Journal of Coastal Research, 33*(2), 295-303.

Hughes, M., Beeco, J.A., Hallo, J.C., Norman, W. (2014). Diversifying rural economies with natural resources: the difference between local and regional OHV trail destinations. *Journal of Rural and Community Development, 9*(2), 149-167.

Important Bird Areas. (2016a). Miscou Island IBA Site Summary. Retrieved from: http://www.ibacanada.ca/site.jsp?siteID=NB021&lang=EN

Important Bird Areas. (2016b). Escuminac IBA Site Summary. Retrieved from: https://www.ibacanada.ca/site.jsp?siteID=NB042

Jones, A.S., Anderson, J.J., Dickson, B.G., Boe, S., Rubin, E.S. (2017). Off-highway vehicle road networks and kit for space use. *Journal of Wildlife Management, 81*(2), 230-237.

Jorgensen, J. G., & Bomberger Brown, M. (2015). Evaluating recreationists' awareness and attitudes toward Piping Plovers (Charadrius melodus) at Lake McConaughy, Nebraska, USA. *Human Dimensions of Wildlife*, *20*(4), 367-380.

Kansky, R., Kidd, M. & Knight, A.T. (2016). A wildlife tolerance model and case study for understanding human wildlife conflicts. *Biological Conservation, 201,* 137-145.

Kinsley, C.B., Gowan, M., Fenster, M.S., Didham, R., Barton, P. (in press). Effects of off-highway vehicles on sandy habitat critical to survival of a rare beetle. *Insect Conservation and Diversity.* DOI: 10.1111/icad.12244

Kuehn, D.M., D'Luhosch, P.D., Luzadis, V.A., Malmsheimer, R.W., Schuster, R.M. (2011). Attitudes and intensions of off-highway vehicle riders toward trail users: implications for forest managers. *Journal of Forestry, 109*(5), 281-287.

Kuehn, D.M., Schuster, R. & Nordman, E. (2015). Landowner perceptions of three types of boating in the Saranac Lakes area of New Your State's Adirondack Park. *Journal of Outdoor Recreation and Tourism, 9,* 53-63.

Liordos, V., Kontsiotis, V.J., Georgari, M., Baltzi, K., Baltzi, I. (2017). Public acceptance of management methods under different human-wildlife conflict scenarios. *Science of the Total Environment, 579,* 685-693.

Mann, M.J., & Leahy, J.E. (2010). Social capital in an outdoor recreation context. *Environmental Management, 45*(2), 363-376.

Mann, M.J., & Leahy, J.E. (2009). Connections: integrated meaning of ATV riding among club members in Maine. *Leisure Sciences, 31*(4), 384-396.

Mcgovern, E.B. & Kretser, H.E. (2015). Predicting support for recolonization of mountain lions (Puma concolor) in the Adirondack park. *Wildlife Society Bulletin, 39*(3), 503-511.

McIntyre, N. & Pigram, J.J. (1992). Recreation specialization re-examined: The case of vehicle-based campers. *Leisure Sciences*, *14*(1), 3-15.

Meena, V., MacDonald, D.W. & Montgomery, R.A. (2014). Managing success: Asiatic lion conservation, interface problems and peoples' perceptions in the Gir Protected Area. *Biological Conservation, 174,* 120-126.

Miller, A.D., Vaske, J.J., Squires, J.R., Olson, L.E., Roberts, E.K. (2017). Does zoning winter recreationists reduce recreation conflict? *Environmental Management, 59*(1), 50-67.

Moreto, W.D., Lemieux, A.M. & Nobles, M.R. (2016). 'It's in my blood now': The satisfaction of rangers working in Queen Elizabeth National Park, Uganda. *Oryx, 50*(4), 655-663.

Nature Conservancy of Canada. (2017). Featured Projects: Miscou Island. Retrieved from: http://www.natureconservancy.ca/en/where-we-work/new-brunswick/featured-projects/acadian-peninsula/miscou-island.html

New Brunswick All-Terrain Vehicle Federation. (2016). *Yearly Federation Membership*. Retrieved from: https://nbatving.com/en/statistiques.php

New Brunswick All-Terrain Vehicle Task Force. (2001). *Working together towards a safer future.* Fredericton, NB: Department of Public Safety, 88 pgs.

Newman, P., Manning, R., Dennis, D., McKonly, W. (2005). Informing carrying capacity decision making in Yosemite National Park, USA using stated choice modeling. *Journal of Park and Recreation Administration, 23*(1), 75-89.

Off-Road Vehicle Act, Statutes of New Brunswick (1985, c. O-1.5). Retrieved from: http://laws.gnb.ca/en/ShowPdf/cs/O-1.5.pdf

Pierskalla, C.D., Schuett, M.A., & Thompson, K.A. (2011). Management perceptions of off-highway vehicle use on National Forest System lands in Appalachia. *Northern Journal of Applied Forestry, 24*(4), 208-213.

Pont, A.C., Marchini, S., Engel. M.T., Machado, R., Ott, P., Crespo, E., Coscarella, M., Dalzochio, M., Oliveira, L. (2016). The human dimensions of the conflict between

fishermen and South American sea lions in southern Brazil. *Hydrobiologia, 770*(1), 89-104.

Riley, C.J. (2013). *Examining OHV user displacement at the Oregon Dunes National Recreation Area: A ten year trend study* (Doctoral dissertation). Available from ProQuest dissertation and theses database (document ID: 3576330).

Riley, C.J., Pierskalla, C.D., Burns, R.C., Maumbe, K.C., Graefe, A.R., Smaldone, D.A., Williams, S. (2015). Examining OHV user displacement at the Oregon Dunes National Recreational Area and Sand Lake: a 10-year trend study. *Journal of Outdoor Recreation and Tourism, 9,* 44-52.

Robinson, S. (2010). *Coastal sand dunes of New Brunswick: A biodiversity and conservation status assessment*. Sackville, NB: Atlantic Canada Conservation Data Centre.

Rokeach, M. (1973). *The nature of human values*. New York, NY: Free Press.

Roy, D. (2012). Acadian Peninsula – Atlantic region natural area conservation plan. Fredericton, NB: Nature Conservancy Canada – New Brunswick Chapter.

Smith, J.W. (2008). *Utah off-highway vehicle owners' specialization and its relationship to environmental attitudes and motivations* (Master's thesis). Available from ProQuest dissertation and theses database (document ID: 1457206).

Smith, J. W., Burr, S. W., & Reiter, D. K. (2010). Specialization among off-highway vehicle owners and its relationship to environmental worldviews and motivations. *Journal of Park and Recreation Administration, 28*(2), 57–73.

Smith, J.W., & Burr, S.W. (2011). Environmental attitudes and desired social-psychological benefits of off-highway vehicle users. *Forests, 2*(4), 875-893.

Species at Risk Act, Statutes of Canada (2002, c. 29). Retrieved from: http://laws-lois.justice.gc.ca/eng/acts/s-15.3/

Statistics Canada. (2016a). Census Profile: Miscou Island. *Government of Canada.* Retrieved from: http://www.statcan.gc.ca/

Statistics Canada. (2016b). Census Profile: Escuminac & Pointe-Sapin. *Government of Canada.* Retrieved from: http://www.statcan.gc.ca

Switalski, A. (2018). Off-highway vehicle recreation in drylands: A literature review and recommendations for best management practices. *Journal of Outdoor Recreation and Tourism*, *21*, 87-96.

Tarr, N.M., Simons, T.R., & Pollock, K.H. (2010). An experimental assessment of vehicle disturbance effects on migratory shorebirds. *Journal of Wildlife Management, 74*(8), 1776-1783.

Teel, T. & Manfredo, M. (2010). Understanding the diversity of public interests in wildlife conservation. *Conservation Biology, 24*(1), 128-139.

Thompson, K.A. (2007). *Management perceptions of off-highway vehicle use on national forest system lands in Appalachia* (Master's thesis). Available from ProQuest dissertation and theses database (document ID: 1451737).

Vaske, J. J., Deblinger, R. D., & Donnelly, M. P. (1992). Barrier beach impact management planning: findings from three locations in Massachusetts. *Canadian Water Resources Journal*, *17*(3), 278-290.

Vaske, J. J. & Donnelly, M. P. (1999). A value-attitude-behavior model predicting wildland preservation voting intentions. *Society and Natural Resources 12*(6), 523–537.

Vaske, J.J., & Whittaker, D. (2004). Normative approaches to natural resources. In M. J. Manfredo, J. J. Vaske, B. L. Bruyere, D. R. Field, and P. Brown (Eds.) *Society and natural resources: A summary of knowledge* (pp. 283-294). Jefferson, MO: Modern Litho.

Wagar, J.A. (1969). *Nonconsumptive uses of the coniferous forest, with special relation to consumptive uses*. Proceedings: 1968 Symposium Coniferous Forests of the Northern Rocky Mountains. Missoula, MT: University of Montana Foundation, 255-270.

Waight, C.F. (2013). *Understanding all-terrain vehicle users: the human dimensions of ATV use on the island portion of Newfoundland and Labrador* (Master's thesis). St. John's Campus, Memorial University of Newfoundland, St. John's, NL.

Waight, C.F. & Bath, A.J. (2014a). Recreational specialization among ATV users and its relationship to environmental attitudes and management preferences on the Island of Newfoundland. *Leisure Sciences*, *36*(2), 161-182.

Waight, C.F. & Bath, A.J. (2014b). Factors influencing attitudes among all-terrain vehicle users on the island portion of the province of Newfoundland and Labrador, Canada. *Journal of Outdoor Recreation and Tourism, 5*(6), *27-36.*

Whittaker, D., Vaske, J.J., & Manfredo, M.J. (2006). Specificity and the cognitive hierarchy: Value orientations and the acceptability of urban wildlife management actions. *Society & Natural Resources, 19*(6), 515-530.

Wiener, C.S., Needham, M.D., Wilkinson, P.F. (2009). Hawaii's real life marine park: interpretation and impacts of commercial marine tourism in the Hawaiian Islands. *Current Issues in Tourism, 12*(5), 489-504.

Wilson, P.I. (2008). Preservation versus motorized recreation: institutions, history, and public lands management. *The Social Science Journal, 45*(1), 194-202.

Zinn, H.C., Manfredo, M.J., Vaske, J.J, & Wittmann, K. (1998). Using normative beliefs to determine the acceptability of wildlife management actions. *Society & Natural Resources, 11*(6), 649-662.

Co-authorship Statement

This thesis includes two manuscripts that were written in collaboration with two additional authors. For both manuscripts, the candidate independently prepared the research proposal based on a review of the literature and was directly responsible for all aspects of the research process. The candidate collected all data, performed statistical analysis on the samples, interpreted the ensuing results, and was the primary and corresponding author of both manuscripts.

The first collaborative manuscript, entitled "Recreation Specialization: Applying a Self-Classification Method on All-Terrain Vehicle Users in New Brunswick, Canada" is written with Dr. Alistair J. Bath (Memorial University) and Dr. Jerry J. Vaske (Colorado State University). The article is intended for publication in the *Journal of Leisure Research*.

The second collaborative manuscript, entitled "Factors Affecting Recreation Specialization: The Case of the ATV" is written with Dr. Jerry J. Vaske (Colorado State University) and Dr. Alistair J. Bath (Memorial University). The article is intended for publication in the *Journal of Outdoor Recreation and Tourism*.

Chapter 2: Recreation Specialization: Applying a Self-Classification Method on All-Terrain Vehicle Users in northeastern New Brunswick, Canada

2.1 Abstract

This article examines the utility of a single-item self-classification measurement of recreation specialization on all-terrain vehicle (ATV) users. A three-category self-classification measure of specialization (Type I: casual; Type II: intermediate; Type III: expert) is compared with an 11-variable composite specialization index measure of the concept. Data were obtained from a questionnaire distributed to residents of three communities in northeastern New Brunswick, Canada (Response rate = 53%). Discriminant analysis shows that the specialization variables correctly classified 41% of Type I, 90% of Type II, and 53% of Type III ATV users. Overall, 68% of respondents were correctly classified. These findings suggest the self-classification measurement of recreation specialization may not perform as well as the traditional multivariate measurement for ATV users.

Keywords: recreation specialization; self-classification; all-terrain vehicle; discriminant analysis

2.2 Introduction

Recreationists are typically not homogeneous and display a broad range of skills, attitudes, motivations and behaviours (Needham, Sprouse, & Grimm, 2009; Manning, 2011; Bryan, 2000). To understand this diversity, Bryan (1977) advanced the theory of

recreational specialization. Within this framework, participants in an activity can be arranged along 'a continuum of experience and commitment to the sport, from the beginning recreationists to the specialist' (Bryan, 1977, p. 176). Each stage along the specialization continuum exhibits different behavioural traits and preferences, emphasizing the variation of characteristics among activity participants (Bryan, 1977). This article applies the recreation specialization framework to all-terrain vehicle (ATV) users.

Although the application of specialization concepts to motorized activities is limited, recreation specialization has been applied to a broad range of recreational activities. These include consumptive activities such as hunting (Needham & Vaske, 2013; Needham, Vaske, Donnelly, & Manfredo, 2007; Schroeder, Fulton, Lawrence, & Cordts, 2013) and angling (Garlock & Lorenzen, 2017; Needham et al., 2009; Oh & Sutton, in press), and non-consumptive activities like hiking (Jun, Gerard, Graefe, & Manning, 2015; Kim & Song, 2017; Wöran & Arnberger, 2012) and skiing (Needham, Rollins, & Vaske, 2005; Vaske, Dyar, & Timmons, 2004; Won, Bang, & Shonk, 2008). Despite the diversity of applications, there is little consensus on how recreation specialization should be measured. Some studies have conceptualized specialization as a multivariate construct consisting of cognitive, affective and behavioural dimensions (see Manning, 2011; Needham, Scott, & Vaske, 2013; Scott & Shafer, 2001). The cognitive dimension measures skill level and knowledge of the activity (Donnelly, Vaske, & Graefe, 1986; Needham et al., 2007; Salz & Loomis, 2005; Thapa, Graefe, & Meyer, 2006). The affective dimension measures centrality to life and commitment to the activity

(Bricker & Kerstetter, 2000; Dyck, Schneider, Thompson, & Virden, 2003; McFarlane, Boxall, & Watson, 1998; Salz, Loomis, & Finn, 2001). The behavioural dimension measures past experience and frequency of participation (Lee & Scott, 2006; Oh & Ditton, 2006; Scott & Thigpen, 2003; Waight & Bath, 2014a). While both single and multi-item constructs have been used to measure these dimensions, multi-item measurements have dominated past research as no single variable has proven to be a perfect indicator of specialization (Lee & Scott, 2004; Scott & Shafer, 2001).

Recent studies have implemented an alternative specialization measurement using a self-classification approach (Beardmore, Haider, Hunt, & Arlinghaus, 2013; Kerins, Scott, & Shafer, 2007; Needham et al, 2009; Scott, Ditton, Stoll, & Eubanks Jr., 2005; Sorice, Oh, & Ditton, 2009). In this, a single questionnaire item is used with pre-defined definitions that correspond with the anticipated levels of specialization. Compared to traditional multivariate approaches, the self-classification method significantly reduces respondent burden and simplifies the classification process. The self-classification approach, however, has only been applied to a limited number of activities, with each study calling for further applications to test its external validity (Beardmore et al., 2013; Kerins et al., 2007; Needham et al., 2009; Scott et al., 2005; Sorice et al., 2009).

Recreation specialization has been used to understand off-highway vehicle (OHV) users (e.g., Smith, Burr, & Reiter, 2010), but has rarely been applied to ATV users (Waight & Bath, 2014a; Waight & Bath, 2014b). ATVs are defined as motorized off-highway vehicles with three to four low-pressure tires (Off-Road Vehicle Act, 1985) and are commonly referred to as ‘quads’, ‘side-by-sides’, or simply ‘bikes.’ This study

employs both a self-classification and multivariate recreation specialization methodology to ATV users. We hypothesize that the two approaches will result in similar classifications of ATV user specialization, as has been achieved in previous studies (Beardmore et al., 2013; Kerins et al., 2007; Needham et al., 2009; Scott et al., 2005; Sorice et al., 2009).

2.3 Methods

2.3.1 Study Areas

Data were collected in three communities in the Canadian province of New Brunswick, namely Miscou Island, Escuminac, and Pointe-Sapin. These communities were selected for two reasons. First, each community is characterized by prominent ATV use. Second, their coastal location along the Gulf of St. Laurence has resulted in potentially harmful ATV interactions with local conservation initiatives, including the protection of vulnerable migratory shorebirds like the Piping Plover (*Charadrius melodus*), which is listed federally as a species at risk (Environment Canada, 2012; Robinson, 2010; Roy, 2012; SARA, 2002). Together, these communities are home to approximately 1,200 residents (Statistics Canada, 2016a, 2016b), and are known for their diversity of species and thriving coastal habitats, including beaches, dunes, and peatlands (Noel et al., 2015; Roy, 2012). Our sampling frame comprised residents of these three communities who had used an ATV either as an operator or as a passenger, and who were at least 19 years of age.

2.3.2 Data Collection

Data were obtained by questionnaire using Riley and Kiger's (2002) drop-off /pick-up (DOPU) method administered from May to August 2017. This method is suitable in areas where mailing addresses and telephone numbers are not readily available (Clark & Finley, 2007). Participants were recruited by going door-to-door using a systematic random sample of half the households in each community, ensuring sample uniformity and minimizing selection bias (Vaske, 2008). The questionnaires were initially dropped-off with instructions that the completed questionnaire would be picked-up two days later. If a completed questionnaire was not available upon pick-up, a stamped envelope addressed to the primary researcher with a reminder card was provided to allow respondents to return their questionnaire. If the questionnaire package remained untouched on a doorknob for seven days and contact could not be established with the resident, the package was removed, and the household considered not occupied. Of the 301 questionnaires delivered, 144 were returned. After eliminating incomplete questionnaires and accounting for unoccupied households, the response rate was 53%.

2.3.3 Organization of Variables

Variables were operationalized using an eight-page questionnaire that was modeled after similar ATV and OHV research (Smith et al., 2010; Waight & Bath, 2014a; Waight & Bath, 2014b). Specialization was examined using two approaches. First, a multivariate specialization index comprised of cognitive, affective and behavioural dimensions was computed. The specialization dimensions contained 11 variables that were derived from past research (McIntyre & Pigram, 1992; Needham et al., 2009; Scott

& Shafer, 2001; Sorice et al., 2009). The cognitive dimension contained four variables assessing respondents' knowledge of the activity using 5-point scales ranging from 1 (strongly disagree) to 5 (strongly agree). The affective dimension contained five variables that assessed respondents' commitment to ATVing using 5-point scales ranging from 1 (strongly disagree) to 5 (strongly agree). The behavioural dimension was comprised of two variables regarding ATV participation in hours per week and percentage of free time spent ATVing in the past 12 months.

The second method examined ATV specialization using a single self-classification variable that asked respondents to classify themselves as one of three types of ATV users:

Type I: 'This is an enjoyable but **infrequent activity** that is a minor activity to my other outdoor interests and I **am not highly skilled** in this activity.'

Type II: 'This activity is important to me but is only one of the outdoor activities in which I participate in. My participation in this activity is not regular and I consider myself to be moderately skilled in this activity.'

Type III: 'This is my **primary** outdoor activity. I consider myself to be **highly skilled** in this activity, and I participate in this activity every available chance I get.'

Respondents selected the category that best described their ATV participation. Each category incorporated the cognitive, affective and behavioural specialization dimensions, and was adapted from similar studies (e.g., Beardmore et al., 2013; Needham et al., 2009; Scott et al., 2005; Sorice et al., 2009). These categories represent a continuum from

casual ATV users (Type I) to expert ATV users (Type III) similar to the traditional multivariate approach.

2.3.4 Data Analysis

Following data collection, completed questionnaires were coded and entered into IBM's SPSS statistical software (version 23) for analysis. Appropriate quality control procedures were used to ensure that coding, data entry, and data preparation were done correctly. Improperly coded variables and outliers were identified using descriptive statistical techniques and corrected or deleted from the dataset (Tabachnick & Fidell, 2001).

Descriptive statistics were also used to explore the preliminary characteristics of the data. In accordance with standard practices, Missing Values Analysis (MVA) confirmed that missing data were random, and missing values were replaced with their respective dimensional means (Tabachnick & Fidell, 2001; Vaske, 2008). Creation of the multivariate specialization index and subsequent analysis was modeled on methods used by Needham et al. (2009). Cronbach's alpha (α) reliability analysis was performed to identify the composition of each specialization dimension. The 11 specialization variables were then converted to standardized Z-scores for ease of interpretation (Smith et al., 2010; Thapa et al., 2006; Waight & Bath, 2014a; Waight & Bath, 2014b). One-way analysis of variance (ANOVA) with Least Significant Difference (LSD) and Games-Howell *post-hoc* tests were used to assess how each specialization variable differed across the self-classification sub-groups. Eta (η) effect size measurement was used to quantify the extent of these differences. Discriminant analysis was then performed to identify the

degree to which the independent specialization dimensions were used to predict membership in the dependent self-classification sub-groups.

2.4 Results

Means and reliability coefficients for the 11 variables of the multivariate specialization index are shown in Table 2.1. Cronbach's alphas were .85 for the cognitive dimension (four variables), .89 for the affective dimension (five variables), and .68 for the behavioural dimension (two variables). Deletion of variables with low item-total correlations did not improve any of the reliabilities. Overall, the alpha value for the entire specialization index was .83.

Respondents who classified themselves as Type I ATV users (i.e., casual; 36%) reported the lowest means on all items measuring cognitive, affective, and behavioural dimensions; Type III ATV users (i.e., expert; 18%) reported the highest means on all dimensional items. Type II ATV users (i.e., intermediate; 46%) reported means in between the other groups. For example, mean responses to the affective dimension item 'I would rather go ATVing than do other outdoor activities' were 1.68 for Type I, 2.77 for Type II, and 3.95 for Type III on a scale of 1 (strongly disagree) to 5 (strongly agree). ANOVA and *post-hoc* tests showed that all responses, with the exception of one cognitive item, differed significantly among the three self-classification groups. The corresponding *F-values* ranged from 5.14 to 29.00, and *p-values* ranged from .007 to < .001. Eta (η) effect sizes ranged from .31 to .60 suggesting substantial differences among these groups (Vaske, 2008) after excluding the statistically insignificant cognitive variable ($F = 2.66$; $p = .075$; $\eta = .22$ or minimal relationship).

Table 2.1: Reliability analysis of specialization dimensions and variables

Specialization dimensions and variables	*M*	*SD*	Item total correlation	Alpha (α) if deleted	Cronbach alpha (α)
Cognitive[1]					.85
I am aware of provincial ATV regulations	3.65	1.17	.61	.83	
I am aware of all ATV trails in my community	3.89	1.16	.70	.80	
I know which trails are officially designated as ATV trails	3.85	1.26	.75	.77	
I know which trails are private	3.71	1.26	.66	.81	
Affective[1]					.89
If I stopped ATVing, an important part of my life would be missing	3.10	1.43	.82	.84	
ATVing is an important part of my community's culture	3.57	1.16	.59	.89	
ATVing is a large part of my life	2.93	1.32	.83	.84	
I would rather go ATVing than do other outdoor activities	2.61	1.35	.73	.86	
If the price of gas went up, I would still go ATVing	3.66	1.20	.67	.88	
Behavioural					.68
On average, how many hours per week do you ride your ATV[2]	1.75	.91	—	—	
What percentage of your free time do you spend ATVing[3]	2.08	.74	—	—	
Overall specialization index					.83

[1] Variables coded on 5-point scale: 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly agree
[2] Variable coded on 4-point scale: 1 = less than 1 hour, 2 = 1-4 hours, 3 = 5-9 hours, 4 = 10 or more hours
[3] Variable coded on 5-point scale: 1 = 15% or less, 2 = 20%, 3 = 40%, 4 = 60%, 5 = 80%

Table 2.2: Comparison of specialization variables and dimensions across self-classification group

Specialization dimensions and variables	Self-classification group[1]			*F-value*	*p-value*	Effect size (η)
	Type I	Type II	Type III			
Cognitive[2]						
I am aware of provincial ATV regulations	3.38 [a]	3.81	4.05 [b]	2.66	.075	.22
I am aware of all ATV trails in my community	3.51 [a]	4.10 [b]	4.41 [b]	5.19	.007	.31
I know which trails are officially designated as ATV trails	3.43 [a]	4.08 [b]	4.42 [b]	5.14	.007	.30
I know which trails are private	3.24 [a]	3.97 [b]	4.25 [b]	6.09	.003	.33
Affective[2]						
If I stopped ATVing, an important part of my life would be missing	2.24 [a]	3.35 [b]	4.26 [c]	18.16	< .001	.51
ATVing is an important part of my community's culture	3.08 [a]	3.69 [b]	4.37 [c]	9.76	< .001	.40
ATVing is a large part of my life	2.05 [a]	3.19 [b]	4.00 [c]	21.21	< .001	.54
I would rather go ATVing than do other outdoor activities	1.68 [a]	2.77 [b]	3.95 [c]	29.00	< .001	.60
If the price of gas went up, I would still go ATVing	3.14 [a]	3.88 [b]	4.37 [b]	8.86	< .001	.39
Behavioural						
On average, how many hours per week do you ride your ATV[3]	1.80 [a]	2.02 [b]	2.68 [c]	9.69	< .001	.41
What percentage of your free time did you spend ATVing[4]	1.34 [a]	1.73 [a]	2.63 [b]	15.19	< .001	.49

[1] Type I analogous to casual; Type II analogous to intermediate; Type III analogous to expert. Cell entries are means unless specified otherwise. Entries with different letter superscripts across each row differ at $p < .05$ using Least Significant Differences (LSD) or Games-Howell *post hoc* tests.
[2] Variables coded on 5-point scale: 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly agree
[3] Variable coded on 4-point scale: 1 = less than 1 hour, 2 = 1-4 hours, 3 = 5-9 hours, 4 = 10 or more hours
[4] Variable coded on 5-point scale: 1 = 15% or less, 2 = 20%, 3 = 40%, 4 = 60%, 5 = 80%

The discriminant analysis generated two functions. Function 1 explained 97% of the variance and Function 2 explained 3% of the variance (Table 2.3). Canonical correlations were .624 for Function 1 and .145 for Function 2; the eigenvalue for Function 1 was .649 ($p < .001$), but only .002 ($p = .374$) for Function 2. A large and significant eigenvalue suggests more explanatory power in the dependent variable (Vaske, 2008).

Wilk's lambda for Function 1 was $\Lambda = .597$ and $\Lambda = .979$ for Function 2. The smaller lambda value for Function 1 suggests greater discriminating ability than Function 2 (Vaske, 2008). Overall, these results suggest that Function 2 lacked sufficient explanatory power, so only Function 1 was retained for further analysis.

Table 2.3: Discriminant analysis predicting specialization self-classification

Function	Eigenvalue	Percent variance	Canonical correlation	Wilks' Lambda	χ^2-*value*	*p-value*
1	.639	96.7	.624	.597	47.43	< .001
2	.002	3.3	.145	.979	1.97	.374

Table 2.4 shows that only the affective ($F = 17.49$, $p < .001$) and behavioural dimensions ($F = 18.49$, $p < .001$) significantly predicted the self-classification measure. The cognitive dimension only approached statistical significance ($F = 2.85$, $p = .063$). The affective (standardized coefficient = .660) and behavioural (.624) dimensions had the greatest discriminating ability in predicting the self-classification membership. The cognitive dimension (standardized coefficient = .035), however, was least important in predicting the self-classification membership relative to the other specialization dimensions (Table 2.4).

Table 2.4: Discriminant function coefficients and equality of group means predicting specialization self-classification

Discriminant variables	Function 1 statistics		Wilks' Lambda	*F-value*	*p-value*
	Unstandardized coefficient	Standardized coefficient			
Cognitive dimension	.051	.035	.942	2.85	.063
Affective dimension	.980	.660	.716	18.49	< .001
Behavioural dimension	.817	.624	.727	17.49	< .001

Group centroids were relatively close to each other (-.889, -.008, 1.382), indicating that the specialization dimensions did not discriminate effectively among Type I, II, and III ATV users (Table 2.5). The specialization dimensions correctly classified 90% of Type II ATV users, but only 41% of Type I respondents and 53% of Type III individuals. Overall, only 68% of respondents were correctly classified into Type I, II, and III of the self-classification measure (Table 2.5).

Commented [M1]: Show discriminant graph?

Table 2.5: Discriminant analysis classification results and group centroids

Actual group selection	Predicted group membership (%)[1]			Group centroids
	Type I	Type II	Type III	
Type I	41	55	4	-.889
Type II	6	90	4	-.008
Type III	5	42	53	1.382

[1] Total correctly classified = 67.7%. Type I: casual; Type II: intermediate; Type III: expert.

2.5 Discussion

Contrary to previous research (Beardmore et al., 2013; Kerins et al., 2007; Needham et al., 2009; Scott et al., 2005; Sorice et al., 2009), only Type II ATV users were sufficiently classified in our findings. Overall, about two-thirds of respondents were

correctly classified. This compares to 88% (Needham et al., 2009), 71% (Kerins et al., 2007), and 72% (Scott et al., 2005) reported in other studies. The poor performance of our cognitive dimension in the ANOVA and discriminant analysis coupled with the misclassification of Type I and III ATV users indicates that while our study replicated Needham et al.'s (2009) analysis, it did not replicate their results. This might suggest two possibilities: (a) ATV user specialization differs from that of other recreation activities, and (b) the self-classification method requires further investigation.

Previous applications of the self-classification method have applied the approach either to consumptive activities (i.e., angling) or non-consumptive activities (i.e., bird watching, scuba diving, ultimate frisbee). Activity consumption is conceptualized as a continuum from non-consumptive activities where participants resource consumption is limited, to consumptive activities where natural resources are consumed at the expense of participant experiences (Wagar, 1969). Unlike most outdoor activities, ATV users can have both non-consumptive (i.e., recreation) and consumptive (e.g., collecting firewood) components. This difference in ATV use could explain why our overall classification was less effective than previous studies.

Research has explored the consumptive versus non-consumptive distinction relative to participant satisfaction (Roemer & Vaske, 2012; Vaske, Donnelly, Heberlein, & Shelby, 1982; Vaske & Roemer, 2013). Results consistently show that consumptive recreationists report significantly lower levels of overall satisfaction than their non-consumptive counterparts. Given the consumptive and non-consumptive properties of

ATV use, we propose that the effectiveness of classifying participant specialization levels could vary by type of consumption.

Whether a participant uses their ATV primarily for non-consumptive (recreational) or consumptive (utilitarian) purposes could influence the utility of the cognitive dimension as an indicator of their specialization. Knowledge of local ATV trails and provincial regulations could be a skill sets tailored to recreational ATV users more than their utilitarian counterparts. Utilitarian participants may not need to be aware of ATV trail systems to accomplish their desired tasks. Additionally, most provincial ATV regulations in New Brunswick govern ATV use in relation to public roads and populated areas (Off-road Vehicle Act, 1988). This is relevant knowledge for recreational ATV users, but less critical for utilitarian users in remote areas or on private land. These factors could have influenced our sample's responses to these cognitive items, resulting in low and insignificant discriminant function coefficients, and low Eta effect size values.

The findings outlined here are limited to a small sample of ATV users in northeastern New Brunswick, Canada. Future research with larger sample sizes and additional locations is required to evaluate further the utility of a self-classification method for testing recreation specialization. In addition, future research should investigate if differences in ATV consumption has an impact on user recreation specialization. Researchers are encouraged to inquire into these issues to further develop a typology of ATV user specialization.

2.6 References

Albritton, R., & Stein, T.V. (2011). Integrating social and natural resource information to improve planning for motorized recreation. *Applied Geography, 31*(1), 85-97.

Albritton, R., Stein, T.V., & Thapa, B. (2009). Exploring conflict and tolerance between and within off-highway vehicle recreationists. *Journal of Park and Recreation Administration, 27*(4), 54-72.

Babbie, E. (2003). *The practice of social research with InfoTrac (10th ed.).* Belmont, CA: Wadsworth Publishing Co.

Backlund, E.A., & Kuentzel, W.F. (2013). Beyond progression in specialization research: leisure capital and participation change. *Leisure Sciences, 35*(3), 293-299.

Beardmore, B., Haider, W., Hunt, L.M., & Arlinghaus, R. (2013). Evaluating the ability of specialization indicators to explain fishing preferences. *Leisure Sciences, 35*(3), 273-292.

Bricker, K.S., & Kerstetter, D.L. (2000). Level of specialization and place attachment: an exploratory study of whitewater recreationists. *Leisure Sciences, 22*(4)*,* 233-257.

Bryan, H. (2000). Recreation specialization revisited. *Journal of Leisure Research, 32*(1), 18-21.

Bryan, H. (1977). Leisure value systems and recreational specialization: The case of the trout fisherman. *Journal of Leisure Research*, *9*(3), 174-187.

Clark, W. A., & Finley, J. C. (2007). Contracting meter readers in a drop-off/pick-up survey in Blagoevgrad, Bulgaria. *Society and Natural Resources*, *20*(7), 669–673. https://doi.org/10.1080/08941920701329686

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.).* Hillsdale, NJ: Lawrence Erlbaum Associates.

Cordell, K.H., Betz, C.J., Green, G., & Owens, M. (2005). Off-highway vehicle recreation in the United States, Regions, and States: a national report from the National Survey on Recreation and the Environment (NSRE). Athens, GA: United States Forrest Service.

Deisenroth, D, Loomis, J., & Bond, C. (2009). Non-market valuation of off-highway vehicle recreation in Larimer County, Colorado: implications of trail closures. *Journal of Environmental Management, 90*(11), 3490-3497.

Donnelly, M.P., Vaske, J.J., & Graefe, A.R. (1986). Degree and range of recreation specialization: toward a typology of boating related activities. *Journal of Leisure Research, 18*(2), 81-95.

Dyck, C., Schneider, I., Thompson, M., & Virden, R. (2003). Specialization among mountaineers and its relationship to environmental attitudes. *Journal of Park and Recrearion Administration, 21*(2), 44-62.

Environment Canada. (2012). Recovery Strategy for the Piping Plover (*Charadrius melodus*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. 29 pp.

Garlock, T.M., & Lorenzen, K. (2017). Marine angler characteristics and attitudes toward stock enhancement in Florida. *Fisheries Research, 186*(2), 439-445.

Hawkins, C., Loomis, D.K., & Salz, R.J. (2009). A replication of the internal validity and reliability of a multivariable index to measure recreation specialization. *Human Dimensions of Wildlife, 14*(4), 293-300.

Jun, J., Gerard, K., Graefe, A.R., & Manning, R. (2015). An identify-based conceptualization of recreation specialization. *Journal of Leisure Research, 47*(4), 425-443.

Hughes, M., Beeco, J.A., Hallo, J.C., & Norman, W. (2014). Diversifying rural economies with natural resources: the difference between local and regional OHV trail destinations. *Journal of Rural and Community Development, 9*(2)*,* 149-167.

Kerins, A.J., Scott, D, & Shafer, C.S. (2007). Evaluating the efficacy of a self-classification measure of recreation specialization in the context of ultimate frisbee. *Journal of Park and Recreational Administration, 25*(3)*,* 1-22.

Kim, H., & Song, H. (2017). Measuring hiking specialization and identification of latent profiles of hikers. *Landscape and Ecological Engineering, 13*(1), 59-68.

Knisley, C.B., Gowan, M., Fenster, M.S., Didham, R., & Barton, P. (in press). Effects of off-highway vehicles on sandy habitat critical to survival of a rare beetle. *Insect Conservation and Diversity.* DOI: 10.1111/icad.12244

Lee, J.H., & Scott, D. (2006). For better for worse? A structural model of the benefits and costs associated with recreation specialization. *Leisure Science, 28*(1)*,* 17-38.

Lee, J.H., & Scott, D. (2004). Measuring birding specialization: A confirmatory factor analysis. *Leisure Sciences, 26*(3), 245-260.

Mann, M.J., & Leahy, J.E. (2010). Social capital in an outdoor recreation context. *Environmental Management, 45*(2)*,* 363-376.

Mann, M.J., & Leahy, J.E. (2009). Connections: integrated meaning of ATV riding among club members in Maine. *Leisure Sciences, 31*(4)*,* 384-396.

Manning, R.E. (2011). *Studies in outdoor recreation: search and research for satisfaction* (3rd ed.). Corvallis, OR: Oregon State University Press.

McFarlane, B.L. (2004). Recreation specialization and site choice among vehicle-based campers. *Leisure Sciences, 26*(3), 309-322.

McFarlane, B.I., Boxall, P.C., & Watson, D.O. (1998). Past experience and behavioral choice among wilderness users. *Journal of Leisure Research, 30*(2)*,* 195-213.

McIntyre, N., & Pigram, J.J. (1992). Recreation specialization re-examined: The case of vehicle-based campers. *Leisure Sciences*, *14*(1), 3-15.

Miller, C.A., & Graefe, A.R. (2000). Degree and range of specialization across related hunting activities. *Leisure Sciences, 22*(3), 195-204.

Needham, M.D., Rollins, R.B., & Vaske, J.J. (2005). Skill level and normative evaluations among summer recreationists at alpine ski areas. *Leisure / Loisir, 29*(1)*,* 71-94.

Needham, M.D., Scott, D., & Vaske, J.J. (2013). Recreation specialization and related concepts in leisure research. *Leisure Sciences, 35*(3)*,* 199-202.

Needham, M.D., Sprouse, L.J., & Grimm, K.E. (2009). Testing a self-classification measure of recreation specialization among anglers. *Human Dimensions of Wildlife, 14*(6)*,* 448-455.

Needham, M.D., & Vaske, J.J. (2013). Activity substitutability and degree of specialization among deer and elk hunters in multiple states. *Leisure Sciences, 35*(3), 235-246.

Needham, M.D., Vaske, J.J., Donnelly, M.P., & Manfredo, M.J. (2007). Hunting specialization and its relationship to participation in response to chronic wasting disease. *Journal of Leisure Research, 39*(3), 413-437.

Noel, P., Morrison, M., Noseworthy, J., White, J., Fortune, A., Bernard, L., Joubert, E., Flemming, F., Foley, J., & White, G. (2015). *New Brunswick Northumberland Strait Natural Area Conservation Plan II*. Fredericton, NB: Nature Conservancy Canada – New Brunswick Chapter.

Off-Road Vehicle Act, Statutes of New Brunswick (1985, c. O-1.5). Retrieved from: http://laws.gnb.ca/en/ShowPdf/cs/O-1.5.pdf

Oh, C.-O., & Ditton, R.B. (2006). Using recreation specialization to understand multi-attribute management preferences. *Leisure Science, 28*(4)*,* 369-384.

Ohh, C.-O., & Sutton, S.G. (in press). Comparing the developmental process of consumptive orientation across different population groups. *Leisure Science*. doi: 10.1080/01490400.2017.1325795

Oh, C.-O., Sutton, S.G., & Sorice, M.G. (2013). Assessing the role of recreation specialization in fishing site substitution. *Leisure Sciences, 35*(3), 256-272.

Pigeon, K.E., Anderson, M., MacNearney, D., Cranston, J., Stenhouse, G., & Finnegan, L. (2016). Toward the restoration of caribou habitat: understanding factors associated with human motorized use of legacy seismic lines. *Environmental Management, 58*(5), 821-832.

Riley, P.J. & Kiger, G. (2002). Increasing survey response: the drop-off/pick-up technique. *The Rural Sociologist, 22*(1), 6-9.

Robinson, S. (2010). *Coastal sand dunes of New Brunswick: A biodiversity and conservation status assessment*. Sackville, NB: Atlantic Canada Conservation Data Centre.

Roemer, J.M., & Vaske, J.J. (2012). Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists: A comparative analysis of three decades of research. In C.L. Fisher, & C.E. Watts Jr. (Eds.), *Proceedings of the 2010 Northeastern Recreation Research Symposium* (pp. 9-15). Gen. Tech. Rep. NRS-P-94. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.

Roy, D. (2012). *Acadian Peninsula – Atlantic region natural area conservation plan*. Fredericton, NB: Nature Conservancy Canada – New Brunswick Chapter.

Salant, P., & Dillman, D.A. (1994). *How to conduct your own survey*. New York, NY: John Wiley and Sons.

Salz, R.J., & Loomis, D.K. (2005). Recreation specialization and anglers' attitudes towards restricted fishing areas. *Human Dimensions of Wildlife, 10*(3)*,* 187-199.

Salz, R.J., Loomis, D.K., & Finn, K.L. (2001). Development and validation of a specialization index and testing of specialization theory. *Human Dimensions of Wildlife, 6*(4), 239-258.

Scott, D., Ditton, R. B., Stoll, J. R., & Eubanks Jr., T. L. (2005). Measuring specialization among birders: Utility of a self-classification measure. *Human Dimensions of Wildlife, 10*(1), 53-74.

Scott, D., & Shafer, C.S. (2001). Recreational specialization: A critical look at the construct. *Journal of Leisure Research, 33*(3), 319-343.

Scott, D., & Thigpen, J. (2003). Understanding the birder as tourist: segmenting visitors to the Texas Hummer / Bird Celebration. *Human Dimensions of Wildlife, 8(3)*, 199-218.

Schroeder, S.A., Fulton, D.C., Lawrence, J.S., & Cordts, S.D. (2013). Identity and specialization as a waterfowl hunter. *Leisure Sciences, 35*(3), 218-234.

Smith, J.W., Burr, S.W., & Reiter, D.K. (2010). Specialization among off-highway vehicle owners and its relationship to environmental worldviews and motivations. *Journal of Park and Recreation Administration, 28(2)*, 57–73.

Sorice, M.D., Oh, C.-O., & Ditton, R.B. (2009). Exploring level of support for management restrictions using a self-classification measure of recreation specialization. *Leisure Sciences, 31*(2), 107-123.

Species at Risk Act, Statutes of Canada (2002, c. 29). Retrieved from: http://laws-lois.justice.gc.ca/eng/acts/s-15.3/

Statistics Canada. (2016a). Census Profile: Miscou Island. *Government of Canada.* Retrieved from: http://www.statcan.gc.ca/

Statistics Canada. (2016b). Census Profile: Escuminac & Pointe-Sapin. *Government of Canada.* Retrieved from: http://www.statcan.gc.ca

Tabachnick, B.G. & Fidell, L.S. (2001). *Using multivariate statistics (4th ed.)*. Needham Heights, MA: Allyn & Bacon.

Thapa, B., Graefe, A.R., & Meyer, L.A. (2006). Specialization and marine based environmental behaviors among scuba divers. *Journal of Leisure Research, 38*(4), 601-614.

Tsaur, S.-H., & Liang, Y.-W. (2008). Serious leisure and recreation specialization. *Leisure Sciences, 30(4)*, 325-341.

Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. State College, PA: Venture Publishing.

Vaske, J.J., Donnelly, M.P., Heberlein, T.A., & Shelby, B. (1982). Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists. *Journal of Leisure Research, 14*(3)*,* 195-206.

Vaske, J.J., Dyar, R., & Timmons, N. (2004). Skill level and recreation conflict among skiers and snowboarders. *Leisure Sciences, 26*(2)*,* 215-225.

Vaske, J.J., & Roemer, J.M. (2013). Differences in overall satisfaction by consumptive and nonconsumptive recreationists: a comparative analysis of three decades of research. *Human Dimensions of Wildlife, 18*(3)*,* 159-180.

Wagar, J.A. (1969). *Nonconsumptive uses of the coniferous forest, with special relation to consumptive uses*. Proceedings: 1968 Symposium Coniferous Forests of the Northern Rocky Mountains. Missoula, MT: University of Montana Foundation, 255-270.

Waight, C., & Bath, A.J. (2014a). Recreational specialization among ATV users and its relationship to environmental attitudes and management preferences on the Island of Newfoundland. *Leisure Sciences*, *36*(2), 161-182.

Waight, C., & Bath, A.J. (2014b). Factors influencing attitudes among all-terrain vehicle users on the island portion of the province of Newfoundalnd and Labrador, Canada. *Journal of Outdoor Recreation and Tourism, 5*(6)*, 27-36.*

Wilson, P.I. (2008). Preservation versus motorized recreation: institutions, history, and public lands management. *The Social Science Journal, 45*(1), 194-202.

Won, D., Bang, H., & Shonk, D.J. (2008). Relative importance of factors involved in choosing a regional ski destination: influence of consumption situation and recreation specialization. *Journal of Sport and Tourism, 13*(4), 249-271.

Wöran, B, & Arnberger, A. (2012). Exploring relationships between recreation specialization, restorative environments and mountain hikers' flow experience. *Leisure Sciences, 34*(2), 95-114.

Chapter 3: Factors Affecting Recreation Specialization: The Case of the All-Terrain Vehicle

3.1 Abstract

This study examines the impact of activity consumption on the recreation specialization of all-terrain vehicle (ATV) users. Data were obtained from a questionnaire distributed to three communities in northeastern New Brunswick, Canada (Response rate = 53%). Recreation specialization was measured using a 14-variable composite specialization index, and activity consumption was measured using a four-variable consumptive (utilitarian) composite index and a non-consumptive (recreational) composite index. K-means cluster analysis identified three distinct sub-groups based on responses to the activity consumption composite indices. One-way analysis of variance (ANOVA) was used to compare recreation specialization index scores across each activity consumption sub-group to determine its effect on specialization levels. Results suggest that differences in ATV use significantly impact user recreation specialization. These findings could explain previous difficulties in measuring ATV user recreation specialization, contributing to the development of a typology of ATV users.

3.2 Introduction

All-terrain vehicle (ATV) use is an increasingly popular and rapidly growing activity throughout North America. Commonly referred to as ‘quads’, ‘side-by-sides’, or simply ‘bikes’, this member of the off-highway vehicle (OHV) family provides its users with a wide range of recreational and utilitarian opportunities, including accessing remote

wilderness destinations. Managing the activity's growth in population and versatile applications has become a focal challenge of resource management (Albritton & Stein, 2011; Albritton, Stein, & Thapa, 2009; Cordell et al., 2005; Wilson, 2008). The destructive potential of unmanaged ATV use has become a leading threat to local environmental integrity, pitting outdoor recreation and ecological conservation against each other. This potential for conflict highlights the need to expand our knowledge of ATV users, including the diverse groups that exist within the activity (Albritton & Stein, 2011; Havlick, 2002; Waight, 2013).

New Brunswick, Canada, is at the forefront of the debate between recreational opportunities and ecological preservation related to ATV use. Over the past decade, provincial ATV registration has increased over two-hundred percent to 21,071 registered vehicles in 2016 (NBATVF, 2016). In recent years, ATV use in the province's northeastern coastal regions has been perceived as a leading cause of ecological damage, threatening endangered species such as the Piping Plover (*Charadrius melodus*), which is federally listed as a species at risk (CBC, 2006; CBC, 2007; Environment Canada, 2012; Nature Conservancy Canada, 2017; Roy, 2012; SARA, 2002). When paired with the activity's growth outpacing its capacity to be successfully managed (Nature Conservancy Canada, 2017; Roy, 2012), the perceived threat of ATV use has emphasized the need to understand better and manage the activity and its participants.

Despite the growing body of literature on topics such as biophysical and economic impacts of ATV use, few studies have focused on understanding ATV users themselves (Waight & Bath, 2014a; Waight & Bath, 2014b). Although understanding impacts

resulting from ATV use are essential in informing resource management strategies, successful implementation of such strategies requires both human and biophysical knowledge (Bath, 1998). This article investigates the effects of ATV user activity consumption on levels of recreation specialization. Specifically, we hypothesize that recreation specialization levels vary significantly across different degrees of activity consumption. Addressing this will bridge the gap between human and biophysical knowledge of ATV use, allowing for increasingly informed and successful resource management policy implementation.

3.3 Factors affecting ATV use

3.3.1 Recreation Specialization

ATV users, like those engaged in many outdoor activities, cannot be conceptualized as a single homogeneous group. Instead, they exhibit a wide range of attitudes, values, and motivations that influence their participation (Waight, 2013; Waight & Bath, 2014a; Waight & Bath, 2014b). Recreation specialization can be conceptualized as placing participants on a continuum from the inexperienced or general user to the expert or focused user to understand within-activity differences in participation (Bryan, 1977). As participants develop skills, preferences, and experience within the activity, their level of recreation specialization increases, shifting their position on the continuum accordingly. By dividing participants into sub-groups based on their level of recreation specialization, resource managers can improve their understanding of an activity's diverse make-up.

Since its conception, recreation specialization has been applied to a diverse variety of recreational activities. These include consumptive activities such as hunting (Needham & Vaske, 2013; Needham, Vaske, Donnelly, & Manfredo, 2007; Schroeder, Fulton, Lawrence, & Cordts, 2013) and angling (Garlock & Lorenzen, 2017; Johnston, Arlinghaus, & Dieckmann, 2010; Needham, Sprouse, & Grimm, 2009; Oh & Sutton, in press), and non-consumptive activities such as hiking (Jun, Gerard, Graefe, & Manning, 2015; Kim & Song, 2017; Song, Graefe, Kim, & Park, 2018; Wöran & Arnberger, 2012) and bird watching (Cheung, Lo, & Fok, 2016; Hvenegaard, 2002; Lee, McMahan, & Scott, 2015; Lee & Scott, 2004; Scott & Lee, 2010; Scott & Thigpen, 2003). While there is little consensus regarding optimal specialization measurement, most studies agree that recreation specialization is a multivariate construct composed of latent dimensions (Manning, 2011; Needham, Scott, & Vaske, 2013; Scott & Shafer, 2001). Commonly used dimensions include cognition, measuring skill level and knowledge of the activity (Donnelly, Vaske, & Graefe, 1986; Needham et al., 2007; Salz & Loomis, 2005; Thapa, Graefe, & Meyer, 2006); affection, measuring activity importance centrality to life (Bricker & Kerstetter, 2000; Dyck, Schneider, Thompson, & Virden, 2003; McFarlane, Boxall, & Watson, 1998; Salz, Loomis, & Finn, 2001); and behaviour, measuring past experience and frequency of participation (Lee & Scott, 2006; Oh & Ditton, 2006; Scott & Thigpen, 2003; Waight & Bath, 2014a).

Although recreation specialization has been diversely applied since its conception (see Manning, 2011; Needham et al., 2013; Scott & Schafer, 2001 for reviews), its extension to ATV users is limited. While some studies have measured with relative

success specialization associated with ATV issues (Smith, 2008; Smith, Burr, & Reiter, 2010; Waight, 2013; Waight & Bath, 2014a), a recent study by McNeil, Bath, & Vaske (2018) reported results contradicting this past success. Specifically, McNeil et al. (2018) experienced challenges in correctly classifying ATV users into specialization sub-groups despite significant dimensional differences between participants. In their discussion, McNeil et al. (2018) suggest that these classification challenges could be attributed to the consumptive and non-consumptive applications of ATVs, which could each impact levels of recreation specialization differently.

3.3.2 Activity Consumption

An additional method used to classify and understand recreational activities is by examining the degree of resources they consume or their activity consumption. Proposed initially by Wagar (1969), activity consumption is conceptualized as a continuum from non-consumptive activities where participants are provided with 'experiences rather than products' (p. 255), to consumptive activities where natural resources are consumed at the expense of participant experiences. Although most recreational activities consume some degree of resources to achieve the desired user experience, activity consumption differentiates minimally consumptive activities such as bird watching from resource-dependent activities such as hunting.

Using an activity consumption lens to compare activities and their participants has been a common practice in resource management and tourism. Previous studies have focused on topics such as the non-consumptive use (Fazio & Lawrence, 1977; Langenau, 1979; More, 1979; Shaw & Mangun, 1984; Wilson & Tisdell, 2001) and consumptive use

of wildlife (Dimanche & Samdahl, 1994; Organ & Fritzell, 2000). Additionally, past studies have used activity consumption to compare different types of participation on topics such as wildlife tourism (Tremblay, 2001; Snepenger & Bowyer, 1990; Wilkes, 1977) and recreation satisfaction (Roemer & Vaske, 2012; Vaske, Donnelly, Heberlein, & Shelby, 1982; Vaske & Roemer, 2013). In the case of comparing recreationist satisfaction by activity consumption, studies spanning three decades have consistently reported significant differences between consumptive and non-consumptive participants (Roemer & Vaske, 2012; Vaske & Roemer, 2013). This consistency suggests that differences in activity consumption could influence participant experiences in ways other than satisfaction.

While most recreational activities are typically classified as either consumptive or non-consumptive, ATV use straddles both ends of Wagar's (1969) continuum. Within this activity, users can participate in non-consumptive, intangible recreational activities such as enjoying the outdoors, but also consumptive, utilitarian activities such as hunting and wood collection. Furthermore, it is possible that both ends of Wagar's (1969) continuum may occur in tandem within ATV use. Users whose primary objective is to hunt, for example, could also value the non-consumptive aspects of traveling to and from their hunting grounds. These distinct differences in ATV use make the activity uniquely complex with respect to resource and recreational management. As proposed by McNeil et al. (2018) this could be a factor in accounting for the weak classification of ATV users by recreation specialization. We address whether the impact of activity consumption on satisfaction can be applied to ATV user levels of recreation specialization.

3.4 Methods

3.4.1 Study Areas

Data for this article were collected in three communities in the Canadian province of New Brunswick. Located along the province's northeastern coast, the communities of Miscou Island, Escuminac, and Pointe-Sapin were selected for two reasons. First, each community is characterized by prominent ATV use, increasing the likelihood of identifying potential participants within our study sampling frame. Second, their coastal location on the Gulf of St. Laurence has resulted in ATV interactions with surrounding conservation initiatives, including vulnerable migratory shorebirds like the endangered Piping Plover (Robinson, 2010; Roy, 2012). These communities are home to approximately 1,200 residents (Statistics Canada, 2016a & 2016b), and are known for their diversity of species and thriving coastal habitats, including beaches, dunes, and peatlands (Noel et al., 2015; Roy, 2012).

Residents of these three New Brunswick communities who have used an ATV either as an operator or passenger and who were at least 19 years of age constituted our study sampling frame. Despite a lack of data on ownership rates in this region, ATVs are considered a prevalent part of its landscape. Together, these communities are ideal locations to understand differences within ATV users, including how they interact with their surrounding environment.

3.4.2 Data Collection

Data for this article were obtained using a questionnaire administered from May to August, 2017. Riley and Kiger's (2002) drop-off /pick-up (DOPU) method was used,

which is appropriate in areas where mailing addresses and telephone numbers are not readily available (Clark & Finley, 2007). Participants were recruited by going door-to-door using a systematic random sample of half the households in each community. Questionnaires were hand delivered to households using the DOPU method. This consisted of the initial questionnaire package drop-off with instructions denoting that the completed questionnaire would be picked-up in two days. If a completed questionnaire was not available upon pick-up, a stamped envelope addressed to the primary researcher with a reminder card was provided. Effort was made to establish contact with residents in each household. However, when that was not possible a questionnaire package was left on their door knob. If the questionnaire package remained untouched for seven days and contact could not be established with the resident, the package was removed, and the household considered not occupied. Of the 301 questionnaires delivered, 144 were returned. Following the removal of incomplete questionnaires, the response rate was 53%.

3.4.3 Operationalization of Variables

Variables were operationalized using closed-ended and scale rating questions. The questionnaire was modelled after similar ATV and off-road vehicle (ORV) research (Smith et al., 2010; Waight & Bath, 2014a; Waight & Bath, 2014b). ATV specialization was examined using a multivariate specialization index composed of cognitive, affective, experiential and behavioural dimensions. The specialization dimensions consisted of fourteen variables that were consistent with past research (McIntyre & Pigram, 1992; Needham et al., 2009; Scott & Shafer, 2001; Sorice et al., 2009). The cognitive dimension included four items assessing respondents' knowledge of the activity using a 5-point scale

ranging from 1 (strongly disagree) to 5 (strongly agree). The affective dimension contained six items that assessed respondents' commitment to ATVing using a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The experiential dimension contained two closed-ended items regarding how many years the respondent has participated in the activity and their self-selected skill level. The behavioural dimension included two closed-ended items regarding ATV participation in hours per week and percentage of free time spent ATVing in the past 12 months (Table 3.2).

ATV user consumption was measured using eight items regarding why respondents participate in the activity. The questions were designed to reflect the consumptive and non-consumptive ends of Wagar's (1969) continuum of activity consumption using a 5-point scale ranging from 1 (never) to 5 (all the time). Four items described consumptive ATV use, expressing utilitarian characteristics such as collecting wood. The remaining four items described non-consumptive ATV use, demonstrating recreational characteristics such as enjoying the outdoors (Table 3.3).

3.4.4 Data Analysis

After the data were collected, the questionnaires were coded and entered using IBM's Statistical Package for the Social Sciences (SPSS), version 23. Appropriate quality control procedures were used to ensure that coding, data entry, and data preparation was done correctly. Improperly coded variables and outliers were identified using descriptive statistical techniques and corrected or deleted from the dataset. Descriptive statistics were used to explore the preliminary characteristics of the data. Missing Values Analysis (MVA) confirmed that missing data were random, and missing values were replaced with

their respective dimentional mean (Tabachnick & Fidell, 2001; Vaske, 2008). Consistent with previous research (Lee, Graefe, & Li, 2007; Lee & Scott, 2004; Scott, Ditton, Stoll, & Eubanks Jr., 2005), exploratory factor analysis (EFA) was used to identify underlying dimensions within the specialization-related variables. Specifically, principal component analysis (PCA) with a varimax rotation to examine the orthogonality of the factors was used. The 14 specialization variables were converted to standardized Z-scores because some were coded on different scales (Smith et al*.,* 2010; Thapa et al., 2006; Waight & Bath, 2014a; Waight & Bath, 2014b). Cronbach's alpha (α) was then calculated as an indicator of reliability.

PCA with a varimax rotation was also used to identify underlying factors within the consumption-related variables. This factor analysis produced eight variables divided evenly into two underlying factors: consumptive use and non-consumptive use. Cronbach's alpha reliability analysis was used to confirm their reliable measurement related to the associated factor. Variables within each factor were then combined into a summated rating scale (Vaske, 2008). K-means cluster analysis was used to segment participants into distinct sub-groups based on their responses to the consumption summated rating scales. This was done to identify the types and degrees of ATV consumption within our sample, as well as the relationship between both rating scales. Cluster sizes ranging from two to four groups were generated until a suitable solution was identified. One-way analysis of variance (ANOVA) with Least Significant Differences (LDS) and Games-Howell *post-hoc* tests were then used to determine how each sub-group differed across the specialization dimensions.

3.5 Results

The specialization EFA produced four components with eigenvalues ranging from 5.41 to 1.21 that cumulatively explained 72% of the variance. Table 3.1 shows the rotated component matrix loadings of the 14 specialization variables. Factor loadings ranged from .639 to .903. The Kaiser-Meyer-Olkin measure of sampling adequacy was .834 and Bartlett's test of sphericity was statistically significant ($p < .001$).

The mean responses and alpha coefficients for each specialization component are shown in Table 3.2. Cronbach alpha values were .85 for the cognitive component (four variables), .90 for the affective dimension (six variables), .64 for the experiential component (two variables), and .67 for the behavioural dimension (two variables). Deletion of variables with low item-total correlations did not improve any of the reliabilities. Overall, the alpha value for the entire specialization index was .87, suggesting a reliably measured index (Vaske, 2008).

The consumptive EFA produced two factors with eigenvalues of 3.33 and 1.70 that cumulatively explained 63% of variance. Table 3.3 shows the rotated component matrix loadings of the eight consumption variables, with values ranging from .698 to

Table 3.1: Recreation Specialization Exploratory Factor Analysis with Varimax Rotation Loadings

Recreation Specialization Factor Items	*Factor 1: Affective*	*Factor 2: Cognitive*	*Factor 3: Behavioural*	*Factor 4: Experiential*
Affective Items[1]				
If I stopped ATVing, an important part of my life would be missing	**.885**			
ATVing is a large part of my life	**.822**			
I would rather go ATVing than do other outdoor activities	**.768**			
ATVing is an important part of my community's culture	**.744**			
If the price of gas went up, I would still go ATVing	**.739**			
I have invested a lot of money in ATV equipment	**.708**			
Cognitive Items[1]				
I know which trails are officially designated as ATV trails		**.828**		
I am aware of all ATV trails in my community		**.825**		
I know which trails are private		**.786**		
I am aware of provincial ATV regulations		**.768**		
Behavioural Items				
What percentage of your free time do you spend ATVing[2]			**.834**	
On average, how many hours per week do you ride your ATV[3]			**.808**	
Experiential Items				
How many years have you been riding[4]				**.903**
How do you rate your ATV skill level[5]				**.639**
Eigenvalues	5.413	2.185	1.239	1.209
Percent of total variance explained	38.7	15.6	8.9	8.6
Cumulative variance explained	38.7	54.3	63.2	71.8

[1] Variable coded on 5-point scale: 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly agree
[2] Variable coded on 5-point scale: 1 = 15% or less, 2 = 20%, 3 = 40%, 4 = 60%, 5 = 80%
[3] Variable coded on 4-point scale: 1 = less than 1 hour, 2 = 1-4 hours, 3 = 5-9 hours, 4 = 10 or more hours
[4] Variable coded on 5-point scale: 1 = < 1 yr, 2 = 1-4 yrs, 3 = 5-9 yrs, 4 = 10-14 yrs, 5 = 15 + yrs
[5] Variable coded on 5-point scale: 1 = Beginner, 2 = Novice, 3 = Intermediate, 4 = Advanced, 5 = Expert

Table 3.2: Reliability analysis of recreation specialization dimensions and variables

Specialization dimensions and variables	*M*	*SD*	Item total correlation	Alpha (α) if deleted	Cronbach alpha (α)
Affective[1]					.90
If I stopped ATVing, an important part of my life would be missing	3.14	1.36	.83	.86	
ATVing is a large part of my life	2.96	1.26	.81	.86	
I would rather go ATVing than do other outdoor activities	2.65	1.29	.75	.87	
ATVing is an important part of my community's culture	3.59	1.10	.61	.89	
If the price of gas went up, I would still go ATVing	3.70	1.13	.64	.89	
I have invested a lot of money in ATV equipment	2.63	1.31	.68	.88	
Cognitive[1]					.85
I know which trails are officially designated as ATV trails	3.85	1.22	.75	.77	
I am aware of all ATV trails in my community	3.89	1.12	.70	.80	
I know which trails are private	3.71	1.22	.66	.81	
I am aware of provincial ATV regulations	3.65	1.13	.61	.83	
Behavioural					.67
What percentage of your free time do you spend ATVing[2]	2.08	.69	.51	—	
On average, how many hours per week do you ride your ATV[3]	1.75	.86	.51	—	
Experiential					.64
How many years have you been riding[4]	4.30	1.09	.47	—	
How do you rate your ATV skill level[5]	3.49	1.09	.47	—	
Overall specialization index					.87

[1] Variable coded on 5-point scale: 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly agree
[2] Variable coded on 5-point scale: 1 = 15% or less, 2 = 20%, 3 = 40%, 4 = 60%, 5 = 80%
[3] Variable coded on 4-point scale: 1 = less than 1 hour, 2 = 1-4 hours, 3 = 5-9 hours, 4 = 10 or more hours
[4] Variable coded on 5-point scale: 1 = < 1 yr, 2 = 1-4 yrs, 3 = 5-9 yrs, 4 = 10-14 yrs, 5 = 15 + yrs
[5] Variable coded on 5-point scale: 1 = Beginner, 2 = Novice, 3 = Intermediate, 4 = Advanced, 5 = Expert

Table 3.3: Activity Consumption Exploratory Factor Analysis with Varimax Rotation Loadings

Activity consumption Factor Items	*Factor 1: Non-consumptive*	*Factor 2: Consumptive*
Non-consumptive Items[1]		
I go ATVing to travel around my community	**.854**	
I go ATVing to see my friends	**.816**	
I go ATVing to enjoy the outdoors	**.730**	
I go ATVing to visit my favourite places	**.728**	
Consumptive Items[1]		
I go ATVing to go hunting		**.798**
I go ATVing to help collect wood		**.774**
I go ATVing to help move fishing gear		**.752**
I go ATVing to pick berries		**.698**
Eigenvalues	3.328	1.700
Percent of total variance explained	41.6	21.2
Cumulative variance explained	41.6	62.8

[1] Variable coded on 5-point scale: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Mostly, 5 = All the time

Table 3.4: Reliability Analysis of Activity Consumption Dimensions and Variables

Activity consumption dimensions and variables	*M*	*SD*	Item total correlation	Alpha (α) if deleted	Cronbach alpha (α)
Non-consumptive[1]					.81
I go ATVing to travel around my community	2.65	1.30	.70	.72	
I go ATVing to see my friends	3.69	1.22	.61	.77	
I go ATVing to enjoy the outdoors	2.29	1.23	.60	.77	
I go ATVing to visit my favourite places	3.07	1.25	.59	.78	
Consumptive[1]					.77
I go ATVing to go hunting	2.63	1.51	.65	.68	
I go ATVing to help collect wood	3.34	1.38	.56	.73	
I go ATVing to help move fishing gear	2.43	1.40	.53	.74	
I go ATVing to pick berries	2.43	1.28	.57	.73	

[1] Variable coded on 5-point scale: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Mostly, 5 = All the time

Table 3.5: Comparison of specialization variables and dimensions across activity consumption clusters

Specialization dimensions and variables	*M*	K-mean Cluster Membership[1]			*F-value*	*p-value*
		1	2	3		
Affective[2]						
If I stopped ATVing, an important part of my life would be missing	3.14	3.91[a]	2.48[b]	3.50[a]	12.62	< .001
ATVing is a large part of my life	2.96	3.83[a]	2.34[b]	3.22[a]	14.73	< .001
I would rather go ATVing than do other outdoor activities	2.64	3.04[a]	2.15[b]	3.03[a]	6.96	.001
ATVing is an important part of my community's culture	3.59	3.87[a]	3.20[b]	3.90[a]	5.66	.005
If the price of gas went up, I would still go ATVing	3.70	4.00	3.38	3.93	3.65	.029
I have invested a lot of money in ATV equipment	2.63	3.00[a]	2.12[b]	3.0 [a]	7.23	.001
Cognitive[2]						
I know which trails are officially designated as ATV trails	3.85	4.09	3.54[a]	4.10[b]	2.83	.064
I am aware of all ATV trails in my community	3.89	4.35[a]	3.52[b]	4.07	5.25	.007
I know which trails are private	3.70	4.07[a]	3.28[b]	4.01[a]	5.45	.006
I am aware of provincial ATV regulations	3.65	4.09[a]	3.41[b]	3.69	2.89	.061
Behavioural						
What percentage of your free time do you spend ATVing[3]	2.08	2.48[a]	1.92[b]	2.05[b]	5.38	.006
On average, how many hours per week do you ride your ATV[4]	1.75	2.30[a]	1.42[b]	1.85[c]	9.70	< .001
Experiential						
How many years have you been riding[5]	4.30	4.13	4.17	4.55	1.64	.198
How do you rate your ATV skill level[6]	3.49	3.65	3.23	3.71	2.42	.094

[1] Cluster 1 analogous to principally non-consumptive users; cluster 2 analogous to non-preferential users; cluster 3 analogous to highly consumptive users. Entries with different letter superscripts across each row differ at $p < .05$ using Least Significant Differences (LSD) or Games-Howell *post-hoc* tests.
[2] Variable coded on 5-point scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neither, 4 = Agree, 5 = Strongly agree
[3] Variable coded on 5-point scale: 1 = 15% or less, 2 = 20%, 3 = 40%, 4 = 60%, 5 = 80%
[4] Variable coded on 4-point scale: 1 = Less than 1 hour, 2 = 1-4 hours, 3 = 5-9 hours, 4 = 10 or more hours
[5] Variable coded on 5-point scale: 1 = < 1 yr, 2 = 1-4 yrs, 3 = 5-9 yrs, 4 = 10-14 yrs, 5 = 15 + yrs
[6] Variable coded on 5-point scale: 1 = Beginner, 2 = Novice, 3 = Intermediate, 4 = Advanced, 5 = Expert

.854. The Kaiser-Meyer-Olkin measure of sampling adequacy was .756 and Bartlett's test of sphericity was statistically significant ($p < .001$).

The mean responses and alpha reliability coefficients for each component are depicted in Table 3.4. The non-consumptive component had an alpha value of .81 (four variables) and the consumptive component had an alpha value of .77 (four variables). This suggests that both components have good internal consistency (Vaske, 2008), and deletion of additional variables did not improve reliability.

K-means cluster analysis produced three meaningful consumption-based clusters after four iterations. Subsequent values regarding the consumption summated rating scales reflect their standardization with a mean of zero and a standard deviation of one. The first cluster ($n = 23$) contained non-consumptive responses that were well above the mean (.8) and consumptive responses below the mean (-.3). Participants in cluster two ($n = 49$) responded below the mean in both scales, with a non-consumptive value of -.6 and a consumptive value of -.5. The third cluster ($n = 40$) consisted of non-consumptive responses just above the mean (.2) and consumptive responses well above the mean (.8). Both scales were statistically significant ($p < .001$) with a non-consumptive *F-value* of 48.9 and consumptive *F-value* of 80.9.

The ANOVA showed responses to 10 of the 14 specialization variables differed significantly, with *p-values* of < .001 to .029 and *F-values* of 3.7 to 14.7 (Table 3.5). The *post-hoc* tests reveal responses between each cluster did not always vary significantly at $p \leq .05$. While a majority of cluster two responses were significantly different from the other clusters, clusters one and three did not differ significantly from each other. Both

variables in the experiential dimension were not significant (p = .094 - .198), and two cognitive dimension variables approached statistical significance (p = .061 - .064).

3.6 Discussion

3.6.1 ATV User Typology

Our study found that there were distinct differences in participant responses depending on their activity consumption. When asked about their ATV use characteristics, participants were effectively and reliably divided into consumptive and non-consumptive groups, accounting for nearly two-thirds of the explained variance. The EFA confirms similar findings by Waight & Bath (2014b) with regards to differences in ATV use, but with higher explained variance and reliability loadings for each activity consumption group. This reinforces McNeil et al.'s (2018) assumption that activity consumption plays a vital role in understanding ATV users, while further contributing to the complex nature of ATV use as participation varies not only by recreation specialization but also by activity consumption.

The cluster analysis identified important differences between predominately consumptive and non-consumptive ATV users. While the highly non-consumptive sub-group (cluster 1) exhibited low consumptive ratings, these results were not mirrored in the highly consumptive sub-group (cluster 3). Instead, consumptive users also participated in non-consumptive applications, illustrating two distinct types of ATV participants with high degrees of consumption. Those who participate primarily for non-consumptive reasons such as to enjoy the outdoors have little inclination to use their ATV for highly consumptive purposes. However, those who participate primarily to hunt or collect wood

also enjoy non-consumptive applications, although to a lesser degree than their non-consumptive counterparts. This suggests that highly consumptive ATV users can occupy both ends of Wagar's (1969) continuum of consumption simultaneously.

When compared across specialization dimension variables, participants with high levels of consumption (clusters 1 and 3) frequently exhibited significantly higher specialization values than those with low levels of consumption (cluster 2). This suggests that ATV user activity consumption does affect levels of recreation specialization. Moreover, consumptive and non-consumptive use have similar effects on the specialization dimension responses, except in terms of hours per week participating. In contrast, experiential dimension variables such as number of years participating and some cognitive dimension variables such as awareness of provincial ATV regulations were not impacted by activity consumption.

The results presented in this article support the heterogeneous nature of ATV users. Participants displayed a range of cognitions, affections, behaviours and experiences that culminate in their level of recreation specialization. The 14-variable specialization index was reliably measured while accounting for a high degree of explained variance among responses. This represents two distinct features that contribute to an improved understanding of ATV user specialization in New Brunswick. First, the high reliability and explained variance achieved by the specialization index confirms the existence of varying degrees of recreation specialization among participants, showcasing the breadth and applicability of this measurement to ATV users. Additionally, the range of variables

within four distinct dimensions emphasizes the depth of participant specialization, highlighting the complexity of factors that play a role in ATV specialization.

In general, the findings presented in this study have a range of implications with regards to understanding ATV users and their participation within the activity. First, the impact of activity consumption on satisfaction levels, as discussed in Roemer & Vaske (2012); Vaske & Roemer (2013); and Vaske et al. (1982), was successfully extended to ATV users in New Brunswick, Canada. This highlights the effects that activity consumption can have on various elements of participation, including but not necessarily limited to satisfaction and recreation specialization. Our findings also stress both the complexity of ATV use and the diversity of its participants. While participants of many other outdoor activities have been found to exhibit a range of recreation specialization levels, ATV users are unique in displaying the range of activity consumption presented in our findings. This serves not only to confirm the work of Smith et al. (2010), Waight & Bath (2014a), Waight & Bath (2014b) and McNeil et al. (2018) in showing the heterogeneous nature of ATV and OHV participation, but it also adds to the depth of their results by demonstrating an additional factor that could explain a portion of the variance not previously accounted for. In addition, our results stress the importance of incorporating human research in recreational and resource management. When combined with existing biophysical research on ATV impacts, our results show that such impacts may vary depending both on participant recreation specialization and activity consumption.

3.6.2 Applications in Resource Management

Recognizing the diversity of ATV users is essential to achieve a reduction in future interactions between ATV users and conservation initiatives. Because users display a range of specialization levels, identifying which subjects are most likely to be involved in harmful interactions is vital in determining the appropriate resource management solution. If the subjects are found to have low levels of specialization, targeted educational messages highlighting the negative impacts of ATV use in certain areas and suggesting alternatives may suffice. However, if the subjects have a high level of specialization, additional measures may be required. This could include initiating a dialogue where the benefits and detriments of ATV use could be openly discussed, resulting in a suitable compromise. Management solutions should also incorporate location-specific considerations where possible as circumstances often differ from region to region.

Additionally, identifying a subject's level of activity consumption could assist resource managers in designing and implementing management strategies. When encountering consumptive ATV users whose primary goals are traveling to their hunting grounds or retrieving fishing equipment, focusing on the accessibility of substitute routes such as trails and beach access points may achieve the desired outcome. For non-consumptive users, an inventory of alternative recreational opportunities in the region could inform subjects of ways to minimize their environmental impact while maintaining their recreational experience. Special consideration to highly consumptive and non-

consumptive user specialization levels should also be incorporated where possible as it may impact potential solutions more than their consumptive counterparts.

Future research should focus on replicating and confirming our results with additional locations and with larger sample sizes. Additionally, future research should also explore the effects of activity consumption on participant characteristics other than satisfaction and recreation specialization. Finally, future research should continue to examine the diversity of ATV users to ensure successful management of the activity.

3.7 References

Albritton, R., & Stein, T.V. (2011). Integrating social and natural resource information to improve planning for motorized recreation. *Applied Geography, 31*(1), 85-97.

Albritton, R., Stein, T.V., & Thapa, B. (2009). Exploring conflict and tolerance between and within off-highway vehicle recreationists. *Journal of Park and Recreation Administration, 27*(4), 54-72.

Babbie, E. (2003). *The practive of social research with InfoTrac (10th ed.).* Belmont, CA: Wadsworth Publishing Co.

Bath, A.J. (1998). The role of human dimensions in wildlife resource research in wildlife management. *Ursus, 10*, 349-355.

Bricker, K.S., & Kerstetter, D.L. (2000). Level of specialization and place attachment: an exploratory study of whitewater recreationists. *Leisure Sciences, 22*(4)*,* 233-257.

Bryan, H. (1977). Leisure value systems and recreational specialization: The case of the trout fisherman. *Journal of Leisure Research*, *9*(3), 174-187.

Canadian Broadcasting Corporation. (2007, Jul 31). ATV barrier on beach irks DNR officials. Retrieved from: http://www.cbc.ca/news/canada/new-brunswick/atv-barrier-on-beach-irks-dnr-officials-1.692882

Canadian Broadcasting Corporation. (2006, Jul 27). ATV rally moved to protect rare bird. Retrieved from: http://www.cbc.ca/news/canada/new-brunswick/atv-rally-moved-to-protect-rare-bird-1.605221

Cheung, L., Lo, A., & Fok, L. (2017). Recreational specialization and ecologically responsible behaviour of Chinese birdwatchers in Hong Kong. *Journal of Sustainable Tourism, 25*(6)*,* 817-831.

Clark, W. A., & Finley, J. C. (2007). Contracting meter readers in a drop-off/pick-up survey in Blagoevgrad, Bulgaria. *Society and Natural Resources*, *20*(7), 669–673. https://doi.org/10.1080/08941920701329686

Cordell, K.H., Betz, C.J., Green, G., Owens, M. (2005). Off-highway vehicle recreation in the United States, Regions, and States: a national report from the National Survey on Recreation and the Environment (NSRE). Athens, GA: United States Forrest Service.

Dimanche, F., & Samdahl, D. (1994). Leisure as symbolic consumption: A conceptualization and prospectus for future research. *Leisure Sciences, 16*(2), 119-129.

Donnelly, M.P., Vaske, J.J., & Graefe, A.R. (1986). Degree and range of recreation specialization: toward a typology of boating related activities. *Journal of Leisure Research, 18*(2), 81-95.

Dyck, C., Schneider, I., Thompson, M., Virden, R. (2003). Specialization among mountaineers and its relationship to environmental attitudes. *Journal of Park and Recreation Administration, 21*(2), 44-62.

Environment Canada. (2012). Recovery Strategy for the Piping Plover (Charadrius melodus melodus) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. 29 pp.

Fazio, J.R., & Belli, L.A. (1977). *Characteristics of nonconsumptive wildlife users in Idaho*. Transactions of the Forty-Second North American Wildlife and Natural Resources Conference. Washington, DC: Wildlife Management Institute, 116-128.

Garlock, T.M., & Lorenzen, K. (2017). Marine angler characteristics and attitudes toward stock enhancement in Florida. *Fisheries Research, 186*(2), 439-445.

Havlick, D.G. (2002). *No place distant*. Washington, D.C.: Island Press.

Hvenegaard, G.T. (2002). Birder specialization differences in conservational involvement, demographics, and motivations. *Human Dimensions of Wildlife, 7*(1), 21-36.

Johnston, F.D., Arlinghaus, R., & Dieckmann, U. (2010). Diversity and complexity of angler behaviour drive socially optimal input and output regulations in a bioeconomic recreational-fisheries model. *Canadian Journal of Fisheries and Aquatic Sciences, 67*(9), 1507-1531.

Jun, J., Gerard, K., Graefe, A.R., Manning, R. (2015). An identify-based conceptualization of recreation specialization. *Journal of Leisure Research, 47*(4), 425-443.

Kim, H., & Song, H. (2017). Measuring hiking specialization and identification of latent profiles of hikers. *Landscape and Ecological Engineering, 13*(1), 59-68.

Langenau, E.E. (1979). Nonconsumptive uses of the Michigan deer herd. *Journal of Wildlife Management, 43*(3), 620-625.

Lee, S., Graefe, A.R., & Li, C. (2007). The effects of specialization and gender on motivations and preferences for site attributes in paddling. *Leisure Sciences, 29*(4), 355-373.

Lee, S., McMahan, K., & Scott, D. (2015). The gendered nature of serious birdwatching. *Human Dimensions of Wildlife, 20*(1), 47-64.

Lee, J.H., & Scott, D. (2006). For better for worse? A structural model of the benefits and costs associated with recreation specialization. *Leisure Science, 28*(1), 17-38.

Lee, J.H., & Scott, D. (2004). Measuring birding specialization: A confirmatory factor analysis. *Leisure Sciences, 26*(3), 245-260.

Manning, R.E. (2011). *Studies in outdoor recreation: search and research for satisfaction* (3rd ed.). Corvallis, OR: Oregon State University Press.

McFarlane, B.I., Boxall, P.C., & Watson, D.O. (1998). Past experience and behavioral choice among wilderness users. *Journal of Leisure Research, 30*(2)*,* 195-213.

McIntyre, N., & Pigram, J.J. (1992). Recreation specialization re-examined: The case of vehicle-based campers. *Leisure Sciences*, *14*(1), 3-15.

McNeil, K.D., Bath, A.J., & Vaske, J.J. (2018). *Recreation specialization: Applying a self-classification method on all-terrain vehicle users in New Brunswick, Canada*. Unpublished manuscript.

More, T.A. (1979). *The demand for nonconsumptive wildlife uses: A review of the literature* (Technical Report NE-52). Broomall, PA: United States Forest Service.

Needham, M.D., Rollins, R.B., & Vaske, J.J. (2005). Skill level and normative evaluations among summer recreationists at alpine ski areas. *Leisure / Loisir, 29*(1)*,* 71-94.

Needham, M.D., Scott, D., & Vaske, J.J. (2013). Recreation specialization and related concepts in leisure research. *Leisure Sciences, 35*(3)*,* 199-202.

Needham, M.D., Sprouse, L.J., & Grimm, K.E. (2009). Testing a self-classification measure of recreation specialization among anglers. *Human Dimensions of Wildlife, 14*(6)*,* 448-455.

Needham, M.D., & Vaske, J.J. (2013). Activity substitutability and degree of specialization among deer and elk hunters in multiple states. *Leisure Sciences, 35*(3), 235-246.

Needham, M.D., Vaske, J.J., Donnelly, M.P., Manfredo, M.J. (2007). Hunting specialization and its relationship to participation in response to chronic wasting disease. *Journal of Leisure Research, 39*(3), 413-437.

New Brunswick All-Terrain Vehicle Federation. (2016). *Yearly Federation Membership*. Retrieved from: https://nbatving.com/en/statistiques.php

Noel, P., Morrison, M., Noseworthy, J., White, J., Fortune, A., Bernard, L., Joubert, E., Flemming, F., Foley, J., White, G. (2015). *New Brunswick Northumberland Strait Natural Area Conservation Plan II*. Fredericton, NB: Nature Conservancy Canada – New Brunswick Chapter.

Off-Road Vehicle Act, Statutes of New Brunswick (1985, c. O-1.5). Retrieved from: http://laws.gnb.ca/en/ShowPdf/cs/O-1.5.pdf

Oh, C.-O., & Ditton, R.B. (2006). Using recreation specialization to understand multi-attribute management preferences. *Leisure Science, 28*(4)*,* 369-384.

Ohh, C.-O., & Sutton, S.G. (in press). Comparing the developmental process of consumptive orientation across different population groups. *Leisure Science*. doi: 10.1080/01490400.2017.1325795

Organ, J.F., & Fritzell, E.K. (2000). Trends in consumptive recreation and the wildlife profession. *Wildlife Society Bulletin, 28*(4)*,* 780-787.

Riley, P.J. & Kiger, G. (2002). Increasing survey response: the drop-off/pick-up technique. *The Rural Sociologist, 22*(1), 6-9.

Robinson, S. (2010). *Coastal sand dunes of New Brunswick: A biodiversity and conservation status assessment*. Sackville, NB: Atlantic Canada Conservation Data Centre.

Roemer, J.M., & Vaske, J.J. (2012). Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists: A comparative analysis of three decades of research. In C.L. Fisher, & C.E. Watts Jr. (Eds.), *Proceedings of the 2010 Northeastern Recreation Research Symposium* (pp. 9-15). Gen. Tech. Rep. NRS-P-94. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.

Roy, D. (2012). Acadian Peninsula – Atlantic region natural area conservation plan. Fredericton, NB: Nature Conservancy Canada – New Brunswick Chapter.

Salant, P., & Dillman, D.A. (1994). *How to conduct your own survey*. New York, NY: John Wiley and Sons.

Salz, R.J., & Loomis, D.K. (2005). Recreation specialization and anglers' attitudes towards restricted fishing areas. *Human Dimensions of Wildlife, 10*(3), 187-199.

Salz, R.J., Loomis, D.K., & Finn, K.L. (2001). Development and validation of a specialization index and testing of specialization theory. *Human Dimensions of Wildlife, 6*(4), 239-258.

Schroeder, S.A., Fulton, D.C., Lawrence, J.S., & Cordts, S.D. (2013). Identity and specialization as a waterfowl hunter. *Leisure Sciences, 35*(3), 218-234.

Scott, D., Ditton, R. B., Stoll, J. R., & Eubanks Jr., T. L. (2005). Measuring specialization among birders: Utility of a self-classification measure. *Human Dimensions of Wildlife, 10*(1), 53-74.

Scott, D., & Lee, J.H. (2010). Progression, stability, or decline? Sociological mechanisms underlying change in specialization among birdwatchers. *Leisure Sciences, 32*(2), 180-194.

Scott, D., & Shafer, C.S. (2001). Recreational specialization: A critical look at the construct. *Journal of Leisure Research 33*(3), 319-343.

Scott, D., & Thigpen, J. (2003). Understanding the birder as tourist: segmenting visitors to the Texas Hummer / Bird Celebration. *Human Dimensions of Wildlife, 8*(3), 199-218.

Shaw, W.W., & Mangun, W.R. (1984). *Nonconsumptive use of wildlife in the United States* (Resource Publication 154). Washington, DC: United States Fish and Wildlife Service.

Smith, J.W. (2008). *Utah off-highway vehicle owners' specialization and its relationship to environmental attitudes and motivations* (Master's thesis). Available from ProQuest dissertation and theses database (document ID: 1457206).

Smith, J.W., Burr, S.W., & Reiter, D.K. (2010). Specialization among off-highway vehicle owners and its relationship to environmental worldviews and motivations. *Journal of Park and Recreation Administration, 28*(2), 57–73.

Snepenger, D.J., & Bowyer, R.T. (1990). Differences among non-resident tourist making consumptive and nonconsumptive uses of Alaskan wildlife. *Arctic, 43*(3)*,* 262-266.

Species at Risk Act, Statutes of Canada (2002, c. 29). Retrieved from: http://laws-lois.justice.gc.ca/eng/acts/s-15.3/

Song, H., Graefe, A.R., Kim, K., & Park, C. (2018). Identification and prediction of latent classes of hikers based on specialization and place attachment. *Sustainability, 10*(4), 1163-1179.

Sorice, M.D., Oh, C.-O., & Ditton, R.B. (2009). Exploring level of support for management restrictions using a self-classification measure of recreation specialization. *Leisure Sciences, 31*(2), 107-123.

Statistics Canada. (2016a). Census Profile: Miscou Island. *Government of Canada.* Retrieved from: http://www.statcan.gc.ca/

Statistics Canada. (2016b). Census Profile: Escuminac & Pointe-Sapin. *Government of Canada.* Retrieved from: http://www.statcan.gc.ca

Tabachnick, B.G. & Fidell, L.S. (2001). *Using multivariate statistics (4th ed.)*. Needham Heights, MA: Allyn & Bacon.

Thapa, B., Graefe, A.R., & Meyer, L.A. (2006). Specialization and marine based environmental behaviors among scuba divers. *Journal of Leisure Research, 38*(4), 601-614.

Tremblay, P. (2001). Wildlife tourism consumption: consumptive or non-consumptive? *International Journal of Tourism Research, 3*(1)*,* 81-86.

Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. State College, PA: Venture Publishing.

Vaske, J.J., Donnelly, M.P., Heberlein, T.A., Shelby, B. (1982). Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists. *Journal of Leisure Research, 14*(3)*,* 195-206.

Vaske, J.J., & Roemer, J.M. (2013). Differences in overall satisfaction by consumptive and nonconsumptive recreationists: a comparative analysis of three decades of research. *Human Dimensions of Wildlife, 18*(3)*,* 159-180.

Wagar, J.A. (1969). *Nonconsumptive uses of the coniferous forest, with special relation to consumptive uses*. Proceedings: 1968 Symposium Coniferous Forests of the Northern Rocky Mountains. Missoula, MT: University of Montana Foundation, 255-270.

Waight, C.F. (2013). *Understanding all-terrain vehicle users: the human dimensions of ATV use on the island portion of Newfoundland and Labrador* (Master's thesis). St. John's Campus, Memorial University of Newfoundland, St. John's, NL.

Waight, C., & Bath, A.J. (2014a). Recreational specialization among ATV users and its relationship to environmental attitudes and management preferences on the Island of Newfoundland. *Leisure Sciences*, *36*(2), 161-182.

Waight, C., & Bath, A.J. (2014b). Factors influencing attitudes among all-terrain vehicle users on the island portion of the province of Newfoundalnd and Labrador, Canada. *Journal of Outdoor Recreation and Tourism, 5*(6)*, 27-36.*

Wilkes, B. (1977). They myth of the non-consumptive user. *Canadian Field-Naturalist, 91*(4)*,* 343-349.

Wilson, P.I. (2008). Preservation versus motorized recreation: institutions, history, and public lands management. *The Social Science Journal, 45*(1), 194-202.

Wilson, C., & Tisdell, C. (2001). Sea turtles as a non-consunptive tourism resource especially in Australia. *Tourism Management, 22*(3), 279-288.

Wöran, B, & Arnberger, A. (2012). Exploring relationships between recreation specialization, restorative environments and mountain hikers' flow experience. *Leisure Sciences, 34*(2), 95-114.

Chapter 4: Conclusion

This chapter reviews the objectives and key findings of this research, while also integrating the results into existing bodies of literature. Additionally, this chapter discusses the study's limitations, offers suggestions for the direction of future research, and provides recommendations for the management of ATV users in New Brunswick, elsewhere in Canada and abroad.

4.1 Discussion

Natural resource management (NRM) is an essential element in maintaining a balance between human use of nature and its preservation. Successful management policies and practices not only provide people with opportunities to engage with natural environments, but also ensure that future generations can do the same. While NRM has historically focused on understanding the resources in question, successful management is unlikely to occur without also understanding the values, attitudes, motivations and behaviours of the people using those resources (Bennett et al., 2017; Decker, Riley, & Siemer, 2012). As such, ensuring that future management strategies incorporate both biophysical and human dimensions is crucial to maintain the balance between people and their environment (Bath, 1998).

In the context of all-terrain vehicle (ATV) management in the Canadian province of New Brunswick, this thesis has provided a human dimension to complement existing research on the activity's relationship with the natural environment. Specifically, the thesis used three research objectives to identify and document the beliefs, values, and

behaviours of ATV users in the communities of Point-Sapin, Escuminac, and Miscou Island. First, ATV users in these communities exhibited varying levels of recreation specialization. Second, the effectiveness of existing recreation specialization methodologies was evaluated by comparing multivariate and self-classification approaches. Third, the effects of activity consumption on levels of recreation specialization were successfully identified. Together, these objectives contribute to academic literature within human dimensions and the future management of ATV users.

4.1.1 Recreation Specialization

Chapter 2 addressed the first and second research objective by conducting a methodological comparison between the self-classification and multivariate applications of recreation specialization. Consistent with relevant literature (Waight, 2013; Waight & Bath, 2014a), ATV users were found to exhibit varying levels of recreation specialization using a multivariate specialization index. The cognitive, affective, and behavioural specialization dimensions and variables were reliably measured, and their responses differed significantly in all but one cognitive item. Hence, they were strong indicators of specialization (Manning, 2011; Needham, Scott, & Vaske, 2013; Scott & Shafer, 2001). This supports the utility of using the recreation specialization framework to identify differences in participation within ATV use.

However, the methodological comparison found dissimilarities between the self-classification and multivariate applications of recreation specialization, contrasting the literature (Beardmore, Haider, Hunt, & Arlinghaus, 2013; Kerins, Scott, & Shafer, 2007; Needham, Sprouse, & Grimm 2009; Scott, Ditton, Stoll, & Eubanks Jr., 2005; Sorice, Oh,

& Ditton, 2009). Unlike those studies, the discriminant analysis found that responses to the self-classification variable did not clearly correlate with that of the specialization index. Although a majority of those who identified as Type II or intermediate users were successfully classified as such, Type I (casual) and Type III (expert) users were frequently misclassified as belonging to Type II. These results, in conjunction with the underperformance of overall correct classification, suggest external factors are affecting ATV user specialization that were not present in previously studied outdoor activities.

This chapter contributes to the existing literature in two meaningful ways. First, applying the self-classification method on ATV users addresses the literature's call for further investigation of this method's utility. Chapter 2 not only expands the breadth of outdoor activities that have been subject to similar comparisons but also incorporates an activity with limited exposure to the recreation specialization framework. Second, the misclassification of the discriminant analysis suggests that the method's previous success does not translate similarly to every outdoor activity. While the self-classification method has been successfully applied to activities such as angling (Beardmore et al., 2013; Needham et al., 2009) and bird watching (Scott et al., 2005), our results suggest that it may not have the same utility as the multivariate approach in measuring a range of activities. This is a significant contribution given that the self-classification approach is intended to provide a simplified application of the recreation specialization framework while maintaining its reliability and integrity.

Although the participant self-classification method was designed to improve the efficiency of the recreation specialization framework, future applications should carefully

consider the trade-offs associated with it. One potential issue of independently using the self-classification method is the high researcher bias related to selecting the number of specialization categories and their respective definitions. While existing literature can inform decisions concerning frequently researched activities like angling, this would prove less fruitful when studying under-researched activities that do not have an established body of literature. Furthermore, regional variations in activity participation such as differences in technical terminology may present challenges in determining category definitions, even within highly researched activities. Whereas a multivariate approach can utilize a range of variables to ensure the underlying concept is being appropriately measured, the use of an independent self-classification approach relies primarily on the researcher's knowledge of the activity and region being studied, hence increasing bias.

A second potential issue with an independent self-classification application of the recreation specialization framework is that it assumes participants can accurately assess their level of specialization. Even if clear and intelligible category definitions are implemented, their concise design risks participant misinterpretation and could result in inaccurate information. Despite the previous success of similar methodological comparisons, each study observed instances where a participant's self-classification selection did not reflect their responses to the respective multivariate items. While subsequent analysis typically accounts for this phenomenon, such procedures would have limited applications on an independent self-classification method. Thus, implementation

of an independent self-classification method would necessitate a way to account for participant misclassification to ensure the results are successfully interpreted.

4.1.2 Activity Consumption

Chapter 3 addressed the third research objective by analysing how consumptive and non-consumptive ATV use relates to participant levels of recreation specialization. This was done to determine if differences in ATV user consumption could have acted as an external factor in affecting the methodological comparison results in chapter 2. Despite the addition of an experiential dimension to the specialization index to increase its reliability, responses to the specialization dimensions did not achieve the same degree of variance between k-mean cluster groups as was found in chapter 2. However, results still reaffirm that varying levels of recreation specialization exist within ATV participants.

Due to the unique nature of ATV use containing both consumptive and non-consumptive elements, as well as the novelty of comparing their influence on recreation specialization, there is no literature with which we can directly compare our findings. With this being said, inspiration from related research on participant satisfaction (Roemer & Vaske, 2012; Vaske, Donnelly, Heberlein, & Shelby, 1982; Vaske & Roemer, 2013) resulted in meaningful similarities and differences. Consistent with this research, ATV users were successfully divided into three sub-groups: two reflecting high levels of activity consumption and one reflecting low levels. In contrast to the related literature, both highly consumptive and highly non-consumptive ATV use were found to have a similar influence on levels of recreation specialization.

The results discussed in chapter 3 offer a contribution to the growing body of literature on ATV users. While Waight and Bath (2014b) reported a similar division between consumptive and non-consumptive ATV use, we not only confirmed this phenomenon but also determined the relationships between each type of activity consumption. These differences, illustrated by the k-means cluster analysis in Section 3.5, add considerable depth to existing knowledge on the composition of ATV users. Additionally, the impacts of activity consumption on levels of recreation specialization contribute to the framework's continued development as well as provide insight for its future applications.

4.1.3 Study Limitations

Notwithstanding the contributions produced by this study, some limiting factors were experienced during the data collection and subsequent analysis. First, as this was a preliminary study, the sample size limits its ability to represent accurately ATV users outside of New Brunswick. Second, minimal existing literature on ATV user recreation specialization and activity consumption limited the ability to compare directly our results with similar studies. Finally, the single field season allowed for the use of only a single research instrument, restricting the extent of subsequent data analysis. The insights gained from this project suggest it is worthwhile to build upon this knowledge with subsequent field data. Such data would not only contribute to a better understanding of the factors driving ATV user behaviour and the specialization discourse but also begin the important relationship of building communication between residents and NGOs working in the area.

4.2 Future Research

Given the results discussed in this thesis, the following is a list of topics that could be incorporated into future research projects. These suggestions address ways to contribute further to building a typology of ATV users.

I. Replicate the analysis discussed in this thesis with larger sample sizes to improve external validity.

II. Incorporate additional New Brunswick communities that are prone to future ATV user – wildlife interactions. This will further contribute to the activity's successful management in the province.

III. Expand sample frame to include additional motorized vehicle users such as dirt bikes, buggies, and trucks. Doing so will allow comparison between ATV users and other off-road vehicle participants.

IV. Further investigate the utility of a self-classification approach to assess recreation specialization.

V. Further investigate the influence of activity consumption on ATV users, including their recreation specialization, satisfaction, and behaviours.

VI. Enquire into the spatial relationships of ATV user specialization in different regions. This could assist in identifying additional external factors that may impact levels of recreation specialization.

VII. Explore additional human dimension properties of ATV users to expand baseline data on the activity.

4.3 Management Recommendations

In addition to academic and theoretical contributions, this thesis provides preliminary insights as to how ATV management in New Brunswick can be improved. This section highlights critical considerations that resource managers could incorporate as they work towards achieving a balance between providing adequate ATV use opportunities and the continued protection of the province's natural environments.

As noted in chapter 1, the province's prevalent increase in ATV use poses a significant challenge to managing the activity due to funding and logistical constraints. This alone emphasizes the importance of working with local ATV clubs and members to ensure the success of management strategies. ATV use was found to be important not only to individuals, but also for their communities and cultures. As such, participants have a vested interest in the activity's management to guarantee opportunities for current and future users. It is therefore suggested that resource managers engage local ATV clubs and organizations to determine how potential human-wildlife interactions can be proactively mitigated. Strong relationships with these groups will encourage their members to respect future management plans, as failing to comply will breach social norms. Additionally, this could better address location-specific management challenges as local ATV users have a greater ability to monitor and enforce policies than resource managers.

A second key consideration is to ensure the availability of consumptive and non-consumptive ATV opportunities. Instead of focusing attention on how to keep ATV users away from beaches and out of protected areas, resource managers could instead focus on

why they are there to begin with. Are participants using beaches to access their hunting grounds due to a lack of trails? Or is it because there is a lack of suitable alternative locations to enjoy the outdoors? Once the motives behind these behaviours are better understood, solutions can be adapted to situational contexts, ensuring the continued accommodation of the recreational activity and the protection of the province's biophysical integrity. As ATV use continues to grow, so does the need to ensure its users have dedicated opportunities to use the vehicles. New Brunswick has plenty of space to meet the needs of ATV users while also ensuring that its natural environments are sustained for future generations, but both must be addressed to prevent future compromising interactions.

ATV use is not a homogeneous activity and it is essential that management policies reflect this. Strategies intended to address consumptive use may not apply to non-consumptive users, and solutions developed for casual users may not be effective with expert users. This represents a need for targeted approaches that ensure ATV users of various specialization levels and degrees of activity consumption receive messages relevant to their use characteristics.

As discussed in chapter 3, highly non-consumptive ATV users were not inclined to participate in consumptive use, while highly consumptive users valued both types of activity consumption. This suggests that management approaches targeted to users who hunt and collect wood are not relevant to non-consumptive users, while approaches intended for more recreational use would, in fact, be applicable to everyone. Similarly, a brochure on ways to improve ATV safety may be well received by causal users but could

also be negatively received by their expert counterparts. In contrast, an invitation to participate in an ATV focus group might be of little interest to casual users but could be an excellent way to solicit the opinions of experts and to disseminate the results of studies such as this. In sharing these results with ATV clubs and local residents in the communities, trust was increased between the NGO community funding the research, law enforcement officials and local residents. In fact, suggestions were made on how to continue to foster communication between all groups and build a productive relationship. As such, resource managers must ensure that targeted approaches intended to address specific management concerns are not only designed for their desired participants but also properly received by them.

4.4 References

Bath, A.J. (1998). The role of human dimensions in wildlife resource research in wildlife management. *Ursus, 10*, 349-355.

Beardmore, B., Haider, W., Hunt, L.M., & Arlinghaus, R. (2013). Evaluating the ability of specialization indicators to explain fishing preferences. *Leisure Sciences, 35*(3), 273-292.

Bennett, N.J., Roth, R., Klain, S.C., Chan, K., Christie, P. Clark, D.A., Cullman, G., Curran, D., Durbin, T.J., Epstein, G., Greenberg, A., Nelson, M.P., Sandlos, J., Stedman, R., Teel, T.L., Thomas, R., Verissimo, D., Wyborn, C. (2017). Conservation social science: understanding and integrating human dimensions to improve conservation. *Biological Conservation, 205*, 93-108.

Decker, D.J., Brown, T.L. & Siemer, W.F. (2001). Evolution of people-wildlife relations. In D.J. Decker, T.L. Borwn, W.F. Siemer (Eds.), *Human Dimensions of Wildlife Management in North America* (3-22). Bethesda, MD: The Wildlife Society.

Kerins, A.J., Scott, D, & Shafer, C.S. (2007). Evaluating the efficacy of a self-classification measure of recreation specialization in the context of ultimate frisbee. *Journal of Park and Recreational Administration, 25*(3), 1-22.

Manning, R.E. (2011). *Studies in outdoor recreation: search and research for satisfaction* (3rd ed.). Corvallis, OR: Oregon State University Press.

Needham, M.D., Scott, D., & Vaske, J.J. (2013). Recreation specialization and related concepts in leisure research. *Leisure Sciences, 35*(3), 199-202.

Needham, M.D., Sprouse, L.J., & Grimm, K.E. (2009). Testing a self-classification measure of recreation specialization among anglers. *Human Dimensions of Wildlife, 14*(6), 448-455.

Roemer, J.M., & Vaske, J.J. (2012). Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists: A comparative analysis of three decades of research. In C.L. Fisher, & C.E. Watts Jr. (Eds.), *Proceedings of the 2010 Northeastern Recreation Research Symposium* (pp. 9-15). Gen. Tech. Rep. NRS-P-94. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.

Scott, D., Ditton, R. B., Stoll, J. R., Eubanks Jr., T. L. (2005). Measuring specialization among birders: Utility of a self-classification measure. *Human Dimensions of Wildlife, 10(1)*, 53-74.

Scott, D., & Shafer, C.S. (2001). Recreational specialization: A critical look at the construct. *Journal of Leisure Research, 33*(3), 319-343.

Sorice, M.D., Oh, C.-O., & Ditton, R.B. (2009). Exploring level of support for management restrictions using a self-classification measure of recreation specialization. *Leisure Sciences, 31*(2), 107-123.

Vaske, J.J., Donnelly, M.P., Heberlein, T.A., & Shelby, B. (1982). Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists. *Journal of Leisure Research, 14*(3)*,* 195-206.

Vaske, J.J., & Roemer, J.M. (2013). Differences in overall satisfaction by consumptive and nonconsumptive recreationists: a comparative analysis of three decades of research. *Human Dimensions of Wildlife, 18*(3)*,* 159-180.

Waight, C.F. (2013). *Understanding all-terrain vehicle users: the human dimensions of ATV use on the island portion of Newfoundland and Labrador* (Master's thesis). St. John's Campus, Memorial University of Newfoundland, St. John's, NL.

Waight, C.F. & Bath, A.J. (2014a). Recreational specialization among ATV users and its relationship to environmental attitudes and management preferences on the Island of Newfoundland. *Leisure Sciences*, *36(2)*, 161-182.

Waight, C.F. & Bath, A.J. (2014b). Factors influencing attitudes among all-terrain vehicle users on the island portion of the province of Newfoundland and Labrador, Canada. *Journal of Outdoor Recreation and Tourism, 5(6), 27-36.*

Appendices

Appendix A: English Questionnaire

CONFIDENTIAL
MAKE YOUR
OPINION COUNT!

Dear ATV enthusiast:

You have been randomly selected to give your opinions on this issue. The survey should take about 10 minutes to complete. Memorial University of Newfoundland is interested in learning more about the motivations, preferences, and goals of ATV users in your community.

We request that **one** person **19 years of age or older** participate in the study as questionnaire responses could improve the management of ATV use and other motorized vehicles in the area. **If there are several ATV users in the household, the adult who is having the NEXT BIRTHDAY should complete the questionnaire.**

***NOTE: Fore this study, an ATV is defined as a three or four-wheeled all-terrain vehicle, quad, or side by side designed for off-road use.**
Snowmobiles and dirt bikes are **not** included as ATVs for the purpose of this study.

When you have completed the questionnaire, please seal it in the envelope provided and hang it on your front door in the plastic doorknob bag.
A research assistant will be by to collect your completed questionnaire on _____ between the hours _____ and _____.

Please answer all questions as completely as possible. We encourage you to voice your opinions, whether for, against, or neutral. Your views will help guide future management decisions and will be grouped with those of others in the community. All individual responses will be kept strictly **confidential**.

Thank you for your help by participating in this study about recreational ATV use. If you have any questions about the study or questionnaire, please do not hesitate to contact Kaleb McNeil at (506) 337-2124 or by e-mail at nbATVstudy@gmail.com

Sincerely,

Kaleb McNeil
Project Coordinator

Dr. Alistair Bath
Project Supervisor

Section 1: These first questions ask about your ATVing background. Please circle your response.

1. Have you ever participated in ATVing either as an operator or a passenger?
    a. Yes
    b. No

*NOTE: If you answered **NO** to question 1, please skip to **section 8***

2. If you answered yes, how do you usually participate?
    a. As an operator
    b. As a passenger
    c. Both
3. Do you own an ATV?
    a. Yes
    b. No
4. If you answered yes to the question above, how many do you own?
    a. 1
    b. 2 – 4
    c. 5 or more

Section 2: The following questions ask where you use your ATV. Please circle the response that best describes your opinion.

5. How often do you typically use your ATV in the following places? Please circle the response that best describes your opinion.

	Never	Rarely	Sometimes	Mostly	All the time
On paved roads	1	2	3	4	5
On gravel roads	1	2	3	4	5
On designated ATV trails	1	2	3	4	5
On private trails	1	2	3	4	5
Remotely off trails	1	2	3	4	5
On trails when possible	1	2	3	4	5
On paved roads when possible	1	2	3	4	5
On beaches	1	2	3	4	5
On dunes	1	2	3	4	5
On wetlands or bogs	1	2	3	4	5

Section 3: The following questions will address your knowledge about ATVing. Please circle the response that best describes your opinion.

6. In my opinion, I…

	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
… am aware of provincial ATV regulations	1	2	3	4	5
… am aware of all ATV trails in my community	1	2	3	4	5
… know which trails are officially designated as ATV trails	1	2	3	4	5
… know which trails are private	1	2	3	4	5
… believe ATVs can impact the environment	1	2	3	4	5
… feel that I am more skilled at ATVing than others in my community	1	2	3	4	5
… have significantly better ATVing skills than last year.	1	2	3	4	5

Section 4: The following questions will address how often you use your ATV. Please circle your response.

7. On average, how many hours per week do you ride your ATV?
    a. Less than 1 hour
    b. 1 – 4 hours
    c. 5 – 9 hours
    d. 10 or more hours

8. Which season do you typically ride **most often**? (circle *one*)
    a. Winter (December – February)
    b. Spring (March – May)
    c. Summer (June – August)
    d. Fall (September – November)

9. How many years have you been riding?
    a. Less than 1 year
    b. 1 – 4 years
    c. 5 – 9 years
    d. 10 – 14 years
    e. 15 or more years

10. In the past 12 months, roughly what percentage of your **free time** did you spend ATVing?
    a. 20% (a little)
    b. 40% (almost half)
    c. 60% (mostly)
    d. 80% (nearly all of my time)
    e. Other (please specify): _____ %

Section 5: The following questions will address why you participate in ATVing. Please circle the response that best describes your opinion.

11. I go ATVing…

	Never	Rarely	Sometimes	Mostly	All the time
… to be with my family	1	2	3	4	5
… to travel around my community	1	2	3	4	5
… to enjoy the outdoors	1	2	3	4	5
… to help move fishing gear	1	2	3	4	5
… to help collect wood	1	2	3	4	5
… to go hunting	1	2	3	4	5
… to collect Irish Moss	1	2	3	4	5
… to see my friends	1	2	3	4	5
… to go to the cabin	1	2	3	4	5
… to go mudding	1	2	3	4	5
… to pick berries	1	2	3	4	5
… to visit my favourite places	1	2	3	4	5

Section 6: The following section will address how important ATVing is to you. Please circle the response that best describes your opinion.

12.	**Strongly Disagree**	**Disagree**	**Neither agree or disagree**	**Agree**	**Strongly Agree**
If I stopped ATVing, an important part of my life would be missing	1	2	3	4	5
ATVing is an important part of my community's culture	1	2	3	4	5
ATVing is a large part of my life	1	2	3	4	5
I would rather go ATVing than do other outdoor activities	1	2	3	4	5
If the price of gas went up, I would still go ATVing	1	2	3	4	5
ATVing is important for helping with work	1	2	3	4	5
I have invested a lot of money in ATV equipment	1	2	3	4	5
I often spend time learning about the newest ATV equipment every year	1	2	3	4	5

Section 7: The following questions ask about your involvement in ATVing. Please circle your response.

13. Have you taken an ATV safety course?
    a. Yes
    b. No

14. Do you subscribe to any ATVing magazines?
    a. Yes
    b. No

15. Do you belong to any ATV clubs or organizations?
    a. Yes
    b. No

16. How do you rate your ATV skill level? (circle ***one***)

a. Beginner b. Novice c. Intermediate d. Advanced e. Expert

17. *Based on the following definitions, which best describes your level of involvement in ATVing? Please circle **one** response.*

a. This is an enjoyable but **infrequent activity** that is a minor activity to my other outdoor interests and I **am not highly skilled** in this activity.

b. This activity is important to me but is only one of the outdoor activities in which I participate in. My participation in this activity is **not regular** and I consider myself to be **moderately skilled** in this activity.

c. This is my **primary** outdoor activity. I consider myself to be **highly skilled** in this activity, and I participate in this activity every available chance I get.

Section 8: The following questions will address your preferences for ATV management in your community. Please circle the response that best describes your opinion.

18. In my opinion…

	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
… more ATV trails should be created in my community	1	2	3	4	5
… ATV users should be required to take a safety course	1	2	3	4	5
… ATV trail maps should be posted around my community	1	2	3	4	5
… provincial ATV regulations should be posted around my community	1	2	3	4	5
… ATV parking areas should be created near foot trails leading to beaches	1	2	3	4	5
… ATVing on beaches would decrease if more ATV trails were created in my community	1	2	3	4	5

… there should be increased fines for ATV's breaking provincial regulations	1	2	3	4	5

Section 9: The following questions will help us compare this study with other communities in New Brunswick. Please circle your response.

19. With which of the following do you identify?
    a. Male
    b. Female
    c. Other

20. What is your age? _____

21. How many months per year do you live in your community?
    a. 1 month or less
    b. 2 – 4 months
    c. 5 – 9 months
    d. 10 or more months

22. How many years have you lived in your community?

    a. 1 year or less b. 2 – 5 years c. 6 – 10 years

    d. 11 – 15 years e. 16 – 20 years f. 20 or more years

23. How many ATV riders live in your household?
    a. 1 rider
    b. 2 – 4 riders
    c. 5 or more riders
    d. None

Are there any other comments you wish to make?

Thanks again for your participation!

Appendix B: French Questionnaire

CONFIDENTIEL

VOTRE OPINION COMPTE!

Cher passionné de VTT:

Vous avez été choisi au hasard pour partager votre opinion sur cet enjeu. Ce sondage ne devrait prendre que 10 minutes à remplir. L'Université Memorial de Terre-Neuve aimerait en apprendre davantage sur les motivations, les préférences et les buts des utilisateurs de VTT de votre communauté.

Nous demandons qu'une personne âgée de **19 ans ou plus** participe à l'étude puisque les réponses du questionnaire pourraient améliorer la gestion de l'utilisation des VTT et autres véhicules motorisés dans la région. **Si plusieurs utilisateurs de VTT vivent à cette adresse, l'adulte qui fêtera son ANNIVERSAIRE le prochain devrait remplir le questionnaire.**

****AVIS : Dans le cadre de cette étude, un VTT se définit comme étant un véhicule tout terrain de 3 ou 4 roues, quad ou côte à côte conçu pour l'utilisation hors-piste.****
Les motoneiges et les motocross ne sont **pas** inclus comme VTT dans cette étude.

Quand vous aurez complété le sondage, s'il vous plaît scellez-le dans l'enveloppe fournie et suspendez-le dans le sac en plastique à la poignée de votre porte.
Un assistant de recherche va ramassera votre sondage
sur _____ d'entre ____ et ____.

Veuillez répondre à toutes les questions de la manière la plus complète possible. Nous vous encourageons à émettre votre opinion, que vous soyez pour, contre ou que vous soyez neutre. Votre point de vue aidera à prendre des décisions de gestion et sera regroupé à celui d'autres répondants de votre communauté. Toutes les réponses individuelles seront gardées complètement **confidentielles.**

Nous vous remercions pour votre aide en participant à cette étude portant sur l'utilisation récréative des VTT. Si vous avez des questions à propos de l'étude ou sur le questionnaire, n'hésitez pas à contacter Kaleb McNeil au (506) 337-2124 ou par courriel au nbATVstudy@gmail.com

Sincerely,

Kaleb McNeil
Responsables du projet

Dr. Alistair Bath
Superviseur du projet

Section 1: Ces premières questions portent sur votre historique de VTT. Veuillez n'encercler qu'une seule réponse.

1. Avez-vous déjà utilisé un VTT soit comme conducteur ou passager ?
    a. Oui
    b. Non

*AVIS: Si vous avez répondu **NON** à la question 1, veuillez passer à la **section 8** *

2. Si vous avez répondu oui à la question ci-dessus, comment avez-vous l'utilisez vas habitude ?
    a. Comme conducteur
    b. Comme passager
    c. Tous les deux

3. Possédez-vous un VTT?
    a. Oui
    b. Non

4. Si vous avez répondu oui à la question ci-dessus, combien possédez-vous?
    a. 1
    b. 2 – 4
    c. 5 ou plus

Section 2: Les questions qui suivent portent sur l'endroit où vous utilisez votre VTT. Veuillez encercler la réponse qui décrit le mieux votre opinion.

5. À quelle fréquence utilisez-vous votre VTT aux endroits suivants? Veuillez encercler la réponse qui décrit le mieux votre opinion.

	Jamais	Rarement	Parfois	Plupart de temps	Tout le temps
Sur les routes pavées	1	2	3	4	5
Sur les routes de gravier	1	2	3	4	5
Sur des pistes désignées pour les VTT	1	2	3	4	5
Sur des pistes privées	1	2	3	4	5
Hors-piste	1	2	3	4	5
Sur des pistes quand c'est possible	1	2	3	4	5
Sur des routes pavées quand c'est possible	1	2	3	4	5
Sur les plages	1	2	3	4	5

Sur les dunes	1	2	3	4	5
Dans les marécages ou dans les tourbières	1	2	3	4	5

Section 3: Les questions qui suivent portent sur votre connaissance des VTT. Veuillez encercler la réponse qui décrit le mieux votre opinion.

6. D'après moi, je...

	Fortement en désaccord	En désaccord	Indifférent	D'accord	Fortement d'accord
… Connais les règlements provinciaux sur les VTT.	1	2	3	4	5
… Connais les pistes de VTT dans ma communauté.	1	2	3	4	5
… Sais quelles pistes sont officiellement désignées comme pistes de VTT.	1	2	3	4	5
… Sais quelles pistes sont privées.	1	2	3	4	5
… Crois que les VTT peuvent nuire à l'environnement.	1	2	3	4	5
… Crois que je suis plus habile en VTT que les autres de ma communauté.	1	2	3	4	5
… J'ai plus de talents en VTT cette année que l'année dernière.	1	2	3	4	5

Section 4: Les questions qui suivent portent sur la fréquence à laquelle vous utilisez votre VTT. Veuillez n'encercler qu'une seule réponse.

7. Vous utilisez votre VTT pendant combien d'heures par semaine en moyenne?
   a. 1 heure ou moins
   b. 2 – 5 heures
   c. 6 – 9 heures
   d. 10 heures ou plus

8. Pendant quelle saison l'utilisez-vous le plus? (N'encerclez qu'une réponse)
    a. Hiver (Décembre – Février)
    b. Printemps (Mars – Mai)
    c. Été (Juin – Août)
    d. Automne (Septembre – Novembre)

9. Depuis combien d'années utilisez-vous un VTT?
    a. Moins d'un an
    b. 1 – 4 ans
    c. 5 – 9 ans
    d. 10 – 14 ans
    e. 15 ans ou plus

10. Pendant environ quel pourcentage de votre temps libre des 12 derniers mois avez-vous roulé en VTT?
    a. 20% (un peu)
    b. 40% (presque la moitié)
    c. 60% (pour la plupart)
    d. 80% (presque tout le temps)
    e. Autre (veuillez spécifiez): _____ %

Section 5: Les questions qui suivent portent sur les raisons qui font que vous choisissez de rouler en VTT. Veuillez encercler la réponse qui décrit le mieux votre opinion.

11. J'utilise un VTT...

	Jamais	Rarement	Parfois	Plupart de temps	Tout le temps
… pour être avec ma famille	1	2	3	4	5
… pour me promener dans ma communauté	1	2	3	4	5
… pour profiter du grand air	1	2	3	4	5
… pour m'aider à déplacer mon équipement de pêche	1	2	3	4	5
… pour m'aider à ramasser du bois	1	2	3	4	5
… pour aller chasser	1	2	3	4	5
… pour ramasser de la mousse d'Irlande	1	2	3	4	5
… pour voir mes amis	1	2	3	4	5
… pour me rendre au chalet	1	2	3	4	5
… Pour jouer dans la boue	1	2	3	4	5
… pour récolter des petits fruits	1	2	3	4	5
… pour me rendre à mes endroits préférés	1	2	3	4	5

Section 6: La section suivante porte sur l'importance que ça a pour vous. Veuillez encercler la réponse qui décrit le mieux votre opinion.

12.	Fortement en désaccord	En désaccord	Indifférent	D'accord	Fortement d'accord
Si j'arrête de me promener en VTT, il me manquerait un morceau important de ma vie.	1	2	3	4	5
Se promener en VTT est une activité importante dans ma communauté.	1	2	3	4	5
Me promener en VTT prend une grande place dans ma vie.	1	2	3	4	5
Je préfère me promener en VTT plutôt que de pratiquer toute autre activité extérieure.	1	2	3	4	5
Même si le prix du gaz montait, je continuerais d'utiliser mon VTT.	1	2	3	4	5
Il est important d'utiliser le VTT pour aider au travail.	1	2	3	4	5
J'ai investi beaucoup d'argent en équipement pour VTT.	1	2	3	4	5
Chaque année, je prends le temps d'en apprendre davantage sur les nouveaux équipements pour VTT.	1	2	3	4	5

Section 7: Les questions qui suivent s'intéressent à votre implication dans le milieu du VTT. Veuillez n'encercler qu'une seule réponse.

16. Êtes-vous abonné à un magazine portant sur le VTT?
    a. Oui
    b. Non

17. Faites-vous partie d'un club de VTT ou de toute autre organisation?
    a. Oui
    b. Non

18. Avez-vous suivi un cours en sécurité pour VTT?
    a. Oui
    b. Non

16. Comment qualifieriez-vous vos compétences en VTT? (N'encerclez qu'une réponse)

a. Débutant b. Novice c. Intermédiaire d. Avancé e. Expert

17. Selon les définitions qui suivent, laquelle décrit le mieux votre niveau d'implication en VTT? Veuillez n'encercler qu'une seule réponse.

a. C'est une activité agréable, mais **non fréquente** qui représente une très petite partie de mes autres intérêts en plein air et je ne suis **pas hautement qualifié** pour cette activité.

b. C'est une activité importante pour moi, mais ce n'est qu'une activité extérieure parmi plusieurs que je pratique. Ma participation à cette activité **n'est pas régulière** et je me considère **moyennement qualifié** dans cette activité.

c. C'est ma **principale activité** extérieure. Je me considère **hautement qualifié** dans cette activité, et je pratique cette activité aussi souvent que possible.

Section 8: Les questions qui suivent portent sur vos préférences. Veuillez encercler la réponse qui décrit le mieux votre opinion.

18. Selon moi, je pense que ...

	Fortement en désaccord	En désaccord	Indifférent	D'accord	Fortement d'accord
… Plus de pistes de VTT devraient être créées dans ma communauté.	1	2	3	4	5
… Il devrait être obligatoire que les utilisateurs de VTT suivent un cours de sécurité.	1	2	3	4	5
… Une carte indiquant les pistes de VTT devrait être affichée dans ma communauté.	1	2	3	4	5

… Les lois provinciales portant sur les VTT devraient être affichées dans ma communauté.	1	2	3	4	5
… Des stationnements pour les VTT devraient être aménagés près des sentiers piétonniers menant aux plages.	1	2	3	4	5
… La présence des VTT sur les plages diminuerait si plus de pistes de VTT étaient créées dans ma communauté.	1	2	3	4	5
… Il faut augmenter les amendes provinciales pour les délits liés aux VTT	1	2	3	4	5

Section 9: Les questions qui suivent nous aideront à comparer cette étude à celles provenant d'autres communautés du Nouveau-Brunswick. Veuillez n'encercler qu'une seule réponse.

19. Comment vous identifiez-vous?
    a. Homme
    b. Famme
    c. Autre
20. Quel âge avez-vous ? _____

21. Combien de mois par année habitez-vous dans votre communauté ?
    a. Moins de 1 mois
    b. 1 – 4 mois
    c. 5 – 9 mois
    d. 10 mois ou plus

22. Depuis combien d'années vivez-vous dans votre communauté ?

    a. Moins d'un an b. 1 – 5 ans c. 6 – 10 ans

    d. 11 – 15 ans e. 16 – 20 ans f. Plus de 20 ans

23. Combien d'utilisateurs de VTT y a-t-il dans votre famille?
    a. 1 utilisateur
    b. 2 – 4 utilisateurs
    c. 5 utilisateurs ou plus
    d. Aucun

Aimeriez-vous laisser un commentaire?

Merci encore pour votre participation!

Appendix C: Reminder Letter

MAKE YOUR OPINION COUNT!

Dear ATV enthusiast:
Thank you so much for accepting to participate in this study on recreation uses of ATVs. Your answers will provide valuable insight into how the people of New Brunswick feel about ATVing and how you would like the activity to be managed in the area. All individual responses will be kept strictly confidential.

Please place **ONE** completed questionnaire in the enclosed pre-paid envelope and bring it to your local post office as soon as you are able.

If you have any questions, concerns or would like help filling out the survey, please do not hesitate to call me at (506) 337-2124 or send an e-mail to nbATVstudy@gmail.com.

Thank you again for your help,
Kaleb McNeil
Project Coordinator

VOTRE OPINION COMPTE!

Cher passionné de VTT:

Merci beaucoup d'avoir accepté de participer à cette étude sur l'usage récréatif de VTT. Vos réponses nous fourniront de précieux éclaircissements sur comment les représentations des Néo-Brunswicrois à propos des VTT et sur comment ils envisagent la gestion de cette activité dans leur région. Toutes les réponses individuelles seront gardées strictement confidentielles.

SVP placer **UN** questionnaire rempli dans l'enveloppe prépayée ci-jointe et amenez-le à votre bureau de poste

Si vous avez des questions à propos de cette étude ou avez besoin d'aide compléter le sondage, n'hesitez pas à contacter Kaleb McNeil à (506) 337-2124 ou par courielle à nbATVstudy@gmail.com.

Merci Beaucoup pour votre aide,
Kaleb McNeil
Responsables du projet