Greening the Game: Understanding the Organizational and Geographic Factors Influencing Environmental Commitment Among Professional Sports Teams

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners. I understand that my thesis may be made electronically available to the public.

Abstract

North American professional sports teams have substantial economic and social leverage due to their sizeable revenue streams and captive audiences. However, these professional sports teams also have the potential to influence environmental behaviours through their environmental commitments. Fan engagement with green initiatives is largely possible because of the high degree of interest and fan loyalty that exists in Big Four sports. Professional sports teams are motivated to adopt environmental practices for various reasons. Eco-friendly actions can have monetary and strategic advantages for professional sports teams that justify the time, money and effort required to implement sustainable practices. The formation of the Green Sports Alliance in 2010 has led to a growing number of teams integrating sustainability into daily operations. Membership in the Green Sports Alliance is highly uneven, from entire leagues joining to only some team participation in other leagues. This suggests that environmental commitment among Big Four sports teams in North America varies by team. There is an opportunity to further explain why certain teams engage with the natural environment while others engage to a lesser degree.

This study identifies the factors that influence environmental action amongst teams across the 'Big Four' professional sports teams: Major League Baseball (MLB), the National Basketball Association (NBA), National Football League (NFL) and the National Hockey League (NHL). The study considers both organizational (peer) and geographic (place) factors that may influence the level of environmental commitment amongst professional sports teams. This includes further analysis of: external influences, venue features, team characteristics, urban sustainability commitments, and metropolitan socioeconomic conditions. Recent studies suggest that teams actively communicate environmental initiatives via the Internet. Therefore, this study evaluates professional sports teams' environmental commitment on online platforms through qualitative content analyses of both official team websites and verified team Twitter accounts. It is assumed that all teams have similar capacity to communicate their environmental commitments and that their declarations are both complete and accurate. Using descriptive statistics, one-way ANOVA tests, bivariate (Pearson) correlations and multivariate regressions, the research finds that Green Sports Alliance membership, teams with greater average attendance, a smaller metropolitan area population, and host city with a climate action plan positively influence North American Big Four professional sports teams' commitment to the environment.

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List of Abbreviations

AEG	Anschutz Entertainment Group
ANOVA	Analysis of Variance
ATP	Association of Tennis Professionals
BPA	Bisphenol A
CSR	Corporate Social Responsibility
ESPN	Entertainment and Sports Programming Network
FIFA	Fédération Internationale de Football Association
FWC	FIFA World Cup
GSA	Green Sports Alliance
IOC	International Olympic Committee
LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
MLB	Major League Baseball
NAICS	North American Industry Classification System
NBA	National Basketball Association
NFL	National Football League
NGO	Non-Governmental Organization
NHL	National Hockey League
NRDC	Natural Resources Defense Council
REC	Renewable Energy Credit
SPSS	Statistical Package for the Social Sciences
UNEP	United Nations Environment Programme
USCB	United States Census Bureau
USD	United States Dollar
USGBC	United States Green Building Council

1.0 Introduction

North American professional sports teams have large revenue streams, netting approximately 67 billion United States Dollars (USD), with the largest four sports leagues in the continent hosting approximately 175 million spectators on an annual basis (PricewaterhouseCoopers, 2016; Holden Moss, 2014). Specifically, the 122 teams that are members of the Big Four leagues, including Major League Baseball (MLB), the National Basketball Association (NBA), National Football League (NFL), and National Hockey League (NHL), have noteworthy social and economic leverage. This influence positions these teams as powerful organizations capable of influencing change in their community and elsewhere (Godfrey, 2009).

According to Henly, Hershkowitz and Hoover (2012:7), "sport is a great unifier, transcending political, cultural, religious and socioeconomic barriers." This suggests that professional sports teams possess leverage across a diverse range of groups, which allows teams the possibility of influencing the behaviour of large numbers of fans. Much of this potential to create change in sports is achievable due to the high degrees of interest by fans. According to research by Gallup, approximately sixty percent of Americans consider themselves sports fans (Jones, 2015). Big Four sports teams thrive due to the presence of interested, engaged and loyal fans. Because of these strong relations, Big Four sports teams have the capacity to stimulate fans' green behaviour both in teams' respective venues, and within the community (Blankenbuehler and Kunz, 2014). It is for this reason that Big Four sports teams' environmental commitments are worthy of evaluation (Godfrey, 2009; Deloitte, 2016).

1.1 Sports and the Environment: A Natural Match

Sports fans are critical to the sports industry because they pledge money and time to watch games. According to Deloitte (2016:3), "the natural loyalty that exists in the realm of sports is something that brands in other industries look to with envy – but sports loyalty is not unwavering." Winning is undoubtedly beneficial in generating interest, but win or lose, there can often remain a contingent of fans who continue to pay admission on the basis of loyalty and fandom. Big Four fan loyalty should not be taken lightly. Fans directly contribute to sizeable revenue streams as well as engage in team initiatives. Deloitte (2016) identifies six primary reasons that explain why sports fan loyalty can be robust. Fan commitment to a team can be a result of: (1) hometown, (2) current location, (3) family tradition, (4) team performance, (5) a favourite player currently or previously playing on a team, and (6) frequency or accessibility of television and/or radio broadcasts. Overall, fan interest and loyalty are perhaps the most important attributes of Big Four sports that make environmental commitment and fan engagement with eco-friendly initiatives possible and effective.

Communities that host Big Four sports teams can often be directly associated with their teams' performance, athletic star power and overall public image. As such, teams and professional athletes are often viewed as public figures or ambassadors for their city and can have an important role in local economic development. In particular, cities capitalize on sports as a means to: improve their image, promote community engagement, and be relied upon for future community development projects that can stimulate economic development (Bieganek and Huberty, 2015; Misener and Mason, 2009). Both the high levels of interest and engagement in local sports content within respective Big Four cities are convincing reasons as to why

professional sports teams possess power and legitimacy in their communities (Babiak and Trendafilova, 2011).

Beyond the "product" performing on the field, ice or hardwood, are also the many elements that make the business case for sustainability in professional sports. Environmental actions can directly enrich business operations by: improving fan experience, offsetting costs, attracting new fans and corporate partners, strengthening brand image, and remaining profitable (Blankenbuehler and Kunz, 2014). There is a strong presence of sports culture in North America. However, there is also the potential for environmental harm inherent in sports such as improper waste disposal and pollution. The negative impacts sports have on the environment have garnered serious attention as diverse organizations across the continent are dedicated to the promotion of green sports (McCullough and Kellison, 2017).

Although environmental commitment is increasing amongst Big Four sports, it is possible that some teams still do not view environmental commitments as advantageous for their franchise. It is estimated that the entire professional sports industry in North America will net approximately $75.7 billion USD in revenue from: gate revenues, media rights, sponsorships, and merchandising during the entirety of 2018, according to PricewaterhouseCoopers (2016). Despite their immense wealth and influence in their respective communities, not all professional sports teams have prioritized environmental commitment to a notable degree (Henly, Hershkowitz and Hoover, 2012).

Teams that do commit to actions that protect the natural environment have the opportunity to experience diverse financial and strategic benefits. This can include: monetary savings, improved brand image, market differentiation, local economic development, stronger community ties, an enhanced fan experience, and attraction of new clientele and corporate partners (Henly,

Hershkowitz and Hoover, 2012; Blankenbuehler and Kunz, 2014; Athanasopoulou, Dovus and Kyriakis, 2011; Filizöz and Fisne, 2011). Collectively, these many benefits and motives explain why environmental strategies can be fruitful components of professional sports teams' business strategies.

Owing to these advantages, over the past decade and a half, professional sports teams have intensified their environmental commitment (Blankenbuehler and Kunz, 2014). The Green Sports Alliance (GSA), since forming in 2010, has inspired a growing number of teams, leagues, venues, and other sports-related organizations to integrate sustainable solutions into their practices (Green Sports Alliance – "About," 2017). These actions have saved North American professional leagues, teams and venues several millions of dollars while mitigating teams' impacts to the natural environment. The GSA's efforts, along with the prior groundwork and continued efforts from the Natural Resources Defense Council (NRDC) and green programs initiated by individual Big Four leagues, have resulted in successful environmental initiatives across leagues, teams and venues (Henly, Hershkowitz and Hoover, 2012).

Given the pervasive digital technologies that exist, team websites and social media can be useful tools for teams to share information and for the public to engage with content. Previous studies have found that professional sports teams express high levels of diligence in articulating environmental involvement through online platforms (Walker and Parent, 2010). Sports teams realize the power of leveraging different platforms on the Internet as instruments for communication and marketing. This is propelled by partnership and alliance prospects together with encouraging the formation and contributions of fans to online communities that foster interest. Online communities such as those that exist on social media platforms, fantasy sports platforms, online forums and others unite individuals with a passion for sports and promote

fandom. This connectivity fosters an online culture where interest and engagement with others is cultivated.

The interactive culture of social media and online interactions are economically beneficial for teams and realized through ticket sales, merchandise sales, television viewership and other revenue streams (Evans and Smith, 2004). Social media can also be a meaningful outlet to analyze how professional sports teams market and promote initiatives, share information with fans, and conduct public relations (Kuzma, Bell and Logue, 2014; Wang, 2014; Gibbs, 2013). Arguably the most dominant and engaging form of social media is Twitter, which allows sports teams to achieve the above while directly participating in dialogue with fans (Gibbs, 2013). In addition, sports teams actively use Twitter and other social media to their benefit by: personalizing content for fans, crowdsourcing and fansourcing, as well as collecting fan data (Wysocki, 2012). These online practices make compelling arguments as to why both team websites and social media in the form of Twitter are dependable platforms for interpreting environmental commitments made by Big Four sports teams.

This research has three primary goals. The first goal is to evaluate the degree of environmental commitment among Big Four professional sports teams. Environmental commitments are measured by the presence of sports-and-environment terms indicative of green practices communicated via official team websites and verified team Twitter accounts. This research considers environmental communication as environmental commitments. It is assumed teams' environmental communication is both accurate of their intentions and that teams will follow through with their declarations. Evaluating both websites and social media (Twitter) contributes novel findings that assess online environmental commitment among sports teams.

The second goal is to identify team and league-wide characteristics that can influence professional sports teams' environmental commitment. The third goal is to identify community-wide attributes that can influence sports teams' environmental commitment. By identifying the factors that influence the environmental commitment of professional sports teams, the analysis seeks to contribute meaningful and practical results that can be helpful for sustainability planning for teams, leagues and cities alike.

1.2 Problem Statement

Since environmental challenges demand collective action across all scales, professional sports are a superlative means of raising environmental awareness and prompting positive action. Among many reasons, environmental action is largely possible through professional sports because of the strong connection with large fanbases as well as teams' capacity to instill green behaviour among fans (Blankenbuehler and Kunz, 2014). That said, variability exists among North American Big Four sports teams' environmental commitment, as teams engage dissimilarly with the natural environment (Henly, Hershkowitz and Hoover, 2012).

Greater opportunity exists to explain why certain teams commit to sustainability while others engage to a lesser degree. There are tangible prospects for professional sports franchises to leverage their economic, social and cultural influence and to commit to the natural environment. Teams engaging with the environment to a lesser degree must realize the magnitude of ecological issues, their power to encourage fans and the monetary advantages sustainable practices have for their triple bottom line. More teams should integrate sustainability into their core objectives given that eco-friendly actions can: encourage cost savings, positively alter fan behaviours, and indirectly help their business through improved brand image (Henly,

Hershkowitz and Hoover, 2012; Athanasopoulou, Dovus and Kyriakis, 2011; Filizöz and Fisne, 2011; Inoue and Kent, 2012; Levermore, 2013).

To date, existing literature has recognized and evaluated Big Four teams' environmental commitments and league-wide environmental initiatives to a certain degree. However, the sports industry has few recognizable trends concerning environmental commitment. Therefore, the research gap exists in two capacities. First, this study intends to understand current levels of environmental commitment among all North American Big Four teams as provided on official team websites and verified team Twitter accounts. Second, this research aims to identify factors that influence environmental commitment among different Big Four teams. Subsequently, the following research questions are developed.

Research Questions:

1. What are the levels of environmental commitment among North American Big Four sports franchises? And how do they differ?
2. What factors influence environmental commitment among North American Big Four professional sports teams?

1.3 Analysis of Factors

This study evaluates factors that may influence North American Big Four sports teams' environmental commitments. This analysis aims to recognize both league-wide and team-specific environmental initiatives as well as community-wide environmental programs that engage professional sports teams with the natural environment. Because the sports industry has few recognizable trends with regard to environmental commitment, it is meaningful to identify

potential drivers of environmental action within Big Four teams, leagues and host cities. Therefore, this research aims to contribute a greater understanding of why Big Four sports teams might be inclined to adopt the natural environment. Insightful findings are also delivered that detail information from individual sports franchises, leagues and metropolitan areas under consideration.

To quantify environmental commitment of Big Four sports teams, two separate content analyses of official team websites and verified team Twitter accounts is undertaken. Empirical sports-and-environment literature recognize sports teams as being quite diligent in communicating environmental commitment online (Walker and Parent, 2010; Ciletti, Lanasa, Ramos, Luchs and Lou, 2010; Blankenbuehler and Kunz, 2014, Wysocki, 2012; Kuzma, Bell and Logue, 2014; Wang, 2014). Evaluating both websites and Twitter attempts to capture different types of content across dissimilar online platforms.

To evaluate environmental commitment, a list of 115 search terms was created with all terms recognized as significant and reoccurring themes from relevant sports-and-environment literature. Each of the terms are searched across 122 individual team websites and 122 verified team Twitter accounts and must be mentioned in an environmental context as determined by the researcher for the commitment to be considered. After data were recorded, terms were then assigned to encompassing environmental commitment types according to the context and frequency of observation in website and Twitter content. These commitment types include: Broad Application, Energy Efficiency, Food and Beverage, Philanthropy and Outreach, Transportation, Venue Design and Operations, and Waste Management.

Thereafter, environmental commitment results were sorted and descriptive statistics were analyzed according to league, metropolitan area and commitment type. These different types of

practices are then compared amongst teams and leagues to recognize trends and to distinguish industry leaders. Additional data were acquired from external sources and evaluated against website, Twitter and overall data to assess factors that may influence environmental commitment. This analysis is most suitable to answer the research questions because it uniquely derives environmental content from professional sports teams' official online platforms and allows comparisons to be made across diverse groups.

To answer the second research question, factors that can potentially influence sports teams are assessed in relation to website, Twitter and overall environmental commitments by Big Four teams. The following topics consist of variables that required external data collection and comprise the different factors under analysis: external influences, team characteristics, venue features, urban sustainability commitments, and metropolitan socioeconomic conditions. One-way Analysis of Variance (ANOVA), bivariate correlation analysis (both referred to as analysis of factors) and multivariate regression analysis are relied upon to understand the relationship these types of variables have on professional sports teams' environmental commitment. External influences, team characteristics and venue features are considered as peer effects, whereas urban sustainability commitments and metropolitan socioeconomic conditions are considered as place effect analysis. For the purposes of this study, peer and place effect designation is used to sort variables and structure ANOVA tests and bivariate correlation analysis as well as regression models for regression analysis. Findings are described in both Section 4.6 Analysis of Factors and Section 4.7 Regression Analysis.

In summary, this thesis investigates the levels of environmental among Big Four professional sports teams in North America and how they differ. This research also evaluates factors that may influence environmental commitment among Big Four sports teams.

Epistemologically, this research considers all environmental communication on official team websites and verified team Twitter accounts as environmental commitments that are part of the team's philosophical approach. This methodology assumes that teams' sustainability communications both accurately reflect their intentions and that teams' declared actions become fulfilled. Correspondingly, any knowledge gained from official team websites and verified team Twitter accounts is believed to be factual. Any of the following types of environmental communication, as derived from Lynes and Dredge (2006), are perceived as environmental commitments for the purposes of this study: (1) pledge of financial resources or time to sustainability initiatives, (2) declaration to environmental accountability, (3) attempt to minimize environmentally harmful activity, and (4) demonstrated effort of responsibility toward the natural environment.

2.0 Literature Review

2.1 Introduction

This chapter delivers a review of relevant literature that explores the affiliation sports teams can have with the natural environment. Evaluating existing literature is beneficial in identifying the research gap that exists for this study. First, this chapter reviews the theoretical literature surrounding CSR and environmental commitment. This discussion either encourages sports teams, and businesses as a whole, to engage with both internal and external stakeholders or for them to be firm on the notion of ignoring the idea of responsibility. Second, diverse financial and strategic advantages are examined that can encourage sports teams to adopt sustainable practices. As well, the types of environmental commitments by sports teams are assessed. The following common types of commitments are explained in detail: energy efficiency, food and beverage, philanthropy and outreach, transportation, venue design and operations, and waste management. Third, sports governing bodies and their ability to instill sustainability are examined. From a broader perspective, global sports leagues and organizations are examined, followed by North American Big Four leagues and their programs, initiatives and efforts regarding sustainability. Additionally, professional sports teams' propensity to be environmentally committed are evaluated in relation to the following factors: external influences, team characteristics, venue features, geographic location and team market size, urban sustainability commitments, and socioeconomic characteristics. Lastly, social media is examined as a tool for evaluating sports teams' environmental commitments. This discussion focuses on, sports teams' use of Twitter, making the argument for undertaking content analyses of both team websites and Twitter.

2.2 Theoretical Perspectives for Environmental Commitment

To understand why certain businesses, and sports teams in specific, embrace the environment into their operations, an evaluation of corporate normative theories must be conducted to realize how a business might approach responsible behaviour or actions. Evaluating CSR literature provides greater context to understand theories pertinent to environmental commitment. This is because environmental commitment commonly falls under the broader, more inclusive, but still applicable label of CSR in literature.

Carroll (2001) opines that CSR demands philanthropic, ethical, legal and economic responsibilities. This argument calls for organizations to: be good corporate citizens, have values, obey the law, and remain profitable. Carroll alludes to the notion of moral management when businesses engage with local community stakeholders. This approach considers the community and its resources as critical components that must be factored into decision-making. Moral management views community and corporate objectives as mutually interdependent with high levels of collaboration and strategic philanthropy. As Carroll (2001) suggests, there is a natural relationship between the notion of CSR and an organization's shareholders as well as stakeholders at large. Ultimately, management is tasked with the decision between stakeholders that may or may not merit consideration, resources and/or attention from the business. To discern between stakeholders, Carroll believes that management must individually assess the power, legitimacy and urgency of their stakeholders (Carroll, 2001).

Edward Freeman continues the conversation of what is believed to be proper corporate stakeholder management. Freeman's "stakeholder theory" considers those individuals or groups targeted by environmental initiatives of CSR. A stakeholder, as defined by Freeman et al. (2010:26), is "any group or individual that can affect or be affected by the realization of an organization's purpose." Freeman theorizes that for a firm to survive and thrive, attention at the

very least must be provided to all stakeholders, both internal and external. In opposition, Milton Friedman would completely disregard the notion of a business having "responsibilities." Friedman believes that only human beings have responsibilities and that a corporation is an artificial person with artificial responsibilities. This ideology stresses that the only appropriate strategy for businesses is to increase its profits. In fact, Friedman believes returning money to shareholders and employees is the only social responsibility that should be considered (Friedman, 1970).

In a sports context, Smith and Westerbeek (2007) side with Freeman and believe that stakeholder theory has pertinent value. Due to teams' combination of wealth, distributive capacity and symbolic power, they believe an immense opportunity exists for professional sports teams to engage with both internal and external stakeholders that can directly impact profitability. This is due to sports teams' financial and social power to captivate and unite fans (Godfrey, 2009). Also, the corporate world, and especially the sports industry, has the ability to mobilize vital resources to satisfy social responsibilities. This leverage is no different for environmental responsibility by professional sports teams, as social and environmental actions have potential to be: widespread, inclusive, interactive, culturally liberating, and enjoyable (Smith and Westerbeek, 2007). Consequently, professional sports teams are in a unique position in their respective cities to implement environmentally conscious initiatives. The intensified involvements in CSR and increased commitments to sustainability by sports franchises and corporations at large are expected to continue into the foreseeable future (McGowan and Mahon, n.d.).

Roger Levermore is an academic who sides with Friedman after examining socially and environmentally responsible actions of professional sports teams. He believes CSR and

environmental commitment through sports is controlled by instrumental, integrative and normative stakeholder viewpoints. In summary, Levermore considers professional sports teams engaged in this type of behaviour to exemplify some of the lowest or weakest forms of CSR among all industries. This argument views responsible actions as indistinctly tied to the core objectives of the organizations. In addition, he believes eco-friendly actions orchestrated by sports teams are considered as distantly associated with stakeholder aspirations of what corporate responsibility is supposed to be (Levermore, 2013). Moreover, some are skeptical of the message sports teams convey publicly by undertaking CSR. Critics consider socially responsible actions as apologies for destructive behaviour in the community and façades that disguise self-interest (Godfrey, 2009).

Clearly there are opposing views among theoretical literature for how businesses should approach environmental commitments and CSR at large. These arguments draw many parallels to literature addressing sports franchises and environmental commitment. From this discussion, it can be argued that professional sports franchises either side with Carroll (2001), Freeman (2010) and Smith and Westerbeek (2007) by making decisions according to responsibility or they conform with Friedman (1970) and Levermore (2013) by associating their corporate vision with an economically-driven approach. Nevertheless, because the nature of professional sports involves high levels of fan engagement, interest and loyalty, it is conceivable that active and ongoing engagement with multiple internal and external stakeholders can be a tremendous benefit for professional sports teams.

2.3 Motives and Benefits of Environmental Commitment

Empirical findings have discovered financial and strategic advantages for teams to engage with the natural environment (Blankenbuehler and Kunz, 2014). Numerous incentives exist that encourage sports teams to commit to sustainable practices. Greater commitment to the environment can be attributed to the following motives: orientation toward fulfilling their duty to society, a team's CSR strategy, and pressure from leagues, sponsors, global organizations and local communities as well as others (Athanasopoulou, Dovus and Kyriakis, 2011). Moreover, teams are motivated to adopt the environment for cost savings. This is suggested by Henly, Hershkowitz and Hoover (2012:7) who note that "North America's professional leagues, teams and venues have collectively saved millions of dollars by shifting to more efficient, healthy and ecologically intelligent operations." Executives responsible for sustainability-related decisions in sports organizations indicate another primary reason for pursuing environmentally friendly practices is to attempt to conform to institutional expectations and pressures. Overall, studies find that teams are displaying higher propensities to acknowledge their impact on the environment, community, and others (Babiak and Trendafilova, 2011).

Professional sports teams have come to value their prominent position in their respective regions by displaying high levels of involvement within their local communities for decades (Babiak and Trendafilova, 2011; Godfrey, 2009). As a result, some North American Big Four sports teams have taken initiative by creating departments that implement an array of programs and events within their local communities. These programs are often spearheaded as part of team-based programs, while some are coordinated league-wide initiatives (Bieganek and Huberty, 2015). Smith and Westerbeek (2007) find that sports teams become engaged in environmental initiatives to create change at the local level but also seek to influence change at the regional, national and international levels.

Patterns of corporate social action are evident within local communities. These corporate social patterns at a local scale are informative when conducting research on professional sports teams' environmental commitments. Since professional sports teams are representatives of their respective metropolitan area, many social and environmental actions by teams occur at the local level. Analysis of corporate environmental attitudes and behaviours in the form of sports teams' environmental commitments has a high likelihood of adding to the sports-and-environment discussion. This is especially likely because of the economic and social power North American Big Four sports teams have within their respective communities (Godfrey, 2009).

Additionally, there is a developing trend for professional sports teams to imitate the social engagement strategies of peers, such as those promoting green initiatives or cost-efficient practices (Walker and Parent, 2010). Teams might be inclined to mimic social and environmental engagement strategies based on their perception that those involved in philanthropic or green initiatives have superior and/or beneficial information. Likewise, teams could be tempted to imitate strategies in an attempt to maintain competitive parity and to limit the competitive advantage of rivals (Lieberman and Asaba, 2004). This could be especially relevant for professional sports teams that coexist in the same metropolitan area. Although the imitation of other teams is likely a force behind certain teams' motivation to be greener, it may not be the sole reason for teams to adopt eco-friendly practices. Babiak and Trendafilova (2011) find that over sixty percent of North American sports teams adopt green strategies to either: conform to community values, be the first mover in the industry or community, or be mimetic of other teams. Gimenez, Casadesus and Valls Pasola (2003) emphasize the strong, positive correlation between a business's acceptance of green practices and its competitive position. Therefore, much can be gleaned by assessing environmental commitment levels of all members of the largest four

leagues in the continent. Establishing the leaders and laggards in North American Big Four sports according to results from content analyses can help ascertain teams that are influencing environmental change. As well, this type of analysis can establish teams in a position that could potentially imitate these green strategies from leaders in the industry sometime in the future.

Diverse financial and strategic benefits of environmental commitments for professional sports teams can include the following: monetary savings, improved brand image, market differentiation, local economic development, stronger community ties, an enhanced fan experience, and attraction of new clientele and corporate partners (Henly, Hershkowitz and Hoover, 2012; Blankenbuehler and Kunz, 2014; Athanasopoulou, Dovus and Kyriakis, 2011; Filizöz and Fisne, 2011). Additional benefits for sports teams to go green include: a better firm reputation, a larger fan base, an increase in tickets sold, a greater volume of website traffic, and greater television viewership (Athanasopoulou, Dovus and Kyriakis, 2011). Jan Prochazka (2014) also finds that when CSR (including commitment to sustainability) is comprehensive and well done by professional sports teams, these many benefits overvalue the costs involved. Collectively, these many advantages and motives explain why the environment can be a fruitful component of a professional sports team's corporate strategy.

2.4 Types of Environmental Commitment

Big Four sports teams and leagues have recognized the importance of committing to environmentally friendly practices in the past decade and a half (Blankenbuehler and Kunz, 2014). Different professional sports teams can engage with the environment through similar practices but also many unique and creative initiatives. Existing literature identifies teams' respective venues and communities as common sites where sports teams are inclined to

incorporate the natural environment. Green practices by professional sports teams can generally be categorized into greater themes including: energy efficiency, food and beverage, philanthropy and outreach, transportation, venue design and operations, and waste management (Babiak and Trendafilova, 2011; Blankenbuehler and Kunz, 2014; Henly, Hershkowitz and Hoover, 2012; IOC, 2012; Kellison, Trendafilova and McCullough, 2015; U.S. EPA, 2013).

Firstly, professional sports teams rely on massive amounts of energy on a daily basis to support playing conditions and accommodate fans in home venues. Therefore, energy efficient practices can be pivotal for teams seeking more cost-savings and/or greater engagement with the natural environment (Babiak and Trendafilova, 2011). Traditionally, sports teams have consumed substantial amounts of non-renewable energy and have consequently distributed a heavy burden on their cities' public utilities (Kellison, Trendafilova and McCullough, 2015). Conserving energy and/or maximizing energy efficiency can be achieved through various practices such as: initiating energy monitoring programs, investing in energy efficient cooling, installing heating and lighting fixtures, sourcing renewable energy, or purchasing Renewable Energy Credits (RECs) (U.S. EPA, 2013; Kellison, Trendafilova and McCullough, 2015; Blankenbuehler and Kunz, 2014).

A distinct venue operation that cannot be overlooked when considering the environment is food and beverage operations. This is because all of the large concessionaires in North American sports stadiums collectively provide food for tens of millions of people (Henly, Hershkowitz and Hoover, 2012). To be more sustainable, teams can: partner with local food businesses, source their food from sustainable farms or distributors, or grow their own produce for fans' consumption (Henly, Hershkowitz and Hoover, 2012; Kellison, Trendafilova and McCullough, 2015). In addition, food waste is a distinct and significant sector, as sports venues

generate tens of millions of pounds of trash annually (Grant, 2014). Intertwined with the greater subject of waste management are compostable and biodegradable food serviceware that assist in diverting waste from the landfill. In addition, the recycling of used cooking oil for biodiesel fuel reduce some teams' environmental footprint (Blankenbuehler and Kunz, 2014; Henly, Hershkowitz and Hoover, 2012). Among others, these primary actions can support teams in sustainably sourcing incoming food and managing organic waste.

Given that professional sports teams are powerful actors in their respective communities, many teams undertake outreach and philanthropic endeavors to maximize their leverage (Walker and Parent, 2010). The trend of adopting CSR first began in the sporting world by athletes visiting hospitals to encourage and motivate sick children to continue battling illnesses. Likewise, athletes promoted academics through educational outreach initiatives (Godfrey, 2009). Outreach initiatives encourage others in the community to consider and adopt the natural environment. Environmental outreach practices can take many forms and typically promote education, awareness and other opportunities to teach or engage members of the community in proper environmental practices (Babiak and Wolfe, 2006).

Philanthropic environmental initiatives promote a similar outcome as outreach undertakings but involve sports teams or individual athletes "giving back," or donating time, money, effort, or resources to engage community members with the environment and to create positive change (Filizoz and Fisne, 2011). A few examples of environmental philanthropy or outreach programs by sports teams include: "Go Green" or green week campaigns, tree planting efforts in the community, trash or recycling cleanups, and other unique environmental stewardship initiatives (Walker and Parent, 2010; Henly, Hershkowitz and Hoover, 2012).

Many potential environmental impacts of professional sports teams can occur specifically at team venues, either occurring as a result of venue design or operations. Blankenbuehler and Kunz (2014:75) agree with this notion with the following quote: "Since sports activities and venues can have a strong impact on the environment, there is a natural link between sports and environmental conservation." Aside from the factors previously discussed, alternative actions where sustainability can be integrated into venue design and operations include, but are not limited to: air quality, heating and cooling, plumbing, and water usage (Henly, Hershkowitz and Hoover, 2012; Babiak and Trendafilova, 2011). Moreover, a venue's design according to green standards can noticeably improve the efficiency of the facility while reducing its negative impact on the environment. Leadership in Energy and Environmental Design (LEED) certification and green retrofitting are two venue design elements that can both inspire a venue with a smaller ecological footprint and drive greater cost savings (Henly, Hershkowitz and Hoover, 2012; Kellison, Trendafilova and McCullough, 2015).

Big Four venues can accommodate large quantities of people. Therefore, the methods of travel required to transport large numbers of fans to a venue are worthy of consideration. Certain sports teams have anticipated and introduced initiatives to mitigate environmental impacts related to transportation. Efficient methods to transport fans to the venue can include: building a venue in a central location, ensuring public transit opportunities exist, and providing electric vehicle charging stations in venue parking lots (Rindge, 2015; Smith, 2014). In addition, more creative approaches for sustainable transportation undertaken by teams can include: admission discounts for metro riders, bike valet services, and preferred parking for fuel-efficient vehicles (Blankenbuehler and Kunz, 2014; Henly, Hershkowitz and Hoover, 2012).

Depending on the sport and capacity, the venue itself is precisely where tens of thousands of fans will attend games, consume food and beverages, and create waste. Diverse streams of waste are nearly inevitable with the large amounts of people attending games and the high rates of food and beverage consumption before, during and after a game. This emphasizes the urgency for well-developed waste management regimes between sports teams and leagues. This can include but is not limited to: descriptive labelling on waste bins, composting in kitchens and/or on a concourse, orchestrating electronic waste or battery drives, or athletes participating in litter retrieval programs (Blankenbuehler and Kunz, 2014; Henly, Hershkowitz and Hoover, 2012).

In summary, existing literature identifies a range of sustainable practices by professional sports teams that fall into a number of categories, including: energy efficiency, food and beverage, philanthropy and outreach, transportation, venue design and operations, and waste management. These types of green practices reflect a team's vision to be more environmentally friendly. However, a more top-down design can exist and be quite effective, where leagues administer sustainability programs across all teams in the league.

2.5 Global Sports Governing Bodies for Environmental Commitment

Sports governing bodies can be key influencers for instilling sustainability among professional sports teams. On a global scale, Fédération Internationale de Football Association (FIFA) has emerged as a league that has embraced the relationship between sports and sustainability. FIFA has indicated commitments to making the 2018 FIFA World Cup (FWC) and all future FWCs as sustainable as possible. The FWC is a large-scale event held every four years that hosts thirty-two nations' qualified soccer teams that competing to become world champions of the sport. FIFA encourages eco-friendly practices for the largest single-sport event in the world by:

investing in LEED certified venues, following state-of-the-art building standards and green infrastructure, sustainably handling waste within the venues, and providing efficient transportation for millions of fans to attend games (FIFA, 2015).

Likewise, long-term developments that are expected to receive extensive use over the duration of the tournament prioritize the mitigation of environmental risks (FIFA, 2015). Without strategic planning for sustainability, the scale and intensity of the FWC could have detrimental effects to the environment. This could be primarily attributed to the large audiences, amount of produced waste as well as water and energy that are required to support matches. Although the event is structured in the form of a tournament, the FWC draws many parallels to tangible environmental efforts by other professional sports leagues. The FWC, like some Big Four professional sports teams in the U.S., is seizing the opportunity of its position on the global scale. With millions of people interested in the sport, there is an opportunity for promoting environmental awareness. Deliberate environmental planning that is proactive in creating eco-friendly venues capable of accommodating large numbers of fans is critical to alleviate environmental pressure. As a result, FIFA is an exemplary leader as a sports governing body that administers sustainability.

Likewise, the International Olympic Committee (IOC) is committed to sustainability at the global level. The IOC aims to use the Olympic games as a catalyst for social, ethical and environmental change and innovation. According to the IOC (2012:5), "sport presents broad opportunities to promote environmental awareness, capacity building and far-reaching actions for environmental, social and economic development across society." The IOC above all seeks to address the following environmental issues: (1) conserving and managing natural resources, (2) maximizing the role of athletes to promote green messages to communities, (3) designing eco-

friendly venues, (4) minimizing carbon footprints for bid and applicant cities, (5) ensuring sustainable energy supports facilities, (6) raising climate protection awareness, and (7) guaranteeing efficient waste management practices are employed (IOC, 2012).

Environmental governance became a component of the Olympic structure in 1994. This timing was significant because it occurred two years after world leaders met at the United Nations Conference on Environment and Development, held in June 1992 to address global sustainable development issues. The IOC partnered with United Nations Environment Programme (UNEP) in 1994 and unveiled the environment as the third pillar of Olympism along with sport and culture. This was followed by the creation of the IOC's Sport and Environment Commission in 1995, which advises on achievements in environmental governance and sustainable development (IOC, 2012). The dedication and headship of implementing holistic sustainability efforts across both FIFA and the IOC epitomize the approach of environmentally committed sports organizations or administrative leagues.

The greening of tennis has become an emerging theme in the past decade and has expanded on a global scale. The Association of Tennis Professionals (ATP) has made several strides in improving environmental efforts for tennis worldwide. In June 2016, Roland Garros (the French Open) became the first tennis championship event to be recognized with 20121 ISO (International Standards Organization) certification. This ISO designation is a management system standard constructed to assist efforts in adopting sustainability (Hershkowitz, 2016).

Furthermore, the U.S. Open, under the efforts of the U.S. Tennis Association (USTA), achieved LEED certification in 2016. The U.S. Open achieved ninety percent diversion rates for recycling and composting and avoided 12,000 metric tons of greenhouse gas emissions (Hershkowitz, 2016). This includes the diversion of 3,400 tons of waste from landfills since 2008

and the conversion of 550 tons of food waste into high nutrient compost for gardens and farms. Likewise, more than one hundred tons of unused food have been donated by the USTA to residents in New York City. Other USTA-led efforts include: a carbon offsetting program that counteracts miles flown and driven by all players attending the U.S. Open, the introduction of more green buildings, the adoption of green cleaning products, and the purchase of RECs to offset electricity consumption (U.S. Open, 2017). Cumulatively, these efforts by the ATP and USTA demonstrate the power and influence of upper league management.

Among several other leagues on a global scale with strong environmental commitment are major professional sports leagues in North America that currently have some form of a greening or environmental strategy. This includes the Big Four leagues as well as: Major League Soccer (MLS), United States Golf Association (USGA), Women's National Basketball Association (WNBA), National Association for Stock Car Auto Racing (NASCAR), and the aforementioned USTA (Green Sports Alliance – "Fact Sheet," 2017). However, as discussed in the next section, the Big Four sports leagues in North America approach environmental commitment in diverse ways.

2.6 Environmental Commitments of North American Big Four Leagues

2.6.1 NBA Environmental Commitments

The NBA first committed to the environmental commitment in 2007 by working with the NRDC's Sports Project. Together, the NBA and NRDC launched a league-wide program called NBA Green (Henly, Hershkowitz and Hoover, 2012). The GSA and NBA now collectively lead efforts to attain NBA Green's overarching objective to protect the natural environment by spreading environmental awareness. NBA Green achieves this objective by allocating funds to

reduce the NBA's impact on the environment while conducting outreach programs with fans and the community as well as greening the league's daily operations (NBA, n.d.). The partnerships between the NBA and NRDC, and currently with the GSA, has allowed the league to improve an array of operations including: implementing recycling programs, installing energy efficient fixtures, promoting sustainable products, and encouraging fans to use mass transit.

Before the GSA's involvement, the NRDC offered detailed advice to the NBA Store to reduce waste and adopt energy efficient and environmentally friendly products. In accordance, the NBA banned all plastic items containing the organic compound Bisphenol A (BPA); this was four years in advance of the U.S. Food and Drug Administration recommending the removal of BPA from plastics. Moreover, in 2009, NBA launched Green Week, an annual initiative that continues to be embraced by NBA teams. In addition to environmental awareness and education programs for the environment, teams host community service events pertaining to sustainability such as recycling drives and tree planting programs (Henly, Hershkowitz and Hoover, 2012). In 2013, the NBA partnered with the GSA and Renewable Choice Energy to launch Mosaic, an online tool capable of quantifying environmental impact. With the assistance of Mosaic, all NBA teams and venues have the capability to monitor, measure, and explore cost savings opportunities with respect to sustainability. Additional features from Mosaic seek to improve the league's overall environmental footprint by: utilizing more environmentally friendly materials, encouraging mass transit among fans, optimizing recycling programs, investing in energy and water-saving fixtures, purchasing RECs, and offsetting carbon emissions (NBA, 2015).

2.6.2 MLB Environmental Commitments

Next, MLB, as a governing body, has fourteen community programs that seek to promote progressive action within communities. The majority of the programs support social or health related initiatives. MLB Green, a partnership between MLB and the GSA, is the lone environmental program that attempts to integrate environmental protection into the league's strategy. All MLB teams have expressed a high level of interest to engage in environmentally sound operations. MLB demonstrates this commitment by being the first professional sports league to have all teams become members of the GSA (MLB, 2018).

A partnership between MLB and the NRDC through the MLB Greening Program orchestrated earlier efforts regarding sustainability. The MLB Greening Program aimed to instill environmentally innovative outcomes as growing and widespread trends across MLB (NRDC, 2008). The initiative improved a variety of MLB teams' operations including: increased use of solar energy, endorsement of recyclable and/or compostable products to consumers, promotion of LEED certified construction, and procurement of information that aids teams with offsetting carbon emissions (Loughney, 2014; NRDC, 2008). Currently, MLB Green drives the Rock and Wrap It Up! campaign, an initiative that aims to "feed people, not landfills" by donating untouched food in MLB venues to those in need. Other sustainable efforts encouraged through MLB Green include: composting, waste diversion, energy efficiency, on-site gardens, and Green Teams that collect recyclables, light-emitting diode (LED) field lighting and solar panel installations (MLB, 2018).

The present MLB collective bargaining agreement (CBA) ensures competitive balance above all else. Due to dramatic differences in MLB teams' revenues, as well as the absence of a hard salary cap, all clubs must pledge thirty-four percent of their Net Local Revenue to a central

fund. This money is then evenly distributed among the thirty franchises. This funding model means that smaller market teams are already relying on financial support from larger markets to remain competitive. Therefore, smaller market teams inherently may struggle to fund expensive environmental programs or new green policies under MLB's current CBA (Loughney, 2014).

Also, according to Thomas Grant Jr. (2014), MLB teams produce approximately 179 tonnes of carbon, the fewest amount of emissions per game by league. However, due to MLB's lengthy schedule of eighty-one home games per season, each individual team produces nearly 30,000 tonnes of carbon emissions annually. Overall, the 162-game regular season schedule places more of an emphasis on MLB teams and venues to ensure operations are as sustainable as possible. However, according to Henly, Hershkowitz and Hoover (2012), MLB has the most thorough environmental data measurement initiative.

2.6.3 NHL Environmental Commitments

The NHL has made several strides to integrate the environment into both league and team operations. In 2010, Commissioner Gary Bettman created the NHL Green initiative (NHL, 2014). Efforts from former NHL player Andrew Ference and Omar Mitchell, vice president of corporate social responsibility for the NHL, have propelled NHL Green to be more environmentally inclusive (Benjamin, 2017). The league demonstrates an unwavering commitment to this initiative. All NHL teams are actively engaged in fostering environmental stewardship and sustainable business practices that assist teams' triple bottom line (NHL, 2014). Likewise, Ference's efforts in 2007 to create a program concerned with the counterbalance of carbon emissions of travel from teammates and league-mates has become a core component of the NHL and the NHL's Green Week to date (Benjamin, 2017).

Most notably, the league published the 2014 NHL Sustainability Report, which addresses the impact humans have on the environment as well as necessary strategies for current and future league-wide environmental efforts. The NHL, with the assistance of the NRDC and Dr. Hershkowitz, advocated for a plan that looks to solve pressing issues such as: greenhouse gas emissions, energy usage, water consumption, waste management, and travel. Each facility's local operations and engineering teams are accountable for identifying and implementing efficiency upgrades, policies and procedures. The 2014 NHL Sustainability Report is the first published document by a Big Four sports league that advocates and develops a strategy for future environmental action (NHL, 2014).

The league's comprehensive sustainability report communicated that NHL fans are eleven times more likely to recycle glass, paper, or plastic, thirteen times more likely to purchase locally grown food and nineteen times more likely to donate time or funds toward environmental initiatives than a person with no ties to the league (Green Sports Alliance – "Fact Sheet," 2017). Although MLB and the NFL can require water to prepare playing surfaces, the NHL requires greater amounts of water on a day-to-day basis to maintain ice surface conditions. This is amplified even more during the NHL's outdoor games, which have grown in popularity over the recent decade. The average MLB venue relies on nearly twelve million gallons of water per year for eighty-one home games. During outdoor games, it is estimated that 3.5 million gallons of water are necessary over several days to ensure the ice is playable (Grant Jr., 2014). That said, not only does the NHL have all teams committed to the GSA, like MLB, the league itself is a member of the Alliance. The only league of the Big Four that is not a GSA member is the NFL (GSA – "Members Clubhouse," 2017). Like MLB, the NHL has developed an environmental

data measurement program. Henly, Hershkowitz and Hoover (2012) consider the NHL's environmental initiative to be less-developed than MLB but comparable to the NBA.

2.6.4 NFL Environmental Commitments

Lastly, NFL Green is a league initiative within the "NFL and the Community." This initiative's objective is to assist NFL teams in achieving their environmental goals. According to the NFL's official website, many teams have embraced the sustainability movement and are coordinating efforts in eco-friendly operations and management. Although a structure to NFL Green is not communicated online, the league is, at the very least, cognizant of their environmental impact and has opportunity to improve efforts in the future (NFL, 2011). That said, only fifty-nine percent of NFL teams are members of the GSA, the lowest percentage of any Big Four Sports league (GSA – "Members Clubhouse," 2017). NFL teams also produce the most carbon emissions per game among North American sporting events with 716 tons of emitted carbon. In spite of that, with only sixteen games over a seventeen-week period, the NFL has the shortest season (including both regular season and playoffs) of North American Big Four sports leagues. Therefore, it can be argued that the NFL's annual impact on the environment is less than the other three Big Four leagues (Grant Jr., 2014).

One key visionary leading environmental efforts for the NFL is Jack Groh, the league's first Director of the NFL Environmental Program. Over the course of several years, the NFL implemented its Environmental Program, which has: reduced solid waste, increased recycling rates, and raised landfill diversion rates. Groh has spearheaded Super Bowl greening practices as a primary visionary by leading the following initiatives through the NFL's Environmental Program: planting trees in host cities, promoting reuse and recycling of Super Bowl materials,

creating a fleet of fuel-friendly vehicles, and pushing the game and pre-game festivities toward carbon neutrality (Muellner, 2008).

Unlike the other three of the Big Four leagues, the NFL is unique in that its championship is a single game that undoubtedly attracts the largest television audience for a single game among the leagues (Gaines, 2014). Therefore, the environmental practices introduced to Super Bowl host cities by Groh and members of the NFL Environmental Program are momentous in promoting admirable environmental initiatives. That said, according to Henly, Hershkowitz and Hoover (2012), the NFL is lacking a developed environmental data measurement program. Likewise, with the league being the only non-member of the GSA among North American Big Four leagues, greater opportunity to commit to the natural environment appears possible across the entire season of the NFL (GSA – "Members Clubhouse," 2017). The following hypothesis was developed from the above discussion of Big Four leagues' environmental commitments: Big Four leagues ranked from most to least environmentally committed include: MLB, the NHL, the NBA and the NFL.

2.7 Analysis of Factors

This section assesses relevant literature that address the explanatory variables under study. These variables are grouped by theme, and after a review of literature, may influence professional sports teams' environmental commitment. The specific factors are explained more in each subsection. The following types of factors include: External Influences, Venue Features, Team Characteristics, Geographic Location and Team Market Size. Urban Sustainability Commitments, Socioeconomic Conditions.

2.7.1 External Influences: GSA Membership and Sports in the City

In the past decade, the natural environment has garnered considerable attention from a few organizations actively involved in the sports and sustainability community. The NRDC became one of the first organizations to connect sports and sustainability. Under the guidance of then NRDC scientist Dr. Allen Hershkowitz, the NRDC Sports Project was launched. This project consulted professional sports teams and helped teams achieve sustainability-related goals. For instance, the Philadelphia Eagles made one of the first public environmental commitments by a sports team under the NRDC Sports Project. Team owners sought assistance from the NRDC with aspirations to green Lincoln Financial Field. The venue later received U.S. Green Building Council's LEED certification and officially opened in 2003 (MacMillan, 2016; Blankenbuehler and Kunz, 2014; Henly, Hershkowitz and Hoover, 2012). The efforts by the NRDC have encouraged all major professional sports leagues in the United States to be engaged with the Sports Project and to participate in eco-friendly practices, with varying degrees of involvement among leagues and teams.

As arguably one of the most influential organizations propelling both sports and the natural environment, the GSA has drastically expanded upon the NRDC's efforts (Green Sports Alliance – "Fact Sheet," 2017). The GSA is as an organization leading those involved in sports worldwide to collaborate and develop solutions to environmental challenges (Green Sports Alliance – "About," 2017). By leveraging the cultural and market influence inherent in professional sports, the GSA aims to promote healthy sustainable communities (Green Sports Alliance – "Home Page," 2017).

The Alliance employs a multi-faceted approach through: goal setting, research, facilitated networking, sharing of best practices, and improved communication among those involved

(Green Sports Alliance – "Members Clubhouse," 2017). Common stakeholders motivated by the GSA include: professional sports leagues, teams, college and university athletics, venues, corporate partners, and millions of fans to support and engage in eco-friendly practices. GSA membership is available to any sports team, venue, league or collegiate institution (Green Sports Alliance – "About," 2017).

The GSA assists members in: decreasing waste, conserving energy and water, engaging fans with the environment, and many other initiatives that look to increase environmental awareness and/or save money in the process (Green Sports Alliance – "Members Clubhouse," 2017). Annual summits are organized by the GSA, each with a theme that guides social, environmental and economic development (Green Sports Alliance – "Summit," 2017). In addition, the GSA publishes documents regularly that inform audiences of environmental commitments and progress in the sports and environment industry. Over seven years, the GSA has accumulated nearly five hundred sports teams and venues and fifteen sports leagues in fourteen countries (Green Sports Alliance – "Home," 2017). Notably, both opposing teams in the same league and teams in the same metropolitan area have the ability to acknowledge others' environmental commitments through the organization's public platform.

A professional sports team can assist in providing impactful local economic development in a respective metropolitan area. Gate receipts are an obvious and direct method of generating income. Moreover, cities indirectly earn money from accommodations, food, entertainment, sales of merchandise and sporting goods as well as transportation including flights, trains and coaches (Herstein and Berger, 2013). Sports teams also improve cities' brand through diverse means. First, sport is a theme that reaches captive audiences and is relatively simple to market among varying demographics. Next, people are likely to build an allegiance with local teams

and/or athletes, offering powerful allegiances over time. This not only unites people within a community, but establishes a resilient spending market (Deloitte, 2016).

Sports teams similarly have the capacity to shape a city's image. This is because local, national and global audiences, media, investors and others observe games and have an opportunity to witness an exhibition featured by the host city (Herstein and Berger, 2013). Unequivocally, sports teams and potentially the number of leagues represented in a metropolitan area holistically influence the people and culture in a given city. The number of teams or leagues within a metropolitan area might be a strong indicator of robust or weak sports markets. Also, metropolitan areas with two or more teams that ensure professional sports are played year-round (or close to) may indicate a stronger sports market. The following hypotheses were developed from the above discussion of external influences: (1) teams in cities that host more teams and leagues have higher levels of environmental commitment, and (2) Green Sports Alliance members have higher levels of environmental commitment.

2.7.2 Venue Features: Venue Age, LEED Certification and Sponsorship

Professional sports are played in an assortment of unique venues that impact the natural environment dissimilarly. This is due in large part to varying degrees of scope, sensitivity or permanent alterations a facility can have on its landscape (Rydin, Seymour and Lorimer, 2011). Management of a sports venue requires a significant amount of meticulous effort and due diligence. Many venues are multi-purpose facilities used year-round for not only sporting events by other occasions such as concerts, performances and/or other professional sports. The extensive use of these venues raises questions for sound sustainability management.

AEG (Anschutz Entertainment Group), a subsidiary of the Anschutz Company, owns, manages or consults with over 120 sports venues and convention centres worldwide. This organization has led efforts to effectively and efficiently manage sports venues for sustainability. AEG Sports, one business segment within the company, is a leading example of a sustainable venue manager because it is the world's largest operator of sports teams and high-profile sporting events. One of AEG's fundamental values is to address climate change, set sustainability goals, and align corporate objectives with the realities of science.

Moving forward, AEG intends to achieve its environmental goals by 2020. This includes: reducing GHG emissions across all operations by 3.2 percent per year from 2010 to 2020, reducing potable water use at water-stressed sites by 2.3 percent per year from 2010 to 2020, and diverting seventy percent of waste from landfills across all operations by 2020. One prominent example of an AEG-managed facility is the Staples Center, the home venue of three Big Four Sports Teams (Los Angeles Clippers, Los Angeles Lakers and Los Angeles Kings). AEG, in recognition of the venue's high demand, has made a noteworthy accomplishment by installing a 500-kilowatt Bloom Energy fuel cell in an effort to reduce the venue's carbon footprint (AEG, 2016). Over two hundred-fifty events and over four million guests attend the Staples Center annually (Staples Center, 2017). AEG's efficient management of a multi-purpose facility in the centre of the world for sports and entertainment is one example of how venues can accommodate sustainability efforts.

In addition, there are an increasing number of sports teams that are adopting LEED certification for venue construction or renovations (Henly, Hershkowitz and Hoover, 2012). This trend started in 2008 when the Washington Nationals opened Nationals Park, the first newly constructed LEED-certified Big Four sports venue in the United States. Newly constructed sports

venues are subject to rules and regulations that limit the venue's impact to the environment (Grant, 2014). Precisely, LEED certification recognizes more sustainable building operations such as energy efficiency and less water usage to name a few (Henly, Hershkowitz and Hoover, 2012). Therefore, it might be an indication that changing attitudes and regulations inspire newer venues to be more sustainable than older venues. This is also more likely because of the *National Environmental Policy Act*, a federal law that considers the natural environment as well as stringent state and local environmental regulations that influence the construction of sports venues (Grant, 2014). Conducting analysis of LEED certified venues in relation to sports teams' environmental commitment is potentially illuminating insofar that newer venues might have a lesser impact on the natural environment than older venues. That said, analysis of LEED certified venues examines newer or recently retrofitted venues against all other venues. To capture a different scale of newer to older venues, venue age is a relevant variable to analyze against website, Twitter and overall environmental commitment.

Sponsorship in North American Big Four sports currently ranks as the industry's third largest segment, trailing only gate revenues and media rights (PricewaterhouseCoopers, 2016). See Table 1 for a complete breakdown of the North American Sports Market by segment. According to Henly, Hershkowitz and Hoover (2012:11): "There is a reason some of the largest industries on earth pay millions of dollars to affiliate with professional sports. They know that sports offer an effective way to influence the culture of the marketplace." Thus, the wealthiest and most powerful corporations in the continent have identified an opportunity to pledge their financial leverage to seize the distributive and symbolic capacities that exist in the sports industry. This stakeholder approach satisfies the interests of both corporations seeking exposure and effective marketing as well as individual sports teams seeking another robust revenue stream

(Smith and Westerbeek, 2007). Total sponsorship in Big Four sports leagues in North America is growing rapidly as it is estimated to rise from $15.5 billion in 2015 to an estimated $18.7 billion by 2020 (PricewaterhouseCoopers, 2016).

Table 1: North American Sports Market by Segment (in Millions of USD)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	CAGR
Gate Revenues	16,115	15,821	17,372	17,707	18,266	18,721	19,372	19,789	20,318	20,818	2.7%
Media Rights	10,800	11,619	12,282	14,595	16,305	18,218	18,876	19,868	20,533	21,289	5.5%
Sponsorship	12,615	13,257	13,900	14,689	15,481	16,301	16,931	17,541	18,128	18,741	3.9%
Merchandising	12,482	12,771	13,144	13,493	13,806	13,966	14,200	14,422	14,624	14,822	1.4%
Total	52,012	53,468	56.678	60,484	63,867	67,206	69,379	71,620	73,603	75,670	3.5%

= Estimated Values
CAGR = Compound Annual Growth Rate
Source: PricewaterhouseCoopers, 2016

Many diverse forms of sponsorship exist in sports, such as key community sponsors or those behind home plate in a baseball game, but these types of sponsorships are difficult to quantify. However, one method of analysis can include an examination of venue sponsorships, which exist in accordance to annual contracts (Turner, 2014). This makes Big Four venue sponsorship a practical option to be researched further. From the types of existing sponsorships for sports venues, it is likely that energy sponsorships might influence teams' willingness and ability to adopt environmental practices. For instance, sports teams with energy sponsors might closely align their core values to one another. Overall, venue sponsorships can be researched by sorting the various Big Four venue sponsorships into exhaustive industry classifications. These classifications can then be compared to website, Twitter and overall environmental commitments. The following hypotheses were developed from the above discussion of venue

features: (1) teams with newer venues have higher levels of environmental commitment, (2) teams with LEED certified venues have higher levels of environmental commitment, and (3) teams with home venues sponsored by energy companies have higher levels of environmental commitment.

2.7.3 Team Characteristics: Franchise Value, Attendance and Years in Location

The overall value of the sports market in North America is projected to increase from $63.9 billion USD in 2015 to $75.7 billion USD in 2020. Increasing at a compound annual rate of 3.5 percent, the North American sports industry is growing at a rapid pace (PricewaterhouseCoopers, 2016). As the largest four professional sports leagues in North America, the Big Four sports leagues can often be defined by payroll and wealth. Nonetheless, it is inequitable to examine payroll among four professional sports leagues with dissimilar salary cap systems.

All Big Four leagues have different roster sizes and employ salary cap or luxury tax systems with dissimilar spending limits. The NFL and NHL employ a hard salary cap, which strictly forbid exceeding the limit, whereas the NBA employs a soft salary cap, one where exceeding the salary cap is permitted when retaining players already on the roster (Gonzalez-Eiras, Harmon and Rossi, 2017). The MLB does not have a salary cap, but rather opts to employ a luxury tax which is levied on teams that exceed a predetermined threshold (Schwartz and Zarrow, 2009).

Although team payroll does not allow for an equitable comparison among Big Four teams, there is value in examining teams' franchise value in relation to teams' environmental commitments across websites, Twitter and overall. Franchise value is expressed as the sum of: national and local television and radio revenues, merchandising revenues, gate receipts and

revenues from games, other media revenues, franchising, and other advertising. This sum is then subtracted by team expenses such as player contracts, administrative expenses, other operating costs and taxes after this valuation (Damodaran, n.d.).

As discussed, teams in smaller markets may be at a disadvantage as they might rely on revenue-sharing policies that distribute television revenue or gate receipt revenues between both home and away teams. Therefore, this could potentially force smaller market teams to have fewer readily available funds to invest in environmental programs (Holden Moss, 2014). A similar argument can be made for teams of lesser franchise value than others. For instance, franchises with large television deals, expensive labour contracts for players, a more expensive private venue and/or a very wealthy owner might be more prepared to spend money or allocate resources toward environmental efforts. In contrast, a franchise with fewer resources, and ultimately a lower franchise value, could be aspiring for success in the form of wins to advance revenue streams such as gate receipts and merchandising. This might become the priority for smaller market teams as opposed to social or environmental matters that might advance their brand in the community.

The 122 Big Four sports teams considered for this research are members of the four wealthiest North American leagues that draw both the largest attendance and television ratings in the continent (Holden Moss, 2014). According to PricewaterhouseCoopers (2016), gate revenues are the highest yielding segment in the North American sports market. Superior Big Four attendance figures are indicative of either a: competitive team, strong fan base and/or robust local economy. Therefore, assessing attendance figures in relation to environmental commitment effectively examines interest in sports within teams' respective metropolitan areas and

essentially gate receipts, a major segment of teams' revenue streams. These two indicators are significant and potentially relevant to teams' sustainability initiatives.

Furthermore, with large numbers of spectators paying admission and attending games in a team's venue, teams with high attendance rates should especially consider integrating sustainability into their operations to ensure an optimal triple bottom line. For instance, a team that averages over 70,000 fans a game compared to 15,000 might be more inclined to ensure as many fans as possible appropriately dispose of waste. Although sustainability might appeal to all teams from a triple bottom line perspective, it can be argued that with more fans, a greater environmental impact can be realized. However, according to McCullough and Kellison (2016), more fans may not correlate to increased participation with sustainability programs. This is because fans of both college and professional sports are attending games with the intention to be entertained and may not be focused on participating in eco-friendly initiatives.

Existing literature find that teams seek to influence fans' environmental behavior at home venues and within their respective metropolitan areas (Blankenbuehler and Kunz, 2014). As Porter (2012) suggests, there are opportunities for sports teams to create shared value within teams' respective communities. Shared value from an environmental perspective can efficiently be developed by sports teams performing philanthropy, outreach and CSR initiatives pertinent to sustainability. Therefore, teams with a longer tenure in a locale might have a greater opportunity to potentially create shared value and thus could be leaders for implementing sustainability initiatives. Contrarily, perhaps there is a threshold where too long of tenure in a given location influences a team's ability to be engaged, while relatively newer teams to a location might display more ambitious environmental programs. Consequently, as part of understanding team characteristics, the number of years a team has operated in a current location is a variable worth

considering for this research. The following hypotheses were developed from the above discussion of team characteristics: (1) teams with greater franchise value have higher levels of environmental commitment, (2) teams with greater attendance have higher levels of environmental commitment, and (3) teams that have operated more years in a current location have higher levels of environmental commitment.

2.7.4 Geographic Location and Team Market Size

There is reason to believe that geography, or local characteristics, influence actions or innovations across a country. Despite the diversity of the United States, the literature suggests that geography affects trends in environmental commitment. For example, Saxenian (1994) describes Silicon Valley and Boston's high degree of innovation as starkly different than even other developing technology regions such as San Diego, North Carolina and Orange County. This level of innovation may not translate to more diverse or effective environmental actions in these areas but speaks to the notion that many areas in the U.S. are unique. Likewise, laws, regulations, subsidies and other governmental influences may slightly or drastically differ by municipality, county and/or state. The United States Census Bureau (USCB) identifies, four core regions: Midwest, Northeast, South, and West (United States Census Bureau, n.d.). Of these four regions, the progressive and technological research in Silicon Valley and California overall might propel teams in the West region to be more environmentally committed. Nonetheless, regional geographic diversity is a consideration when evaluating environmental commitment among sports teams.

According to Holden Moss (2014), professional sports teams located in large metropolitan areas have a competitive advantage over smaller market teams as they draw from a larger

population base and television audience. Noil (2003:36) agrees with this notion stating: “In an American closed league with territorial rights, teams in the largest cities have an attendance advantage over teams in smaller markets, and so, if well managed, are likely to be persistent winners.” Thus, these densely populated centres can play an essential role in influencing stakeholder attitudes and purchasing behaviour because of mass media capacity and communication power (Filizöz and Fisne, 2011).

Additionally, metropolitan areas prominently embrace sports from a tourism perspective. This is because cities can capitalize on sports as a means to improve their image, promote community engagement and are relied upon for future development projects (Bieganek and Huberty, 2015). These advantages afforded to teams in larger markets are possibly avenues for far-reaching environmental change. This is especially relevant because consumers have a high propensity to adopt teams’ positive environmental practices (Inoue and Kent, 2012). The following hypotheses were developed from the above discussion of geographic location and team market size: (1) teams in cities with a greater population have higher levels of environmental commitment, and (2) teams in cities in the West region as defined by the United States Census Bureau have higher levels of environmental commitment.

2.7.5 Urban Sustainability Commitments

It is widely accepted in the academic field of sports management that a sports team represents a community (Heere and James, 2007). As focal points within their respective communities, sports teams are influential economic and social actors (Smith and Westerbeek, 2007). A primary goal of a professional sports team is to build a sense of community within their respective city. This is generally observed through appropriate team nicknames that often represent local symbols such

as the Miami Dolphins or Colorado Rockies. Numerous examples exist that exemplify residents and/or fans identifying with both the team and host community. For example, this can be observed at a Green Bay Packers game, where green is a common colour in the crowd and fans can be seen wearing headwear designed to depict a block of cheese (Heere and James, 2007). The capacity sports teams have in their community to unite people should be considered an asset for attaining goals expressed in urban sustainability commitments.

Similarly, cities can be an influence on teams. Portney (2009:228) opines that "American cities may well have done more to contribute to the sustainability of the Earth over the past decade than has the federal government." Therefore, community-wide environmental efforts are not to be overlooked. Similar to any other wealthy and recognizable local business, a sports team is likely well positioned within the city to promote sustainable development. This is especially relevant because of their strong sense of community. Although literature seldom explores the role sports teams have in a metropolitan area's urban sustainability commitment, it is possible they can be toward the forefront given their power and local influence. For instance, the Portland Trailblazers and San Francisco Giants are motivated to be greener teams because they are aware of their respective city being environmentally conscious and that fans would readily adopt their green movement (Henly, Hershkowitz and Hoover, 2012).

Following an examination of metropolitan areas under study, different types of urban sustainability commitments can be organized into three different types: sustainability plans, green or environmental plans, and climate action plans. A climate action plan seeks to build a more resilient community against climate change (Bierbaum and Stults, 2013), whereas sustainability plans coordinate inclusive guidelines that accomplish and measure environmental, social and economic objectives. Green or environmental plans either coordinate only

environmental initiatives or approach sustainability in a more general sense, along with other urban efforts. Different stakeholders can publish these types of plans including: municipal governments' sustainability offices, other municipal government offices, or county offices, which oversee efforts including the host city and surrounding areas. Lastly, urban sustainability commitments can either summarize efforts from previous years or outline future targets.

The following hypotheses were developed from the above discussion of urban sustainability commitments: (1) teams in cities with a climate action plan have higher levels of environmental commitment, (2) teams in cities with urban sustainability commitments published by a municipal government with a sustainability office have higher levels of environmental commitment, and (3) teams in cities with urban sustainability commitments that outline future targets have higher levels of environmental commitment.

2.7.6 Socioeconomic Conditions

Moreover, core areas of analyses regarding interest, loyalty and fandom can be derived from the citizens themselves in Big Four host cities. Other place variables in this study seek to capture information within a city but lack insight regarding the populace itself. Additionally, there is an onus on cities to ensure residents buy into sustainability strategies (Henly, Hershkowitz and Hoover, 2012). Although data for sustainability acceptance by city are scarce, broader census data remain applicable. A range of census variables such as median income, percentage below poverty level, educational attainment as well as occupational and industry data cover a variety of themes that define a metropolitan area's population.

Undoubtedly, a substantial amount of public expenditure is required to construct new sports facilities. However, estimates predict that a sports team's presence leads to a local job

multiplier as high as 2.5, with each initial perceived job created accounting for 2.5 total jobs. A strong case can equally be made for hosting a major professional sports franchise as a team can improve the quality of life for residents in the community. The most visible improvement to residents' quality of life is the source of happiness that comes from attending home games. Much of the same can be said about residents supporting their local professional team and the satisfaction that accompanies this relation (Rappaport and Wilkerson, 2001).

Census data can be especially useful for comparing the residents in Big Four metropolitan areas. This is because regular season games and most postseason games (excluding the Super Bowl as it is a host city) predominantly draw local fans, or those within metropolitan boundaries. Interpreting diverse socioeconomic data by metropolitan area can effectively examine Big Four fans at local levels (Herstein and Berger, 2013). Census data would not be particularly valuable when evaluating other sports leagues in the world or international sporting events such as the FWC. This is because large international sporting events draw a larger percentage of fans from the global market (FIFA, 2015). Notwithstanding, residents of local metropolitan areas are typically well represented at Big Four sports games (Herstein and Berger, 2013). The following hypothesis was developed from the above discussion of socioeconomic conditions: teams in cities with stronger socioeconomic conditions will have higher levels of environmental commitment.

2.8 Sports and Social Media

2.8.1 Social Media as a Tool for Research

Relevant empirical literature identifies sports teams as being very active in communicating environmental actions online (Walker and Parent, 2010; Ciletti, Lanasa, Ramos, Luchs and Lou, 2010; Blankenbuehler and Kunz, 2014, Wysocki, 2012; Kuzma, Bell and Logue, 2014; Wang, 2014). That said, there is limited academic research on how industries or corporations are approaching social media use. Most studies are aimed at consumer behaviours and social media activity (Parsons, 2011). Researchers generally examine publicly available status updates, tweets and other online discourse in an attempt to realize meaningful applications to society. Notable studies include: monitoring infectious disease outbreaks, predicting the performance of the stock market, and interpreting sentiments about products or companies (Schwartz and Ungar, 2015).

Tweets are considered a variation of microblogging. Microblogging is a form of concise online posts, typically on a social media platform, that intend to collaborate with larger audiences (Jansen, Zhang, Sobel and Chowdury, 2009). From an analysis of 150,000 microblogs, Jansen, Zhang, Sobel and Chowdury (2009) find that nearly twenty percent of microblogs mention a brand. Electronic word of mouth, or the sharing of information online, typically through microblogs, has become a widely accepted method of online communication. Electronic word of mouth especially has enticed the attention of businesses curious about their reputation and clientele feedback. This is because consumer brand perceptions and purchasing behaviours appear to be influenced by website communications as well as social networking among consumers and between consumers and the business itself. Twitter is undoubtedly the most popular Web 2.0 microblogging platform, and not only allows direct communication between a company's microblogging account and consumer account but allows a business to search key

terms in a query (Jansen, Zhang, Sobel and Chowdury 2009). This information, along with material publicly viewable on users' accounts, are powerful sources for marketing and advertising teams seeking to expand and improve their brand image (Parsons, 2011). This is no different for sports franchises that are interested in advancing their own brand and/or image.

2.8.2 Professional Sports and the Use of Twitter

According to Wang (2014), professional sports teams tend to rely on social media to share information and promote products such as merchandise or giveaways with fans. Wang alludes to the notion of sports teams strengthening their relationship with both fans and their community. This is especially relevant for Big Four sports teams as the majority of environmental efforts communicated on team Twitter accounts reference local efforts in their respective community to improve environmental conditions. Similarly, social media, most notably Twitter, conveniently allows sports teams' communication departments to establish direct and engaging dialogue not facilitated by traditional media outlets (Gibbs, 2013). This type of online engagement is therefore quite likely to engage audiences through innovative and non-traditional conversation.

Examining social media is especially pertinent given that is a tool professional sports teams are utilizing at an increasing rate to interact more effectively and efficiently with communities, corporate partners and fans (Wysocki, 2012). For this reason, a content analysis of exclusively websites is not sufficient. Analysis of sports teams' online content indicates that teams do not rely solely on their official websites to communicate sustainability initiatives. Rather, unique content is shared through social media, especially Twitter, because of its ability to be more topical and accessible. It is for this reason that this research integrates both website and Twitter content from North American Big Four sports teams.

2.9 Literature Review Discussion

This chapter has delivered a review of relevant literature. From theoretical literature, teams are either encouraged to engage with many stakeholders (both internal and external) or to completely ignore the notion of responsibility (Carroll, 2002; Freeman, 2010; Smith and Westerbeek, 2007; Friedman, 1970; Levermore, 2013). Financial and strategic advantages exist for sports teams when they commit to the environment. This includes: monetary savings, improved brand image, market differentiation, local economic development, stronger community ties, an enhanced fan experience, and attraction of new clientele and corporate partners (Henly, Hershkowitz and Hoover, 2012; Blankenbuehler and Kunz, 2014; Athanasopoulou, Dovus and Kyriakis, 2011; Filizöz and Fisne, 2011).

From the literature, it is also clear that sports governing bodies are capable of instilling sustainability through unique environmental programs. In addition, existing literature identifies sports teams as being diligent in communicating actions through websites and Twitter (Walker and Parent, 2010; Ciletti, Lanasa, Luchs and Lou, 2010; Blankenbuehler and Kunz, 2014; Wysocki, 2012; Kuzma, Bell and Logue, 2014; Wang, 2014). Green practices implemented by sports teams organize into the following themes: energy efficiency, food and beverage, philanthropy and outreach, transportation, venue design and operations, and waste management (Babiak and Trendafilova, 2011; Blankenbuehler and Kunz, 2014; Henly, Hershkowitz and Hoover, 2012; IOC, 2012; Kellison, Trendafilova and McCullough, 2015; U.S. EPA, 2013).

In summary, the following hypotheses were formed and are tested later as part of this research's analysis: (1) Big Four leagues ranked from most to least environmentally committed include: MLB, the NHL, the NBA and the NFL, (2) teams in cities that host more teams and leagues have higher levels of environmental commitment, (3) Green Sports Alliance members

have higher levels of environmental commitment, (4) teams with newer venues have higher levels of environmental commitment, (5) teams with LEED certified venues have higher levels of environmental commitment, (6) teams with home venues sponsored by energy companies have higher levels of environmental commitment, (7) teams with greater franchise value have higher levels of environmental commitment, (8) teams with greater attendance have higher levels of environmental commitment, (9) teams that have operated more years in a current location have higher levels of environmental commitment, (10) teams in cities with a greater population have higher levels of environmental commitment, (11) teams in cities in the West region as defined by the United States Census Bureau have higher levels of environmental commitment, (12) teams in cities with a climate action plan have higher levels of environmental commitment, (13) teams in cities with urban sustainability commitments published by a municipal government with a sustainability office have higher levels of environmental commitment, (14) teams in cities with urban sustainability commitments that outline future targets have higher levels of environmental commitment, and (15) teams in cities with stronger socioeconomic conditions have higher levels of environmental commitment.

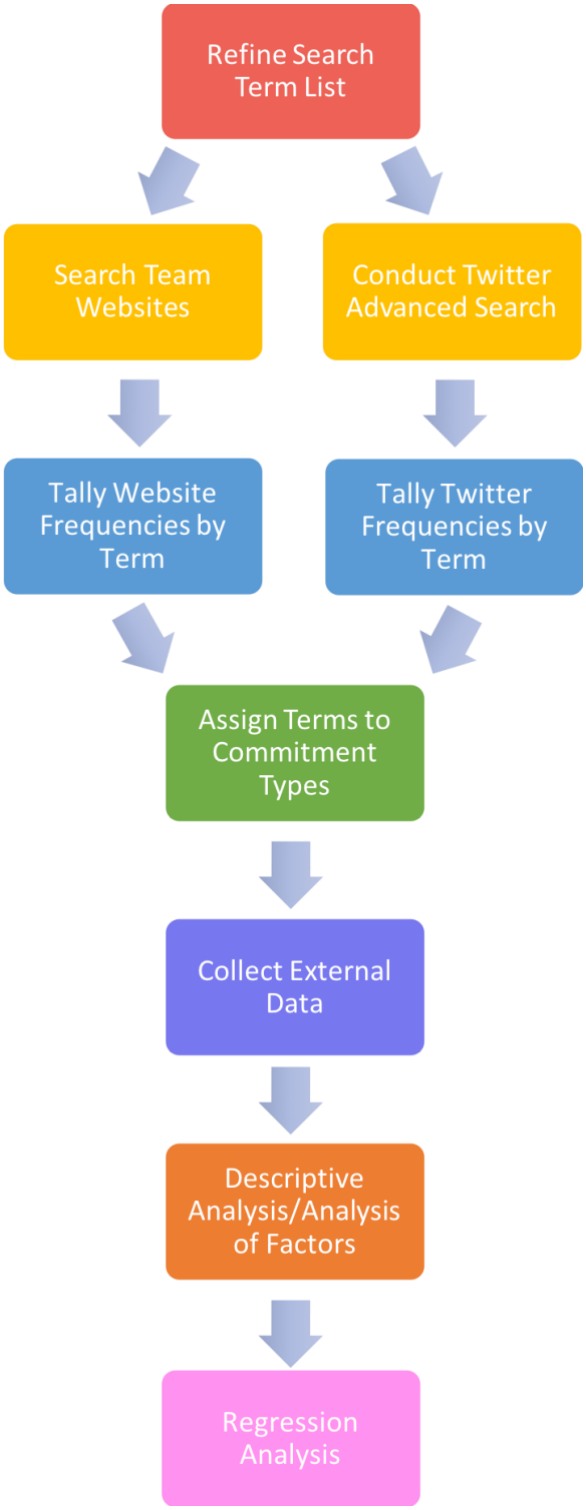
3.0 Research Design and Methods

Detailed in this chapter are the research methods that structure this study's analysis of Big Four environmental commitments. Of the Big Four leagues, MLB, the NBA and NHL each have thirty teams, while thirty-two teams comprise the NFL. Thus, a total of 122 Big Four teams (the unit of analysis) are included in this research. Existing literature demonstrates a reliable analytical framework that recognizes professional sports teams' environmental actions is one that undertakes a qualitative content analysis from team websites (Babiak and Trendafilova, 2011; Blankenbuehler and Kunz, 2014; Smith, 2014). Furthermore, Walker and Parent (2010) suggest that professional sports teams express high levels of diligence in articulating environmental involvement through online platforms. All things considered, this thesis will follow a similar analytical framework used by existing literature that evaluates sports teams' environmental actions from team websites.

This research provides additional insights compared to preexisting studies by also gathering environmental commitments from social media. This is achieved by undertaking a second qualitative content analysis of verified team Twitter accounts in addition to reviewing team websites. As Schwartz and Ungar (2015) suggest, there are opportunities to leverage publicly available information from social media. The data collection methods of this thesis, through both websites and Twitter, provide opportunities to collect ample and unique data to answer the following research questions: (1) What are the levels of environmental commitment among North American Big Four sports franchises? And how do they differ? (2) What factors influence environmental commitment among North American Big Four professional sports teams?

All environmental commitments communicated on team websites and verified team Twitter accounts are considered as part of teams' philosophical approach and public relations strategy. Any knowledge gained from team websites and Twitter accounts is believed to be factual. An assumption of the analysis is that communication of sustainability actions is both accurate of their intentions and that actions declared become fulfilled. See Figure 1 for the analytical framework used for this research. Further information regarding data collection and analysis methodologies are discussed below.

Figure 1: Analytical Framework for Research



3.1 Search Term List Development and Commitment Type Assignment

All Big Four sports teams have a publicly available search tool on their websites' home page and publicly available and active Twitter accounts. Hence, it is possible to collect data from both online platforms. A core element prior to the collection of data was to create a list of relevant terms to be searched for across both team websites and verified team Twitter accounts. A list of 115 sports-and-environment terms was constructed by drawing on the existing literature (see Babiak and Trendafilova, 2011; Blankenbuehler and Kunz, 2014; Ciletti et al., 2010; Henly, Hershkowitz and Hoover, 2012; IOC, 2012; Kellison, Trendafilova and McCullough, 2015; and U.S. EPA, 2013). A complete list of terms can be observed in Figure 2 and a list of all terms and corresponding sources is provided in Appendix A.

Figure 2: Environmental Search Terms

Accountability	Disaster	Global warming	Motion sensor	Restoration
Air Quality	Disposal	Green	Natural	Retrofit
Alternative	Diversion	Green bin	Net zero	Reusable
Animal	Donation	Green products	Neutral	Savings
Awareness	Earth	Green roof	Offset	Soil
Battery	Earthquake	Green week	Organic	Solar
Bicycle	Eco	Greenhouse	Outdoor	Species
Biodegradable	Education	Habitat	Outreach	Steward
Biodiesel	Efficiency	Heating	Packaging	Stormwater
Biomass	Electric	Hurricane	Paper	Supplier
Bottle	Electronic	Hybrid	Parking	Sustainability
Bulb	Emissions	Incandescent	Philanthropic	Tornado
Carbon	Energy	Infrastructure	Planet	Transportation
Carpool	Environment	Kilowatt	Plant	Trash
Certification	Electric vehicle	Landfill	Plastic	Trees
Climate change	Farm	LED	Plumbing	Tsunami
Compost	Flood	LEED	Pollution	Usage
Conservation	Food	Lighting	Preservation	Vehicle
Consumption	Footprint	Litter	Rainwater	Waste
Contaminated	Fossil fuel	Local vendor	Recycle	Water
Cooling	Garden	Mass transit	Reduce	Wildlife
Credits (RECs)	Gas	Material	Renewable	Wind
Dioxide	Geothermal	Methane	Resources	Windows

This study's two individual content analyses examine 115 terms that are each assigned to one of the seven environmental commitment types. Commitment types and corresponding term totals noted in parentheses include: Broad Application (26), Energy Efficiency (22), Food and Beverage (6), Philanthropy and Outreach (19), Transportation (9), Venue Design and Operations (12), and Waste Management (21). Terms are assigned to one of the seven categories according to inductive reasoning; whereby associated environmental commitment types are realized during the collection of data and assigned according to context and frequency of observation. The seven types of environmental commitments are recognized as the most dominant and applicable themes both from existing literature and teams' online content.

3.2 Data Collection

3.2.1 Qualitative Content Analyses

Following the creation of the search term list, the use of these 115 terms (as a measure of the environmental commitment by Big Four teams) was evaluated by using team websites' search tools and Twitter's advanced search function. As part of qualitative content analyses, any results recognized through either platform were interpreted entirely, including any additional information presented in the article or tweet after a term is found. The reason for this is two-fold.

Firstly, the entire publication (excluding links for both platforms and images for websites) is examined to ensure the commitment is communicated in an environmental context, as determined by the researcher's judgment. Environmental context is often described in the title or as a core focus for articles and tweets, if not visibly understood from the sentence a term is part of. For example, the term "green" in "Green Bay Packers" would not be considered as an indicator of environmental commitment.

Second, reading the entire article or tweet that contains at least one search term ensures any further commitments communicated in the article or tweet are also discovered, interpreted and recorded. At most, this study considers one mention of a search term through either a team websites or Twitter account as sufficient evidence of a team's environmental commitment. This is because sustainability is inherently holistic and it can be argued that exposure to different environmental initiatives is a more comprehensive approach to sustainability than implementing few intensive initiatives. This methodology takes into consideration but does not statistically evaluate explanations before and/or after terms are mentioned to interpret environmental context. Since terms are mentioned in an environmental context, there is evidence that each mention of environmental terms is in fact delivered as environmental commitments. Intensity of such commitments are not considered, which offers opportunities for future research of sports teams' environmental commitments. However, evaluating by frequency through a quantitative content analysis could overlook environmental context.

After identified terms are deemed to be in proper context by the researcher, results are then recorded in a Microsoft Excel spreadsheet that lists teams as columns and terms as rows. Terms that are not found, or terms that are found but not in an environmental context, are recorded as unfound. Two separate spreadsheets are created; one spreadsheet is used to record data for websites and the other records data for Twitter.

Twitter's advanced search requires query specifications to examine verified team Twitter accounts. An advanced search through Twitter acts similarly to team websites' search tool by displaying tweets according to: term, account, and date. The first step of an advanced search via Twitter is to enter terms into the "Any of These Words" function in five groups of twenty and one group of fifteen terms. The usernames of verified team accounts are then entered into the

"From These Accounts" function in Twitter's advanced search according to metropolitan area(s). Big Four Twitter usernames can be observed in Appendix B.

While Twitter's advanced search exclusively evaluates tweets, different content is examined across team websites corresponding to league. The website search tools for MLB and the NHL examine both articles and press releases (official written statements by teams issued to the media). In contrast, the website search tool for NBA and NFL websites strictly examines articles, since press releases do not exist for these leagues or press release content is included in articles. For the purposes of this research, disregarding press releases for MLB and NHL teams would discount content/data comparable to the NBA and NFL, two leagues that rely on communicating press release content through articles.

Search results are not specific to a certain timeframe because existing literature finds that sports teams have only recently relied on their websites, and notably social media, to promote social and environmental material (Kuzma, Bell and Logue, 2014; Wang, 2014; Wysocki, 2012). Website content may change over time, but in some cases, there were teams with content that was fist posted in the early to mid-2000s. Twitter content included the entire history of the teams' Twitter account. Since teams only first began using Twitter in the late 2000s, there have been more opportunities for teams to communicate content from websites as opposed to Twitter. Although teams infrequently used their websites during the early to mid-2000s, it is possible that green practices dominant in the early 2000s such as recycling are more frequently observed. Data were collected from both Big Four team websites and Twitter accounts during the period between May and July 2017.

Content analyses omit media including video and audio content posted by teams on both websites and Twitter accounts. Picture are not interpreted from team websites but are evaluated

for the content analysis of Twitter. However, pictures are only reviewed for additional terms if a search term is found in the text of a tweet. This is because at the time of the content analysis, tweets were limited to a one-hundred-forty-character limit. Attached pictures to tweets with a search term found in a tweet's text provided supplementary material meaningful to tweets.

Many terms that comprise the search term list do not appear as a result if the term is not inserted into a search function with the proper suffixes. For example, a term such as "recyclable" does not appear as a result in a search of the word "recycling" through a search conducted on either team websites or Twitter. Thus, all possible variants of a search term were used. Synonyms pertinent to many of the 115 terms are also searched for and recorded as the initial term. For instance, the terms "accountability," "accountable," "responsible," "responsibility" and "responsibly" are all searched. If any of these five terms are found in an environmental context, the overarching term "accountability" is recorded as a term that is found. See Appendix A for a complete list of all search terms used in the content analyses.

In addition to capturing the environmental commitment demonstrated through an analysis of websites or Twitter, a composite variable was constructed. The "overall environmental commitment" variable provides an aggregate of the findings from both team websites and Twitter accounts and indicates whether a term was present on either a team's website or Twitter account. The two individual content analyses recognize 4,958 website mentions, 1,425 Twitter mentions and 6,383 overall mentions to construct website, Twitter and overall environmental commitment dependent variables represented as percentages by team.

Despite more mentions recognized from websites than Twitter, the two online platforms are considered equal for this study. This is because unique information can be communicated from each platform. Although, websites tend to provide a greater quantity of information, Twitter

can be capable of communicating content that fans can directly engage with such as promotional giveaways, contests, eco-friendly tips, and more. Thus, because the two platforms uniquely deliver dissimilar content, the two are considered equal and cumulative findings comprise the overall environmental commitment variable.

3.2.2 External Data Collection and Sorting

In addition to collecting primary data on environmental commitment, this research requires the acquisition of additional data that characterize independent variables specific to factors of influence. External data are obtained from a variety of sources that vary by topic. These variables and corresponding sources are outlined throughout the following sections.

3.2.2.1 External Influence Data

External influence data collected outside of the two separate content analyses include: GSA membership, teams in a metropolitan area, leagues in a metropolitan area, and teams from the same league in the same metropolitan area. GSA members are identified through the GSA website. Membership status for teams and leagues are available under the GSA's "Members Clubhouse" heading. All MLB and NHL teams are GSA members, whereas only nineteen of thirty-two teams from the NFL and fifteen of thirty NBA teams are GSA members (Green Sports Alliance, 2017 - Members Clubhouse). See Appendix B for a complete list of GSA members and non-members. GSA members must be members as of October 2017 as displayed on the GSA's website to be considered as GSA members for this research. All members that joined the GSA after October 2017 are considered as non-members for the purpose of this study.

Teams and leagues in the city and teams from the same league in the same city are discovered by visiting each Big Four team website to understand where teams home venues are located. Recorded in an adjacent cell for each team in the spreadsheet is the metropolitan area where the teams' venues are situated. Thereafter, frequencies of teams, leagues and teams from the same league in similar metropolitan areas are tallied.

3.2.2.2 Venue Feature Data

Venue feature data include: LEED certification, venue age, and venue sponsorship. The United States Green Building Council (USGBC) and NRDC corroborate information as to which venues in the Big Four leagues have a LEED certified venue. Sixteen teams have a LEED certified venue according to the USGBC and NRDC (Harder, n.d.; NRDC, n.d.). The venues under consideration are those where Big Four professional sports teams play the majority of their regular season home games. Certain teams host games at venues that are LEED certified, but are excluded from this study. For example, Salt River Fields at Talking Stick in Scottsdale, Arizona, the spring training facility for both the Arizona Diamondbacks and Colorado Rockies, is a venue where preseason exhibition games are hosted (Harder, n.d.). However, this venue is not considered as LEED certified venues for these teams because the site is not a venue that hosts the majority of regular season home games.

To determine venue age, Baseball-Almanac, NBA Hoops Online, Pro-Football-Reference and Hockey-Reference are relied upon as resources. These sources specify active venues and years of operations from opening year to current year. Years in a current location are sourced from the following resources: Baseball-Almanac, Basketball-Reference, Pro-Football-Reference, and Hockey-Reference. These sources specify the years current Big Four teams played in a

particular metropolitan area. To determine venue age and years in a current location respectively, years are calculated between the opening and closing or current year of a venue and consecutive years are computed in a given metropolitan area.

Venue sponsorship is determined by examining each individual team website and recording all Big Four venue names. The North American Industry Classification System (NAICS) is used to identify and classify each venue sponsor to an industry. The categories used to classify Big Four venue sponsors include: Energy, Finance and Insurance, Food and Beverage, No Sponsor, Other, Retail Trade, Telecommunications, and Transportation (NAICS, 2017). See Appendix B for a complete list of teams, corresponding venue names and associated NAICS classifications.

3.2.2.3 Team Characteristic Data

Team characteristic data gathered for this research include: total attendance, average attendance, attendance percentage, years in a current metropolitan area, and franchise value. The three types of attendance measures are all sourced from ESPN (Entertainment and Sports Programming Network). All attendance data are from the 2016 or 2016-2017 season, the most recent full season completed aligning with the primary data collection period. The following includes each Big Four league and the respective season, denoted in parentheses, that are used for analysis: MLB (2016), NBA (2016-2017), NFL (2016), and NHL (2016-2017).

Total attendance represents raw counts of attendance figures from all home games over the course of the 2016 season for MLB and NFL teams and 2016-2017 season for NBA and NHL teams. Average attendance is represented as teams' total attendance divided by the number of home games. Attendance percentage is the total attendance divided by the total seating

capacity of teams' corresponding home venues. It is possible for attendance percentage values to achieve figures greater than one hundred percent over the course of a season. This is because a venue at full capacity can have all seats filled in addition to fans who are admitted into the venue without a given seat (e.g. standing room only admission). Although ESPN is relied upon to source attendance statistics, one additional source is referenced to obtain accurate data. ESPN displays the Los Angeles Rams as having played only one home game through the NFL attendance page for the 2016 season. The correct amount is sourced from the Los Angeles Rams' official team website. This source, as well as all other external sources, are displayed in Appendix E.

Franchise value statistics are individually sourced by league from Forbes. Similar to attendance data, all franchise values are retroactive to either the 2016 or 2016-2017 seasons, the most recent complete seasons for all leagues under consideration. Big Four franchise values are all represented in billions (USD), including Canadian teams.

3.2.2.4 Urban Sustainability Commitment Data

Host cities of Big Four sports teams generally have some variation of a documented public strategy for current and/or future sustainable development in their community. Urban sustainability commitments can provide meaningful insights because sports teams are powerful representatives in the public eye of their respective communities (Heere and James, 2007; Smith and Westerbeek, 2007). Acknowledging the vision these cities have on sustainability can possibly provide insight of how professional sports teams might approach environmental efforts.

Through exploring the different urban sustainability commitments of the metropolitan areas under study, it became evident that types of commitments can be defined by one of the

following titles: sustainability plan, green or environmental plan, and climate action plan. A commitment's core focus is generally communicated overtly in the document's title and/or executive summary. It is possible for a city to employ two or more types of urban sustainability commitments. A climate action plan is a document that contains concrete strategies that intend to build a more resilient community against climate change (Bierbaum and Stults, 2013).

Unlike climate action plans, sustainability plans are not definitively aimed at mitigating climate change or any one issue. Rather, a sustainability plan establishes holistic guidelines for achieving and measuring environmental, social and economic objectives. These goals typically seek to: foster environmental engagement, build a sense of community, and project finances required to fund sustainable initiatives (Harvey, 2013). Green and environmental plans in this study primarily focus on environmental initiatives such as waste management, water conservation, renewable energy, land use, etc. Also included in the green and environmental plan label are general plans – sustainable strategies that focus on non-environmental topics but communicate a portion of the document to green efforts. All three types of urban sustainability commitments are included as independent variables to evaluate if certain types of commitments influence stronger or weaker environmental commitment by Big Four sports teams.

These plans may be published by a variety of local stakeholders, including municipal governments' sustainability offices or other municipal government offices, or county offices, which have jurisdiction over a wider area including the host city. In the metropolitan areas of Charlotte, Detroit and New Orleans, plans are led by non-governmental organizations (NGOs). It is also worth noting that Green Bay is the only metropolitan area in this research without a published strategy addressing urban sustainability. See Appendix E for a complete list of Big Four metropolitan areas with corresponding sources for urban sustainability commitments.

3.2.2.5 Socioeconomic and Geographic Data

Each Big Four sports team was allocated to a geographic region, with regions defined by the United States Census Bureau (USCB) (United States Census Bureau, n.d.). See Appendix C for a map of census region boundaries within the United States defined by the USCB. Excluded from socioeconomic and regional analyses are the nine Canadian Big Four teams, including seven NHL teams, one MLB team and one NBA team.

Socioeconomic data for each metropolitan area was collected: population, education, unemployment, income, poverty, as well as industry and occupation percentage distributions. These data were sourced from the USCB's 2016 American Community Survey 1-Year-Estimates. All data are representative of metropolitan areas rather than cities, to capture a broader spectrum of sports fans in communities across the United States.

For this research, data representative of estimated household median income in USD is sourced from the "Median Income in the Past 12 Months (in 2016 Inflation-Adjusted Dollars)" table. Education data are sourced from the "Educational Attainment" table and examine percentage estimates of the working population who are high school graduates or higher as well as a percentage of the working population who possess a bachelor's degree or higher. Data representative of estimated percentages below poverty level of the population for whom poverty status is determined are sourced from the "Poverty Status in the Past 12 Months" table.

Industry data include both estimated total counts of the civilian employed population who are sixteen years and over as well as estimated total counts of industry manufacturing occupations. Industry as opposed to occupational data are sourced to capture a better representation of a wide variety of manufacturing careers that exist within American metropolitan areas. Percentage distributions of industry manufacturing occupations are then

calculated from the total civilian employed population. These data are sourced from the "Industry by Sex for the Civilian Employed Population Sixteen Years and Over" table. Occupational data are sourced from the "Occupation by Sex for the Civilian Employed Population Sixteen Years and Over" table. From this dataset, the following estimated total count occupations are sourced: management, business, science and arts occupations, service occupations, sales and office occupations, natural resources, construction and maintenance occupations, and production, transportation and material moving occupations.

Of the occupations and industries under analysis, management, business, science and arts as well as service sector and sales and office occupations are considered as white-collar occupations whereas natural resources, construction and maintenance and production, transportation and material moving occupations are considered as blue-collar occupations. These occupation counts as well as industry counts are then divided by the total civilian employed population according to metropolitan area to calculate percentage distributions for each type of occupation and industry.

3.2.3 Analysis of Factors Methods

Following the collection and recording of data from the two content analyses and various external sources, an exhaustive codebook is created. This spreadsheet, constructed in Microsoft Excel, lists teams as rows and dependent and independent variables as columns. The codebook is then imported into RStudio to calculate descriptive statistics and generate graphs. Microsoft Excel is also relied upon to create colour-coordinated graphs by league for all Big Four teams' website, Twitter and overall environmental commitment.

Furthermore, the codebook is imported into Statistical Package for the Social Sciences (SPSS) Premium GradPack 24 as a .csv file to compute: ANOVA tests, bivariate correlation analysis, and multivariate regression analysis. See Appendix F for a comprehensive codebook legend depicting all variable codes, labels and definitions. Additional sorting and analyses are performed through the use of Microsoft Excel's PivotTable function for topics including: commitment type, venue sponsorship, and dependent variable trend identification by league and search term. Output tables from PivotTables for these topics are then inserted into RStudio and SPSS to calculate descriptive statistics and generate graphs.

The primary dependent variables for this research include: website environmental commitment, Twitter environmental commitment, and overall environmental commitment. Using only raw counts for website, Twitter and overall environmental commitment are not reflective of the total 115 terms and potentially misleading. Therefore, these findings are better reflected as percentages of all possible terms in the search term list. For example, fifty terms from the 115-term list are found in an environmental context on the Houston Texans' website. For the website environmental commitment variable, this is reflected as 43% (or 50 divided by 115).

For the purposes of analyzing factors of influence, data are grouped according to peer and place variables and type of data. Grouped factors include: membership, venue, fan engagement, region and population, sports in the city, urban sustainability commitments, and socioeconomic conditions. Evaluating among North American Big Four metropolitan areas requires a consistent means of analysis because the number of teams vary by metropolitan area. Therefore, mean values for all Big Four sports teams' environmental commitments are calculated for each metropolitan area. As explained in Section 4.5, metropolitan areas with fewer teams may have an

advantage as a metropolitan area with only one team with strong environmental commitment can rank noticeably higher. Likewise, a city with four or more teams can require strong results across numerous teams and leagues to receive a higher rank. All Big Four teams present in the same metropolitan area have identical socioeconomic data by variable.

Descriptive frequencies are calculated using RStudio, where: counts, mean, median, standard deviation, minimum, and maximum values are quantified through the use of Structured Query Language (SQL). This is performed for all variables, including both dependent and independent variables. Descriptive frequency values computed using RStudio are then recorded into an inclusive table, which can be observed in Table 6.

Analysis of factors is accomplished by comparing means, recognizing correlations, and undertaking multivariate linear regression analysis among the three primary dependent variables and the independent variables. The two types of data in this study are nominal and interval data, which represent discrete and continuous data respectively. Nominal data represent group-related data such as regional, league affiliation, or sponsorship variables where number values differ according to group characteristics. Continuous or interval data signifies data where values are truly representative, including, but not limited to, the following variables: venue age, franchise value, years in a current metropolitan area, and socioeconomic statistics. It is important to distinguish between the different types of data since different methods of analysis are required for dissimilar data. Correlation analysis of nominal data is achieved by undertaking comparison of means ANOVA tests. Bivariate correlation analysis is most applicable to yield Pearson correlation coefficient values, which measure the linear correlation between continuous data and the dependent variables. See Appendix E for a complete list of sources relied upon to collect external data.

3.2.4 Multivariate Regression Methods

Multivariate linear regression analysis is relied upon to predict website environmental commitment, Twitter environmental commitment, and overall environmental commitment based on independent variable factors of influence. Three different multivariate regression models are created, each representative of the three primary dependent variables. Each multivariate regression model contains the following blocks of variables: Base Model (control variables), External Influences, Team Characteristics, Venue Features, Peer Overall, Urban Sustainability Commitments, Industry, Human, Place Overall, and a Peer and Place overall model (see Section 4.7 for more details).

To reduce the number of variables used in the multivariate regression, an initial stepwise-backward multivariate regression was used for each of the models. Insignificant variables are excluded by SPSS through this process for each regression block. Variables with statistical significance less than 0.1 in the Peer and Place effect (overall) block for each individual dependent variable model are manually excluded for the entire model. This approach aims to eliminate variables with no significance and focus on those with greater influence.

Data evaluated from each individual regression output includes overall: adjusted r-squared values, significance values, and t-values, as well as individual: significance values, t-values, and standardized beta coefficients for each independent variable. For regression analysis, control variables that comprise the base model include: MLB, NBA, NHL, and 2016 Metropolitan Population variables. The categories with the largest values were dropped from for categorical variables (Big Four Leagues and Venue Sponsorship).

3.2.5 Limitations and Boundaries

The research boundaries for this thesis are delineated in part by the research questions, that is, to evaluate environmental commitment of all North American Big Four professional sports teams. Therefore, any teams not playing in the Big Four leagues in North America do not satisfy this research's criteria and are therefore outside of parameters. Moreover, only those environmental commitments communicated on official team websites and verified Twitter accounts are within research boundaries. A variety of valuable online resources exist for quantifying environmental commitments of Big Four sports teams. However, the scope of this study strictly examines the two aforementioned platforms.

Thus, the analysis of environmental commitment is strictly limited to the content analyses, and does not seek additional insight derived from interviews, surveys, and other sources. This is accomplished by collecting data from team websites, an online source where environmental content is regularly communicated and has been subject to previous studies (cf. Blankenbuehler and Kunz, 2014; Ciletti et al., 2010), as well as verified team Twitter accounts, perhaps the most direct, engaging and established form of social media in recent years (Evans and Smith, 2004; Gibbs, 2013). For both platforms, there are no time-related boundaries for the content under analysis. As previously discussed, existing literature finds that sports teams have only recently promoted environmental content online (Kuzma, Bell and Logue, 2014; Wang, 2014; Wysocki, 2012).

Since the analysis draws upon qualitative data, it is important to address subjectivity in the collection of data. A degree of subjectivity is firstly involved in the interpretation of online content. This is limited as much as possible by the researcher interpreting entire articles and press releases on team websites and evaluating tweets and tweet images to fully interpret the

meaning of each post, while ensuring all terms are communicated in environmental context. Additionally, coding has a degree of subjectivity, as some commitments or terms may be assigned to commitment types of lesser relevance. This is prevented as much as possible by using existing sports-and-environment literature to identify terms and assigning terms to commitment types according to the context and frequency of observation. For example, the term "pollution" could be assigned to venue design and operations category. However, the term's context is most commonly observed through Big Four sports teams' website and Twitter content as belonging to the waste management category.

This research is limited by the quality of communication expressed by teams. For example, if a broad term such as "sustainable" solely describes an action with little detail, then interpretation may be completely different from reality. In addition, observed search terms displayed on team websites and Twitter accounts may not entirely be an accurate portrayal of reality. Some articles or tweets summarize accomplishments, while others describe future action. This research does not discern between these. In addition, communicated environmental commitments are documented according to team, with no consideration for the location of these action.

As discussed, there are no time limitations during data collection. Since websites were first used by teams since the early to mid-2000s and Twitter was used as a tool for communication during the late 2000s, it is probable that more terms are found from websites. The 140-character limit employed by Twitter employed during data collection is likely an influence of fewer Twitter term mentions than website mentions. Also, it is likely that green practices implemented in the early 2000s such as recycling will occur more frequently than more recent sustainable practices such as LED light installations.

There are also differences in how each league website functions. For example, the search function for NBA websites only identifies search terms in article headlines rather than material within the articles like the other three Big Four leagues. This factor may limit the total potential of terms being identified for NBA websites. Regardless, each article identified was reviewed in full. Also, any additional information provided after an article's core content, such as a description a of a business referenced in the article, is considered in the content analysis.

Finally, the analysis only accounts for the presence or absence of each of the 115 terms, used in an environmental context rather than the frequency of the term. This prevents an analysis of the degrees or depth of any specific type of commitment. This means the analysis favours teams with an holistic approach to sustainability rather than teams that use a few eco-friendly practices extensively. This logic is applied to this research to capture the broad and include nature of sustainability management and practices. Thus, it is sensible to apply this method to capture and interpret a wide assortment of environmental efforts.

4.0 Data Findings and Analysis

This chapter discusses the findings from the website and Twitter content analyses in both descriptive and more analytical terms. The findings are divided according to website, Twitter and overall environmental commitments. Descriptive statistics are examined according to cumulative or league-wide environmental commitments, cumulative environmental commitments by type and individual team standouts by platform. Thereafter, Big Four leagues and known league-wide environmental programs are analyzed in relation to this study's environmental commitment findings. Next, bivariate analysis of organizational and geographic factors is undertaken in relation to teams' environmental commitments to determine if peer and/or place effects influence environmental commitment.

4.1 Descriptive Results

This section delivers descriptive results from the website and Twitter content analyses. Descriptive results are divided according to website, Twitter and overall environmental commitments. Detailed in the subsections by platform are cumulative environmental commitments by league, league environmental commitments by type, and individual team standouts.

4.1.1 Website Findings

A total of 4,958 environmental commitments are found among Big Four websites. This total represents an average of thirty-five percent of cumulative terms communicated from the 115-term-list for Big Four teams. Teams in the NFL accounted for the highest share of environmental commitment terms; NFL teams communicated 1606 total terms (32% among Big Four leagues)

on their websites. NHL teams communicate the second most terms by league for the website content analysis by communicating 1557 total terms (31% among Big Four leagues), with each team communicating an average of forty-five percent of the environmental terms, the greatest average value by any Big Four league. The NFL and NHL's website search term frequencies are in stark contrasts to the NBA and MLB, as teams belonging to the latter leagues communicate 955 total terms (19% among Big Four leagues) and 893 total terms (18% among Big Four leagues), with an average of twenty-eight percent and twenty-five percent of terms per team respectively for the NBA and MLB.

NHL teams communicate more broad application (58%), energy efficiency (38%) and food and beverage (48%) terms through websites than any other Big Four league (Table 2). The NFL outperforms all other Big Four leagues for philanthropy and outreach (54%) and transportation (50%) terms. NHL and NFL teams tie for the most venue design and operations (29%) and waste management (43%) terms communicated. MLB teams communicate the fewest environmental terms of any Big Four team for: broad application (26%), venue design and operations (16%), and waste management (21%) environmental commitment types. NBA teams communicate the fewest environmental terms for: energy efficiency (21%), food and beverage (29%), philanthropy and outreach (24%), and transportation (28%).[1]

[1] It is possible low results for the NBA are a result of NBA teams' website search tool only displaying content with environmental terms in their headlines.

Table 2: Website Environmental Commitment Types by League

League	Broad	Energy	Food	Philanthropy	Transportation	Venue	Waste	All
MLB	26%	22%	33%	35%	30%	16%	21%	26%
NBA	37%	21%	29%	24%	28%	18%	31%	27%
NFL	49%	37%	46%	54%	50%	29%	43%	44%
NHL	58%	38%	48%	46%	41%	29%	43%	43%
Big Four	43%	36%	34%	39%	39%	30%	29%	36%

Source: Author's Calculations
Green = Highest/Red = Lowest

Among Big Four websites, the Buffalo Sabres communicated ninety-one percent of terms from the 115-term-list, the most by an individual team. It is without question the Sabres are proficient in communicating environmental terms by comprehensively engaging with the natural environment. The Sabres' environmental communication strategy for their website is maximized to its full potential by: listing exhaustive details of green partnerships, providing numerous environmentally conscious money saving tips, and describing in detail how the Sabres Green Team actively engages their community with the natural environment (Buffalo Sabres, 2008 – "Going Green on the Go"; Buffalo Sabres, 2016 – "Green Team Event: North Tonawanda Wetlands Cleanup"). See Appendix B for a table outlining all Big Four teams and corresponding website environmental commitment values expressed in percentages.

The Los Angeles Rams communicated the second most terms through their websites with eighty-three percent of terms, the Minnesota Vikings communicating the third most with seventy-five percent of terms.[2] The Charlotte Hornets are the only Big Four team that did not communicate any terms, as the team's website search function was unresponsive to queries. The Charlotte Hornets, from their Twitter account, communicated only twelve percent of terms. As a result, it appears the Hornets have a low level of environmental commitment.

[2] Notwithstanding, a greater number of actions expressed by the Los Angeles Rams are performed in St. Louis, the team's host city until the end of the 2015 season.

Some terms were more likely to appear on Big Four teams' websites. For instance, eighty-six percent of Big Four teams communicate the term "environment," eighty-five percent of teams communicate "recycle" and seventy-nine percent of teams reference "green," all in environmental contexts. These terms are all relevantly generic but do indicate some commitment to the environment.

4.1.2 Twitter Findings

In total, 1,425 environmental commitments are found through Twitter. On average, teams communicate ten percent of terms from the 115-term-list through their Twitter account. This is a noticeably lower amount than an average of thirty-seven percent of terms communicated via team websites. MLB teams communicated 451 terms (32% among Big Four leagues) using Twitter, the most of any league, with each team communicating an average of thirteen percent of the environmental terms. The NBA communicated 419 terms (29% among Big Four leagues), with each team communicating an average of twelve percent of the environmental terms. NHL teams communicated 333 terms (23% among Big Four leagues), with each team communicating an average of nine percent of the environmental terms. Finally, the NFL communicated 230 terms (16% among Big Four leagues), with each team communicating an average of six percent of the environmental terms.

Table 3 shows Twitter environmental commitment findings by league and commitment type. MLB is tied for the greatest percentage of terms communicated with the NBA for philanthropy and outreach communication (16%), while recording the greatest percentage of terms for every commitment type category except for broad application and waste management. Both aforementioned categories are dominated by the NBA, with thirteen percent of broad application and eighteen percent of waste management terms communicated across NBA team

Twitter accounts. MLB distinctively outrivals other Big Four leagues with seventeen percent of terms communicated for transportation, eleven percent for food and beverage and twelve percent for energy efficiency via Twitter. The NFL especially lags across Twitter, as the league records the lowest percentage of terms communicated across every commitment type except transportation, whereas the NBA only records seven percent. Notably, only two percent of venue design and operation terms and food and beverage terms are expressed by NFL teams through tweets.

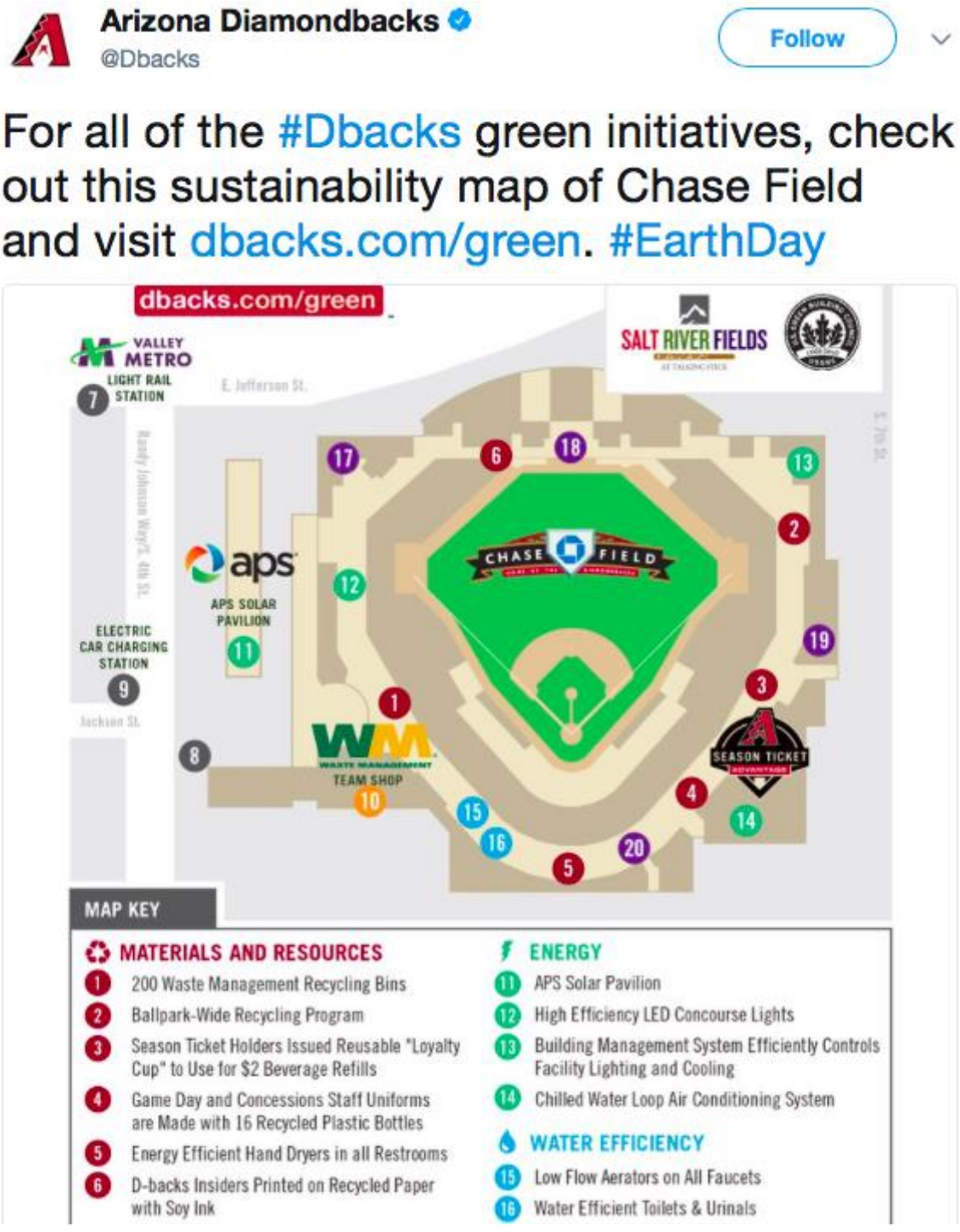
Table 3: Twitter Environmental Commitment Types by League

League	Broad	Energy	Food	Philanthropy	Transportation	Venue	Waste	All
MLB	11%	12%	11%	16%	17%	11%	15%	13%
NBA	13%	8%	7%	16%	7%	9%	18%	11%
NFL	6%	6%	2%	11%	8%	2%	7%	6%
NHL	10%	8%	5%	13%	9%	5%	12%	9%
Big Four	10%	8%	6%	14%	10%	7%	12%	10%

Source: Author's Calculations
Green = Highest/Red = Lowest

The Arizona Diamondbacks communicate forty-six terms (40%), the most by any team through Twitter. This is accomplished largely by tweeting the following themes: green giveaways, descriptive sustainability pictures and infographics, environmental partnerships, as well as eco-friendly facts regarding their venue design and operations. For instance, the latter can be observed in Figure 3 where the image attached to a tweet by the Arizona Diamondbacks displays all of the sustainability practices at their home venue (Arizona Diamondbacks, 2017).

Figure 3: Arizona Diamondbacks Sustainability Map



Source: (@Dbacks, 2017)

The Minnesota Twins (ranked second of 122 teams) communicated thirty-one percent of the environmental terms and the Cleveland Cavaliers (ranked third of 122 teams) communicated twenty-nine percent of the environmental terms. Similar to the Diamondbacks, the Twins and Cavaliers aim to promote sustainability tips and awareness, green partnerships and eco-friendly giveaways through their Twitter accounts. See Appendix B for a table outlining all Big Four teams by league and corresponding Twitter environmental commitment values expressed in percentages.

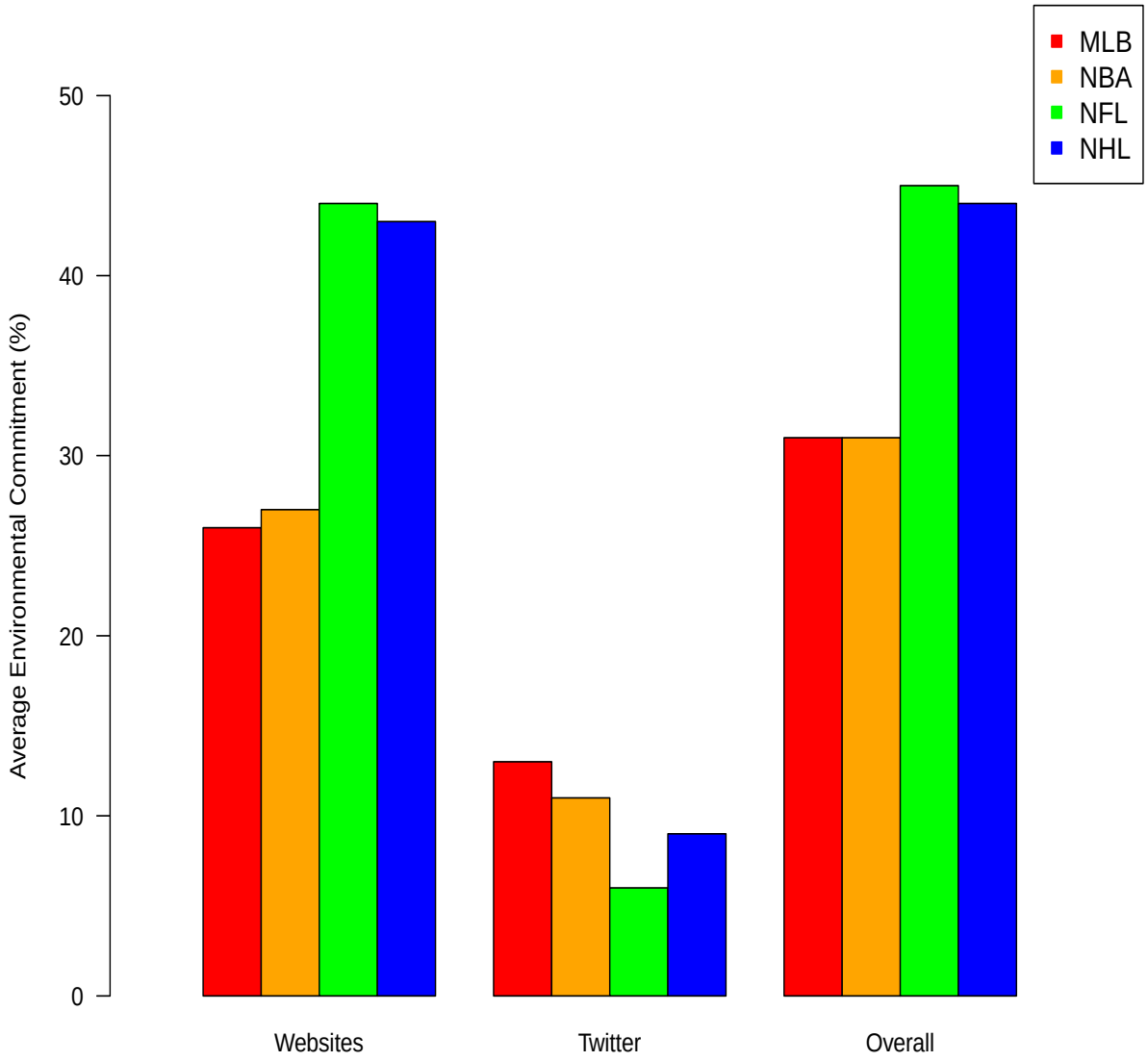
The following quote by the Minnesota Twins is an example of an environmentally engaging tweet by a Big Four sports team, "Get a free LED light bulb as you exit the game tomorrow night (6/14). Take it home and if it lights up blue, red or green…You win!" June 13, 2017, 6:00 a.m. Tweet. (@Twins, 2017). The Cleveland Cavaliers also provide an example of tweeting green partnerships and their Tree4Threes planting initiative from a tweet: "We've teamed up with @PwC_LLP & @DaveyTree to help make Cleveland GREEN again! #Tree4Threes RECAP: on.nba.com/2epY30i." October 21, 2016, 3:43 p.m. Tweet. (@cavs, 2016).

The above tweets are just a few examples of how sports teams can creatively communicate sustainability through social media platforms. Among all 122 Big Four teams, the New York Rangers are the only team that did not communicate any terms from the 115-term-list in an environmental context. Fifty-one percent of Big Four sports teams communicate the term "green" in an environmental context through their Twitter accounts, the highest percentage of any search term. "Energy" is the second highest percentage with forty percent, while "earth" ranks third with thirty-nine percent.

4.1.3 Overall Findings

Every team communicates some form of environmental commitment, through the use of either or both official team websites and verified team Twitter accounts. A greater volume of results are discovered from websites as opposed to Twitter accounts. An average of thirty-five percent of terms are found in an environmental context through Big Four team websites, whereas an average of ten percent of terms are found in an environmental context through team Twitter accounts. This might be due to the fact that websites' can be used to communicate more – and more detailed – information on a topic, while Twitter communicates information with a set character limit. Therefore, teams would be required to tweet more frequently about the environment or rely on images to communicate similar quantities of information provided on team websites. Figure 4 shows average environmental commitment by league according to website, Twitter and overall environmental commitment. See Appendix B for a table outlining all Big Four teams by league and corresponding overall environmental commitment values expressed in percentage.

Figure 4: Average Environmental Commitment for Big Four Sports Leagues by Platform



Source: Author's Calculations

As discussed, each Big Four league approaches environmental commitment in a different manner. This can be observed by examining patterns in the types of environmental commitment type across the Big Four leagues. First and foremost, NHL teams are the most likely Big Four league to engage in energy efficiency and sustainable food and beverage practices. Forty percent of NHL teams engage with energy efficiency and fifty percent of NHL teams sustainably manage their food and beverage practices. Among food and beverage actions: donating unused concession food, locally sourcing food, and creating urban gardens are common actions found across Big Four team websites and Twitter accounts. NFL teams are comparable to NHL teams as both leagues record greater than fifty percent communication of broad application terms with fifty-one percent and fifty-nine percent respectively. NFL teams excel most with philanthropy and outreach (56%), transportation (52%) and waste management (45%) initiatives, the greatest percentages communicated by any Big Four league.

It should be noted that the patterns related to levels of environmental commitment findings and commitment type findings by league are relatively consistent across both website and overall environmental commitment results. This is likely attributed to the fact that over three times as many terms are found through content on team websites than content on team Twitter accounts. Table 4 shows overall environmental commitment findings by league and type. Thus, the NFL and NHL rank as the top two leagues across every overall environmental commitment type.

MLB and the NBA interchangeably rank as leagues with the lowest and second lowest respective overall environmental commitment values across all environmental commitment types. Both MLB and the NBA only satisfy twenty-one percent of terms from website and Twitter environmental commitment findings for sustainable venue design and operations, while

the NFL and NHL both communicate an average of thirty percent of the environmental terms. Likewise, only an average of twenty-six percent of energy efficiency terms are found for MLB and NBA teams, whereas NFL and NHL teams communicate an average of thirty-six and forty percent respectively. MLB teams are the least effective at communicating waste management and broad application terms, as only twenty-seven percent and thirty-one percent of terms are communicated between these respective types of commitments across both websites and Twitter. The NBA lags at: food and beverage (31%), philanthropy and outreach (31%), and transportation (31%) practices.

Table 4: Overall Environmental Commitment Types by League

League	Broad	Energy	Food	Philanthropy	Transportation	Venue	Waste	All
MLB	31%	26%	37%	41%	37%	21%	27%	31%
NBA	44%	26%	31%	31%	31%	21%	36%	31%
NFL	51%	36%	47%	52%	52%	30%	45%	45%
NHL	59%	40%	50%	44%	44%	30%	44%	44%
Big Four	46%	32%	41%	44%	41%	25%	38%	38%

Source: Author's Calculations
Green = Highest/Red = Lowest

4.2 Big Four League Analysis

In this section, team actions observed in the content analyses are assessed and intertwined with league-wide initiatives identified from a review of literature. The discussion is not exhaustive, but rather, initiatives that are frequently observed, unique across leagues, and relevant to leagues' environmental programs. These innovative practices among Big Four leagues are discussed to further explain peer effect trends. Figure 5 shows all 115 search terms and overall counts from the website and Twitter content analyses by league.

All thirty NHL teams have participated in the NHL Food Recovery Program, in which untouched food prepared in NHL venues is donated to local shelters and other places of need.

The NHL's mission to "Feed People - Not Landfills" has been well embraced by teams as roughly one hundred tons of prepared and untouched concession foods are diverted from landfills to local people in need (Arizona Coyotes, 2010; NHL Green, 2015). NHL teams' participation in this program might explain the league's high overall environmental commitment findings for food and beverage (50%) and waste management (44%).

Furthermore, former NHL player Andrew Ference's accomplished environmental efforts have fortified the NHL's green movement. As a board member of the GSA and having worked in conjunction with the NHL Players Association for over a decade, Ference has spearheaded the NHL Players Association's Carbon Neutral Challenge (Anderson, 2012). This league-wide environmental program aims to encourage NHL athletes to pledge financial resources to compensate for the large amounts of travel over the course of an NHL season. Ference has also contributed across countless other environmental sectors besides transportation such as: waste management, energy efficiency, water conservation, and management and monitoring of sustainability data (Druzin, 2016). These efforts do not go unnoticed, as all aggregate categories rank as either the highest or second highest among overall environmental commitment findings for Big Four leagues.

The content analyses identify concrete terms that NHL teams most frequently communicate. Aside from common, broad terms such as "green" or "environment," the thirty NHL teams most frequently communicate the following terms through their websites: energy (26), lighting (25), animal philanthropy (24), natural disaster relief (24), bottles (23), transportation (23), waste (22), water conservation (21), and wildlife (20). Recycling (16), donation (13), LED (13) and animal philanthropy (11) and are most common across Twitter. Clearly, the NHL covers holistic topics across both websites and Twitter, with evident strengths

in website communication, philanthropy and outreach and waste management. It is also worth acknowledging that the NHL is the only league to have all thirty teams reference at least one environmental term in an environmental context across a platform. All thirty NHL teams, in proper context, state the term "environment" through their websites.

The NFL appears to adopt a different strategy than other Big Four leagues by dedicating their greening efforts toward NFL events and facilities more so than league-wide programs. For over fifteen years, the Super Bowl environmental program has worked with local partners of Super Bowl host cities in implementing eco-friendly initiatives. This includes: waste management and recycling, food recovery, material donations, sports equipment and book donations, and greenhouse gas reduction programs. Green tailgating programs, the use of renewable energy, and purchase of RECs, are common among NFL teams but do not appear to be convened by the league (NFL, 2011). The NFL's objective of greening events and facilities appropriately aligns with overall environmental commitment results that lead all Big Four leagues in both philanthropy and outreach as well as venue design and operations.

From analysis of environmental commitment types, there is evidence that NFL teams commit to environmental philanthropy and outreach programs. Particularly, twenty-eight of thirty-two teams state the word "donation" through their websites. Twenty-eight teams also allude to animal philanthropy and outreach and twenty-nine teams discuss hurricane relief philanthropy and outreach efforts via websites. Similar results are found through Twitter, as seven teams discuss animal philanthropy and outreach and ten teams cite hurricane relief outreach efforts, with animals being the seventh most stated term and hurricane being the third most referenced term via Twitter. Clearly these types of philanthropic efforts are common in the NFL. Thirty-one teams mention "recycling," with only the Dallas Cowboys failing to refer to

recycling efforts on their website. Other high counts for the thirty-two NFL websites include: LED (28) and transportation (26), whereas earth (13), energy (12), and recycling (10) rank among the top Twitter terms.

NBA Green's efforts speak to the league's ability to implement league-wide sustainability programs. NBA Green Week includes players wearing NBA Green cotton t-shirts made by Adidas from organic materials and featuring the NBA Green logo during pregame warm-ups (Philadelphia 76ers, 2013). Additionally, teams are raising environmental awareness to fans throughout games and teams are creating their own initiatives during Green Week to help the environment. For instance, the Golden State Warriors help remove invasive species at San Francisco's Golden Gate Park (Golden State Warriors, 2014). The Indiana Pacers have partnered with Republic Services to create hands-on environmental activities during the week (Indiana Pacers, 2017). Also, the Philadelphia 76ers have partnered with PECO, an electricity company based in Philadelphia, to help plant trees and demonstrate how homes can be more energy efficient (Philadelphia 76ers, 2013). These are just a few examples of teams across the NBA have engaged in the league-wide initiative of Green Week and have tailored their efforts for their own community. In total, twenty-two NBA teams mention "green week" on their websites and twenty-one teams communicate "green week" via Twitter, the most across either platform for any Big Four league.

Numerous teams including the Portland Trailblazers, Cleveland Cavaliers and Milwaukee Bucks have established partnerships with businesses and participate in a "Trees for Threes" program. The teams donate trees and tree seedlings to their respective communities according to the amount of three-point shots completed over the course of the regular season (Odom, 2016). This program has become so popular for NBA teams that it could be mistaken for a league-wide

initiative. Trees for Threes and NBA Green Week's activities are popular subjects across NBA team Twitter accounts and explain the highest environmental philanthropy and outreach overall environmental commitment value across this platform and among Big Four leagues. Three broad terms lead the highest counts for the thirty NBA websites. This includes: "recycling," "environment," and "green," all of which are mentioned by twenty-five teams across either websites or Twitter. Green week (22), education (21) and trees (21) are most communicated via websites. From Twitter, green week (21), recycling (18), trees (16) and plant (15) are cited most frequently.

Similar to the NFL, the MLB has fewer recognized team actions that are coordinated by league-wide efforts. While collecting data, unique team-specific programs closely aligned with one another. For instance, exactly half of the thirty MLB teams allude to gardening efforts through their websites and nine teams mention gardening efforts through Twitter. No Big Four league alludes to gardening efforts across both websites and Twitter more than MLB. Another prominent area for sustainability among MLB teams is the installation of more energy efficient LED lighting. Fourteen teams communicate the term "LED" through team websites and sixteen teams communicate LED through Twitter. Across Twitter, LED records the second most counts, with only "recycling" recording more with twenty-one counts.

MLB Green also discusses MLB teams' ability to divert waste (MLB, 2018). MLB Green has evidently influenced MLB teams' composting efforts as MLB teams mention composting six occasions through Twitter and ten occasions through websites, the most cumulative counts for the term across both platforms by any league. Other terms frequently observed across the thirty MLB websites include the following with counts denoted in parentheses: animal philanthropy (24), energy (21), hurricane relief (21), recycling (21), and transportation (21). Across Twitter,

MLB teams most frequently discuss the following terms: recycling, (21), LED (16), e-waste (15), emissions (14), and donation (13).

In summary, the NFL communicates the greatest percentage of terms (45%) across both websites and Twitter. This includes the NFL being most effective at philanthropy and outreach (52%), transportation (52%), venue design and operations (30%) and waste management (45%) among Big Four leagues. The NFL's philanthropy and outreach efforts are driven by animal philanthropy and natural disaster relief efforts, specifically hurricane relief. NFL teams' adoption of LED lighting drives venue design and operations' efforts, mass transit and bicycle accessibility support transportation efforts, while green bin use and recycling efforts reinforce a greater majority of NFL teams' waste management programs.

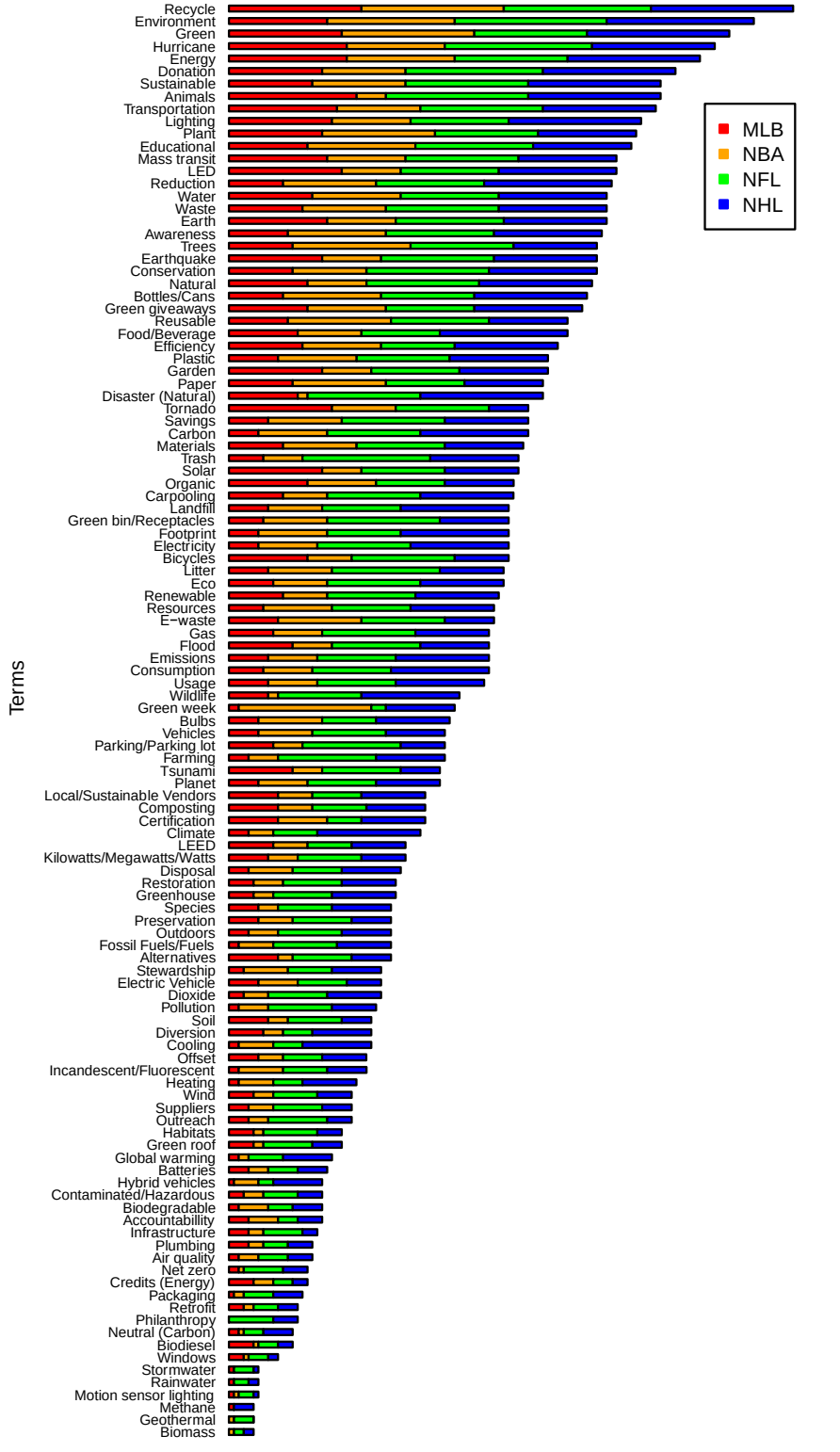
The NHL communicates the second greatest percentage of terms (44%) by league through both websites and Twitter. This includes the NHL being the most effective Big Four league at communicating: broad application (59%), energy efficiency (40%), food and beverage (50%), and venue design and operations (30%) terms. The NHL is the only league where every team mentions one term, as all teams communicate the term "environment" in proper context. The leading food and beverage environmental commitments for the NHL can be attributed to the efforts of the NHL Food Recovery Program. Similar to the NFL, much of the energy efficient practices by the NHL are as a result of the installation of LED, or more efficient, lighting. Venue design and operations engagements are driven by water conservation efforts, as twenty-two NHL teams more efficiently use water.

Both MLB and the NBA (31%) tie for the least effective leagues at communicating terms through both websites and Twitter. The high degree of philanthropic and outreach efforts among NBA teams include efforts from the "Trees for Threes" and NBA Green Week programs. These

niche initiatives, in addition to recycling and environmental education and awareness efforts reaffirm the NBA's mission of integrating sustainability into teams' operations. The MLB Greening Program, and currently MLB Green, have both noticeably influenced teams' ability to compost, as MLB teams discuss composting six occasions through Twitter and ten occasions through websites, the most cumulative counts for the term across both platforms by any Big Four league. Animal philanthropy and hurricane relief philanthropy, recycling efforts, LED light installation and e-waste recycling are all popular initiatives by MLB teams. The latter three initiatives are communicated most frequently via Twitter.

Overall, MLB and the NBA communicate environmental commitments more effectively through Twitter, whereas the NFL and NHL best communicate their environmental commitments through their team websites. With 4,958 cumulative findings through websites and only 1,425 cumulative findings through Twitter, the NFL and NHL therefore clearly perform better for overall environmental commitment. The most common terms communicated by Big Four teams include: recycling (94%), environment (88%), green (83%), hurricane philanthropy (81%), and energy (79%).

Figure 5: Overall Search Term Frequencies by Big Four Leagues



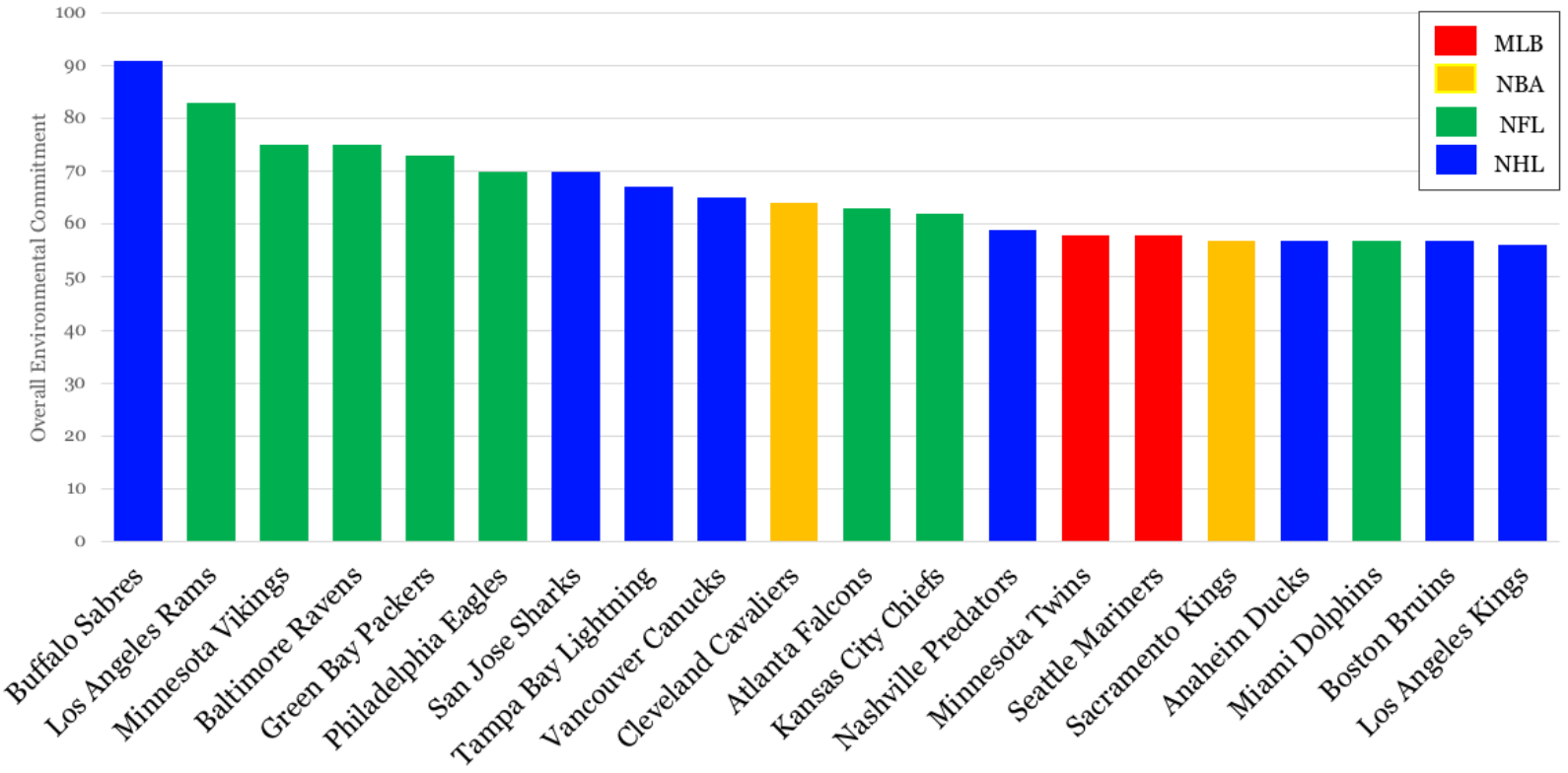
Source: Author's Calculations

4.3 Team and City Leaders

This section identifies individual teams and cities that outperform others with respect to Big Four sports teams' environmental commitments. Recognizing the most effective teams and cities through descriptive statistics can help explore other strong influences that encourage environmental commitments. Consistent environmental performance among Big Four sports cities is evaluated by quantifying the mean of the environmental commitment dependent variables for all Big Four sports teams present in a metropolitan area. A similar method is used to evaluate by city and commitment type, as mean values are quantified for all teams in the city according to commitment type. In this analysis, a city with fewer teams can more easily achieve a greater rank by simply having one team excel. This is because consistently high environmental commitment among teams in a city is arguably easier to achieve across fewer teams as opposed to eight or nine teams. That said, it remains possible for cities with several Big Four teams to perform better than cities with fewer teams.

See Figure 6 for a graph displaying the ten teams with the highest overall environmental commitment recordings. The Buffalo Sabres (91%) in the NHL, Los Angeles Rams (83%) in the NFL, Seattle Mariners (53%) in MLB and Cleveland Cavaliers (58%) in the NBA lead their respective leagues in website environmental commitment. The Arizona Diamondbacks (40%) in MLB, Cleveland Cavaliers (29%) in the NBA, Los Angeles Kings (28%) in the NHL and Philadelphia Eagles (19%) in the NFL lead their respective leagues in Twitter environmental commitment. The Buffalo Sabres (91%), Los Angeles Rams (83%), Minnesota Twins (58%) in MLB and Cleveland Cavaliers (64%) lead their respective leagues in overall environmental commitment.

Figure 6: Big Four Teams with Greatest Overall Environmental Commitment



Source: Author's Calculations

The Cleveland Cavaliers, Los Angeles Rams, Philadelphia Eagles, Sacramento Kings and Vancouver Canucks all mention one hundred percent of food and beverage terms across either websites or Twitter. All the above teams communicate at least half of all terms, and thus perform well in other categories. The Anaheim Ducks are the only other team that communicates all terms from a particular type of commitment, with all nine transportation terms communicated via websites or Twitter. Furthermore, the Philadelphia Eagles, Tampa Bay Lightning, Los Angeles Rams and Buffalo Sabres have four commitment types with at least eighty percent of terms communicated. Following the Sabres, five NFL teams are in the top six for Big Four overall environmental commitment including the: Los Angeles Rams, Minnesota Vikings, Baltimore Ravens, Green Bay Packers, and Philadelphia Eagles. These results are unexpected as the NFL as a league is the only Big Four league not committed to the GSA.

See Figure 7 for a representation depicting all Big Four cities by number of teams present in respective metropolitan areas and corresponding average overall environmental commitment findings. There is merit in analyzing the Buffalo Sabres, the most environmentally committed Big Four team as well as the city of Buffalo, a city tied for being the most environmentally committed with Green Bay, based on Figure 6. The Buffalo Sabres clearly attain a reputable status with regard to sustainability, as the team covers all broad application and food and beverage terms, while communicating eighty-nine percent of transportation terms, ninety-two percent of venue design and operations terms, and ninety percent of waste management terms.

Overall, the city of Buffalo performs noticeably well across all environmental commitment types. All environmental commitment types for the city of Buffalo rank are in the top ten percent of all cities. These results are propelled by the high levels of environmental commitment demonstrated by the Buffalo Sabres (Website = 91%, Twitter = 15% and Overall =

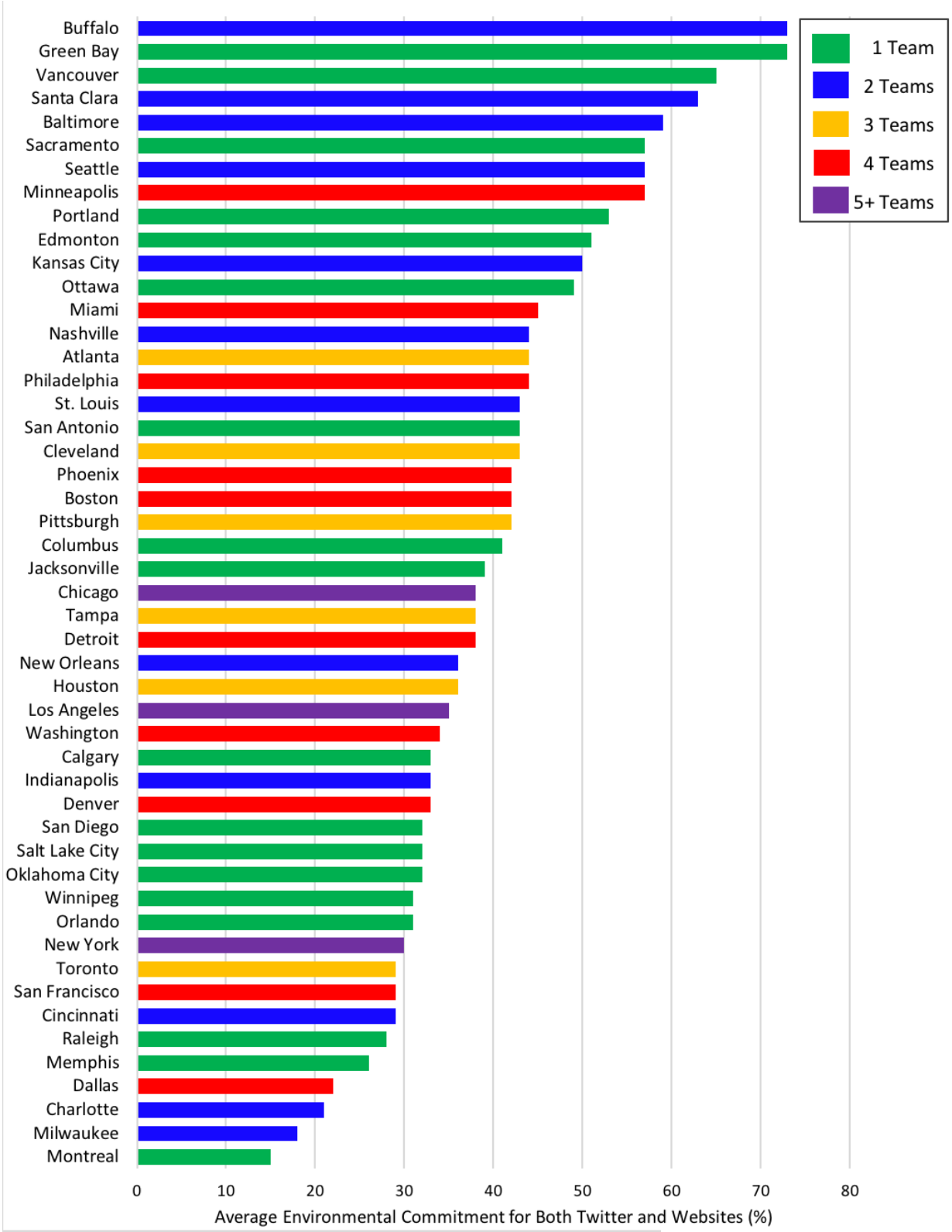
91%) and Buffalo Bills (Website = 55%, Twitter = 7% and Overall = 55%). Among other efforts, the Bills' objective is for their venue to be a zero-waste facility, while partnering with a renewable energy company to deploy micro wind turbines (Buffalo Bills, 2011; Buffalo Bills, 2013). Meanwhile, the Sabres dedicate space on their website for explaining efforts made by the Sabres' Green team and the benefits for fans to integrate eco-friendly practices to their lives (Buffalo Sabres, 2008; Buffalo Sabres 2016).

There are ten cities where all the teams in the city perform well on the indicator of environmental commitment (greater than 50%), these include: Buffalo (73%), Green Bay (73%), Vancouver (65%), Santa Clara (63%), Baltimore (59%), Sacramento (57%), Seattle (57%), Minneapolis (57%), Portland (53%), and Edmonton (51%). These places can be distinguished from their peers as they have only one or two teams, save for Minneapolis, which has four. Minneapolis is also the only city with four or more Big Four teams, where mean commitment types across all four teams rank in the top ten percent for specific overall environmental commitment types. To be specific, Minneapolis ranks as having the third highest mean broad application term percentage across the city's four teams for any Big Four city with seventy-five percent of terms. As well, Minneapolis has the fifth greatest mean commitment value for energy efficiency with fifty-nine percent across all teams in the city.

Cities with five or more teams include: Chicago (38%), Los Angeles (35%) and New York (30%); these places record noticeably lower overall environmental commitment values across Big Four teams in their respective cities. Green Bay, Sacramento and Vancouver are all cities with one team that perform to the ninetieth percentile in at least three overall environmental commitment types. It is worth noting that Green Bay is the only city with at least one Big Four sports team without any type of urban sustainability commitment. Green Bay

records the highest energy efficiency percentage by a city with seventy-three percent, ties for the highest in food and beverage with eighty three percent and records the highest waste management percentage by city with eighty-one percent. The above results suggest that it is possible cities with fewer Big Four teams embrace sustainability to greater lengths than cities with three or more teams.

Figure 7: Average Environmental Commitment for Both Twitter and Websites by Big Four City



Source: Author's Calculations

4.4 Organizational and Geographic Analysis

To understand the organizational and geographic factors influencing environmental commitment among Big Four sports teams, comparison of means one-way ANOVA tests are relied upon to calculate significance values between the three dependent variables and discrete independent variables. Among continuous independent variables, bivariate correlation analysis is conducted to produce Pearson correlation coefficient values. The following variables are analyzed: membership of Big Four leagues and the GSA, venue age and sponsorship as well as LEED certification, fan engagement variables, regions and population, sports in the city, socioeconomic conditions, and community green commitment.

4.4.1 League Membership

One-way ANOVA tests were conducted to compare the effect of individual Big Four leagues on each of website, Twitter and overall environmental commitment. Tables 5, 6 and 7 show the comparison of means one-way ANOVA test values for discrete variables website, Twitter and overall respectively. Table 8 shows the Pearson correlation coefficient values for continuous variables against the three primary dependent variables. Of the Big Four leagues, MLB ($p=0.002$) and the NHL ($p=0.004$) have the greatest effect on overall environmental commitment. That said, NHL teams have the greatest effect on website environmental commitments ($p=0.01$) and less of an effect on Twitter environmental commitments ($p=0.621$). In contrast, MLB teams appear to use Twitter to articulate their environmental commitments. This is because MLB as a league yields a strong p-value of 0.009 from a one-way ANOVA test between the league and Twitter environmental commitment. This is the most significant p-value

following a comparison of means one-way ANOVA test for all Big Four leagues in relation to Twitter environmental commitments.

Results from one-way ANOVA tests of individual leagues and the three primary dependent variables can be divided into two subgroups. The first subgroup contains MLB and the NHL, which significance values less than 0.01 when compared to overall environmental commitment. The second subgroup contains Big Four leagues with overall environmental commitment p-values greater than 0.01. The NFL yields a p-value of 0.015 while the NBA yields a p-value of 0.021 following ANOVA tests between the two individual leagues and overall environmental commitment. This analysis supports the following rankings of Big Four leagues from most environmentally committed across both websites and Twitter to the least: 1) MLB, 2) NHL, 3) NFL and 4) NBA.

The above league findings are close to substantiating this research's hypothesis that states Big Four leagues ranked from most to least environmentally committed include: MLB, the NHL, the NBA and the NFL. From ANOVA tests, MLB has the highest level of environmental commitment, with the NBA yielding the second highest level of commitment. The only two leagues interchanged between the hypothesis and findings are the NFL and NBA, as according to ANOVA test results, the NFL is the third most environmentally committed league and the NBA is the least committed. The above ANOVA test findings also validate much of the information provided by Henly, Hershkowitz and Hoover (2012), who suggest that MLB has the most established environmental data measurement program, followed by the NHL and the NBA. This perception is confirmed for the former two leagues through ANOVA test findings as MLB's p-value of 0.002 and NHL's p-value 0.004 against overall environmental commitment. However, NBA's overall p-value of 0.021 slightly trails the NFL (p=0.015) by 0.006. Henly, Hershkowitz

and Hoover do not reference the NFL's environmental data measurement program. Therefore, it is assumed that it is non-existent. That said, an ANOVA test of environmental commitment data in this research suggests the NFL is the third most committed Big Four league to the environment, trailing the NHL and demonstrating better commitment than the NBA.

Table 5: One Way ANOVA Results for Website Environmental Commitment

		Sum of Squares	df	Mean Square	F	Sig.
MLB	Between Groups	0.450	1	0.450	14.547	0.0001
	Within Groups	3.716	120	0.031		
	Total	4.166	121			
NBA	Between Groups	0.255	1	0.255	7.826	0.006
	Within Groups	3.911	120	0.033		
	Total	4.166	121			
NFL	Between Groups	0.336	1	0.336	10.528	0.002
	Within Groups	3.830	120	0.032		
	Total	4.166	121			
NHL	Between Groups	0.341	1	0.341	10.701	0.001
	Within Groups	3.825	120	0.032		
	Total	4.166	121			
Teams in City	Between Groups	0.196	7	0.028	0.804	0.585
	Within Groups	3.970	114	0.035		
	Total	4.166	121			
Leagues in City	Between Groups	0.124	3	0.041	1.207	0.310
	Within Groups	4.042	118	0.034		
	Total	4.166	121			
Teams from Same League in Same City	Between Groups	0.166	1	0.166	4.991	0.027
	Within Groups	4.000	120	0.033		
	Total	4.166	121			
GSA Membership	Between Groups	0.054	1	0.054	1.580	0.211
	Within Groups	4.112	120	0.034		
	Total	4.166	121			
LEED Venue	Between Groups	0.015	1	0.015	0.428	0.514
	Within Groups	4.151	120	0.035		
	Total	4.166	121			
Urban Sustainability Commitments	Between Groups	0.269	6	0.045	1.323	0.253
	Within Groups	3.897	115	0.34		
	Total	4.166	121			
No Urban Sustainability Commitment	Between Groups	0.134	1	0.134	3.981	0.048
	Within Groups	4.032	120	0.034		
	Total	4.166	121			
Sustainability Plan	Between Groups	0.115	1	0.115	3.396	0.068
	Within Groups	4.051	120	0.034		
	Total	4.166	121			
Green/Environmental Plan	Between Groups	0.001	1	0.001	0.035	0.853
	Within Groups	4.165	120	0.035		
	Total	4.166	121			
Climate Action Plan	Between Groups	0.095	1	0.095	2.808	0.096

	Within Groups	4.071	120	0.034		
	Total	4.166	121			
Publisher - NGO	Between Groups	0.048	1	0.048	1.448	0.231
	Within Groups	3.984	119	0.033		
	Total	4.031	120			
Publisher - City with Sustainability Office	Between Groups	0.008	1	0.008	0.248	0.619
	Within Groups	4.024	119	0.034		
	Total	4.032	120			
Publisher - City with no Sustainability Office	Between Groups	0.0001	1	0.0001	0.0001	0.999
	Within Groups	4.032	119	0.034		
	Total	4.032	120			
Publisher - County Office	Between Groups	0.049	1	0.049	1.474	0.227
	Within Groups	3.983	119	0.033		
	Total	4.032	120			
Publisher - Government	Between Groups	0.048	1	0.048	1.448	0.231
	Within Groups	3.984	119	0.033		
	Total	4.032	120			
Plan Content - Progress Report	Between Groups	0.004	1	0.004	0.112	0.738
	Within Groups	4.028	119	0.034		
	Total	4.032	120			
Plan Content - Future Report	Between Groups	0.002	1	0.002	0.047	0.830
	Within Groups	4.031	119	0.034		
	Total	4.032	120			
Region	Between Groups	0.038	4	0.009	0.269	0.897
	Within Groups	4.128	117	0.035		
	Total	4.166	121			
West Region	Between Groups	0.001	1	0.001	0.025	0.874
	Within Groups	4.165	120	0.035		
	Total	4.166	121			
Midwest Region	Between Groups	0.014	1	0.014	0.415	0.521
	Within Groups	4.152	120	0.035		
	Total	4.166	121			
South Region	Between Groups	0.02	1	0.02	0.570	0.452
	Within Groups	4.146	120	0.035		
	Total	4.166	121			
Northeast Region	Between Groups	0.0001	1	0.0001	0.0001	0.995
	Within Groups	4.166	120	0.035		
	Total	4.166	121			
Venue Sponsorship	Between Groups	0.254	7	0.036	1.056	0.396
	Within Groups	3.912	114	0.034		
	Total	4.166	121			
Venue Sponsor - Energy	Between Groups	0.0001	1	0.0001	0.01	0.920
	Within Groups	4.166	120	0.035		
	Total	4.166	121			
	Between Groups	0.029	1	0.029	0.839	0.361

Venue Sponsor - Finance and Insurance	Within Groups	4.137	120	0.034		
	Total	4.166	121			
Venue Sponsor - Food and Beverage	Between Groups	0.131	1	0.131	3.903	0.05
	Within Groups	4.025	120	0.034		
	Total	4.166	121			
Venue Sponsor - No Sponsor	Between Groups	0.006	1	0.006	0.163	0.687
	Within Groups	4.160	120	0.035		
	Total	4.166	121			
Venue Sponsor - Other	Between Groups	0.021	1	0.021	0.599	0.440
	Within Groups	4.145	120	0.045		
	Total	4.166	121			
Venue Sponsor - Retail Trade	Between Groups	0.021	1	0.021	0.604	0.439
	Within Groups	4.145	120	0.035		
	Total	4.166	121			
Venue Sponsor - Telecommunications	Between Groups	0.033	1	0.033	0.948	0.332
	Within Groups	4.133	120	0.034		
	Total	4.166	121			
Venue Sponsor - Transportation	Between Groups	0.051	1	0.051	1.494	0.224
	Within Groups	4.115	120	0.034		
	Total	4.166	121			

Table 6: One-Way ANOVA Results for Twitter Environmental Commitment

		Sum of Squares	df	Mean Square	F	Sig.
MLB	Between Groups	0.032	1	0.032	7.137	0.009
	Within Groups	0.535	120	0.004		
	Total	0.567	121			
NBA	Between Groups	0.015	1	0.015	3.215	0.076
	Within Groups	0.552	120	0.005		
	Total	0.567	121			
NFL	Between Groups	0.068	1	0.068	16.306	0.0001
	Within Groups	0.499	120	0.004		
	Total	0.567	121			
NHL	Between Groups	0.001	1	0.001	0.245	0.621
	Within Groups	0.566	120	0.005		
	Total	0.567	121			
Teams in City	Between Groups	0.027	7	0.004	0.828	0.566
	Within Groups	0.539	114	0.005		
	Total	0.567	121			
Leagues in City	Between Groups	0,005	3	0.002	0.379	0.768
	Within Groups	0.561	118	0.005		
	Total	0.567	121			
Teams from Same League in Same City	Between Groups	0.002	1	0.002	0.5	0.481
	Within Groups	0.564	120	0.005		
	Total	0.567	121			
GSA Membership	Between Groups	0.031	1	0.031	6.951	0.009
	Within Groups	0.536	120	0.004		
	Total	0.567	121			
LEED Venue	Between Groups	0.011	1	0.011	2.473	0.118
	Within Groups	0.555	120	0.005		
	Total	0.567	121			
Urban Sustainability Commitments	Between Groups	0.037	6	0.006	1.326	0.251
	Within Groups	0.530	115	0.005		
	Total	0.567	1121			
No Urban Sustainability Commitment	Between Groups	0.003	1	0.003	0.574	0.450
	Within Groups	0.564	120	0.005		
	Total	0.567	121			
Sustainability Plan	Between Groups	0.008	1	0.008	1.773	0.186
	Within Groups	0.558	120	0.005		
	Total	0.567	121			
Green/Environmental Plan	Between Groups	0.009	1	0.009	1.897	0.171
	Within Groups	0.558	120	0.005		
	Total	0.567	121			
Climate Action Plan	Between Groups	0.026	1	0.026	5.675	0.019

	Within Groups	0.541	120	0.005		
	Total	0.567	121			
Publisher - NGO	Between Groups	0.0001	1	0.0001	0.052	0.820
	Within Groups	0.564	119	0.005		
	Total	0.564	120			
Publisher - City with Sustainability Office	Between Groups	0.001	1	0.0001	0.056	0.813
	Within Groups	0.564	119	0.005		
	Total	0.564	120			
Publisher - City with no Sustainability Office	Between Groups	0.001	1	0.001	0.121	0.729
	Within Groups	0.563	119	0.005		
	Total	0.564	120			
Publisher - County Office	Between Groups	0.001	1	0.001	0.153	0.696
	Within Groups	0.563	119	0.005		
	Total	0.564	120			
Publisher - Government	Between Groups	0.0001	1	0.0001	0.052	0.820
	Within Groups	0.564	119	0.005		
	Total	0.564	120			
Plan Content - Progress Report	Between Groups	0.001	1	0.001	0.227	0.635
	Within Groups	0.563	119	0.005		
	Total	0.564	120			
Plan Content - Future Report	Between Groups	0.011	1	0.011	2.285	0.133
	Within Groups	0.553	119	0.005		
	Total	0.564	120			
Region	Between Groups	0.044	4	0.011	2.488	0.047
	Within Groups	0.522	117	0.004		
	Total	0.567	121			
West Region	Between Groups	0.022	1	0.022	4.754	0.031
	Within Groups	0.545	120	0.005		
	Total	0.567	121			
Midwest Region	Between Groups	0.006	1	0.006	1.255	0.265
	Within Groups	0.561	120	0.005		
	Total	0.567	121			
South Region	Between Groups	0.013	1	0.013	2.824	0.095
	Within Groups	0.554	120	0.005		
	Total	0.567	121			
Northeast Region	Between Groups	0.012	1	0.012	2.535	0.114
	Within Groups	0.555	120	0.005		
	Total	0.567	121			
Venue Sponsorship	Between Groups	0.022	7	0.003	0.651	0.712
	Within Groups	0.545	114	0.005		
	Total	0.567	121			
Venue Sponsor - Energy	Between Groups	0.0001	1	0.0001	0.075	0.785
	Within Groups	0.566	120	0.005		
	Total	0.567	121			
	Between Groups	0.002	1	0.002	0.363	0.548

Venue Sponsor - Finance and Insurance	Within Groups	0.565	120	0.005		
	Total	0.567	121			
Venue Sponsor - Food and Beverage	Between Groups	0.0001	1	0.0001	0.006	0.940
	Within Groups	0.567	120	0.005		
	Total	0.567	121			
Venue Sponsor - No Sponsor	Between Groups	0.004	1	0.004	0.766	0.383
	Within Groups	0.563	120	0.005		
	Total	0.567	121			
Venue Sponsor - Other	Between Groups	0.006	1	0.006	1.193	0.277
	Within Groups	0.561	120	0.005		
	Total	0.567	121			
Venue Sponsor - Retail Trade	Between Groups	0.012	1	0.012	2.492	0.117
	Within Groups	0.555	120	0.005		
	Total	0.567	121			
Venue Sponsor - Telecommunications	Between Groups	0.001	1	0.001	0.138	0.711
	Within Groups	0.566	120	0.005		
	Total	0.567	121			
Venue Sponsor - Transportation	Between Groups	0.001	1	0.001	0.315	0.575
	Within Groups	0.565	120	0.005		
	Total	0.567	121			

Table 7: One-Way ANOVA Results for Overall Environmental Commitment

		Sum of Squares	df	Mean Square	F	Sig.
MLB	Between Groups	0.275	1	0.275	9.903	0.002
	Within Groups	3.336	120	0.028		
	Total	3.611	121			
NBA	Between Groups	0.157	1	0.157	5.460	0.021
	Within Groups	3.454	120	0.029		
	Total	3.611	121			
NFL	Between Groups	0.176	1	0.176	6.138	0.015
	Within Groups	3.436	120	0.029		
	Total	3.611	121			
NHL	Between Groups	0.243	1	0.243	8.656	0.004
	Within Groups	3.368	120	0.028		
	Total	3.611	121			
Teams in City	Between Groups	0.168	7	0.024	0.794	0.593
	Within Groups	3.443	114	0.03		
	Total	3.611	121			
Leagues in City	Between Groups	0.089	3	0.03	0.990	0.4
	Within Groups	3.523	118	0.03		
	Total	3.611	121			
Teams from Same League in Same City	Between Groups	0.124	1	0.124	4.280	0.041
	Within Groups	3.487	120	0.029		
	Total	3.611	121			
GSA Membership	Between Groups	0.084	1	0.084	2.865	0.093
	Within Groups	3.527	120	0.029		
	Total	3.611	121			
LEED Venue	Between Groups	0.015	1	0.015	0.502	0.480
	Within Groups	3.596	120	0.03		
	Total	3.611	121			
Urban Sustainability Commitments	Between Groups	0.292	6	0.049	1.687	0.130
	Within Groups	3.319	115	0.029		
	Total	3.611	121			
No Urban Sustainability Commitment	Between Groups	0.117	1	0.117	4.030	0.047
	Within Groups	3.494	120	0.029		
	Total	3.611	121			
Sustainability Plan	Between Groups	0.120	1	0.120	4.133	0.044
	Within Groups	3.491	120	.029		
	Total	3.611	121			
Green/Environmental Plan	Between Groups	0.0001	1	0.0001	0.008	0.929
	Within Groups	3.611	120	0.03		
	Total	3.611	121			
Climate Action Plan	Between Groups	0.128	1	0.128	4.413	0.038

	Within Groups	3.483	120	0.029		
	Total	3.611	121			
Publisher - NGO	Between Groups	0.027	1	0.027	0.923	0.339
	Within Groups	3.467	119	0.029		
	Total	3.494	120			
Publisher - City with Sustainability Office	Between Groups	0.010	1	0.01	0.350	0.555
	Within Groups	3.484	119	0.029		
	Total	3.494	120			
Publisher - City with no Sustainability Office	Between Groups	0.0001	1	0.0001	0.002	0.965
	Within Groups	3.494	119	0.029		
	Total	3.494	120			
Publisher - County Office	Between Groups	0.039	1	0.039	1.350	0.248
	Within Groups	3.455	119	0.029		
	Total	3.494	120			
Publisher - Government	Between Groups	0.027	1	0.027	0.923	0.339
	Within Groups	3.467	119	0.029		
	Total	3.494	120			
Plan Content - Progress Report	Between Groups	0.002	1	0.002	0.066	0.798
	Within Groups	3.492	119	0.029		
	Total	3.494	120			
Plan Content - Future Report	Between Groups	0.0001	1	0.0001	0.002	0.969
	Within Groups	3.494	119	0.029		
	Total	3.494	120			
Region	Between Groups	0.044	4	0.011	0.359	0.838
	Within Groups	3.567	117	0.03		
	Total	3.611	121			
West Region	Between Groups	0.011	1	0.011	0.368	0.545
	Within Groups	3.600	120	0.030		
	Total	3.611	121			
Midwest Region	Between Groups	0.014	1	0.014	0.462	0.498
	Within Groups	3.597	120	0.03		
	Total	3.611	121			
South Region	Between Groups	0.03	1	0.030	0.992	0.321
	Within Groups	3.582	120	0.030		
	Total	3.611	121			
Northeast Region	Between Groups	0.002	1	0.002	0.063	0.803
	Within Groups	3.609	120	0.030		
	Total	3.611	121			
Venue Sponsorship	Between Groups	0.194	7	0.028	0.924	0.491
	Within Groups	3.417	114	0.030		
	Total	3.611	121			
Venue Sponsor - Energy	Between Groups	0.001	1	0.001	0.018	0.894
	Within Groups	3.611	120	0.30		
	Total	3.611	121			
	Between Groups	0.02	1	0.02	0.661	0.418

Venue Sponsor - Finance and Insurance	Within Groups	3.591	120	0.03		
	Total	3.611	121			
Venue Sponsor - Food and Beverage	Between Groups	0.071	1	0.071	2.390	0.125
	Within Groups	3.541	120	0.03		
	Total	3.611	121			
Venue Sponsor - No Sponsor	Between Groups	0.006	1	0.006	0.192	0.662
	Within Groups	3.605	120	0.030		
	Total	3.611	121			
Venue Sponsor - Other	Between Groups	0.033	1	0.033	1.095	0.298
	Within Groups	3.578	120	0.03		
	Total	3.611	121			
Venue Sponsor - Retail Trade	Between Groups	0.03	1	0.03	0.996	0.320
	Within Groups	3.582	120	0.03		
	Total	3.611	121			
Venue Sponsor - Telecommunications	Between Groups	0.028	1	0.028	0.943	0.333
	Within Groups	3.583	120	0.03		
	Total	3.611	121			
Venue Sponsor - Transportation	Between Groups	0.034	1	0.034	1.135	0.289
	Within Groups	3.577	120	0.03		
	Total	3.611	121			

Table 8: Pearson Correlation Coefficient Matrix by Dependent and Independent Variables

Continuous Independent Variables	Website (r)	Twitter (r)	Overall (r)
Years in Current Location	-0.007	0.04	0.001
Metropolitan Area Population (2016)	-0.205	-0.148	-0.22
Total Civilian Population (2016)	-0.201	-0.127	-0.211
Total Attendance 2016	-0.315	0.203	-0.266
Average Attendance 2016	0.239	-0.305	0.188
Attendance Percentage 2016	0.321	-0.258	0.267
Venue Age	0.086	0.015	0.082
Franchise Value (Billions)	-0.001	-0.159	-0.017
Unemployment Rate (June 2017)	0.034	0.021	0.033
Median Income (June 2017)	-0.018	0.19	0.022
Percent Below Poverty Level (June 2017)	-0.102	-0.013	-0.108
Percent with High School Diploma or Higher	0.204	0.095	0.217
Percent with Bachelor's Degree or Higher	-0.033	0.075	-0.007
Industry - Manufacturing %	-0.124	-0.122	-0.134
Occupation - Management %	0.019	0.093	0.043
Occupation - Services %	-0.046	-0.08	-0.058
Occupation - Sales %	-0.006	-0.097	-0.029
Occupation - Natural Resources %	-0.057	-0.12	-0.079
Occupation - Production %	0.018	-0.013	0.007

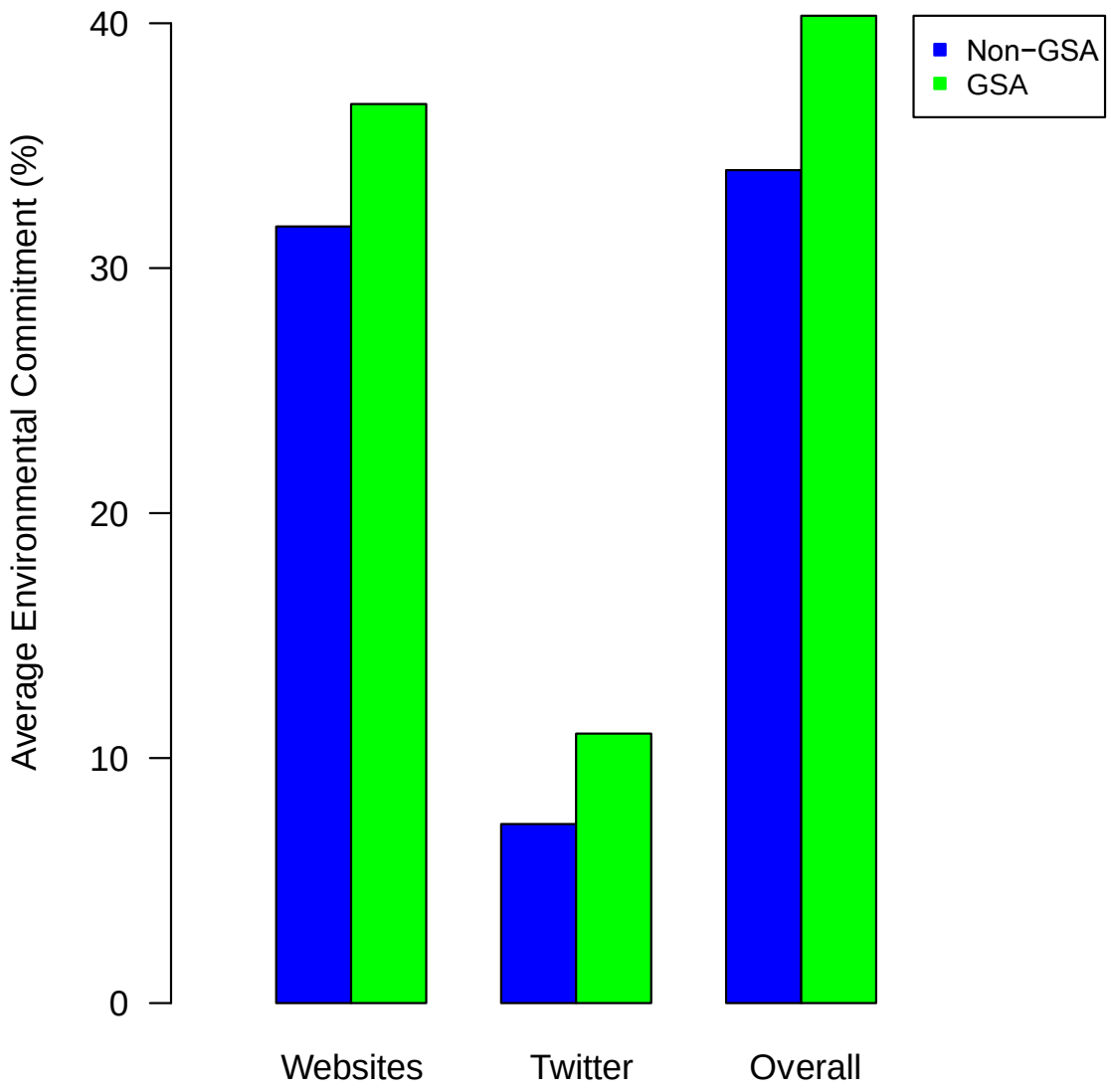
Source: Author's Calculations

0.05 > r > 0.01 level
r < 0.01 level

4.4.2 External Influences

Each Big Four sports team can be divided into either a GSA member or non-member. See Appendix B for a complete list of Big Four teams and corresponding GSA membership status. Figure 8 shows a representation of the average environmental commitment of GSA members and non-members in relation to online communication platforms. It is worth noting that all MLB and NHL teams are committed members of the GSA. Conversely, only nineteen of thirty-two NFL teams and fifteen of thirty NBA teams are GSA members. The GSA actively seeks to facilitate members' adoption of environmental practices (Green Sports Alliance – "About," 2017). Therefore, it is conceivable that MLB and NHL teams communicate greater environmental commitment. This is confirmed as there are statistically significant differences between MLB (31%, $p=0.002$) and the NHL (44%, $p=0.04$), when comparing means to overall environmental commitment. Similar statistical significance is not observed for the NBA (31%, $p=0.021$) and the NFL (45%, $p=0.015$) when comparing the effect of the two individual leagues on overall environmental commitment. The more environmental commitments by GSA-dominated leagues suggest the Alliance is instrumental in teams committing to the environment.

Figure 8: Average Environmental Commitments by Green Sports Alliance Membership



Source: Author's Calculations

One-way ANOVA tests were conducted to compare the effect of GSA membership on teams' environmental commitment. This analysis suggests there was a significant effect of GSA membership on the levels of environmental commitment as expressed through Twitter ($p=0.009$) and overall ($p=0.093$). As a result, it is possible that GSA members more actively rely on social media to communicate environmental commitments. However, ANOVA tests comparing the effect of GSA membership on website environmental commitments indicate there are no significant differences in the levels of environmental commitment as expressed through websites. This is observed as a result of p-values of 0.211 for website environmental commitments. The above ANOVA test results for GSA membership substantiate this research's hypothesis that states: Green Sports Alliance members have higher levels of environmental commitment.

Cities rely on professional sports as a means to advance their image, promote community engagement and drive future development projects (Bieganek and Huberty, 2015). To better understand the sports-and-environment landscape, it is logical to assess the number of teams and leagues within Big Four metropolitan areas. Three variables are used: the number of teams in a city, the number of leagues operating in a city, and the number of teams from the same league in the same city. A fourth variable measures the embeddedness of a team in its current location, using the number of years a team has been present in its current metropolitan area. Using an ANOVA test to examine the difference in means of environmental commitment (measured using the three dependent variables) for these three independent variables, yields no statistically significant results. Generally, there are few significant differences in the levels of overall environmental commitment as expressed through either websites, Twitter or overall between: the number of teams in a city, the number of leagues operating in a city, the number of teams from the same league in the same city and the number of years a team has operated in a current

metropolitan area.

One-way ANOVA tests were conducted to compare the effects of teams and leagues in cities on teams' environmental commitments. The number of teams as well as the number of leagues in the city do not influence environmental commitment, as indicated by the weak ANOVA significance values between 0.31 and 0.768 across website, Twitter and overall environmental commitments. Results are mixed for teams from the same league in the same city, as website ($p=0.027$) and overall ($p=0.041$) environmental commitment values are significant but Twitter environmental commitment ($p=0.481$) is not significant. It is possible that more pressure exists for teams in the same metropolitan area with another team from the same league, as any environmental efforts performed by one team might encourage efforts from another in a competing market. For example, if the New York Yankees become more environmentally friendly, residents of New York might view the New York Mets organization in a more negative light. This peer effect pressure could in fact be beneficial for teams adopting the environment. Still, there is not sufficient evidence across Twitter findings and regression findings (which are discussed later) to believe there is a relationship between the presence of another team in the same league in the same metropolitan region and environmental commitment. Overall, ANOVA test results for external influences do not substantiate this research's hypothesis that states: teams in cities with more teams and leagues have higher levels of environmental commitment.

4.4.3 Venue Features

Venue age and LEED certification are two venue-related variables that could directly or indirectly impact the natural environment. As discussed in Chapter 2, a venue's age can inherently elucidate whether a venue has been designed with consideration for environmental impacts. There are also an increasing number of sports teams building venues with LEED certification or retrofitting to meet LEED standards. Both of which can mitigate the impact a sports venue has on the natural environment (Henly, Hershkowitz and Hoover, 2012). LEED certification is a clear indication of a venue constructed or retrofitted with environmental and energy standards at the forefront. Therefore, it is conceivable that Big Four teams that play home games in newer venues and/or LEED certified venues have more profound environmental commitments.

One-way ANOVA tests were conducted to compare the effect of LEED certified venues on website, Twitter and overall environmental commitments. ANOVA tests for LEED certified venues yields insignificant p-values of 0.514, 0.118 and 0.48 for website, Twitter and overall environmental commitments. Therefore, venues with LEED certification do not influence Big Four sports teams' environmental commitment. Bivariate correlation analysis of venue age yields no significance against the three dependent variables. The Pearson correlation coefficients for website (r=0.086), Twitter (0.015) and overall (0.082) environmental commitments are all positive values indicating that as venue age increases, environmental commitment increases. However, the p-values are very small, suggesting there is no relationship between venue age and the Big Four teams' levels of environmental commitment.

In this study, venue sponsorship was classified into eight categories using the North American Industrial Classification System (NAICS). These types of venue sponsorship include:

energy, finance and insurance, food and beverage, no sponsor, other, retail trade, telecommunications, and transportation. Figure 9 shows the breakdown of Big Four teams' venue sponsorship by industry as well as the levels of overall environmental commitment by type of venue sponsorship. One-way ANOVA tests were conducted to compare the effect of venue sponsorships on environmental commitment.

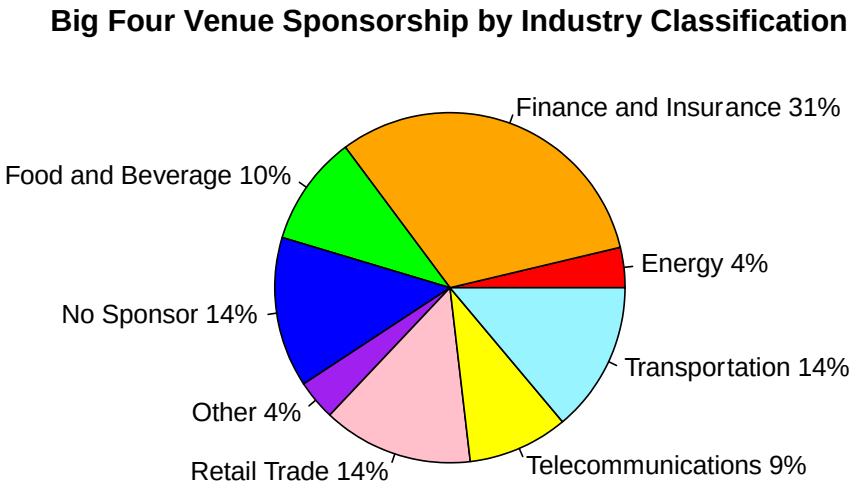
ANOVA tests comparing venue sponsorships to website environmental commitment indicate a significant effect of teams with food and beverage venue sponsorship on environmental commitment, as a p-value of 0.05 is observed. That said, all other venue sponsorships indicate no significant effect on teams' website environmental commitments. ANOVA tests comparing all venue sponsorships and Twitter environmental commitments indicate no significant relationship between venue sponsors and teams' Twitter environmental commitments, as all p-values fall between 0.117 and 0.94.

Furthermore, ANOVA tests comparing venue sponsorships and overall environmental commitments indicate no significant relationship between venue sponsorships and teams' overall environmental commitments. This is because all p-values fall between 0.125 and 0.894. Thus, there is only a difference in the level of environmental commitment observed between food and beverage venue sponsorship and website environmental commitment. Since there is no significance found for food and beverage sponsorship amongst both Twitter and overall environmental commitment, the variable is not significant across all primary dependent variables. All other venue sponsorships indicate no differences in the levels of environmental commitments.

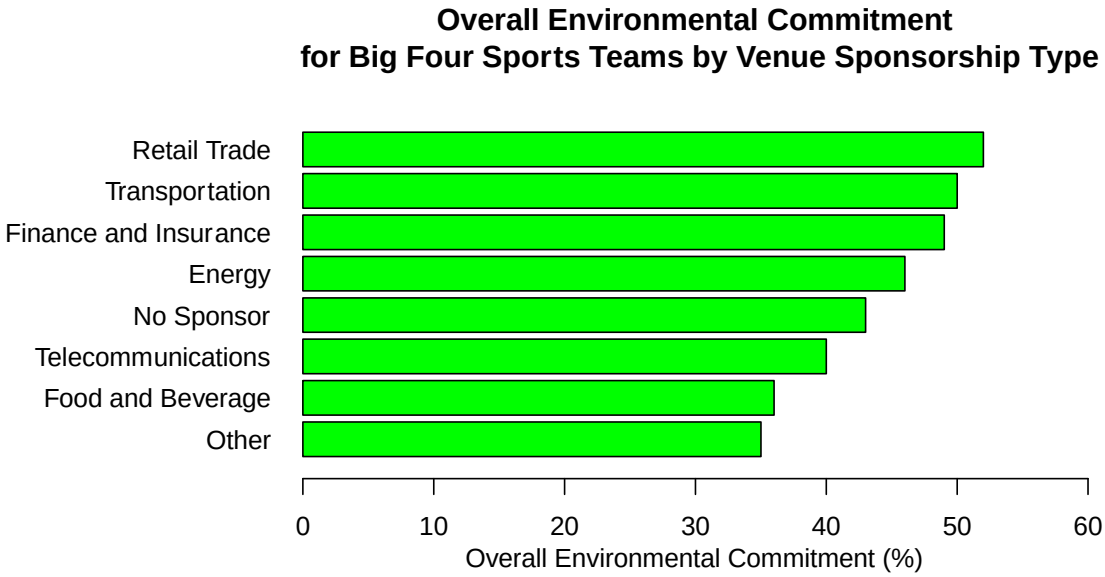
The ANOVA test results for venue features do not substantiate this research's hypotheses that state: (1) teams with newer venues have higher levels of environmental commitment, (2)

teams with LEED certified venues have higher levels of environmental commitment, and (3) teams with home venues sponsored by energy companies have higher levels of environmental commitment.

Figure 9: Big Four Venue Sponsorship by Industry and Overall Environmental Commitment



Source: Author's Calculations



Source: Author's Calculations

4.4.4 Team Characteristics

Levels of fan engagement are worth recognizing as it is plausible that greater environmental impacts can be realized with more fans; this is captured through attendance. Three measurements of 2016 or 2016-2017 home attendance figures are used: total attendance, average attendance, and attendance percentage. Total attendance figures are similar between the NBA and NHL, given that many games are played in multipurpose arenas between the two sports and the schedules contain the same number of games (82) in the season (ESPN, 2017 - "NBA Attendance Report – 2017"; ESPN, 2017 - "NHL Attendance Report – 2016-2017"). However, there are drastic differences in the number of games played by MLB teams (162) and NFL teams (16) (ESPN, 2017 - "MLB Attendance Report – 2016."; ESPN, 2017 - "NFL Attendance – 2016"). Thus, average attendance and attendance percentage might more accurately capture levels of fan engagement amongst leagues.

The average attendance across the Big Four leagues are represented in parentheses and are as follows: NFL (69,262), MLB (29,879), NBA (17,922), and NHL (17,500). Bivariate correlation analysis indicates that average attendance and attendance percentage have strong correlations with website, Twitter and overall environmental commitment values. Attendance percentage strongly correlates with greater website and overall environmental commitments as positive Pearson correlation coefficient values of 0.321 and 0.267 are respectively observed. Furthermore, attendance percentage strongly correlates with greater average attendance as positive Pearson correlation coefficient values of 0.239 and 0.188 are respectively observed. On the contrary, attendance percentage and average attendance in relation to Twitter environmental commitments yield strong, negative Pearson correlation coefficient values at -0.258 and -0.305 respectively. This suggest that as attendance increases, website and overall environmental

commitments decrease. However, these results are only observed through Twitter and more environmental commitments are recorded from websites and overall. Therefore, across more data, as attendance increases, environmental commitments are likely to increase.

The correlation between attendance and overall environmental commitment can be understood in relation to existing literature. In reference to PricewaterhouseCoopers (2016), Big Four attendance figures are indicative of either a competitive team, strong fan base and/or a robust local economy. It can also be argued that North American Big Four sports teams in the largest metropolitan areas inherently have an attendance advantage over teams in smaller markets (Noil, 2003). Thus, it is reasonable to believe that more competitive teams, loyal fan bases and/or stronger local economies are more likely to commit to the environment. However, analysis later in this chapter suggests that market size acts inversely in relation to environmental commitment.

It can be argued that teams of greater franchise value might have more readily available resources to invest in environmental programs, whereas teams of lesser franchise value might lack funding necessary for environmental initiatives. However, franchise value does not appear to influence environmental commitment, as indicated by the insignificant Pearson correlation coefficients for website (-0.001), Twitter (-0.159) and overall (-0.017) environmental commitments. All values are negative, indicating that as franchise value increases, environmental commitment decreases. However, the insignificant values suggest there is no relationship between franchise value and professional sports teams' ability to commit to the environment.

Environmental commitments expressed by teams are usually in relation to initiatives that occur in their respective metropolitan areas and with the support of those in the community (Babiak and Trendafilova, 2011). It is conceivable that teams with a longer tenure in their

respective metropolitan area have a greater propensity to have more developed environmental programs. Nevertheless, there are no differences in the levels of environmental commitment as expressed through websites (r=-0.007), Twitter (r=0.04) and overall (r=0.001) for teams that have operated for numerous years in a current location and teams that are newer to a location.

The ANOVA test results for team characteristics substantiate this research's hypothesis that states: teams with greater attendance have higher levels of environmental commitment. However, the ANOVA test results for team characteristics do not substantiate this research's hypotheses that state: (1) teams with greater franchise value have higher levels of environmental commitment, and (2) teams that have operated more years in a current location have higher levels of environmental commitment.

4.4.5 Geographic Location and Team Market Size

A major objective of place effect analysis is to identify trends according to geography. Comparing means of the environmental commitment of sports teams within and between regions in North America can explore whether geographic location is significant for professional sports teams' environmental commitment. American teams are assigned to one of four regions, defined by the United States Census Bureau: West, Midwest, South, and Northeast. Generally, there are no significant differences in levels of environmental commitment as expressed through either websites, Twitter or overall between the four regions. Much of the differences in the levels of environmental commitment by regions relate to Twitter environmental commitments.

The regional categorical variable (p=0.038), West (p=0.031) and South (p=0.095) regions record strong positive p-values and indicate significant differences in the levels of environmental commitment across Twitter. However, no website or overall environmental commitment values record strong ANOVA significance values, as all p-values fall between 0.114 and 0.995. Overall,

no significant findings across website and overall environmental commitments suggest there are few statistically significant relationships between location in a particular region and the level of Big Four sports teams' environmental commitment.

Densely populated metropolitan areas can play a vital role in influencing stakeholder attitudes and purchasing behaviour largely because of mass media capacity and communication power (Filizöz and Fisne, 2011). Additionally, professional sports teams located in large metropolitan areas are believed to have a competitive advantage over smaller market teams as they draw from a larger population base and television audience and are therefore typically more profitable (Holden Moss, 2014). With the above in mind, two metrics can be used to evaluate if the size of the population in a metropolitan area is related to professional sports teams' environmental commitment. Two variables are used: 2016 Metropolitan Area Population (or a total count of persons) and 2016 Civilian Population, which captures all metropolitan area residents who are sixteen years of age or over and are eligible to work in the United States.

There are significant differences in the levels of overall environmental commitment between teams in metropolitan areas with smaller populations than those in metropolitan areas with greater populations. 2016 metropolitan area population (r=-0.22) and 2016 total civilian population (r=-0.211) yield strong negative Pearson correlation coefficient values and indicate significant differences in the levels of overall environmental commitment. 2016 total civilian population (r=-0.201) and 2016 metropolitan area population (r=-0.205) indicate significant differences in the levels of website environmental commitments. Contrarily, 2016 metropolitan area population (r=-0.148) and 2016 total civilian population (r=-0.127) do not indicate significant differences in the levels of Twitter environmental commitments. Although significant differences are not observed across all primary dependent variables, significant differences are

observed across website and overall environmental commitments. Thus, across the majority of data, teams in cities with a smaller population are more likely to be environmental committed than teams in cities with greater populations.

The ANOVA test results for team market size substantiate this research's hypothesis that states: teams in cities with a greater population have higher levels of environmental commitment. However, the ANOVA test results for geographic location do not substantiate this research's hypothesis that states: teams in cities in the West region as defined by the United States Census Bureau have higher levels of environmental commitment.

4.4.6 Urban Sustainability Commitments

It is possible that teams in cities with demonstrated urban environmental commitments might have greater environmental commitments because of the expectation of place effects. Three different characteristics of urban sustainability commitments are examined. The first characteristic is the type of commitment – sustainability plan, green or environmental plan, and climate action plan. The second characteristic is the author of the plan, an indicator of city-level sustainability leadership: NGO, municipal government with a sustainability office, municipal government without a sustainability office, or a county-level government. Third, the contents of the various plans were analyzed according to their emphasis on past progress, future targets, or a combination of both. As part of a comparison of means ANOVA test, it makes little sense to assess cities with no sustainability plan, as Green Bay is the only city that does not have any form of known urban sustainability commitment, as expressed by having one of the three previously identified types of plans. Likewise, government publishers are included as the opposite binary entry for NGO publishers and are therefore excluded as an individual variable.

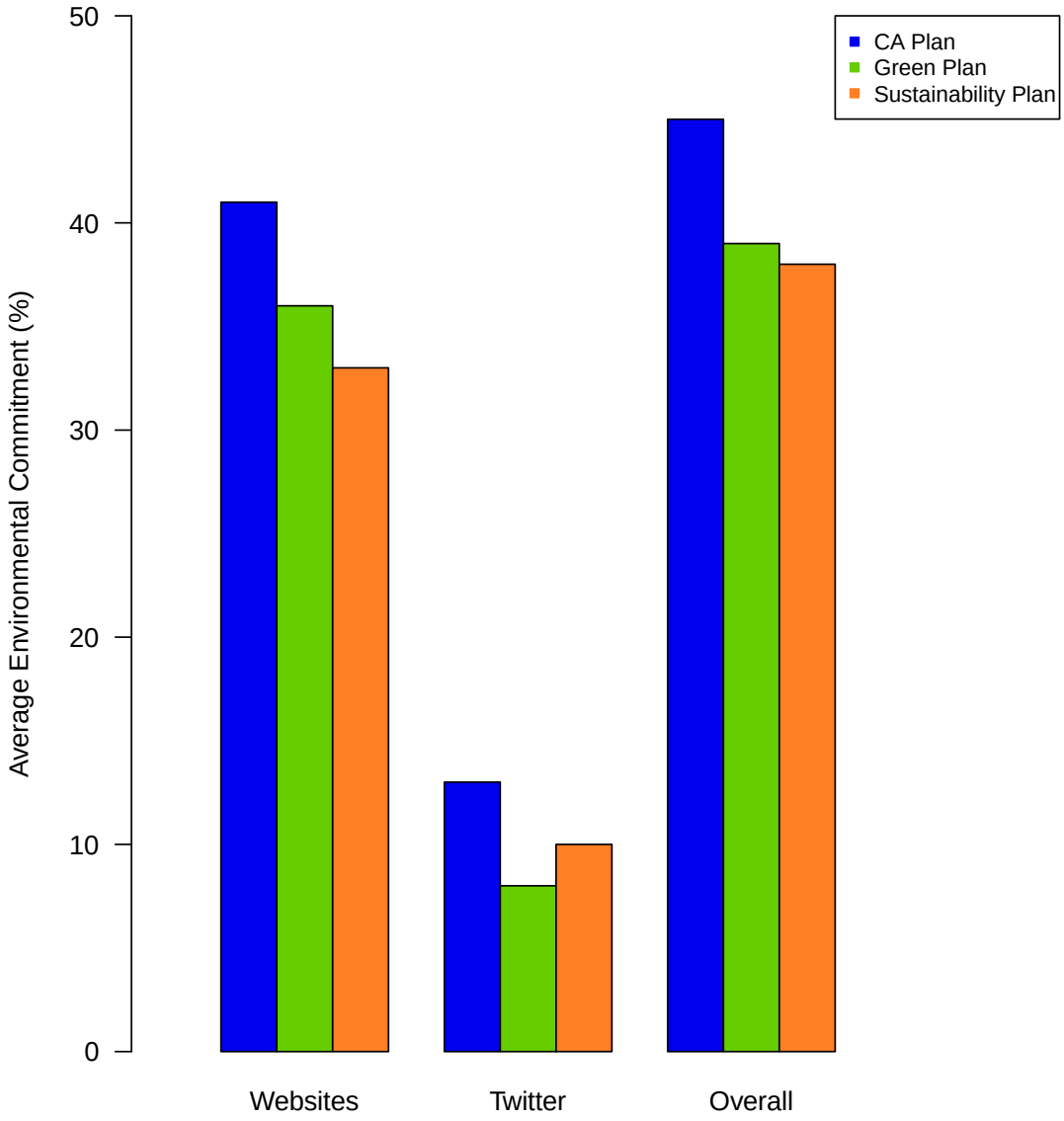
Figure 10 shows average environmental commitment by online source and urban sustainability commitment. One-way ANOVA tests were conducted to compare the effects of types, publishers and content of urban sustainability commitments on Big Four teams' environmental commitments. There are statistically significant differences in the levels of website ($p=0.096$), Twitter ($p=0.019$) and overall ($p=0.038$) environmental commitment between teams in metropolitan areas with a climate action plan than those without. Likewise, there are statistically significant differences for metropolitan areas with a sustainability plan across websites ($p=0.068$) and overall ($p=0.044$), but Twitter ($p=0.186$) remains insignificant. Despite strong findings across the majority of data, sustainability plans yield weak results across regression findings, which will be discussed later. There are no differences in the levels of environmental commitment as expressed through websites ($p=0.853$), Twitter ($p=0.171$) and overall ($p=0.929$) between teams in metropolitan areas with a green or environmental plan and teams without.

Likewise, there are no differences in the levels of environmental commitment as expressed through websites, Twitter and overall for Big Four sports teams' urban sustainability commitment publishers and the type of content delivered in these commitments. An ANOVA test yields significance values between 0.113 and 0.999 for all publisher and content variables in this study. Therefore, there is insufficient evidence across website, Twitter and overall ANOVA tests to believe there is a relationship between the publisher or content of urban sustainability commitments and Big Four teams' environmental commitments.

The ANOVA test results for urban sustainability commitments substantiate this research's hypothesis that states: teams in cities with a climate action plan have higher levels of environmental commitment. However, the ANOVA results for urban sustainability commitments

do not substantiate this research's hypotheses that state: (1) teams in cities with urban sustainability commitments published by a municipal government with a sustainability office have higher levels of environmental commitment, and (2) teams in cities with urban sustainability commitments that outline future targets have higher levels of environmental commitment.

Figure 10: Average Environmental Commitments by Urban Sustainability Commitment Type



Source: Author's Calculations

4.4.7 Socioeconomic Conditions

To further understand environmental commitment among Big Four sports teams, the place-based characteristics of the metropolitan areas are analyzed in relation to the three dependent variables. The first group of socioeconomic analysis evaluates: unemployment rate, median income, and percentage of the population below the poverty level. The results of bivariate correlation analyses suggest there are insignificant relationships between unemployment rate (website r=0.034, Twitter r=0.021, overall r=0.033), median income (website r=-0.018, Twitter r=0.19, overall r=0.022) and percentage below poverty level (website r=-0.102, Twitter r=-0.013, overall r=-0.108) and teams' environmental commitments.

A bivariate analysis of dependent and educational attainment variables provides a more thorough understanding of the people in Big Four metropolitan areas. Two primary educational attainment variables from the United States Census Bureau include the percentage of the civilian population with a high school diploma or higher and percentage of the working population with a bachelor's degree or higher. Bivariate correlation analysis among these independent variables and two of the three primary dependent variables yield differences in the levels of environmental commitment as expressed through websites (r=-0.204) and overall (r=0.217) for teams in metropolitan areas with a greater percentage of the population who have attained a high school diploma of higher. Twitter (r=0.095) does not yield strong differences in the levels of environmental commitment for the above variable. Despite strong values across websites and overall, regression results (as discussed later) suggest otherwise. Likewise, there are no significant differences found across websites (r=-0.033), Twitter (r=0.075) and overall (r=-0.007) that influence the environmental commitment of teams in metropolitan areas with more or fewer citizens who have attained a bachelor's degree or higher. Thus, there are insufficient findings

across websites, Twitter and overall that might indicate that education of civilians in metropolitan areas influence sports teams' environmental commitments.

A complete assessment of place characteristics must interpret the dominant occupations in metropolitan areas. From bivariate correlation analyses, there are no significant differences in the levels of environmental commitment as expressed through websites (r=-0.124), Twitter (r=-0.122) and overall r=-0.134) between those teams in metropolitan areas with more industry manufacturing occupations or fewer industry manufacturing occupations. Similarly, there are no significant differences in the levels of environmental commitment as expressed through websites, Twitter and overall between teams in metropolitan areas with greater percentages of certain occupations or smaller percentages of certain occupations.

A bivariate correlation test yields Pearson correlation coefficient values between -0.097 and 0.093. Therefore, all Pearson correlation coefficient values for occupation variables yield weak significance. Across website, Twitter and overall environmental commitment, Management, Business, Science and Arts occupations as well as Production, Transportation and Material Moving occupations all have weak positive values, whereas the other three occupation variables are all negative. Nonetheless, from bivariate correlation analyses of the socioeconomic variables, there is no statistical significance to believe occupations and industry manufacturing occupations influence environmental commitment of Big Four sports teams. Overall, the ANOVA test results for socioeconomic conditions do not substantiate this research's hypothesis that states: teams in cities with stronger socioeconomic conditions have higher levels of environmental commitment.

4.5 Regression Analysis

This section further evaluates the relationship between Big Four teams' levels of environmental commitment and the various organizational (peer) and geographic (place) factors that may influence teams. Table 6 shows the descriptive statistics associated with each of the independent variables used in the analysis. All of the regression models include a set of control variables (MLB, NBA, NHL and 2016 Metropolitan Population), since the earlier analysis revealed statistically significant differences by league and population size.

The remaining independent variables were assigned to groups (or blocks) related to either organizational (peer) or geographic (place) factors, which include:

- External Influences (Peer): GSA Membership, Number of Teams in City, Number of Leagues in City, and Number of Teams from the Same League in the Same City
- Team Characteristics (Peer): Average Attendance, Attendance Percentage, Number of Years in a Current Location, and Franchise Value
- Venue Features (Peer): LEED Certification, Venue Age, Energy Sponsor, Food and Beverage Sponsor, No Sponsor, Other Sponsor, Retail Trade Sponsor, Telecommunications Sponsor, and Transportation Sponsor
- Urban Sustainability Commitments (Place): Sustainability Plan, Green/Environmental Plan, Climate Action Plan, NGO Publisher, Content - Progress Report, and Content - Future Report
- Socioeconomic - Industry (Place): Unemployment Rate, Median Income, Percentage Below Poverty Level, and Percentage of Industry Manufacturing Occupations
- Socioeconomic - Human (Place): Education - Bachelor's Degree, Percentage of Management, Business, Science and Arts Occupations, Percentage of Service Occupations, Percentage of Sales and Office Occupations, Percentage of Natural

Resources, Construction and Maintenance Occupations, and Percentage of Production, Transportation and Material Moving Occupations

Ordinary least squares (OLS) multivariate regression analysis is used to explore the relative important of these various peer and place effects, for each of the three dependent variables capturing environmental commitment. To predict the relative importance of peer and place factors, three regression models were used: peer effects, place effects, and a final model that accounted for both peer and place related factors. Included for each group of regressions are systematic analyses for all groups of variables, plus a final model that combined all of the variables. Each of these groups of regression models are discussed below.

4.5.1 Peer Effect Multivariate Regression Analysis

Multivariate regressions were conducted to compare the effect of peer and organizational factors on Big Four teams' environmental commitment. The Peer Effect multivariate regression model consists of variables from the following regression blocks: External Influences, Team Characteristics, and Venue Features. Results for the Peer Effect overall models can be observed for website environmental commitment (Table 7), Twitter environmental commitment (Table 8) and overall environmental commitment (Table 9). Only the Twitter environmental commitment model (r^2=0.205, p=0.088) was significant overall. The overall environmental commitment (r^2=0.244, p=0.753) and website environmental commitment (r^2=0.348, p=0.932) models were not statistically significant.

In each of the peer effect models, most of the control variables were significant. This includes the NHL being significant for the Peer Effect overall model across website and overall environmental commitments and MLB, the NBA and 2016 Metropolitan Area Population being

significant for Twitter environmental commitment. In terms of the External Influence factors, the results across all three models suggest the GSA (p=0.009) is only significant in the Twitter environmental commitment model and is excluded in the other two. At least two of the four external influence variables are excluded in each model, as no one variable appears in all three models.

In terms of the Team Characteristic factors, the results across all three models suggest that Average Attendance is significant in the website (p=0.015) and overall (p=0.014) environmental commitment models. However, the variable is excluded in the Twitter environmental commitment model. For Venue Features, results across all three models suggest that the Other Sponsor is somewhat significant in the website (p=0.098) and overall (p=0.093) environmental commitment models. Food and Beverage Sponsor is only significant in the Venue Features model (p=0.038). All Venue Feature variables are excluded from the Twitter environmental commitment block, leaving only the control variables.

For the Peer (Overall) factors, the results across all three models suggest that Average Attendance is very significant for the website (p=0.005) and overall (p=0.01) environmental commitment models. Food and Beverage Venue Sponsor (p=0.041) and Transportation Venue Sponsor (p=0.024) are also significant in the website environmental commitment model. Only the GSA (p=0.007) is significant in the Twitter environmental commitment block, however, this variable is excluded from the other two blocks. Transportation Venue Sponsor (p=0.099) is also significant in the overall environmental commitment model. As a result, after controlling for league and population size for peer effect variables, Average Attendance (or fan engagement) is the only important influencer on a team's level of environmental commitment.

4.5.2 Place Effect Multivariate Regression Analysis

Multivariate regressions were conducted to compare the effect of place or geographical factors on Big Four teams' environmental commitment. The Place Effect multivariate regression model consists of variables from the following regression blocks: Urban Sustainability Commitments, Socioeconomic – Industry, and Socioeconomic - Human. Results for the Place Effect overall models can be observed for website environmental commitment (Table 10), Twitter environmental commitment (Table 11) and overall environmental commitment (Table 12). The overall environmental commitment (r^2=0.186, p=0.003) and website environmental commitment (r^2=0.262, p=0.001) models were significant overall. Only the Twitter environmental commitment model (r^2=0.217, p=0.102) is not statistically significant.

In each of the place effect models, most of the control variables were significant. This includes the NBA and MLB, with the former significant in all blocks and the latter significant in all but one, the Place Effect (Overall) model for website environmental commitment. The NHL is significant in all Twitter environmental commitment blocks and 2016 Metropolitan Area Population is only significant in the Urban Sustainability Commitments and Industry blocks for website and overall environmental commitment. In terms of the Urban Sustainability Commitment factors, the results across all three models suggest that Climate Action Plan is significant across website (p=0.091) and overall (p=0.046) environmental commitment models and is excluded in the Twitter environmental commitment model. NGO Publisher (p=0.091) is also significant in the Urban Sustainability Commitments block for website environmental commitment.

For the Socioeconomic - Industry factors, the results across all three models suggest that no variables are significant. Median Income is the only variable not to be excluded across all

models and Percentage Below Poverty Level is also not excluded for Twitter environmental commitment. However, both variables are insignificant in the blocks they are included in. In terms of the Socioeconomic - Human factors, the results across all three models suggest that Percentage of Natural Resources, Construction and Maintenance Occupations (p=0.039) and Percentage of Production, Transportation and Material Moving Occupations (p=0.066) are significant in the Twitter environmental commitment model. All other variables are either excluded or insignificant in this block.

For the Place (Overall) factors, the results across all three models suggest NGO Publisher (p=0.041) is significant in the website environmental commitment model. The following variables for the Twitter environmental commitment model are significant: Green/Environmental Plan (p=0.061), Content - Future Report (p=0.048), Median Income (p=0.094), Education - Bachelor's Degree (p=0.095), Percentage of Natural Resources, Construction and Maintenance Occupations (p=0.033), and Percentage of Production, Transportation and Material Moving Occupations (p=0.051). Only Climate Action Plan (p=0.089) and NGO Publisher (p=0.082) are significant variables in the overall environmental commitment model. As a result, after controlling for league and population size for place effect variables, Climate Action Plan is the only important influencer on a team's level of environmental commitment.

4.5.3 Peer and Place Effect Multivariate Regression Analysis

Multivariate regressions were conducted to compare the effect of both peer and place factors on Big Four teams' environmental commitment. The Peer and Place Effect multivariate regression model consists of variables from the following regression all blocks including: External Influences, Team Characteristics, and Venue Features, Urban Sustainability Commitments,

Socioeconomic – Industry, and Socioeconomic - Human. Results for the Peer and Place Effect overall models can be observed for website environmental commitment (Table 13), Twitter environmental commitment (Table 14) and overall environmental commitment (Table 15). Both the website environmental commitment (r^2=0.446, p=0.099) and Twitter environmental commitment (r^2=0.276, p=0.018) models are significant overall. Only the overall environmental commitment model (r^2=0.358, p=0.134) is not statistically significant.

In each of the Peer and Place Effect (Overall) models, most of the control variables were significant. This includes the NBA and NHL being significant in all models. MLB (p=0.088) and 2016 Metropolitan Area Population (p=0.067) are both significant in the website environmental commitment model and MLB (p=0.079) is also significant in the Twitter environmental commitment model. In terms of the peer and place effect variables in the Peer and Place Effect models, more included variables are significant than not. This is because all variables were first entered into the Peer and Place Effect overall models using the backward method. Insignificant variables were excluded and significant variables were noted and then reentered using the enter method. After controlling for league and population size for both peer and place effect variables, Average Attendance and Climate Action Plan were the only important influencers on a team's level of environmental commitment.

The results across all three models suggest Average Attendance is significant for overall (p=0.001) and website (p=0.0001) environmental commitment models but is excluded in the Twitter environmental commitment model. Climate Action Plan follows similar trends, as the variable is significant for overall (p=0.005) and website (p=0.012) environmental commitment models but is excluded in the Twitter environmental commitment model. Education - Bachelors

and Percentage of Natural Resources, Construction and Maintenance Occupations are the only two variables significant across all three Peer and Place Effect models.

Table 9: Descriptive Statistics for Dependent and Independent Variables

Variable	Counts	Mean	Median	Standard Deviation	Minimum	Maximum
Website Environmental Commitment (Counts)	122	40.93	36.5	21.37	0	105
Website Environmental Commitment (%)	122	36	32	19	0	91
Twitter Environmental Commitment (Counts)	122	11.75	10	7.78	0	46
Twitter Environmental Commitment (%)	122	10	9	7	0	40
Overall Environmental Commitment (Counts)	122	44.70	42	19.87	5	105
Overall Environmental Commitment (%)	122	39	37	17	4	91
League (Categorical)	122	2.52	3	1.13	1	4
MLB	30	0.25	0	0.43	0	1
NBA	30	0.25	0	0.43	0	1
NFL	32	0.26	0	0.44	0	1
NHL	30	0.25	0	0.43	0	1
Teams in the City	49	2.67	2	1.85	1	9
Leagues in the City	49	2.39	2	1.24	1	4
Teams from the Same League in the City	4	0.08	0	0.28	0	1
Years in Current Location	122	51.91	50	29.7	0	136
GSA Membership	94	0.77	1	0.42	0	1
LEED Venue	18	0.15	0	0.36	0	1
Urban Sustainability Commitments (Categorical)	49	1.71	1	1.19	0	6
No Sustainability Plan	1	0.02	0	0.14	0	1
Sustainability Plan	33	0.67	1	0.47	0	1
Green/Environmental Plan	8	0.16	0	0.37	0	1
Climate Action Plan	11	0.22	0	0.42	0	1
Commitment Publisher - NGO	3	0.06	0	0.25	0	1
Commitment Publisher - City Government with Sustainability Office	30	0.63	1	0.49	0	1
Commitment Publisher - City Government Without Sustainability Office	11	0.23	0	0.43	0	1
Commitment Publisher - County Government	5	0.10	0	0.31	0	1

Commitment Publisher - Government	45	0.94	1	0.25	0	1
Commitment Content - Progress	20	0.42	0	0.50	0	1
Commitment Content - Future	19	0.40	0	0.49	0	1
Regions (Categorical)	49	4.39	2	1.06	1	4
Region - West	13	0.27	0	0.45	0	1
Region - Midwest	12	0.25	0	0.43	0	1
Region - South	16	0.33	0	0.47	0	1
Region - Northeast	7	0.14	0	0.35	0	1
Venue Sponsorship (Categorical)	122	3.34	3	2.31	0	7
Venue Sponsorship - Energy Efficiency	4	0.03	0	0.18	0	1
Venue Sponsorship - Finance and Insurance	39	0.32	0	0.47	0	1
Venue Sponsorship - Food and Beverage	13	0.11	0	0.31	0	1
Venue Sponsorship - No Sponsor	17	0.14	0	0.35	0	1
Venue Sponsorship - Other	4	0.03	0	0.18	0	1
Venue Sponsorship - Retail Trade	17	0.14	0	0.35	0	1
Venue Sponsorship - Telecommunication	10	0.08	0	0.28	0	1
Venue Sponsorship - Transportation	18	0.15	0	0.36	0	1
2016 Total Attendance	122	1099580	739573	833432.66	382088	3703312
2016 Average Attendance	122	34225.3	21346.5	22286.26	11776	92539
2016 Attendance Percentage (%)	122	89	94	16	40	116
Venue Age (Years)	122	22.52	18	18.42	0	105
Franchise Value (Billions USD)	122	1.52	1.23	0.95	0.23	4.8
June 2017 Unemployment Rate (%)	42	4	4	1	3	6
2016 Median Income (USD)	42	64871.4	66200.5	9694	45219	87611
2016 Percentage Below Poverty Level (%)	42	12.5	12.9	2.36	8.4	19.4
2016 Percentage with High School Diploma or Higher (%)	42	88.4	88.9	3.46	79.9	93.5
2016 Percent with Bachelor's Degree or Higher (%)	42	36.4	34.6	6.14	25.6	50.2
2016 Metropolitan Population	122	1244658.84	681170	1559543.23	105139	8537673
2016 Total Civilian Population	42	1895972.93	1228502.5	1766402.95	167708	9848725
Industry Manufacturing Occupations (%)	42	9.6	9.3	4	2.8	21.1

2016 Management, Business, Science or Arts Occupations (%)	42	27.3	18.3	25.6	2	85.3
2016 Service Industry Occupations (%)	42	11.6	8	11.7	0.9	66.2
2016 Percentage of Sales and Office Occupations (%)	42	15,6	10.5	14.4	1.4	80
2016 Natural Resources, Construction and Maintenance Occupations (%)	42	5.1	3.5	4.5	0.6	23.7
2016 Production, Transportation and Material Moving Occupations (%)	42	7	4.6	6.5	1	31.4

Source: Author's Calculations

Table 10: Peer Effect Multivariate Regression for Website Environmental Commitment

	Control			External			Team			Venue			Peer (Overall)		
	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P
External															
GSA															
Teams in City				0.042	0.156	0.877							-0.054	-0.199	0.843
Leagues in City				-0.128	-0.78	0.437							-0.065	-0.393	0.695
Teams in Same League															
Team															
Average Attendance							0.784	2.463	0.015				0.938	2.864	0.005
Attendance Percentage															
Years Current Location															
Franchise Value															
Venue															
LEED Venue															
Venue Age															
Energy Sponsor										-0.079	-0.982	0.328	-0.101	-1.294	0.199
Food/Beverage Sponsor										-0.174	-2.099	0.038	-0.167	-2.075	0.041
No Sponsor															
Other Sponsor										-0.135	-1.671	0.098	-0.074	-0.932	0.354
Retail Trade Sponsor										-0.003	-0.031	0.975	-0.032	-0.373	0.71
Telecom Sponsor										-0.112	-1.388	0.168	-0.186	-2.284	0.024
Transportation Sponsor															
Control															
MLB	-0.436	-4.544	0.0001	-0.429	-4.453	0.0001	0.166	0.635	0.527	-0.439	-4.51	0.001	0.271	1.006	0.317
NBA	-0.388	-4.042	0.0001	-0.397	-4.111	0.0001	0.389	1.183	0.239	-0.389	-4.081	0.0001	0.499	1.468	0.145
NHL	0.062	0.651	0.517	0.068	0.716	0.476	0.802	2.55	0.012	0.046	0.487	0.627	0.926	2.888	0.005
2016 Metro Population	-0.205	-2.538	0.013	-0.194	-1.014	0.313	-0.244	-3.024	0.003	-0.234	-2.883	0.005	-0.213	-1.104	0.272
Overall Values															
n	112			112			112			112			112		
Adjusted R-Squared	0.269			0.266			0.302			0.294			0.348		
T	15.771			9.629			0.169			15.409			0.086		
P-Value	0.0001			0.0001			0.866			0.0001			0.932		

$p < 0.05$
$0.1 > p > 0.05$
Excluded

Source: Author's Calculations

Table 11: Peer Effect Multivariate Regression for Twitter Environmental Commitment

	Control			External			Team			Venue			Peer (Overall)		
	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P
External															
GSA				0.266	2.672	0.009							0.273	2.734	0.007
Teams in City															
Leagues in City															
Teams in Same League															
Team															
Average Attendance															
Attendance Percentage							-0.168	-1.155	0.251				-0.187	-1.322	0.189
Years Current Location															
Franchise Value							0.167	1.035	0.303				0.177	1.133	0.26
Venue															
LEED Venue															
Venue Age															
Energy Sponsor															
Food/Bev Sponsor															
No Sponsor															
Other Sponsor															
Retail Trade Sponsor															
Telecom Sponsor															
Transportation Sponsor															
Control															
MLB	0.451	4.381	0.0001	0.341	3.155	0.002	0.398	2.804	0.006	0.451	4.381	0.0001	0.276	1.905	0.059
NBA	0.393	3.82	0.0001	0.423	4.199	0.0001	0.465	3.566	0.0001	0.393	3.82	0.0001	0.499	3.924	0.0001
NHL	0.228	2.238	0.027	0.125	1.181	0.24	0.361	2.137	0.035	0.228	2.238	0.027	0.264	1.573	0.199
2016 Metro Population	-0.14	1.622	0.108	-0.141	-1.674	0.097	-0.181	-1.862	0.065	-0.14	1.622	0.108	-0.184	-1.948	0.054
Overall Values															
n	112			112			112			112			112		
Adjusted R-Squared	0.16			0.204			0.157			0.16			0.205		
T	5.737			2.875			2.047			5.737			1.719		
P-Value	0.0001			0.005			0.043			0.0001			0.088		

$p < 0.05$
$0.1 > p > 0.05$
Excluded

Source: Author's Calculations

	Control			External			Team			Venue			Peer (Overall)		
	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P
External															
GSA															
Teams in City				0.106	0.378	0.706							0.061	0.221	0.826
Leagues in City				-0.148	-0.856	0.394							-0.12	-0.711	0.479
Teams in Same League															
Team															
Average Attendance							0.83	2.496	0.014				0.927	2.635	0.01
Attendance Percentage															
Years Current Location															
Franchise Value															
Venue															
LEED Venue															
Venue Age															
Energy Sponsor										-0.083	-0.983	0.328	-0.089	-1.072	0.286
Food/Beverage Sponsor															
No Sponsor															
Other Sponsor										-0.143	-1.694	0.093	-0.088	-1.029	0.306
Retail Trade Sponsor															
Telecom Sponsor										-0.077	-0.905	0.367	-0.144	-1.664	0.099
Transportation Sponsor															
Control															
MLB	-0.347	-3.465	0.001	-0.341	-3.381	0.001	0.29	1.06	0.291	-0.385	-3.797	0.0001	0.336	1.164	0.247
NBA	-0.31	3.087	0.003	-0.317	-3.133	0.002	0.513	1.492	0.139	-0.323	-3.233	0.002	0.593	1.632	0.106
NHL	0.092	0.929	0.355	0.098	0.986	0.327	0.876	2.665	0.009	0.072	0.729	0.467	0.948	2.753	0.007
2016 Metro Population	-0.219	-2.598	0.011	-0.254	-1.27	0.207	-0.261	-3.102	0.002	-0.222	-2.63	0.01	-0.282	-1.442	0.152
Overall Values															
n	112			112			112			112			112		
Adjusted R-Squared	0.201			0.195			0.238			0.21			0.244		
T	16.558			9.927			0.269			16.46			0.315		
P-Value	0.0001			0.0001			0.789			0.0001			0.753		

$p < 0.05$
$0.1 > p > 0.05$
Excluded

Source: Author's Calculations

Table 12: Peer Effect Multivariate Regression for Overall Environmental Commitment

Table 13: Place Effect Multivariate Regression for Website Environmental Commitment

	Urban Sustainability Commitments			Industry			Human			Place (Overall)		
	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P
Urban Commitment												
Sustainability Plan												
Green/Enviro Plan												
Climate Action Plan	0.144	1.706	0.091							0.161	1.624	0.108
Publisher - NGO	-0.151	-1.706	0.091							-0.198	-2.067	0.041
Content - Progress	-0.033	-0.33	0.742							-0.026	-0.246	0.806
Content - Future	-0.008	-0.076	0.939							0.042	0.367	0.715
Industry												
Unemployment Rate												
Median Income				0.009	0.104	0.917				0.138	0.614	0.541
Percent Below Poverty												
Industry % Manu												
Human												
Education - Bachelors							0.036	0.238	0.812	-0.21	-0.807	0.421
OCC % - Management							-0.538	-0.609	0.544	-0.347	-0.377	0.707
OCC % - Service							0.943	1.123	0.364	0.75	0.851	0.397
OCC % - Sales												
OCC % - Natural Resources							-0.452	-1.014	0.313	-0.364	-0.759	0.45
OCC % - Production												
Control												
MLB	-0.442	-4.565	0.0001	-0.436	-4.503	0.0001	-0.433	-4.421	0.0001	-0.44	-4.457	0.448
NBA	-0.374	-3.865	0.0001	-0.387	3.994	0.0001	-0.387	-3.978	0.0001	-0.385	-3.902	0.0001
NHL	0.076	0.794	0.429	0.061	0.64	0.524	0.056	0.585	0.56	0.075	0.772	0.442
2016 Metro Population	-0.188	-1.994	0.049	-0.207	-2.506	0.014	-0.183	-0.601	0.549	-0.232	-0.751	0.454
Overall Values												
n	112			112			112			112		
Adjusted R-Squared	0.279			0.26			0.254			0.262		
T	9.812			5.677			2.95			3.318		
P-Value	0.0001			0.0001			0.004			0.001		

$p < 0.05$
$0.1 > p > 0.05$
Excluded

Source: Author's Calculations

Table 14: Place Effect Multivariate Regression for Twitter Environmental Commitment

	Urban Sustainability Commitments			Industry			Human			Place (Overall)		
	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P
Urban Commitment												
Sustainability Plan												
Green/Enviro Plan	-0.135	-1.542	0.126							-0.173	-1.893	0.061
Climate Action Plan												
Publisher - NGO												
Content - Progress												
Content - Future	0.148	1.643	0.103							0.18	1.988	0.048
Industry												
Unemployment Rate												
Median Income				0.065	0.477	0.634				0.382	1.692	0.094
Percent Below Poverty				-0.059	-0.42	0.675				-0.204	-1.185	0.239
Industry % Manu												
Human												
Education - Bachelors							0.114	1.288	0.201	-0.474	-1.686	0.095
OCC % - Management												
OCC % - Service												
OCC % - Sales												
OCC % - Natural Resources							-0.744	-2.094	0.039	-0.764	-2.168	0.033
OCC % - Production							0.565	1.857	0.066	0.59	1.979	0.051
Control												
MLB	0.444	4.323	0.0001	0.446	4.315	0.0001	0.444	4.326	0.0001	0.447	3.321	0.0001
NBA	0.37	3.592	0.0001	0.404	3.88	0.0001	0.402	3.928	0.0001	0.376	3.696	0.0001
NHL	0.232	2.282	0.025	0.225	2.206	0.03	0.222	2.2	0.03	0.239	2.399	0.018
2016 Metro Population	-0.123	-1.343	0.182	-0.135	-1.337	0.184	0.034	0.151	0.88	0.086	0.384	0.702
Overall Values												
n	112			112			112			112		
Adjusted R-Squared	0.181			0.157			0.177			0.217		
T	4.743			0.739			0.746			1.649		
P-Value	0.0001			0.461			0.458			0.102		

$p < 0.05$
$0.1 > p > 0.05$
Excluded

Source: Author's Calculations

Table 15: Place Effect Multivariate Regression for Overall Environmental Commitment

	Urban Sustainability Commitments			Industry			Human			Place (Overall)		
	Beta	T	P	Beta	T	P	Beta	T	P	Beta	T	P
Urban Commitment												
Sustainability Plan												
Green/Enviro Plan												
Climate Action Plan	0.179	2.021	0.046							0.179	1.716	0.089
Publisher - NGO	-0.132	-1.43	0.156							-0.179	-1.757	0.082
Content - Progress	-0.028	-0.264	0.793							-0.026	-0.231	0.818
Content - Future	0.01	0.086	0.932							0.061	0.507	0.613
Industry												
Unemployment Rate												
Median Income				0.04	0.467	0.641				0.174	0.738	0.462
Percent Below Poverty												
Industry % Manu												
Human												
Education - Bachelors							0.072	0.447	0.656	-0.19	-0.687	0.493
OCC % - Management							-0.602	-0.649	0.517	-0.488	-0.504	0.615
OCC % - Service							1.057	1.135	0.259	0.829	0.846	0.4
OCC % - Sales												
OCC % - Natural Resources							-0.549	-1.129	0.262	-0.454	-0.873	0.385
OCC % - Production							0.085	0.247	0.639	0.126	0.369	0.713
Control												
MLB	-0.349	-3.458	0.001	-0.349	-3.449	0.001	-0.346	-3.37	0.001	-0.348	-3.36	0.001
NBA	-0.293	-2.902	0.005	-0.307	-3.449	0.001	-0.307	-3.008	0.003	-0.302	-2.914	0.004
NHL	0.113	1.127	0.262	0.091	0.909	0.365	0.084	0.836	0.405	0.11	1.077	0.284
2016 Metro Population	-0.184	-1.872	0.064	-0.225	-2.616	0.01	-0.185	-0.567	0.572	-0.211	-0.638	0.525
Overall Values												
n	112			112			112			112		
Adjusted R-Squared	0.214			0.193			0.18			0.186		
T	10.103			5.633			2.84			3.057		
P-Value	0.0001			0.0001			0.005			0.003		

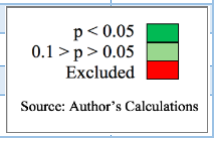


Table 16: Peer and Place Effect Multivariate Regression for Website Environmental Commitment

Variables	Peer and Place		
External	Beta	T	P
GSA			
Teams in City	-1.497	-3.035	0.003
Leagues in City	0.744	2.94	0.004
Teams in Same League			
Team			
Average Attendance	1.255	3.967	0.0001
Attendance Percentage			
Years in Current Location			
Franchise Value			
Venue			
LEED Venue			
Venue Age			
Energy Sponsor	-0.199	-2.489	0.015
Food and Beverage Sponsor	-0.152	-1.89	0.062
No Sponsor			
Other Sponsor	-0.248	-2.891	0.005
Retail Trade Sponsor	-1.68	-1.882	0.063
Telecommunications Sponsor	-0.194	-2.458	0.016
Transportation Sponsor			
Urban Sustainability Commitments			
Sustainability Plan			
Green/Enviro Plan			
Climate Action Plan	0.238	2.569	0.012
Publisher - NGO	-0.25	-2.68	0.009
Content - Progress	0.237	1.861	0.066
Content - Future	0.338	2.841	0.006
Industry			
Unemployment Rate			
Median Income	0.769	3.095	0.003
Percent Below Poverty			
Industry % Manufacturing			
Human			
Education - Bachelors	-0.476	-1.965	0.052
OCC % - Management	-3.318	-3.114	0.002
OCC % - Service	4.636	3.397	0.001
OCC % - Sales			
OCC % - Natural Resources	-1.318	2.385	0.019
OCC % - Production			
Control			
MLB	0.448	1.724	0.088
NBA	0.834	2.517	0.014
NHL	1.225	3.998	0.0001
2016 Metropolitan Area Population	0.68	1.855	0.067
Overall Values			
n	112		
Adjusted R-Squared	0.446		
T	-1.668		
P-Value	0.099		

$p < 0.05$
$0.1 > p > 0.05$
Excluded

Source: Author's Calculations

Table 17: Peer and Place Effect Multivariate Regression for Twitter Environmental Commitment

Variables	Peer and Place		
External	Beta	T	P
GSA	0.294	2.971	0.004
Teams in City			
Leagues in City			
Teams in Same League			
Team			
Average Attendance			
Attendance Percentage	-0.253	-1.713	0.09
Years in Current Location			
Franchise Value	0.261	1.439	0.153
Venue			
LEED Venue			
Venue Age			
Energy Sponsor			
Food/Beverage Sponsor			
No Sponsor			
Other Sponsor			
Retail Trade Sponsor			
Telecom Sponsor			
Transportation Sponsor			
Urban Sustainability Commitments			
Sustainability Plan			
Green/Enviro Plan	-0.18	-2.031	0.045
Climate Action Plan			
Publisher - NGO			
Content - Progress			
Content - Future	0.146	1.636	0.105
Industry			
Unemployment Rate			
Median Income	0.355	1.631	0.106
Percent Below Poverty	-0.301	-1.784	0.078
Industry % Manufacturing			
Human			
Education - Bachelors	-0.608	-2.213	0.029
OCC % - Management			
OCC % - Service			
OCC % - Sales			
OCC % - Natural Resources	-0.885	-2.55	0.012
OCC % - Production	0.693	2.387	0.019
Control			
MLB	0.261	1.774	0.079
NBA	0.532	4.018	0.0001
NHL	0.34	1.862	0.066
2016 Metropolitan Area Population	0.067	0.302	0.763
Overall Values			
n	112		
Adjusted R-Squared	0.276		
T	2.414		
P-Value	0.018		

$p < 0.05$
$0.1 > p > 0.05$
Excluded

Source: Author's Calculations

Table 18: Peer and Place Effect Multivariate Regression for Overall Environmental Commitment

Variables	Peer and Place		
External	Beta	T	P
GSA			
Teams in City	-1.855	-3.289	0.001
Leagues in City	0.814	2.914	0.004
Teams in Same League			
Team			
Average Attendance	1.159	3.43	0.001
Attendance Percentage			
Years in Current Location			
Franchise Value			
Venue			
LEED Venue			
Venue Age			
Energy Sponsor	-0.178	-2.104	0.038
Food and Beverage Sponsor			
No Sponsor			
Other Sponsor	-0.235	-2.595	0.011
Retail Trade Sponsor			
Telecom Sponsor	-0.131	-1.563	0.122
Transportation Sponsor			
Urban Sustainability Commitments			
Sustainability Plan			
Green/Enviro Plan			
Climate Action Plan	0.28	2.888	0.005
Publisher - NGO	-0.261	-2.63	0.01
Content - Progress	0.239	1.812	0.073
Content - Future	0.359	2.872	0.005
Industry			
Unemployment Rate			
Median Income	0.847	3.272	0.002
Percent Below Poverty			
Industry % Manufacturing			
Human			
Education - Bachelors	-0.476	-1.848	0.068
OCC % - Management	-3.133	-2.829	0.006
OCC % - Service	4.756	3.334	0.001
OCC % - Sales			
OCC % - Natural Resources	-1.711	-2.729	0.008
OCC % - Production	0.438	1.336	0.185
Control			
MLB	0.455	1.632	0.106
NBA	0.823	2.34	0.021
NHL	1.178	3.596	0.001
2016 Metropolitan Area Population	0.658	1.631	0.106
Overall Values			
n	112		
Adjusted R-Squared	0.358		
T	-1.51		
P-Value	0.134		

$p < 0.05$
$0.1 > p > 0.05$
Excluded

Source: Author's Calculations

5.0 Discussion and Conclusion

This thesis has explored the environmental commitment levels of North American Big Four sports teams and evaluated the organizational and geographic factors that influenced the levels of environmental commitment. Owing to the strong interest for sports, fan loyalty, and teams' economic and social leverage, professional sports can be a powerful platform capable of promoting positive action and mitigating impacts toward the natural environment. Results of qualitative content analyses of both 122 official team websites and verified team Twitter accounts were delivered as well as overall findings inclusive of the two online platforms.

5.1 Factors of Influence

In summary, all Big Four sports teams commit to the environment through either team websites or Twitter accounts. To understand these commitments, a number of influencing factors were analyzed that organize into the following types: external influences, team characteristics, venue features, urban sustainability commitments, and metropolitan socioeconomic conditions. The analysis showed that Big Four teams' environmental commitments are influenced by the following factors: Green Sports Alliance membership, greater attendance, a smaller metropolitan area population, and host city with a climate action plan.

Green Sports Alliance membership speaks to the organizational commitment of teams to leverage their influence and to rely on consultation expertise from leading sustainability-and-sports experts. Since the GSA relies on developing unique eco-friendly solutions for each team, it is possible that the most impactful initiatives or practices are undertaken by GSA members. In addition, the GSA's experience integrating holistic sustainability efforts ensures teams approach

sustainability from all angles. This might explain as to why GSA members are more environmentally committed.

Teams with high attendance should be diligent in integrating sustainability into their operations to maximize cost savings. A consequence of accommodating more fans in a venue is they inherently require more direction and coordination across diverse sectors that could impact the environment such as waste management. It is plausible that teams with greater attendance also have greater foresight in terms of mitigating environmental impacts, or that fan engagement in the team also brings fan initiative and cooperation with green practices.

A team located in a smaller market could be seen as being disadvantaged. However, the arguments that might encourage failure could in fact be advantages and only drive fan engagement and support their triple bottom line. If loyalty, unity and fandom drive the sports industry, it is possible that all these qualities are stronger in a city with fewer people. Although smaller market teams might swing and miss on lucrative television deals, they can continue to attract the attention of different generations of local fans, directly engage the community and create a culture characteristic of the city's people. These may be leading reasons as to why environmental commitments might come easier to smaller market teams.

Likewise, since professional sports teams are representatives of their respective cities, there might be reason to believe that cities can influence teams' business decisions to a degree. Professional sports teams in the public eye can be seen as influential actors capable of fulfilling a city's vision for urban sustainability. In particular, cities with a climate action plan, or a concrete strategy that mitigates the effects of climate change, appear to be leading cities in terms of sustainability. Teams in these progressive cities are theoretically included as key actors in climate action plans and could explain why these teams are more committed to the environment.

5.2 Search Term Findings

Ninety-four percent of Big Four teams communicate recycling efforts, making "recycling" the most communicated term and most common environmental practice by teams. The next most frequently mentioned terms communicated by Big Four teams include: environment (88%), green (83%), hurricane philanthropy (81%), and energy (79%). Recycling might be the most frequently communicated term because of the significant amount of website findings. Website findings date as far back as the early to mid-2000s. Therefore, this allows teams the entire time frame of communication through websites to communicate an environmental practice that has been widely accepted for decades.

5.3 League Findings

Among Big Four leagues, MLB and NBA teams exhibit greater environmental commitment through Twitter, whereas NFL and NHL teams exhibit greater environmental commitment through team websites. League findings from ANOVA tests substantiate this research's hypothesis that states MLB is the most environmentally committed league followed by the NHL. However, this research's hypothesis stated the NFL is least committed, whereas findings indicate the NBA is the league with the most opportunity for improvement.

League-wide environmental programs have noticeably influenced the environmental commitment of teams. To be specific, the engagement of all thirty NHL teams in the NHL Food Recovery Program, NBA Green Week's seven-day promotion of eco-consciousness, MLB Green's influence in supporting teams to divert waste, and the NFL's Super Bowl environmental program have all raised environmental awareness and helped teams and communities be more sustainable through sports.

5.4 Team Findings

Of all Big Four teams, the Buffalo Sabres (Website = 91%, Twitter = 15% and Overall = 91%) have the greatest overall environmental commitment. Following the Sabres, five NFL teams are in the top six for overall environmental commitment including the: Los Angeles Rams (Website = 83%, Twitter = 11% and Overall = 83%), Minnesota Vikings (Website = 75%, Twitter = 6% and Overall = 75%), Baltimore Ravens (Website = 75%, Twitter = 10% and Overall = 75%), Green Bay Packers (Website = 72%, Twitter = 5% and Overall = 73%), and Philadelphia Eagles (Website = 68%, Twitter = 19% and Overall = 70%). This is unexpected as the NFL as a league is the only Big Four league not committed to the GSA and GSA membership does influence teams' environmental commitment.

5.5 City Findings

After quantifying mean values representative of teams' environmental commitment across both websites and Twitter by city, Buffalo and Green Bay record the highest values, as sports teams present in these cities communicate an average of seventy-three percent of terms. This is followed by: Vancouver (65%), Santa Clara (63%), Baltimore (59%), Sacramento (57%), Seattle (57%), and Minneapolis (57%). Seven of the top eight cities have only one or two Big Four teams, whereas Minneapolis is a city with four teams that ranks the highest. In contrary, cities with five or more teams including Chicago (38%), Los Angeles (35%) and New York (30%) all perform in the lower half. It is possible that evaluating by mean more easily allows teams with fewer sports teams to record greater environmental commitment.

5.6 Contributions

Existing literature has examined environmental commitment among sports teams through team websites (Babiak and Trendafilova, 2011; Blankenbuehler and Kunz, 2014; Smith, 2014). To incorporate analysis of social media, this research investigated Big Four sports teams' environmental commitment across both official team websites and verified team Twitter accounts. This method of the research design has captured unique data, typically relating to topics pertinent to fans' environmental engagement including: environmental giveaways, green events, proper waste disposal instructions, and more. Thus, a greater understanding of Big Four sports teams' online presence with regard to environmental commitments is achieved with the integration of Twitter data. In addition, the use of more recent data provides an update to these previous studies.

The findings in this research support results from Blankenbuehler and Kunz (2014), as recycling was the most dominant environmental initiative. They find 69 of 141 different teams mention recycling, whereas this study finds 104 of 122 teams mention recycling through team websites. That said, they find that only 113 (80%) teams (from: MLB, NBA, NFL, NHL and Major League Soccer) communicate at least one sustainable initiative on team websites. This research finds that 121 (99%) teams from the Big Four communicate at least one sustainable initiative on team websites.

Furthermore, the study incorporated additional dimensions to previous studies. This included the consideration of place-based factors, including environmental commitments in metropolitan areas as well as environmental engagement programs rooted in Big Four Leagues. This is followed by recognizing factors of influence across leagues, teams and metropolitan area hosts. No existing literature has explored professional sports teams in relation to respective metropolitan areas' urban sustainability commitments. Integrating assessments of team venues,

urban sustainability commitments and socioeconomic conditions in relation to professional sports teams' environmental commitments adds novel findings and new insights to the small, but existing literature on the environmental commitments of sports teams.

The Buffalo Sabres (91%) in the NHL, Los Angeles Rams (83%) in the NFL, Seattle Mariners (53%) in MLB and Cleveland Cavaliers (58%) in the NBA lead their respective leagues in website environmental commitment. The Arizona Diamondbacks (40%) in MLB, Cleveland Cavaliers (29%) in the NBA, Los Angeles Kings (28%) in the NHL and Philadelphia Eagles (19%) in the NFL lead their respective leagues in Twitter environmental commitment. The Buffalo Sabres (91%), Los Angeles Rams (83%), Minnesota Twins (58%) in MLB and Cleveland Cavaliers (64%) lead their respective leagues in overall environmental commitment.

5.7 Opportunities for Future Research

This research is designed to be exhaustive, yet many opportunities continue to exist to explore environmental commitment of sports teams. First, future research might assess other professional sports leagues in both North America and globally. Also, this study exclusively considers environmental commitment as any single form of environmental communication in proper context from the search term list. Future analysis could employ a method of evaluation that examines the number of occurrences a term is stated in an environmental context or assign weighted values according to type or degree of commitment.

Another critical component of sports that is not captured in this research is the concept of team success or winning percentage. Team success is omitted from this thesis as it is perceived as a difficult indicator to quantify over several years while accounting for environmental commitments. Time frames could be a useful tool to assess winning percentage in relation to

teams' environmental commitments at that moment in time. For instance, over a ten-to-fifteen-year timeline, teams may perform poorly over the course of certain years and better over others. However, within a multi-year scope, analysis could infer direct lineage of when certain types of action are undertaken and how many wins or losses a team had during that season or at that time of communication. This would require meticulous coordination to ensure environmental commitments are analyzed in alignment with winning percentage. Overall, selecting a timeline is challenging for this variable, but analysis of winning percentage could begin when teams started communicating through websites or other online platforms.

Integrating the use of time frames could also be beneficial in evaluating other factors of influence and how differences in environmental commitments have changed over time. For example, the frequency of terms observed could be quantified in relation to time frames. This analysis might be helpful in identifying practices that were dominant by year and/or teams that introduce new sustainable practice to sports. Likewise, this type of quantitative analysis with regard to time could recognize if teams are only first introducing practices that have been successfully introduced several years ago.

Correspondingly, future studies could examine other forms of social media such as teams' Facebook or Instagram accounts to further interpret environmental communication by teams. Analysis among several different types of social media accounts could capture richer data than information interpreted from only Twitter. Additionally, pictures and videos could be interpreted to gather more diverse data from team websites. Pictures attached to tweets are only analyzed for this research, whereas website media is not evaluated. These types of media were omitted from this research because the gathering of data would be time consuming.

An interesting concept throughout data collection is the recognition of unique environmental initiatives by Big Four teams. For instance, among NBA teams, "Trees for Threes" is a common initiative that ties three-point field goals in the sport of basketball to the planting of trees. There is an opportunity to further examine the number of team environmental programs to realize environmental commitments in a community. Deeper analysis of team initiatives could examine distinct actions by these environmental programs.

A component excluded in the analysis of factors is the examination of Canadian teams. Future research could include Canadian teams in peer and place effect analysis. This would require comparable data between both Canadian and American teams. With Canadian data, there would be an opportunity to explore comparisons of Canadian and American teams. This analysis could investigate factors that might influence sports teams to adopt the environment in each country. As well, this research only examines professional sports teams; however, several colleges are GSA members and have implemented sustainability programs in relation to their sports teams (GSA – "Members Clubhouse," 2017). Further analysis could evaluate influencing factors of college teams' commitments to the natural environment. Analysis of college sports teams might relate: number of students, size of campus, collegiate athletic association, number of programs offered, and more.

Furthermore, this research has evaluated teams' venues but has not examined if types of venue ownership influence teams' environmental commitment. Blankenbuehler and Kunz (2014) find that teams stimulate fans' green behaviour both in their respective community and venue. As established in this research, there are many opportunities for teams to integrate sustainability into their venues such as through energy efficiency, waste management, venue design, or other operations. It is possible that private or cooperative ownership might lead to greater

environmental commitment as private owners could spend as much money out of their pocket to support environmental initiatives. Venue ownership analysis might sort according to private, public and cooperative ownership.

Other opportunities for future research could include a similar research design but with entirely different metrics. Including different variables could reveal more unique findings. In addition, a different research design could be attempted. This might include a case interview approach that directly gathers data from those who orchestrate efforts for teams, leagues, venues or cities. For regression analysis, this research has specifically focused on results from American Big Four teams, Canadian teams could be analyzed through regression with accurate and comparable data to teams in the United States. Furthermore, this type of research, through exploring peer and place effect trends, is appropriate for mixed-effect regression types. This type of regression could more accurately evaluate organizational and geographic factors by separating one another in the regression equation.

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Appendices

Appendix A: Search Terms by Environmental Commitment Type and Source Inspiration

Term	Commitment Type	Source Inspiration
Accountability/Accountable/Responsible/Responsibility /Responsibly	Broad Application	Ciletti et al. (2010)
Air quality/Ventilation/Indoor Environment Quality	Venue Design/Operations	Henly, Hershkowitz and Hoover (2012)
Alternative(s)/Alternate	Transportation	Blankenbuehler and Kunz (2014)
Animal(s)	Philanthropy/Outreach	Kellison, Trendafilova and McCullough (2015)
Awareness/Conscious/Consciousness	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Battery/Batteries	Waste Management	Henly, Hershkowitz and Hoover (2012)
Bicycle(s)/Bike(s)	Transportation	Blankenbuehler and Kunz (2014)
Biodegradable/Biodegrade/Decompose(d)(s)/Degrade	Waste Management	Henly, Hershkowitz and Hoover (2012)
Biodiesel/Biofuel/Biogas/Cooking Oil	Waste Management	Henly, Hershkowitz and Hoover (2012)
Biomass/Bio-mass	Energy Efficiency	U.S. EPA (2013)
Bottle(s)/Bottled/Can(s)/Container(s)/Cup(s)/Mug(s)	Waste Management	Babiak and Trendafilova (2011); Henly, Hershkowitz and Hoover (2012)
Bulb(s)	Energy Efficiency	Henly, Hershkowitz and Hoover (2012)
Carbon	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Carpool/Carpooling/Car-share/Car-sharing/Ride-share/Ride-sharing	Transportation	Henly, Hershkowitz and Hoover (2012); Kellison et al. (2015)
Certification/Certified	Venue Design/Operations	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison et al. (2015)
Climate Change/Climate	Broad Application	Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Compost/Composting/Compostable	Waste Management	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)

Conservation/Conserve/Conserving/Conserved/Conservancy	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Kellison, Trendafilova and McCullough (2015)
Consumption/Consumer/Consumers/Consuming	Broad Application	Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Contaminate(d)/Contaminating/Contamination/ Hazardous/Non-toxic/Contaminant	Waste Management	Henly, Hershkowitz and Hoover (2012)
Cooling/Air Conditioning/HVAC (Cooling Context)	Energy Efficiency	Henly, Hershkowitz and Hoover (2012)
Credits/Certificates (Energy/Carbon/Renewable)	Energy Efficiency	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Dioxide/CO2	Broad Application	Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Disaster(s)	Philanthropy/Outreach	IOC (2012)
Disposal/Dispose/Discard/Discarded/Discarding/Remove/Removal/Removing/Removed	Waste Management	Henly, Hershkowitz and Hoover (2012)
Diversion/Divert/Diverting/Diverted	Waste Management	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Donated/Donates/Donation(s)/Donating	Philanthropy/Outreach	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Earth	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Kellison, Trendafilova and McCullough (2015); Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Earthquake	Philanthropy/Outreach	IOC (2012)
Eco/Ecological/Ecosystem/Environmentally Friendly	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Education/Educational/Educate/Educating/Educated/Students/School/Studies	Philanthropy/Outreach	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)

Efficiency/Efficient/Efficiently/Efficiencies	Energy Efficiency	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Electric/Electrical/Electricity	Energy Efficiency	Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Electronic(s)/Electronically/E-waste, E-cycling/Cell Phone(s)	Waste Management	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Emission(s)/Emitting/Emitted	Venue Design/Operations	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Energy/Energies/Power	Energy Efficiency	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Kellison, Trendafilova and McCullough (2015); Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Environment/Environmental/Environmentally	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Electric Vehicle/EV/Charging/HEV/Electric Car/Green Vehicle(s)	Transportation	Henly, Hershkowitz and Hoover (2012)
Farm(s)/Farmers/Farming/Agriculture	Food and Beverage	Henly, Hershkowitz and Hoover (2012)
Flood(s)/Flooding	Philanthropy/Outreach	IOC (2012)
Food(s)/Beverage(s)	Food and Beverage	Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Footprint	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Fossil Fuel(s)/Fuel(s)	Broad Application	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Garden(s)/Gardening	Food and Beverage	Henly, Hershkowitz and Hoover (2012)

Gas/Gasoline	Energy Efficiency	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Geothermal	Energy Efficiency	U.S. EPA (2013)
Global Warming	Broad Application	Babiak and Trendafilova (2011); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012)
Green/Greening	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Green Bin/Receptacles/Blue Bin/Bin/Container(s)/Box/Boxes/Collection/Bag(s)	Waste Management	Blankenbuehler and Kunz (2014); Kellison, Trendafilova and McCullough (2015)
Green Products/Giveaways/Purchasing	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Green Roof/Roof Top	Venue Design/Operations	Henly, Hershkowitz and Hoover (2012)
Green Week	Broad Application	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Greenhouse	Energy Efficiency	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Habitat(s)	Philanthropy/Outreach	Henly, Hershkowitz and Hoover (2012)
Heating/Heat/HVAC (Heating Context)	Energy Efficiency	Henly, Hershkowitz and Hoover (2012)
Hurricane/Typhoon/Cyclone	Philanthropy/Outreach	IOC (2012)
Hybrid Vehicle/Hybrid Car(s)	Transportation	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Incandescent/Fluorescent/CFL/Halide	Energy Efficiency	Henly, Hershkowitz and Hoover (2012)
Infrastructure	Venue Design/Operations	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Kilowatt/Kw/wWh/Megawatt/Mw/mWh/Watt(s)	Energy Efficiency	U.S. EPA (2013)

Landfill(s)	Waste Management	Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
LED	Energy Efficiency	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
LEED	Venue Design/Operations	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Lighting/Light(s)/Non-Essential Lighting	Energy Efficiency	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Litter/Cleanup/Clean/Cleaned/Clutter/Picking Up	Waste Management	Henly, Hershkowitz and Hoover (2012)
Local Vendors/Sustainable Vendors/Concession Donations	Food and Beverage	Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Mass Transit/Public Transit/Subway/Bus/Metro	Transportation	Blankenbuehler and Kunz (2014)
Material(s)	Broad Application	Blankenbuehler and Kunz (2014); Kellison, Trendafilova and McCullough (2015)
Methane	Waste Management	Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Motion Sensor(s)/Motion Sensor Lighting	Energy Efficiency	Henly, Hershkowitz and Hoover (2012)
Natural/Nature	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Net Zero/Zero Carbon/Zero Emission(s)/Energy Credits/Net Energy	Energy Efficiency	Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Neutral (Carbon)	Energy Efficiency	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Offset(s)/Off-set(s)	Energy Efficiency	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012)

Organic(s)	Food and Beverage	Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Outdoor(s)/Outside	Broad Application	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Outreach	Philanthropy/Outreach	Henly, Hershkowitz and Hoover (2012)
Packaging/Package(d)/Packaging	Waste Management	Henly, Hershkowitz and Hoover (2012)
Paper/Paperless/Cardboard/Digital Ticket(s)/Ticketing	Waste Management	Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012)
Parking/Parking Lot	Transportation	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Philanthropic/Philanthropy	Philanthropy/Outreach	Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012)
Planet	Broad Application	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Plant(s)/Planted/Planting	Philanthropy/Outreach	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Plastic	Waste Management	Babiak and Trendafilova (2011); Henly, Hershkowitz and Hoover (2012)
Plumbing/Toilets/Urinals	Venue Design/Operations	Henly, Hershkowitz and Hoover (2012)
Pollution/Pollute/Polluted/Polluting/Pollutant(s)	Waste Management	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Preservation/Preserve/Preserved/Preserving	Broad Application	Babiak and Trendafilova (2011); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012)
Rainwater	Venue Design/Operations	Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Recycle/Recycled/Recycling/Recyclable(s)	Waste Management	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Reduce(s)/Reduction/Reducing	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)

Renewable/Non-renewable	Energy Efficiency	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Resource(s)/Resourcefulness	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Restoration/Restore/Restored/Restoring/Regenerate/Regeneration	Philanthropy/Outreach	Babiak and Trendafilova (2011); Henly, Hershkowitz and Hoover (2012)
Retrofit(s)/Retrofitted/Retrofitting/Upgrade(s)	Venue Design/Operations	Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Reusable/Reuse/Reused/Reusing	Waste Management	Henly, Hershkowitz and Hoover (2012)
Savings/Cost Savings/Cost Effective/Lower Operating Costs/Financial Benefits	Venue Design/Operations	Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012)
Soil	Philanthropy/Outreach	Henly, Hershkowitz and Hoover (2012)
Solar/Photovoltaic/PV	Energy Efficiency	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Species	Philanthropy/Outreach	Henly, Hershkowitz and Hoover (2012)
Steward(s)/Stewardship	Broad Application	Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Kellison, Trendafilova and McCullough (2015)
Stormwater/Storm Drains	Philanthropy/Outreach	Henly, Hershkowitz and Hoover (2012)
Supplier(s)/Supply Chain/Concession(s)	Food and Beverage	Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012)
Sustainability/Sustainable	Broad Application	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); U.S. EPA (2013)
Tornado/Tornadoes	Philanthropy/Outreach	IOC (2012)
Transportation/Transport/Transported/Transporting	Transportation	Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015)
Trash/Garbage	Waste Management	Henly, Hershkowitz and Hoover (2012)
Trees/Forest(s)	Philanthropy/Outreach	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)

Tsunami	Philanthropy/Outreach	IOC (2012)
Usage/Use	Broad Application	Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012)
Vehicle(s)/Car(s)	Transportation	Blankenbuehler and Kunz (2014); Henly, Hershkowitz and Hoover (2012)
Waste/Wasted/Wasteful/Wasting/Wasted	Waste Management	Babiak and Trendafilova (2011); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Water/Waterless	Venue Design/Operations	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Wildlife	Philanthropy/Outreach	Kellison, Trendafilova and McCullough (2015)
Wind	Energy Efficiency	Babiak and Trendafilova (2011); Blankenbuehler and Kunz (2014); Ciletti et al. (2010); Henly, Hershkowitz and Hoover (2012); Kellison, Trendafilova and McCullough (2015); U.S. EPA (2013)
Windows	Venue Design/Operations	Henly, Hershkowitz and Hoover (2012)

Appendix B: Summary by Team

Big Four Team	Metropolitan Area	League	Twitter Username	Website Environmental Commitment (%)	Twitter Environmental Commitment (%)	Overall Environmental Commitment (%)	GSA Member	Venue Name	NAICS Venue Classification
Atlanta Braves	Atlanta, Georgia	MLB	@Braves	27	10	34	Yes	SunTrust Park	Finance and Insurance
Atlanta Falcons	Atlanta, Georgia	NFL	@AtlantaFalcons	60	12	63	Yes	Mercedes-Benz Stadium	Transportation
Atlanta Hawks	Atlanta, Georgia	NBA	@ATLHawks	31	10	34	No	Phillips Arena	Retail Trade
Baltimore Orioles	Baltimore, Maryland	MLB	@Orioles	34	18	43	Yes	Oriole Park at Camden Yards	No Sponsor
Baltimore Ravens	Baltimore, Maryland	NFL	@Ravens	75	10	75	Yes	M&T Bank	Finance and Insurance
Boston Bruins	Boston, Massachusetts	NHL	@NHLBruins	55	7	57	Yes	TD Garden	Finance and Insurance
Boston Celtics	Boston, Massachusetts	NBA	@celtics	17	11	23	No	TD Garden	Finance and Insurance
Boston Red Sox	Boston, Massachusetts	MLB	@RedSox	46	48	49	Yes	Fenway Park	No Sponsor
New England Patriots	Boston, Massachusetts	NFL	@Patriots	37	8	40	Yes	Gilette Stadium	Retail Trade
Buffalo Bills	Buffalo, New York	NFL	@buffalobills	55	7	55	No	New Era Field	Retail Trade
Buffalo Sabres	Buffalo, New York	NHL	@BuffaloSabres	91	15	91	Yes	KeyBank Center	Finance and Insurance
Calgary Flames	Calgary, Alberta	NHL	@NHLFlames	31	5	33	Yes	Scotiabank Saddledome	Finance and Insurance
Carolina Panthers	Charlotte, North Carolina	NFL	@Panthers	29	2	30	No	Bank of America Stadium	Finance and Insurance
Charlotte Hornets	Charlotte, North Carolina	NBA	@hornets	0	12	12	Yes	Spectrum Center	Telecommunications
Chicago Bears	Chicago, Illinois	NFL	@ChicagoBears	62	8	66	Yes	Soldier Field	No Sponsor
Chicago Blackhawks	Chicago, Illinois	NHL	@NHLBlackhawks	27	10	32	Yes	United Center	Transportation

Chicago Bulls	Chicago, Illinois	NBA	@chicagobulls	41	15	47	No	United Center	Transportation
Chicago Cubs	Chicago, Illinois	MLB	@Cubs	30	8	34	Yes	Wrigley Field	Food and Beverage
Chicago White Sox	Chicago, Illinois	MLB	@whitesox	6	20	23	Yes	Guaranteed Rate Field	Finance and Insurance
Cincinnati Bengals	Cincinnati, Ohio	NFL	@Bengals	30	1	30	No	Paul Brown Stadium	No Sponsor
Cincinnati Reds	Cincinnati, Ohio	MLB	@Reds	26	3	27	Yes	Great American Ballpark	Finance and Insurance
Cleveland Browns	Cleveland, Ohio	NFL	@Browns	28	2	28	Yes	FirstEnergy Stadium	Energy
Cleveland Cavaliers	Cleveland, Ohio	NBA	@cavs	58	29	64	Yes	Quicken Loans Arena	Finance and Insurance
Cleveland Indians	Cleveland, Ohio	MLB	@Indians	31	16	36	Yes	Progressive Field	Finance and Insurance
Columbus Blue Jackets	Columbus, Ohio	NHL	@BlueJacketsNHL	39	10	41	Yes	Nationwide Arena	Finance and Insurance
Dallas Cowboys	Dallas-Fort Worth, Texas	NFL	@dallascowboys	19	3	20	No	AT&T Stadium	Telecommunications
Dallas Mavericks	Dallas-Fort Worth, Texas	NBA	@dallasmavs	20	5	23	No	American Airlines Center	Transportation
Dallas Stars	Dallas-Fort Worth, Texas	NHL	@DallasStars	27	7	29	Yes	American Airlines Center	Transportation
Texas Rangers	Dallas-Fort Worth, Texas	MLB	@Rangers	15	5	17	Yes	Globe Life Park in Arlington	Finance and Insurance
Colorado Avalanche	Denver, Colorado	NHL	@Avalanche	23	10	29	Yes	Pepsi Center	Food and Beverage
Colorado Rockies	Denver, Colorado	MLB	@Rockies	10	18	24	Yes	Coors Field	Food and Beverage
Denver Broncos	Denver, Colorado	NFL	@Broncos	48	8	50	Yes	Sports Authority Field at Mile High	Retail Trade
Denver Nuggets	Denver, Colorado	NBA	@nuggets	22	8	27	No	Pepsi Center	Food and Beverage
Detroit Lions	Detroit, Michigan	NFL	@Lions	43	10	45	Yes	Ford Field	Transportation

Detroit Pistons	Detroit, Michigan	NBA	@DetroitPistons	29	26	43	Yes	Little Caesars Arena	Food and Beverage
Detroit Red Wings	Detroit, Michigan	NHL	@DetroitRedWings	40	9	43	Yes	Little Caesars Arena	Food and Beverage
Detroit Tigers	Detroit, Michigan	MLB	@tigers	17	7	19	Yes	Comerica Park	Finance and Insurance
Edmonton Oilers	Edmonton, Alberta	NHL	@EdmontonOilers	51	10	51	Yes	Rogers Place	Telecommunications
Green Bay Packers	Green Bay, Wisconsin	NFL	@packers	72	5	73	No	Lambeau Field	No Sponsor
Houston Astros	Houston, Texas	MLB	@astros	13	8	20	Yes	Minute Maid Park	Food and Beverage
Houston Rockets	Houston, Texas	NBA	@HoustonRockets	43	14	43	Yes	Toyota Center	Transportation
Houston Texans	Houston, Texas	NFL	@HoustonTexans	43	8	44	No	NRG Stadium	Energy
Indiana Pacers	Indianapolis, Indiana	NBA	@Pacers	42	9	43	Yes	Bankers Life Fieldhouse	Finance and Insurance
Indianapolis Colts	Indianapolis, Indiana	NFL	@Colts	22	2	22	No	Lucas Oil Stadium	Transportation
Jacksonville Jaguars	Jacksonville, Florida	NFL	@Jaguars	39	5	39	No	EverBank Field	Finance and Insurance
Kansas City Chiefs	Kansas City, Missouri	NFL	@Chiefs	61	12	62	Yes	Arrowhead Stadium	No Sponsor
Kansas City Royals	Kansas City, Missouri	MLB	@Royals	32	15	37	Yes	Kauffman Stadium	No Sponsor
Anaheim Ducks	Los Angeles, California	NHL	@AnaheimDucks	52	20	57	Yes	Honda Center	Transportation
Los Angeles Angels	Los Angeles, California	MLB	@Angels	6	6	11	Yes	Angel Stadium	No Sponsor
Los Angeles Chargers	Los Angeles, California	NFL	@Chargers	3	4	6	No	Stubhub Center	Other
Los Angeles Clippers	Los Angeles, California	NBA	@LAClippers	3	6	9	No	Staples Center	Retail Trade
Los Angeles Dodgers	Los Angeles, California	MLB	@Dodgers	27	11	32	Yes	Dodger Stadium	No Sponsor
Los Angeles Kings	Los Angeles, California	NHL	@LAKings	50	28	56	Yes	Staples Center	Retail Trade
Los Angeles Lakers	Los Angeles, California	NBA	@Lakers	26	5	28	No	Staples Center	Retail Trade

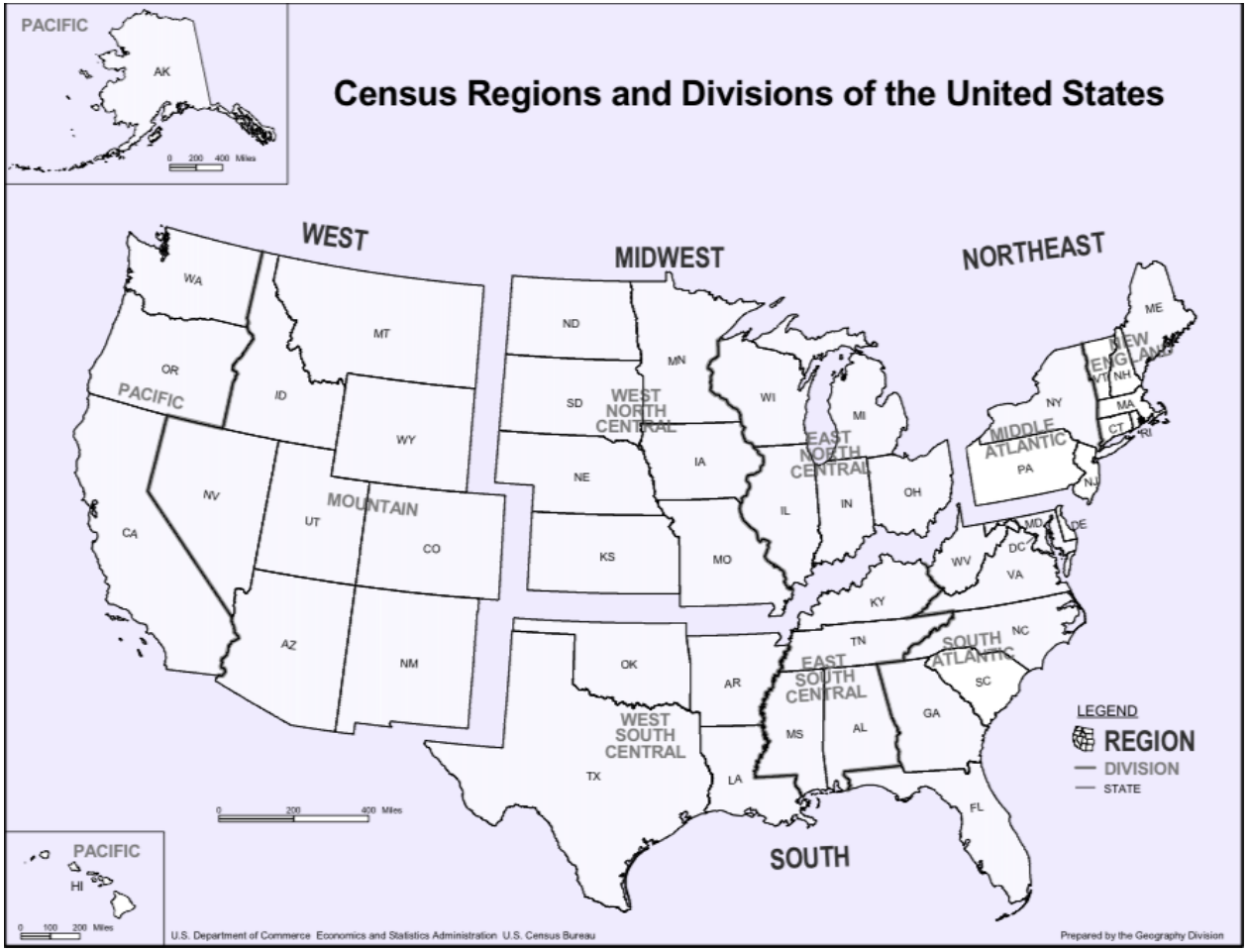
Los Angeles Rams	Los Angeles, California	NFL	@RamsNFL	83	11	83	No	Los Angeles Memorial Coliseum	No Sponsor
Memphis Grizzlies	Memphis, Tennessee	NBA	@memgrizz	22	10	26	No	FedEx Forum	Transportation
Florida Panthers	Miami, Florida	NHL	@FlaPanthers	44	6	44	Yes	BB&T Center	Finance and Insurance
Miami Dolphins	Miami, Florida	NFL	@MiamiDolphins	55	5	57	Yes	Hard Rock Stadium	Food and Beverage
Miami Heat	Miami, Florida	NBA	@MiamiHEAT	44	15	48	Yes	American Airlines Arena	Transportation
Miami Marlins	Miami, Florida	MLB	@Marlins	30	1	30	Yes	Marlins Park	No Sponsor
Milwaukee Brewers	Milwaukee, Wisconsin	MLB	@Brewers	17	9	21	Yes	Miller Park	Food and Beverage
Milwaukee Bucks	Milwaukee, Wisconsin	NBA	@Bucks	12	8	14	No	Bradley Center	Finance and Insurance
Minnesota Timberwolves	Minneapolis-St. Paul, Minnesota	NBA	@Timberwolves	38	18	46	No	Target Center	Retail Trade
Minnesota Twins	Minneapolis-St. Paul, Minnesota	MLB	@Twins	51	31	58	Yes	Target Field	Retail Trade
Minnesota Vikings	Minneapolis-St. Paul, Minnesota	NFL	@Vikings	75	6	75	No	U.S. Bank Stadium	Finance and Insurance
Minnesota Wild	Minneapolis-St. Paul, Minnesota	NHL	@mnwild	46	17	47	Yes	Xcel Energy Center	Energy
Montreal Canadiens	Montreal, Quebec	NHL	@CanadiensMTL	13	4	15	Yes	Bell Center	Telecommunications
Nashville Predators	Nashville, Tennessee	NHL	@PredsNHL	58	7	59	Yes	Bridgestone Arena	Transportation
Tennessee Titans	Nashville, Tennessee	NFL	@Titans	28	3	29	No	Nissan Stadium	Transportation
New Orleans Pelicans	New Orleans, Louisiana	NBA	@PelicansNBA	13	10	21	Yes	Quicken Loans Arena	Food and Beverage
New Orleans Saints	New Orleans, Louisiana	NFL	@Saints	51	10	51	Yes	Mercedes-Benz Superdome	Transportation
Brooklyn Nets	New York, New York	NBA	@BrooklynNets	26	11	30	No	Barclays Center	Finance and Insurance

New Jersey Devils	New York, New York	NHL	@NJDevils	40	6	41	Yes	Prudential Center	Finance and Insurance
New York Giants	New York, New York	NFL	@Giants	28	3	30	Yes	Metlife Stadium	Finance and Insurance
New York Islanders	New York, New York	NHL	@NYIslanders	51	7	51	Yes	Barclays Center	Finance and Insurance
New York Jets	New York, New York	NFL	@nyjets	34	3	34	Yes	Metlife Stadium	Finance and Insurance
New York Knicks	New York, New York	NBA	@nyknicks	2	12	14	No	Madison Square Garden	No Sponsor
New York Mets	New York, New York	MLB	@Mets	20	6	23	Yes	Citi Field	Finance and Insurance
New York Rangers	New York, New York	NHL	@NYRangers	21	0	21	Yes	Madison Square Garden	No Sponsor
New York Yankees	New York, New York	MLB	@Yankees	17	7	22	Yes	Yankee Stadium	No Sponsor
Oklahoma City Thunder	Oklahoma City, Oklahoma	NBA	@okcthunder	29	10	32	No	Chesapeake Energy Arena	Energy
Orlando Magic	Orlando, Florida	NBA	@OrlandoMagic	31	1	31	No	Amway Center	Retail Trade
Ottawa Senators	Ottawa, Ontario	NHL	@Senators	47	9	49	Yes	Canadian Tire Centre	Retail Trade
Philadelphia 76ers	Philadelphia, Pennsylvania	NBA	@sixers	31	10	33	Yes	Wells Fargo Center	Finance and Insurance
Philadelphia Eagles	Philadelphia, Pennsylvania	NFL	@Eagles	68	19	70	Yes	Lincoln Financial Field	Finance and Insurance
Philadelphia Flyers	Philadelphia, Pennsylvania	NHL	@NHLFlyers	38	3	40	Yes	Wells Fargo Center	Finance and Insurance
Philadelphia Phillies	Philadelphia, Pennsylvania	MLB	@Phillies	27	15	31	Yes	Citizens Bank Park	Finance and Insurance
Arizona Cardinals	Phoenix, Arizona	NFL	@AZCardinals	17	4	18	Yes	University of Phoenix Stadium	Other
Arizona Coyotes	Phoenix, Arizona	NHL	@ArizonaCoyotes	55	10	55	Yes	Gila River Arena	Other
Arizona Diamondbacks	Phoenix, Arizona	MLB	@Dbacks	47	40	55	Yes	Chase Field	Finance and Insurance
Phoenix Suns	Phoenix, Arizona	NBA	@Suns	39	8	41	Yes	Talking Stick Resort Arena	Other

Pittsburgh Penguins	Pittsburgh, Pennsylvania	NHL	@penguins	49	5	50	Yes	PPG Paints Arena	Retail Trade
Pittsburgh Pirates	Pittsburgh, Pennsylvania	MLB	@Pirates	33	17	37	Yes	PNC Park	Finance and Insurance
Pittsburgh Steelers	Pittsburgh, Pennsylvania	NFL	@steelers	37	1	38	Yes	Heinz Field	Food and Beverage
Portland Trailblazers	Portland, Oregon	NBA	@trailblazers	50	21	53	Yes	Moda Center	Finance and Insurance
Carolina Hurricanes	Raleigh, North Carolina	NHL	@NHLCanes	25	13	28	Yes	PNC Arena	Finance and Insurance
San Antonio Spurs	San Antonio, Texas	NBA	@spurs	38	22	43	No	AT&T Center	Telecommunications
San Diego Padres	San Diego, California	MLB	@Padres	23	19	32	Yes	Petco Park	Retail Trade
Sacramento Kings	Sacramento, California	NBA	@SacramentoKings	48	10	57	Yes	Golden 1 Center	Finance and Insurance
Utah Jazz	Salt Lake City, Utah	NBA	@utahjazz	24	19	32	Yes	Vivint Smart Home Arena	Retail Trade
Golden State Warriors	San Francisco, California	NBA	@warriors	22	21	32	Yes	Oracle Arena	Retail Trade
Oakland Athletics	San Francisco, California	MLB	@athletics	10	10	17	Yes	Oakland-Alameda County Coliseum	No Sponsor
Oakland Raiders	San Francisco, California	NFL	@RAIDERS	26	3	29	Yes	Oakland-Alameda County Coliseum	No Sponsor
San Francisco Giants	San Francisco, California	MLB	@SFGiants	27	14	36	Yes	AT&T Park	Telecommunications
San Francisco 49ers	Santa Clara/San Jose, California	NFL	@49ers	54	12	55	Yes	Levi's Stadium	Retail Trade
San Jose Sharks	Santa Clara/ San Jose, California	NHL	@SanJoseSharks	70	7	70	Yes	SAP Center	Retail Trade
Seattle Mariners	Seattle, Washington	MLB	@Mariners	53	20	58	Yes	Safeco Field	Finance and Insurance
Seattle Seahawks	Seattle, Washington	NFL	@Seahawks	53	5	55	Yes	CenturyLink Field	Telecommunications

St. Louis Blues	St. Louis, Missouri	NHL	@StLouisBlues	42	5	43	Yes	Scottrade Center	Finance and Insurance
St. Louis Cardinals	St. Louis, Missouri	MLB	@Cardinals	40	13	43	Yes	Busch Stadium	Food and Beverage
Tampa Bay Buccaneers	Tampa-St. Petersburg, Florida	NFL	@TBBuccaneers	31	2	31	No	Raymond James Stadium	Finance and Insurance
Tampa Bay Lightning	Tampa-St. Petersburg Florida	NHL	@TBLightning	66	6	67	Yes	Amalie Arena	Transportation
Tampa Bay Rays	Tampa-St. Petersburg Florida	MLB	@RaysBaseball	10	9	15	Yes	Tropicana Field	Food and Beverage
Toronto Blue Jays	Toronto, Ontario	MLB	@BlueJays	6	4	10	Yes	Rogers Centre	Telecommunications
Toronto Maple Leafs	Toronto, Ontario	NHL	@MapleLeafs	48	14	51	Yes	Air Canada Centre	Transportation
Toronto Raptors	Toronto, Ontario	NBA	@Raptors	23	3	25	Yes	Air Canada Centre	Transportation
Vancouver Canucks	Vancouver, British Columbia	NHL	@Canucks	64	13	65	Yes	Rogers Arena	Telecommunications
Washington Capitals	Washington D.C.	NHL	@Capitals	52	19	55	Yes	Capital One Arena	Finance and Insurance
Washington Nationals	Washington D.C.	MLB	@Nationals	17	12	23	Yes	Nationals Park	No Sponsor
Washington Redskins	Washington D.C.	NFL	@Redskins	54	5	55	Yes	FedEx Field	Transportation
Washington Wizards	Washington D.C.	NBA	@WashWizards	2	4	4	No	Capital One Arena	Finance and Insurance
Winnipeg Jets	Winnipeg, Manitoba	NHL	@NHLJets	40	7	31	Yes	Bells MTS Place	Telecommunications

Appendix C: United States Census Bureau Regions



(United States Census Bureau, n.d.)

Appendix D: Urban Sustainability Commitment Sources by Metropolitan Area

Metropolitan Area	Commitment Type	Urban Sustainability Commitment Uniform Resource Locators (URLs)
Atlanta	Sustainability Plan	http://www.atlantaga.gov/Home/ShowDocument?id=539
Baltimore	Sustainability Plan Climate Action Plan	http://www.baltimoresustainability.org/wp-content/uploads/2015/12/Baltimore-Sustainability-Plan.pdf http://www.baltimoresustainability.org/wp-content/uploads/2015/12/BaltimoreClimateActionPlan.pdf
Boston	Climate Action Plan	https://www.cityofboston.gov/eeos/pdfs/Greenovate%20Boston%202014%20CAP%20Update_Full.pdf
Buffalo	Sustainability Plan	https://docs.google.com/gview?url=http%3A%2F%2Fuploads.oneregionforward.org%2Fcontent%2Fuploads%2F2013%2F06%2FWestern-New-York-Regional-Sustainability-Plan.pdf
Calgary	Sustainability Plan	http://www.calgary.ca/CA/cmo/Documents/2013-0648_ChangesTo2020SusCover_spread_web.pdf
Charlotte	Sustainability Plan	https://d3n8a8pro7vhmx.cloudfront.net/transportationalliance/pages/88/attachments/original/1413261204/Charlotte_2030_A_Sustainable_Vision_-_Low_Res.pdf?1413261204
Chicago	Sustainability Plan	https://www.cityofchicago.org/content/dam/city/progs/env/Sustainable_Chicago_2012-2015_Highlights.pdf
Cincinnati	Green/Enviro Plan	https://www.cincinnati-oh.gov/oes/linkservid/6CE53223-9206-9F36-DB7FA3444F16A1A0/showMeta/0/
Cleveland	Climate Action Plan	http://www.city.cleveland.oh.us/sites/default/files/forms_publications/SC-MAP_Exec_Summ_Final_10.1.13.pdf
Columbus	Sustainability Plan	https://www.columbus.gov/WorkArea/DownloadAsset.aspx?id=2147486721
Dallas	Sustainability Plan	http://greendallas.net/wp-content/uploads/2016/01/QOL_4_sustainabilityplanrevisions2015_combined_052615.pdf
Denver	Sustainability Plan	https://www.denvergov.org/content/dam/denvergov/Portals/741/documents/Audits_2017/OfficeOfSustainability_December2016.pdf
Detroit	Green/Enviro Plan	https://detroitfuturecity.com/wp-content/uploads/2014/02/DFC_ExecutiveSummary_2ndEd.pdf

Edmonton	Green/Enviro Plan	https://www.edmonton.ca/city_government/documents/PDF/TheWayWeGreen-approved.pdf
Green Bay	Not Available	Not Available
Houston	Sustainability Plan	http://www.houstontx.gov/planning/Publications/annlrpt/2012_annlrpt_web.pdf
Indianapolis	Sustainability Plan	http://plan2020.com/wp-content/uploads/2016/01/2016CPSR001-BicentennialAgenda.pdf
Jacksonville	Sustainability Plan	www.coj.net/departments/.../docs/.../2010-symposium-sustainability-presentation.aspx
Kansas City	Sustainability Plan	http://ww4.kcmo.org/pubworks/solidwaste/sustainability_in_KC_web.pdf
Los Angeles	Sustainability Plan	https://www.lamayor.org/sites/g/files/wph446/f/landing_pages/files/pLAn%20first%20annual%20report%202015-2016_0.pdf
Memphis	Sustainability Plan	https://www.sustainableshelby.com/sites/default/files/Implementation%20Plan/01_SustainableShelbyImplementationPlan.pdf
Miami	Sustainability Plan	https://www.miamidade.gov/greenprint/pdf/plan.pdf
Milwaukee	Sustainability Plan	http://city.milwaukee.gov/ReFreshMKE_PlanFinal_Web.pdf
Minneapolis	Climate Action Plan	http://www.ci.minneapolis.mn.us/www/groups/public/@citycoordinator/documents/webcontent/wcms1p-113598.pdf
Montreal	Sustainability Plan	https://ville.montreal.qc.ca/pls/portal/docs/PAGE/PES_PUBLICATIONS_EN/PUBLICATIONS/VERSION_SYNTHESE_EN.PDF
Nashville	Green/Enviro Plan	http://www.nashville.gov/Portals/0/SiteContent/Planning/docs/NashvilleNext/AnnualReports/2016AnnualReport-Final_v6_web.pdf
New Orleans	Sustainability Plan Climate Action Plan	https://www.nola.gov/getattachment/bece551e-5cf8-421c-ac27-48db26194c40/Appendix-Ch-13-GreeNOLA-A-Strategy-for-a-Sustainab/ https://www.nola.gov/nola/media/Climate-Action/Climate-Action-for-a-Resilient-New-Orleans.pdf
New York	Sustainability Plan	http://www.nyc.gov/html/ia/gprb/downloads/pdf/NYC_Environment_PlaNYC.pdf
Oklahoma City	Sustainability Plan	http://planokc.org/wp-content/uploads/2015/07/planokc_sustainokc.pdf

Orlando	Sustainability Plan	http://www.cityoforlando.net/greenworks/wp-content/uploads/sites/9/2017/02/GreenWorks_MunicipalSustainabilityPlan_ProgressReport_highres.pdf
Ottawa	Sustainability Plan	http://ottawa.ca/calendar/ottawa/citycouncil/ec/2012/02-21/03-Document%203%20-%20CoF_Sust%20Plan_FINAL%5B1%5D.pdf
Philadelphia	Sustainability Plan	https://beta.phila.gov/media/20161101174249/2016-Greenworks-Vision_Office-of-Sustainability.pdf
Phoenix	Sustainability Plan	https://www.phoenix.gov/sustainabilitysite/Documents/Final%20COP%202015-16%20Sustainability%20Brochure%2003.27.17.pdf
Pittsburgh	Climate Action Plan	http://pittsburghclimate.org/wp-content/uploads/2011/12/Pittsburgh-Climate-Action-Plan-Version-2-FINAL-Web.pdf
Portland	Climate Action Plan	https://www.portlandoregon.gov/bps/article/636700
Raleigh	Sustainability Plan	http://www.raleighnc.gov/content/extra/Books/Sustainability/2013SustainabilityReport/
Sacramento	Sustainability Plan Climate Action Plan	http://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/General-Plan/Part-1.pdf?la=en http://ascentenvironmental.com/files/9714/0537/0505/Sacramento_CAP_Final_Draft.pdf
Salt Lake City	Sustainability Plan	http://www.slcdocs.com/slcgreen/sustainablesaltlake_plan2015.pdf
San Antonio	Sustainability Plan	http://www.sasustainabilityplan.com/files/managed/Document/160/SA%20Tomorrow%20Sustainability%20Plan%20Adopted%2008%2011%202016.pdf
San Diego	Climate Action Plan	https://www.sandiego.gov/sites/default/files/final_july_2016_cap.pdf
San Francisco	Climate Action Plan	https://sfenvironment.org/sites/default/files/engagement_files/sfe_cc_ClimateActionStrategyUpdate2013.pdf
San Jose/Santa Clara	Sustainability Plan	https://www.sanjoseca.gov/DocumentCenter/View/67867
Seattle	Climate Action Plan	http://www.seattle.gov/Documents/Departments/OSE/2013_CAP_20130612.pdf

St. Louis	Sustainability Plan	https://www.stlouis-mo.gov/government/departments/planning/documents/upload/130219%20STL%20Sustainability%20Plan.pdf
Tampa	Sustainability Plan	https://www.tampagov.net/sites/default/files/green-tampa/files/2016_annual_sustainability_report_for_2015_8_25.pdf
Toronto	Green/Enviro Plan	http://www.toronto.ca/legdocs/mmis/2013/pe/bgrd/backgroundfile-62457.pdf
Vancouver	Green/Enviro Plan	http://vancouver.ca/files/cov/Greenest-city-action-plan.pdf
Washington	Sustainability Plan	https://sustainable.dc.gov/sites/default/files/dc/sites/sustainable/page_content/attachments/DCS-008%20Report%20508.3j.pdf
Winnipeg	Sustainability Plan	http://www.winnipeg.ca/interhom/CityHall/OurWinnipeg/pdf/ASustainableWinnipeg.pdf

Appendix E: External Data Sources

Total Attendance, Average Attendance and Attendance Percentage	MLB: http://proxy.espn.com/mlb/attendance?year=2016&sort=homeTotal
	NBA: http://www.espn.com/nba/attendance/_/sort/homeTotal
	NFL: http://www.espn.com/nfl/attendance/_/year/2016/sort/homeGames http://www.nfl.com/teams/losangeles%20rams/schedule?team=LA&season=2016&seasonType=REG
	NHL: http://www.espn.com/nhl/attendance
Years in Current Location	MLB: http://www.baseball-almanac.com/teammenu.shtml
	NBA: https://www.basketball-reference.com/teams/
	NFL: https://www.pro-football-reference.com/teams/index.htm
	NHL: https://www.hockey-reference.com/teams/
Venue Age	MLB: https://www.baseball-reference.com/bullpen/Category:Ballparks
	NBA: http://nbahoopsonline.com/History/Leagues/NBA/Arenas.html
	NFL: https://www.pro-football-reference.com/stadiums/
	NHL: https://www.hockey-reference.com/arenas/
Venue Sponsorship	https://www.naics.com/search/
LEED Venues	https://www.usgbc.org/articles/leed-pro-sports-which-teams-made-usgbcs-list-eco-all-stars http://nba.greensports.org/greener-building/leed/
Canada Population	http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo05a-eng.htm
U.S. Population/Total Civilian Population	https://factfinder.census.gov
Unemployment Rate	https://www.bls.gov/news.release/pdf/metro.pdf
Median Income	https://factfinder.census.gov-
Below Poverty Level	https://factfinder.census.gov
Educational Attainment	https://factfinder.census.gov
Industry/Occupational	https://factfinder.census.gov

Appendix F: Codebook Legend

Variable Code	Variable Label	Variable Definition
Web	Website Frequencies	Raw Counts
Web_Perc	Website Environmental Commitments	Percentage of Raw Counts From Total Word List
Twitter	Twitter Frequencies	Raw Counts
Twitter_Perc	Twitter Environmental Commitments	Percentage of Raw Counts From Total Word List
Overall	Overall Frequencies	Raw Counts
Overall_Perc	Overall Percentages	Percentage of Raw Counts From Total Word List
League	Big Four Sports League	Categorical Variable 1 – MLB 2 – NBA 3 – NFL 4 – NHL
MLB	Major League Baseball	Binary Variable 0 – Not MLB Team 1 – MLB Team
NBA	National Basketball Association	Binary Variable 0 – Not NBA Team 1 – NBA Team
NFL	National Football League	Binary Variable 0 – Not NFL Team 1 – NFL team
NHL	National Hockey League	Binary Variable 0 – Not NHL Team 1 – NHL Team
Tms_In_City	Number of Teams in City	Totals of Teams in Metropolitan Area
Lgs_In_City	Number of Leagues in City	Totals of Leagues in Metropolitan Area
Tms_Sm_Lg	Number of Teams from the Same League	Totals of Teams from the Same League

Yrs_Cur_Loc	Number of Years in Current Location	Totals of Years in Current Location
GSA	Green Sports Alliance Membership	Binary Variable 0 – Non- GSA Member 1 – GSA Member
LEED	LEED Certified Venue	Binary Variable 0 – No LEED Certified Venue 1 – LEED Certified Venue
Urban_Sus_Comit	Type of Urban Sustainability Commitments	Categorical Variable 0 – No Commitment 1 – Sustainability Plan 2 – Green/Environmental Plan 3 – Climate Action Plan 4 – Sustainability Plan and Green/Environmental Plan 5 – Sustainability Plan and Climate Action Plan 6 – Sustainability Plan, Green/Environmental Plan and Climate Action Plan
No_Comit	No Urban Sustainability Commitment	Binary Variable 0 – Any Type of Sustainability Plan 1 – No Sustainability Plan
Sus_Plan	Sustainability Plan	Binary Variable 0 – No Sustainability Plan 1 – Sustainability Plan
Grn_Plan	Green/Environmental Plan	Binary Variable 0 – No Green/Environmental Plan 1 – Green/Environmental Plan
CA_Plan	Climate Action Plan	Binary Variable 0 – No Climate Action Plan 1 – Climate Action Plan
Other_Than_Sus_Plan	Other Than Sustainability Plan	Binary Variable 0 – Sustainability Plan

		1 – All Other Plans Not Including Sustainability Plan
Pub_NGO	Plan Publisher – NGO	Binary Variable 0 – Not NGO as Publisher 1 – NGO as Publisher
Pub_City_w_Off	Plan Publisher – City with Sustainability Office	Binary Variable 0 – Not City with Sustainability Office as Publisher 1 – City with Sustainability Office as Publisher
Pub_City_w_No_Off	Plan Publisher – City with No Sustainability Office	Binary Variable 0 – Not City with No Sustainability Office as Publisher 1 – City with No Sustainability Office as Publisher
Pub_County	Plan Publisher – County Government Office	Binary Variable 0 – Not County Government as Publisher 1 – County Government as Publisher
Pub_Gov	Plan Publisher – Government	Binary Variable 0 – Non-Government 1 – Government
Pub_Non_Gov	Plan Publisher – Non-Government	Binary Variable 0 – Government 1 – Non-Government
Cont_Prog	Plan Content – Progress Report	Binary Variable 0 – Plan Content is Not a Progress Report 1 – Plan Content is a Progress Report
Cont_Fut	Plan Content – Future Goal Report	Binary Variable 0 – Plan Content is Not a Future Goal Report 1 – Plan Content is a Future Goal Report

Rgn	Census region	Categorical Variable 0 – No Region 1 – West 2 – Midwest 3 – South 4 – Northeast
West_Rgn	Census region – West	Binary Variable 0 – Not West Region 1 – West Region
MWest_Rgn	Census region – Midwest	Binary Variable 0 – Not Midwest Region 1 – Midwest Region
South_Rgn	Census region – South	Binary Variable 0 – Not South Region 1 – South Region
Neast_Rgn	Census region - Northeast	Binary Variable 0 – Not Northeast Region 1 – Northeast Region
Spnsr	Type of venue sponsorship	Categorical Variable 0 – No Sponsorship 1 – Energy 2 – Finance or Insurance 3 – Food and Beverage 4 – Other 5 – Retail Trade 6 – Telecommunications 7 – Transportation
Spnsrshp_Engy	Energy Sponsorship	Binary Variable 0 – No Energy Sponsorship 1 – Energy Sponsorship
Spnsrshp _Fin	Finance or Insurance Sponsorship	Binary Variable 0 – No Finance or Insurance Sponsorship 1 – Finance or Insurance Sponsorship
Spnsrshp _Food	Food and Beverage Sponsorship	Binary Variable 0 – No Food and Beverage Sponsorship 1 – Energy Sponsorship
Spnsrshp _Nospnsr	No Sponsorship	Binary Variable

		0 – Any Sponsorship 1 – No Sponsorship
Spnsrshp _Other	Other Sponsorship	Binary Variable 0 – No Other Sponsorship 1 – Other Sponsorship
Spnsrshp _Rtltrd	Retail Trade Sponsorship	Binary Variable 0 – No Retail Trade Sponsorship 1 – Retail Trade Sponsorship
Spnsrshp _Tele	Telecommunications Sponsorship	Binary Variable 0 – No Telecommunications Sponsorship 1 – Telecommunications Sponsorship
Spnsrshp _Trnsp	Transportation Sponsorship	Binary Variable 0 – No Transportation 1 – Transportation Sponsorship
Metro_Pop_16	2016 Metropolitan Population	2016 Metropolitan Populations Totals
Tot_Att_16	2016 Total Attendance	Attendance Totals from Most Recent Completed Season (2016-2017)
Ave_Att_16	2016 Average Attendance	Total Attendance Divided by Home Games Played
Att_Prc_16	2016 Attendance Percentage	Total Attendance Divided by Seating Capacity in Percentage
Venue_Age	Venue Age (Years)	Venue Age Counts
Frchs_Value_In_Bils	Franchise Value (Billions of USD)	Franchise Value (Billions USD) from Most Recent Completed Season
Unmpnt_Rt_Jun_17	Unemployment Rate (June 2017)	Percentage of Civilian Labour Force that is Unemployed
Mdn_Inc	Median Metropolitan Income (2016)	Median Household Income by Metropolitan Area (2014)

Prc_Bel_Pov_Lvl	Percentage Below Poverty Level (2016)	Estimated Percentage of Population for Whom Poverty Status is Determined Who Are Below Poverty Level
Perc_High_Schl_Highr	Percentage with High School Diploma or Higher (2016)	Percentage of Civilian Population (16 years and over) With At Least a High School Diploma
Perc_Bchlrs_Highr	Percentage with Bachelor's Degree or Higher (2016)	Percentage of Civilian Population (16 years and over) With At Least a Bachelor's Degree
Tot_Civln_Pop	Total Civilian Population (2016)	Total Civilian Population (16 and Over)
IND_Manu_Tot	Total Manufacturing Industry Occupations (2016)	Total of Civilian Population (16 years and over) with Manufacturing Industry Occupations
IND_Manu_Perc_Civln_16_Ovr	Percentage of Manufacturing Industry Occupations (2016)	Percentage of Civilian Population (16 years and over) with Manufacturing Industry Occupations
Tot_OCCS_Mgment_Bus_Sci_Arts	Total Management, Business, Science or Arts Occupations (2016)	Total Counts of Management, Business, Science or Arts Occupations
Tot_OCCS_Srvc	Total Service Industry Occupations (2016)	Total Counts of Service Industry Occupations
Tot_OCCS_Sales_Office	Total Sales and Office Occupations (2016)	Total Counts of Sales and Office Occupations
Tot_OCCS_NatRes_Constrn_ Maintce	Total Natural Resources, Construction and Maintenance Occupations (2016)	Total Counts of Natural Resources, Construction and Maintenance Occupations
Tot_OCCS_Prod_Trans_Matrl_Moving	Total Production, Transportation and Material Moving Occupations (2016)	Total Counts of Production, Transportation and Material Moving Occupations
OCC_Mgmt_Bus_Sci_Arts	Percentage of Management, Business, Science or Arts Occupations (2016)	Percentage of Civilian Population (16 years and

		over) with Management, Business, Science or Arts Occupations
OCC_Service_Ind	Percentage of Service Industry Occupations (2016)	Percentage of Civilian Population (16 years and over) with Service Industry Occupations
OCC_Sales_Office	Percentage of Sales and Office Occupations (2016)	Percentage of Civilian Population (16 years and over) with Sales and Office Occupations
OCC_NatRes_Constrn_ Maintce	Percentage of Natural Resources, Construction and Maintenance Occupations (2016)	Percentage of Civilian Population (16 years and over) with Natural Resources, Construction and Maintenance Occupations
OCC_Prod_Trans_Matrl_Mvng	Percentage of Production, Transportation and Material Moving Occupations (2016)	Percentage of Civilian Population (16 years and over) with Production, Transportation and Material Moving Occupations

Glossary

Big Four Sports Leagues: The wealthiest North American sports governing bodies that draw both the largest attendance and television ratings in the continent (Holden Moss, 2014). This includes: Major League Baseball (MLB), National Basketball Association (NBA), National Football League (NFL) and National Hockey League (NHL).

Environmental Commitment: considered as any one of the following elements, with the first carrying more weight than the others:

- Pledge of financial resources or time to sustainability initiatives;
- Declaration to environmental accountability;
- Attempt to minimize environmentally harmful activity; and
- Demonstrated effort of responsibility toward the natural environment.

(Derived from Lynes and Dredge, 2006)

Environmental Commitment (Overall): A measurement of environmental commitment as a result of terms communicated from both official Big Four team websites and verified team Twitter accounts represented as a percentage of terms found from the one hundred-fifteen term list.

Environmental Commitment (Twitter): A measurement of environmental commitment as a result of terms communicated from Big Four teams' verified Twitter accounts represented as a percentage of terms found from the one hundred-fifteen term list.

Environmental Commitment (Websites): A measurement of environmental commitment as a result of terms communicated from Big Four teams' official websites represented as a percentage of terms found from the one hundred-fifteen term list.

Metropolitan Area: A city and adjacent suburbs that collectively host high densities of residents.

Peer Effect: Altered performance as a result of exposure to dissimilar partners.

Place Effect: A contextual or location-specific factor that drives particular attitudes or behaviours.

Urban Sustainability Commitment: A documented public strategy for current and/or future sustainable development in a metropolitan area.