

AN ABSTRACT OF THE THESIS OF

Amanda Klee for the degree of Master of Science in Sustainable Forest Management presented on May 21, 2019.

Title: Determinants of Willingness to Pay for Forest Recreation Based on Payment Type Using Contingent Valuation: A Practical Application for Forest Managers

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James D. Kiser

Previous studies have utilized different techniques (e.g., contingent valuation and travel cost methods) to understand users and non-users willingness to pay for natural resources, including their use of recreation areas. These techniques enable the calculation of public support, demand, and potential revenue that may influence future policy, conservation methods, land use practices, and strategies for outreach to the public. This study uses on-site survey data from the McDonald-Dunn Forest in Corvallis, Oregon from two time periods (2008-2009 and 2017-2018). The first analysis investigates which of 11 variables are primary determinants of willingness to pay for forest recreation and whether determinants differ across four payment types using the 2008-9 data. This analysis employs logistic and ordinary least squares regressions to calculate the odds that respondents would be willing or not willing to pay a use fee, and the strongest and weakest determinants of the amount users express they are willing to pay via each payment type. In the second analysis, the estimated models from the 2008-9 data are used to estimate willingness to pay and potential revenue under the different payment types using 2017-18 user data. For the first analysis, activity type, satisfaction, years recreating, dog(s), living distance, gender, age, income, education, and previous knowledge were significant determinants in at least one of the four payment type models for both the odds and amount respondents were willing to pay,

concluding that payment type influences certain user choices. In the second analysis, results indicate that the values estimated from the 2008-9 models that were applied to the 2017-18 data were not structurally different. The stability of the user demographics over time for this recreation resource resulted in almost no change for willingness to pay values. This study uses contingent valuation methods and builds upon previous research by describing how different characteristics determine willingness to pay values for forest recreationists. Additionally, as forest and recreation budgets decline, agencies may consider implementing recreation use fees. The results of this study aid forest managers in estimating potential revenue for different payment types depending on user population, suggest outreach projects to target populations to increase participation, as well as contribute to the body of knowledge needed to create sound policies on forest recreation land use.

Keywords: Willingness to pay; Contingent valuation; Human dimensions; Recreation; Ecosystem services; Forest management

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Determinants of Willingness to Pay for Forest Recreation Based on Payment Type Using
Contingent Valuation: A Practical Application for Forest Managers

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Amanda Klee

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APPROVED:

Major Professor, representing Sustainable Forest Management

Head of the Department of Forest Engineering, Resources, and Management

Dean of the Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Amanda Klee, Author

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INTRODUCTION

Study overview

Managers of natural resources have the option to charge use fees for recreation opportunities. When implementation of a use fee is being developed or considered, managers need reliable information on how users make decisions about willingness to pay (WTP) for different recreation payment types. This information serves to guide managers in recreation decision making, provides guidelines for fee implementation, and aids in the policy making decision process. One approach used to gather the information needed uses non-market valuation techniques known as contingent valuation. Non-market contingent valuation is an important tool used to understand users' values towards the environment and non-market goods that are not generally expressed in the marketplace, like recreation (Champ, Boyle, Brown, & Peterson, 2003). Commonly, this has been performed through stated preference and revealed preference.

Stated preference methods to evaluate non-market valuation have been heavily criticized in the past (Ajzen & Driver, 1992; Boyle, 2003; Hanemann, 1994). Previous literature has focused upon a wide range of issues including the loss of faith in respondents to accurately and truthfully provide reliable feedback, increased error amounts from respondents who are unfamiliar with a certain good, biased welfare estimates from individuals who are unable to assign a willingness to pay value, and the correct method to implement survey vehicles to obtain data. However, contradicting literature suggests that when sampling, study site, survey design, and data analysis methods are designed properly these techniques offer insight to respondents' preferences, behavior, and environmental valuation (Champ et al., 2003; Hanemann, 1994). At the same time, complementary relationships between market and non-market goods that are required for revealed preference does not always exist, making stated preference contingent

valuation methods the only option to obtain data (Boyle, 2003; Loomis & Walsh, 1997). To counteract critics, researchers should be familiar with research techniques and use precautions when analyzing data. In the end, the importance of continued research using contingent valuation methods allows researchers the ability to provide useful information to current and future managers when making decisions, including how to handle decreases in budgets and the implementation of use fees to generate revenue, recover costs, and/or ration use.

Federal, state, and local recreation budgets have become strained due to decreases in funding and recovering cost through use fees is becoming increasingly prevalent (L. Brown, 1992; NCSL, 2011). Some states have reduced support of recreation funds and others have eliminated funding altogether. For example, in May 2011, the California Legislature closed 70 of the state's 278 parks due to budget reductions (Carlton, 2011). The United States Forest Service (USFS) recreation program funding has been seriously impacted by reallocation of about 15% of its planned budget to increase wildfire suppression funding (Dorsey, 2015). At a more local level, the 2008 annual budget for forest and recreation management declined for the McDonald-Dunn Forest, located in Corvallis, Oregon, although, recently the forest recreation budget has seen a gradual increase (Brown, 2019; Needham & Rosenberger, 2011).

Ultimately, forest budgets are constantly in flux and managers need information specific to their population of users to maintain recreation services and successfully adapt to change. Realistically, it can become increasingly difficult to manage forest recreation services with an increase in visitation and declining budgets while maintaining a satisfactory user experience and preserve land. Mitigation of budget reductions could encompass the utilization of use fees, but this requires managers to know how individuals feel about different types of use fees and

potential impacts that may occur due to implementation so they can choose a program that is best suited for specific sites. Understanding how users evaluate fees, their preferences for different fee types, and the maximum prices they are willing to pay can assist managers in determining appropriate fee areas, setting fee prices, and designing information and education campaigns to explain the rationale of the fee (Fix & Vaske, 2007).

This study explores how user determinants influence willingness to pay for four different payment types (i.e., voluntary money donation, mandatory annual use fee, mandatory seasonal use fee, and daily use fee) for access to forest recreation areas. The primary objectives of this study uses contingent valuation methods to a) identify determinants of willingness to pay for existing forest users, b) calculate potential revenue, c) create a willingness to pay model to apply to other populations to estimate potential revenue based on past users' willingness to pay values, and d) suggest outreach projects and education campaigns to managers based on significant determinants of willingness to pay to help mitigate decreases in budget, recover cost, and promote visitation to increase revenue.

Outdoor recreation

Outdoor recreation plays a fundamental role in people's lives and is a central way that people can connect with the natural environment (Pashley, 2015; White et al., 2016). The opportunity to engage in outdoor recreation provides physical challenges, supports mental and spiritual health, increases interest in nature, and bonds animal worlds together (Louv, 2008). Outdoor recreation ties people together and encourages us to learn about culture and heritage (Callicott, 1994). From a vision standpoint, outdoor recreation inspires managers to develop management plans, design communication plans, and encourages environmental protection

where needed (i.e. endangered species) (Absher, McCollum, & Bowker, 1999; Duffus & Dearden, 1990). Outdoor recreation teaches adults and children new skills to cope with survival, weather, food gathering, and communication (Wilson, 2007). Places that provide space for outdoor recreation such as parks, forest, grasslands, deserts, and beaches are parts of people's daily routine (Loomis & Walsh, 1997). Economics is one aspect to help guide protecting, conserving, and creating these important natural resource recreation areas. Loomis and Walsh (1997) note: "the purpose of economics is to increase the well-being of the individuals in society, and each individual is the best judge of how well-off he or she is in a given situation".

Recreation economics provides a way to meet the wants and needs from recreation experiences while interacting with natural resources. Economics focusing on environmental services, like outdoor recreation and other ecosystem services, is essential because of the indirect and direct impacts on human populations (Loomis & Walsh, 1997). Economics also focuses on large investments and management strategies and trends that private and public sectors make as providers of environmental services. People who participate in recreation allocate significant portions of their income to participate in outdoor activities, such that Americans spend an estimated \$646 billion annually on recreation equipment and the goods and services connected with outdoor recreation (Loomis & Walsh, 1997; White et al., 2016).

Trends in outdoor recreation

The National Survey on Recreation and the Environment (NSRE) monitors trends in outdoor recreation by conducting general population telephone surveys of individuals 16 years of age and older (White et al., 2016). Their primary focus is to measure participation in outdoor recreation activities and peoples' environmental behaviors and attitudes (Cordell, 2012). The

NSRE collects data from urban and rural locations and private and public land and water.

Another national assessment report done by the USFS for the 2010 Renewable Resource Planning Act Assessment reports past trends of outdoor recreation, current outdoor recreation participation patterns on private and public land, and provides projections of outdoor recreation through 2060 (Cordell, 2012; Cordell, Betz, & Green, 2008). These reports found that the types of recreation activities for Americans are changing based off previously collected data. They observed several overarching trends. Hunting and fishing activities have decreased and are being replaced by “nature-based” activities such as wildlife and bird watching and photography. They observed growth in the outdoor recreation sector and project the growth is due to the increasing population. From the list of 60 outdoor activities, the total number of individuals who participated in one or more of those 60 activities grew by 7.5 percent, and the total number of activity days of participation increased over 32 percent. Different segments of society choose different types and levels of participation in different types of outdoor activities. They found that users visiting historic sites was significantly higher among non-hispanic whites, late teenagers, middle-aged individuals, individuals with some college to completion of advanced degrees, higher income individuals, and individuals born outside of the United States. For the “nature-based” activities, they found this was higher among individuals with higher education, higher incomes, non-hispanic whites, and individuals ages 35 to 54, those having some college to post graduate education, and those earning a minimum of \$50,000 United States Dollars (USD) per year. This survey also found that American youths are spending more time outdoors with approximately 64 percent of youth from the ages 6 to 19 reported spending two or more hours outdoors on a typical weekday and 75 percent reported spending two or more hours outdoors on

weekend days. However, a national survey completed by the United States Fish and Wildlife Service called the Outdoor Foundation and National Fishing, Hunting, and Wildlife Associated Recreation survey reported contradictory findings that children's outdoor activities are declining (Cordell, 2012). This may be due to the fact that the data collected from the national assessment report done by the USFS for the 2010 Renewable Resource Planning Act Assessment reports on whether children are outside or not, regardless of activity. Overall trends also show that public lands are important locations for recreational opportunities and visitation to public land is relatively stable or increasing. The only land to exhibit a decrease in visitation is national forest. The last trend for recreation concerns the constraints and motivation of participants to engage in outdoor recreational activity. Common responses include to be outdoors, to get away from everyday demands of life, to experience nature, to be with family, to contribute to health, and physical exercise.

Funding for outdoor recreation

Fee-supported parks

The history of fees can be recorded back to the Romans charging entrance fees to baths, while in the United States, the first fee recorded was in 1859 in New York's Central Park, where ice skates could be rented for ten cents per hour from park vendors (Warren & Rea, 1998). By the middle of the twentieth century, the reliance on use fees for annual operating budgets was becoming common for parks all across the United States. Other methods utilized to finance parks and recreation services include: general obligation bonds, revenue bonds, federal and state grants, general tax appropriations, special tax levy, donations and gifts, special tax proceeds, and mandatory dedications.

Evidence suggests the implementation of use fees is widely accepted by recreationists as

a way to support the development, general operations, and maintenance cost (Warren & Rea, 1998). The proper implementation of use fees will maximize revenue and visitation, minimize cost, and have low impact on user populations which is usually the primary goal of fee-supported parks.

Use fees

To address funding issues, recreation use fees have gained popularity for several land management agencies (L. Brown, 1992). The first piece of legislation that authorized federal land management agencies to collect recreation use fees and use them for specific services was in 1996. Congress established the Fee Demonstration Program (FDP) which allocated at least 80% of the revenue collected to be utilized in the area where the fee was collected (Martin, 1999). A use fee is a fee or tax paid by a user to a facility owner or operator as a necessary condition for using the facility. An alternative to use fees is a voluntary money donation (which would be optional for the user to pay to the facility owner or operator to use the facility). Fees to visit and recreate in forests, parks, and other natural resources have become common in many countries, primarily in developing countries (Khan, Ali, Khan, Shah, & Shoukat, 2014). Previous research estimated willingness to pay for recreational services. For example, Khan et al. (2014) estimated willingness to pay for recreational services of two public parks in Peshwar, Pakistan. Echeverría, Hanrahan, and Solórzano (1995) quantified the economic benefits of the Monteverde Cloud Forest Preserve using contingent valuation methods in a third world setting and Reynisdottir, Song, and Agrusa (2008) measured visitors' willingness to pay fees in Iceland for natural attractions, where no such measurement had previously been undertaken.

With an increase in visitation to recreation areas, financial stability is a necessity to maintain the environment and achieve management goals for general operations. Many recreation areas are dependent on their municipalities' general fund or other strategies such as grant application, partnership with other governments, reuse programs, facility rentals, and sponsorships (Pinkston, 2015). When shortfalls in budget occur, parks may need to implement a use fee to recover costs for maintaining operations. This strategy allows managers to be less dependent on municipalities' general fund.

Public and private lands offers places for recreation opportunities all around the United States. Examples of activities permitted in these places include hiking, biking, skiing, nature viewing, scenic drives, and gathering forest products such as mushrooms, firewood, and Christmas trees. Additionally, many of the USFS facilities associated with these opportunities do not require a use fee. However, certain facilities do require a use fee to help maintain, manage, and improve national forests and grasslands. Recreation fees, authorized by the Federal Lands Recreation Enhancement Act, enables federal land management agencies to reinvest certain use fees back into the recreation sites (Espey, 2005). Different types of use fee can be implemented depending on facilities available at the site such as toilets, picnic tables, information kiosk, etc. Fees are generally tied to developed facilities where these amenities are available. A list of different passes is located on USFS website (USFS, 2019). Currently, they offer eight different passes with a variety of different benefits to the pass holder and any accompanying passenger(s) in a private non-commercial vehicle. Passes include: a) Single-Day Pass, b) Multi-Day Pass, c) Interagency Annual Pass, d) Interagency Every Kid in a Park 4th Grade Pass, e) Interagency Annual Military Pass, f) Interagency Senior Pass, g) Interagency Access pass, and h) Interagency

and Volunteer Pass. Generally, persons 15 and younger are admitted free of charge and most passes are nontransferable. Ultimately, managers have the choice to implement several different types of use fees depending on management goals and feedback from users and non-users of natural resource.

Impacts of use fee

Implementation of use fees on public lands for recreation opportunities has a controversial history (Driver, Bossi, & Cordell, 1985). The positive and negative impacts have been cited throughout literature with dueling discussions regarding the outcome of fees on lands where experience should be obtainable with freedom from constraints. A summary from Fix and Vaske (2007) notes:

“cited rationale in support of fees include ideas that fees may provide a more efficient allocation of recreation resources, increase equity by having only those who benefit from recreation pay for its provisions, control congestion, reduce vandalism and other undesirable behavior, provide revenue to increase the quality of recreation facilities, and allow recreationist provisions to become more self-sufficient. Alternatively, it has been suggested that recreation fees result in an inequity for socio-economic groups of lower status and may also represent double taxation.”

Previous research completed by More (1999) found that low income users are more sensitive to recreation fees than their counterparts. However, McCarville (1995) suggest that negative impacts can be mitigated by carefully designed fee programs and fee program alternatives.

Additionally, the implementation of use fees can lead to higher expectations of site facilities which could ultimately increase operation budgets (More, Dustin, & Knopf, 1996; Silver, 2005). Conversely, McDonald, Noe, and Hammitt (1987) found that managers may be able to charge a low to moderate use fee without users desiring additional expectations or benefits. The Fee Demonstration Program led to a surge of research about use fees in the late twentieth century. Primary research focused on the acceptance of fees, beliefs about fee programs, socio-demographic variables influencing fees, and the displacement of users and non-users that may occur due to implementation of fees in certain locations.

Understanding recreationist willingness to pay

Willingness to pay through contingent valuation methods

Willingness to pay represents the maximum amount of money a customer is willing to spend for a good or service. However, not all goods can be evaluated in a traditional marketplace (i.e. environmental goods) (Carson, 2000). Creating a hypothetical situation to understand users' willingness to pay for non-market goods is done through different types of data collection (i.e. qualitative and quantitative methods) and assists with providing information on individual's economic valuation of the good in question (Hanley, 2016). Quantitative surveys can be administered or researchers can conduct qualitative interviews or focus groups to get a better understanding of how users assign willingness to pay values to certain goods while providing insight into what respondents were thinking when reporting their answers. These techniques are especially useful for non-market valuation for recreation areas. Two types of values can be evaluated: use value and non-use value. The summation of use value and non-use value give the total value of a good. Use value is defined as the willingness to pay for use of the resource or public good. Non-use value encompasses existence value, option value, and bequest value. These

terms refer to the user knowing the public good exists, using the public good in the future, and knowing future generations can enjoy the good, respectively (Loomis & Walsh, 1997).

The contingent valuation method is a common model utilized to estimate willingness to pay for use value and non-use value of public goods and is employed around the world, in both governmental and private sectors (Hanemann, 1994; Mitchell & Carson, 2013). Davis, Mitchell, and Carsen are credited with the development of contingent valuation methods (Peterson & Loomis, 2000). Contingent valuation methods can be classified into stated preference methods and revealed preference methods. Stated preference methods allow respondents to state how they would act in a hypothetical situation. Revealed preference methods are real situations where respondents deal with the consequences of their choice (Boyle, 2003).

Some economists have long criticized stated preference methods, however, attempts to fully discredit this approach have been unsuccessful (Arrow et al., 1993). The primary argument cast doubt on respondents being able to answer questions about hypothetical situations accurately and truthfully. Rather than invalidating the approach of contingent valuation, criticism has led to better designed studies and more focused validity research. The contingent valuation method has thus evolved into a reliable, valid, and credible technique and the majority of the literature appears to support this conclusion (Arrow et al., 1993; Boyle, 2003). Attempts to address important issues involving non-market goods should accept the strengths of stated preference methods and understand this approach is subjective to each study. To avoid skepticism from critics, researchers must develop a well-designed survey to effectively capture users' preferences and quantify consumers' choice.

Measuring users' valuation of non-market goods can potentially suggest public values

while helping recreation decision makers reflect the publics' values in policy making and recreation decisions (Carson, 2000). Environmental and natural resource non-market valuation techniques do not measure the value of market goods (Carson, 2000). However, the policy or decisions made by policy makers in regards to non-market valuation may affect both non-market and market goods.

Contingent valuation studies are usually observational studies by design and statistical interpretation is not always the most relevant interpretation, leaving room for additional practical interpretation. Understanding human behavior is a complex process and the conclusions provided by researchers often use a practical approach where qualitative and quantitative interpretation is provided. This approach requires researchers to look past the statistical analysis to interpret themes and patterns. This approach can be unique and at times, even foreign to scientists, depending on their primary field of study. Ironically, qualitative research does not have a concrete definition and at times introductory books do not contain definitions due to the concern of having a fixed definition (Creswell, 1998). However, Denzin and Lincoln (2011) propose a strong argument for using a qualitative approach. Patton (2015) describes this interpretive process as requiring both creative and critical faculties in making carefully considered judgements about what is meaningful in the patterns, themes, and categories generated by analysis.

Development of variables used in contingent valuation

The contingent valuation model encompasses variables that theory indicates should have an influence on willingness to pay along with exploratory variables to determine willingness to pay values. These variables can include activity, satisfaction, living distance, years recreating,

sociodemographic, previous knowledge, and dog(s).

Activity. The Recreation Use Values Database (RUVD) contains documents of economic valuation studies that estimate the use value of recreation activities in the U.S. and Canada from 1958 to 2015. This open resource offers an Excel workbook, bibliography, and background information. The updated 2016 version provides a summary of estimates in per person per activity day units adjusted to 2016 USD. The database provides twenty-one activity types with an additional twenty-two activities in the ‘other recreation’ category. The database measures studies per year published, estimates per year published, estimates by primary activity, distribution of consumer surplus estimates, and mean consumer surplus per person per day by primary activity. Additionally, this database can be separated by region of study. Summary reports provided by RUVD found the average value per activity day in the U.S. changes depending on activity. Activities range in value from mountain biking, hiking, hunting, and general other recreation (\$142.70, \$85.09, \$80.43, \$67.65 respectively).

Satisfaction. “Satisfaction is the result of a post consumption or post usage evaluation, containing both cognitive and affective elements” (Homburg, Koschate, & Hoyer, 2005; Oliver, 1980). User satisfaction can also be thought of as customer satisfaction. Customer satisfaction has become an important focus in corporate strategy and many companies have implemented programs for measuring and improving customer satisfaction for satisfactory financial performance. Recent research supports the notion that there is a positive relationship between customer satisfaction and financial performance (Homburg et al., 2005). Customer satisfaction can also lead to other cooperate benefits such as customer loyalty and customer word-of-mouth referrals which lead to increased profitability. On a more specific and smaller level, customer

satisfaction can also be studied with an individual's willingness to pay value for a product or service provided. This relationship is important because potential revenue and profit can be measured from a final model using satisfaction as an independent variable. According to Homburg, the relationship between customer satisfaction and willingness to pay is believed to be based on anecdotal evidence and has limited evidence of a relationship. A study done by Anderson (1996) focused on the link between customer satisfaction and price tolerance (the maximum price customers are willing to pay or tolerate before switching). The study focused on three research questions: a) whether there is a positive relationship between customer satisfaction and willingness to pay at the individual level, b) the functional structure of the relationship between customer service and willingness to pay, and c) the importance of studying dynamic aspects in the link between customer satisfaction and outcome variables. They are able to determine an aspired level of customer satisfaction for satisfactory profitability. Results indicate a positive relationship between customer satisfaction and willingness to pay. Additionally, Christensen, Stewart, and King (1993) and Lindsay, Halstead, Tupper, and Vaske (1992) found a positive relationship with willingness to pay and satisfaction (Christensen et al., 1993; Lindsay et al., 1992).

Living distance. Pate and Loomis (1997) examined willingness to pay for residents from California, Oregon, Washington, and Nevada on alternative programs to protect and expand wetlands and reduce wildlife contamination in the San Joaquin Valley, CA. They state that geographic distance does play a role in the respondents' willingness to pay values while suggesting it declines as distance increases for certain goods, and for others it does not (Pate & Loomis, 1997). When considering distance as a determinant to willingness to pay values we must

also consider repeat visits, satisfaction, current knowledge of location, preservation value, and source of information (Sutherland & Walsh, 1985). Determination of willingness to pay may be higher for repeat visitors since most information about a site is collected during visitation.

Regression analysis provides a statistical estimate of the relationship between willingness to pay and distance from the study site. When distance is not explicitly incorporated into the analysis it is considered to be equal at all points and have a constant effect across the study site.

Preservation value of an environmental resource is a function of the intrinsic properties of the resource and the information individuals have about a particular resource. Information transmitted by media may be distributed to a local area or around the country. Preservation values may be invariant to distance. Additionally, this determinant and willingness to pay values also has contradictory literature. Williams, Vogt, and Vittersø (1999) states respondents living close to a resource are less supportive for willingness to pay than those living further away.

Years recreating. A study published by Lindsay et al. (1992) found several significant factors influencing willingness to pay values for coastal beach protection. They found that the number of years visiting a particular beach was statistically significant in influencing willingness to pay values. Thus, recreationist with a longer history of visiting considered maintaining the location more favorable and felt strongly enough to pay.

Sociodemographic. There are several contradicting bodies of literature on how age, income, and education influence willingness to pay values. A review of previous studies found that determinants for demand for recreation include age, income, and education. Loomis and Walsh (1997) suggest that income and education were positively related and age was negatively related to participation in many recreation activities. These determinants also influence

willingness to pay values for recreation and other goods and services. Younger and highly educated individuals are more likely to support fees while age is negatively related to willingness to pay (Bowker, Cordell, & Johnson, 1999). Conversely, Khan et al. (2014) used contingent valuation methods and found that age was positively related to visitors' willingness to pay responses. Most of the contingent valuation studies show that, on average and depending on the good under evaluation, a more educated population is more likely to be willing to pay for public goods (Whitehead & Blomquist, 1991). Additionally, income has proven to be positively related to participation in recreation activities but there appear to be exceptions of certain activities. Previous literature also suggest that with an increase in age there is a decrease in recreation activity (Loomis & Walsh, 1997). However, Christensen et al. (1993) found that age does not influence willingness to pay values for different National Forest campgrounds. Additionally, results revealed no significant differences in the willingness to pay for three recreational fees for four different income levels and different ages. Neff (2006) also reports that more educated respondents state a higher willingness to pay value for certain types of fees.

Dupont (2001) and Swallow, Weaver, Opaluch, and Michelman (1994) demonstrates the role of gender on willingness to pay values and the appropriate method for aggregating the estimated mean or median willingness to pay values for heterogeneous groups in society, respectively. The results of the Dupont (2001) study support the hypothesis that women have lower willingness to pay values than men do for three different types of improved recreation activities. Dupont makes a case for the income gap between males and females as an important determinant of differential willingness to pay values pointing out the importance of including gender in the model due to the fact that females make up about one half of the population.

Excluding gender in a willingness to pay model will produce a biased mean willingness to pay value. This bias will be compounded when multiplying the mean willingness to pay by the number of individuals in the population. Previous literature states that females have significantly lower valuation than men in a number of recent dichotomous choice contingent valuation models (Alberini et al., 1997; Kealy, Montgomery, & Dovidio, 1990; Swallow et al., 1994).

Contradicting other literature, Neff (2006) reports a significant difference between males and females for willingness to pay the appropriate price for certain recreation fees where females have higher willingness to pay values than men do. Christensen et al. (1993) found gender to be an insignificant predictor of willingness to pay. Just like the determinants of age, income, and education, gender also has contradicting literature to support the influence of willingness to pay values for different goods and services.

Previous knowledge. Previous contingent valuation studies include the determinant of previous knowledge in their studies. Previous knowledge is the amount of information the respondent brings to the survey on their own or it can also include the information the survey provides to the respondent. To better understand the respondent's level of knowledge the survey asks specific questions regarding the focused topic. The respondent's level of knowledge may have an impact on the willingness to pay response. Previous research suggests that the lack of explicit information about related environmental goods in contingent markets can contribute to a misstatement of willingness to pay (Whitehead & Blomquist, 1991). Mesías Díaz, Martínez-Carrasco Pleite, Miguel Martínez Paz, and Gaspar García (2012) analyzed the different levels of knowledge and the influence of willingness to pay values for certain types of foods. They found that respondents' level of knowledge positively influences willingness to pay values for organic

food. Additionally, Lindsay et al. (1992) found that those familiar with protective laws have a greater probability of giving a positive response than those who are unfamiliar with protective laws suggesting that users knowledge of existing laws increases their willingness to pay values (Lindsay et al., 1992).

Exploratory. Respondents who bring dogs to the forest when recreating is considered at latent variable. To my knowledge, there is no published literature on how willingness to pay is influenced by users recreating with dogs or other animals. Previous literature suggests that dog owners engage more frequently in outdoor activities than non-dog owners which leads to physical and mental benefits. Dog owner's motivations to recreate usually include getting outside, exercise, bond with animal, and playtime.

Deriving data via surveys

Dynamic trends in recreation visitation require regular assessment of visitor experiences, typically through user surveys (e.g., questionnaires and user count methods). These assessments provide managers with information regarding recreation use levels, user preferences and experiences, and other valuable information that feeds into complex recreational decision-making process. Recreation use and preference modeling assists management decisions by identifying future demands for recreation resources and infrastructure. Additionally, modeling systems are useful in estimating the economic contributions from alternative recreation management scenarios with use values data obtained via surveys (Kramer & Mercer, 1997). These models allow decision makers to test scenarios, observe potential outcomes, and make better informed decisions on balancing ecological integrity and use of recreation sites.

Current study

In the past, researchers have used contingent valuation methods to better understand how users assign willingness to pay values to non-market goods. The results provide researchers the opportunity to provide managers with valuable information about how users assign willingness to pay values based off different user characteristics. This information aids managers in making educated decisions regarding policy. This is especially useful when managers are considering implementing a use fee in recreation areas.

This study seeks to advance and build upon contingent valuation methods and previous literature, examine more than one use fee simultaneously from a single sample population, and understand how recreationists make use fee decisions. First, it explores the odds of user's willingness to pay depending on user characteristics then compares the statistically significant variables between payment types. Second, it explores the amount users are willing to pay depending on user characteristics then compares the statistically significant variables between payment types. Finally, it seeks to use the models created from previous data collection and apply them to more recent data from the same location, ten years later. The application of the model to the new data collection uses average person willingness to pay estimates and use estimates to determine potential revenue based on a previous population for different payment types. This application model provides practical information to forest managers who are thinking about implementing certain types of fees based on knowledge and access to their population characteristics.

METHODS**Study site**

The McDonald-Dunn Research Forest is located northwest of Corvallis, Oregon on the

western edge of the Willamette Valley and on the eastern foothills of the Coast Range with predominantly forested land. The forest is owned and managed by The College of Forestry at Oregon State University and is an 11,250 acre multi-use forest used for teaching, research, demonstration, timber harvest, cultural resources, and recreation. Some of the primary recreational activities include hiking or walking, dog walking, trail running or jogging, mountain biking, nature viewing, bird watching, horseback riding, hunting, and other general recreation activities. Faculty and students use this forest as a primary source for forest education and research data collection. There are four different tree management themes that allow for side-by-side management comparison while also offering a unique recreation opportunity to forest users to experience different forest landscapes. To achieve the mission and goals for the forest, the land is allocated to one of the four themes (Figure 1). The themes include: theme #1: Short Rotation Wood Production with High Return on Investment, theme #2: High-quality, Growth-maximizing Timber Production, theme #3: Visually Sensitive, Even-aged Forest, and theme #4: Structurally Diverse Complex Forest. Each theme relates to a different set of management objectives (Fletcher et al., 2005).

The forest is an example of a resource rich environmental system that provides a wide-range of ecosystem services and materials. This ecosystem supports a variety of outdoor recreation activities like hiking, biking, hunting, and horseback riding as well as resource materials such as lumber, firewood, Christmas trees, ornamental nursery crops, and foods. Ecosystem services are the benefits that human populations derive from ecosystems (Bolund & Hunhammar, 1999). Additionally, there are many direct and indirect services that a forest system provides to individuals to increase the overall well-being of the surrounding population. Forested

areas, like the McDonald-Dunn Forest, are known to regulate stream flow, control erosion, absorb atmospheric carbon dioxide, and provide habitats for a variety of species while providing wood products for the economy. Furthermore, forest agencies also offers job opportunities for seasonal, part time, and full time employment.

The McDonald-Dunn Forest's proximity to the Corvallis community results in a significant number of individuals recreating on the forest land. Recreation use level estimates have risen 48% in ten years from approximately 105,000 non-motorized annual visits +/- 10% in 2008 to 155,446 non-motorized annual visits +/- 10% in 2018 (Kooistra & Munanura, 2018). This increase in local recreation trends is consistent with recent research findings that recreation trends across the United States have increased (Cordell, 2012). The forest should expect to see recreation use levels increase if population trends continue.

The McDonald-Dunn Forest is open to the general public free of charge for access to recreational activity areas. Special projects or developments are sometimes funded through grants or donations, but the base budget (e.g. covering staff, maintenance, research and supplies) comes directly from the revenue generated from the forest through timber harvest. There are five main high visitation access gates to the forest: Oak Creek, Jackson Creek, Lewisburg Saddle, Peavy Arboretum, and Highway 99; and two low visitation access gates: Sulphur Springs and 400 Rd (Figure 2). The different access gates allows for seven data collection sites and contact to a variety of different forest users.

2008 data collection

Survey data were obtained from an on-site questionnaire of users exiting the McDonald-Dunn Forest in Corvallis, Oregon for a full year between October 2008 and September 2009.

Before administration of the questionnaire, the survey was pre-tested with a small sample of Oregon State University graduate students and edited for length and clarity.

Users were asked if they were willing to complete a questionnaire, read a letter of recruitment/consent, and then immediately completed and returned the questionnaire onsite. Willing participants were provided with a double sided questionnaire booklet, clipboard, and pen to complete the questionnaire. Most respondents completed the questionnaire within fifteen to twenty minutes.

Questionnaires were available at seven access gates. Onsite questionnaires were available and completed face to face at the five main “high visitation” access gates: Oak Creek, Jackson Creek, Lewisburg Saddle, Peavy Arboretum, and Highway 99. In addition, when sampling at Lewisburg Saddle and Highway 99, supplemental drop off/mail-in questionnaires were provided at the two “low visitation” sites: Sulphur Springs (McDonald Forest) and 400 Rd (Dunn Forest) (Figure 2- modified from Needham and Rosenberger, 2011). When sampling at low visitation sites, Allred and Ross-Davis (2011) drop off and mail back method was used. Questionnaires were left on potential respondent vehicles at low visitation sites in a waterproof bag along with a stamped envelope and a letter explaining the study. Vehicle and trailer license plates numbers were recorded to limit the number of repeat contacts to three times if no response was received (i.e., they had not mailed back their survey). All data were collectively analyzed as a whole dataset, rather than analyzing them differently because they were collected through different means.

An attempt was made to contact (in person) each adult party exiting the forest to increase the probability of obtaining a representative sample of users, at high visitation sites. One

questionnaire was given to the person with the most recently passed birthday in each party during these efforts. No one completed the questionnaire more than once during the year. Onsite counts of users exiting the forest were also recorded using hand held counters, during all sample dates and times, to estimate forest use levels.

A stratified random sampling design was used to collect survey data. Sampling dates were randomly selected and the time of day and the site strata were rotated. Dates were categorized into weekdays (Mondays, Tuesdays, Wednesdays, Thursdays) and weekends (Fridays, Saturdays, Sundays, federal holidays). Approximately half of the weekdays and weekends were randomly selected for sampling each month. Sample timing was stratified in morning and afternoon as follows: morning: 7:30 am to 12:30 pm in fall, 8:00 am to 12:00 pm in winter, and 8:00 am to 1:00 pm in spring and summer; afternoon: 12:30 pm to 5:30 pm in fall, 12:00 pm to 4:00 pm in winter, and 1:00 pm to 6:00 pm in spring and summer (Table 1).

2008 questionnaire design

The questionnaire consisted of 37 different questions with a wide range of topics addressing key objectives. Question types included open-ended, 5 point scales, preference, binary, and categorical (Needham & Rosenberger, 2011). The three primary objectives of the survey were to: a) determine the extent that the users are willing to pay to access the McDonald-Dunn Forest under various mechanisms, b) categorize the user's support or opposition to a fee, and c) record the user's expectations for improvements in return for payments. The questionnaire included questions on a range of topics such as prior visitation, activity participation, satisfaction, activity conflict, and support and opposition toward management. Additionally, user activities and demographic information was collected along with opinion-based information on

conditions and management of the forest. Questions were designed to understand current use levels and demand for recreation. Two different versions of the survey were administered to reduce length and respondent burden. Both versions were identical except for the four scenarios (questions 14 to 17) measuring user tradeoffs in support of an annual fee/pass and facility upgrades (Appendix A).

Analysis variables

Variables of interest from the survey were collapsed and re-coded using Statistical Package for Social Science 21.0 (SPSS) (Nie, Bent, & Hull, 1975). Coding of each variable was scaled following an appropriate model of preference to yield a measure of value. Errors and missing values were removed from the dataset before performing analysis. In this study, it was not possible to distinguish protest responses from valid responses. Protest responses such as hypothetical (i.e., lack of experience a person may have in specifying a price for a commodity that has no tradition for being priced, such as a recreation use fee) or strategic bias (i.e., users deliberately overstating or understating true willingness to pay) were not considered.

Two statistical models were used for analysis. Logistic regression (LR) models used a dichotomous dependent variable of “willing to pay or not willing to pay” and the ordinary least squares (OLS) regression models used a continuous dependent variable of “how much respondent stated they would be willing to pay”. The LR models were used to estimate the odds that the event would occur and the OLS models were used to estimate the level of change in the mean dependent variable for each independent variable. Analyses of dependent variables were done for four different payment types. The four payment types were categorized as: a) voluntary money donation, b) mandatory annual use fee, c) mandatory seasonal use fee, d) mandatory daily

use fee. Behavioral intentions, conventional demographic variables, and unconventional variables were included in the models. Complete details for each variable are listed in Table 2.

Behavioral intentions. The respondents were asked the maximum amount they would be willing to pay for each payment type to use the McDonald-Dunn Forest for recreation. Originally, the question was in an open-ended contingent valuation question format similar to that used in previous research (Ajzen & Driver, 1992; Bernath & Roschewitz, 2008). Respondents were given directions to put zero if they were not willing to pay for payment type. For all four payment types, responses for the LR models were re-coded to a dichotomous variable where 0 was “not willing to pay” for payment type and 1 was “willing to pay” for payment type. Any payment amount above zero was coded as 1. Respondents who did not provide a stated willingness to pay response for a payment type, were considered to be unwilling to pay the payment type and were coded as 0. The responses were also used for the OLS regression models where willingness to pay was an open ended continuous variable.

Independent variables in the analysis included: a) respondents typical activity of ‘on foot’ or b) respondents typical activity of ‘on bike’, c) satisfaction, d) years recreating, e) dog(s), f) living distance from the nearest boundary, g) gender, h) age, i) annual household income, j) level of education, and k) previous knowledge. Independent variable description and coding was as follows:

Activity. The respondents were asked to state the primary activity that they typically participate in at the McDonald-Dunn Forest. The original nine categories were: a) hiking or walking b) dog walking, c) trail running or jogging, d) mountain biking, e) nature viewing, f) bird watching, g) horseback riding, h) hunting, and i) other. The activities were collapsed into

three main groups: a) on foot, b) on bike, c) and other. These were collapsed into these categories because of response rates; about 80% of respondents were on foot and 15% were on bike, leaving only 5% for the remaining activities.

Satisfaction. The respondents were asked to state how satisfied they were with their recreation experiences at McDonald-Dunn Forest. The variable was ordinal from 0 to 4 where 0 was very dissatisfied, 1 was dissatisfied, 2 was neither, 3 was satisfied, and 4 was very satisfied. The variable was converted to a dichotomous variable where '0' was satisfied and '1' was very satisfied. Coding of this variable was selected due to the fact that over 95% of respondents selected these two options.

Years recreating. The respondents were asked in total, about how many years they have been recreating in the McDonald-Dunn Forest. The variable was continuous from 0 to 50 years.

Dog(s). The respondents were asked if they typically bring any dog(s) when visiting the McDonald-Dunn Forest. The variable was dichotomous where 0 was no and 1 was yes.

Living distance. The respondents were asked approximately how far away from the nearest forest boundary of the McDonald-Dunn Forest they currently lived. The variable was categorical from 0 to 5 where 0 was adjacent (next to forest), 1 was within ½ mile, 2 was within 1 mile, 3 was 1 to 5 miles, 4 was more than 5 miles, and 5 was unsure. The variable was treated as quasi-continuous in analysis and coded appropriately where 0 was adjacent (next to forest), 0.5 was within ½ mile, 1 was within 1 mile, 3 was 1 to 5 miles, and 7 was more than 5 miles. Unsure respondents were removed from analysis. The mean of each category was used to create continuity.

Gender. The respondents were asked to state their gender as male or female. The variable

was dichotomous where 0 was male and 1 was female.

Age. The respondents were asked to state their age. The variable is continuous from 14 to 88 years.

Income. The respondents were asked to state their current annual household income before taxes. Originally the incomes were categorical and were in increasing increments of \$19,999 USD starting with less than \$10,000 to \$170,000 or more. According to the Census Bureau data from 2009, the median household income was \$44,616 +/- \$5,663 USD in Benton County, Oregon (Bureau, 2009). This information was used to dichotomize categories into '0' below median income and '1' above median income. Below median income consisted of respondents in the range of 0 to \$49,000 and above median income consisted of respondents from the range of \$50,000 to \$170,000 or more.

Education. The respondents were asked to state their highest level of completed education. The variable was ordinal where 0 was less than high school diploma, 1 was high school diploma or General Educational Development (GED), 2 was 2-year associates degree or trade school, 3 was 4-year college degree (e.g. bachelor's degree), and 5 was advanced degree beyond 4-year degree (e.g. masters, Ph.D., medical doctor, law degree). In the analysis, education was treated as quasi-continuous where 8 was less than high school diploma, 12 was high school diploma or General Educational Development (GED), 14 was 2-year associates degree or trade school, 16 was 4-year college degree, and 18 was advanced degree beyond 4-year degree. The average number of years to complete categorical requirement was used to create continuity.

Previous knowledge. The respondents were asked what they think currently pays for

recreation management at the McDonald-Dunn Forest. Originally, the variable was coded as continuous from 0 to 6 where 0 was federal taxes, 1 was state taxes, 2 was local taxes, 3 was timber harvest from the forest, 4 was grants and subsidies, 5 was gifts and donation, and 6 was unsure. The variable was recoded to be dichotomous where 0 represents the incorrect answers 1, 2, 4, 5, 6, and 1 represents the correct answer 3, funding from timber harvest. The conversion to a dichotomous variable allowed researchers to analyze correct and incorrect responses.

Research questions

The three primary research questions explored are:

1. What proportion and amount are users willing to pay for forest recreation depending on payment types?
2. What are users' determinants of willingness to pay for forest recreation and do determinants differ across payment types?
3. Can willingness to pay models estimate potential revenue for the same population?

Theory and previous research suggest that visitors to the McDonald-Dunn Forest in Corvallis, Oregon would be willing to pay a use fee and the amount should change depending on payment type. Determinants, such as activity, satisfaction, income, and education should positively influence willingness to pay, and determinants such as years recreating in forest, age, and living distance should negatively influence willingness to pay. Finally, determinants such as gender, dog(s), and previous knowledge on funding for recreation should have no influence on willingness to pay. In addition, literature suggest that variables would change depending on payment type. The developed 2008 willingness to pay model will be used to estimate willingness

to pay for the 2018 population. Successful application should justify the use of models on different populations to reduce respondent survey burden.

Conceptual model

Contingency tables and general descriptive statistics were used to find the proportion of users willing to pay and the mean amount users were willing to pay for forest recreation for all four payment types. Additionally, two primary model types were used to evaluate the data. First, LR models were used to evaluate the odds that a respondent would or would not be willing to pay a use fee based on the independent variables, for each payment type. Secondly, OLS regression models were used to evaluate the relationship between stated use fee amount respondents were willing to pay and independent variables, for each payment type.

LR:

Stated willingness to pay a payment type was a dichotomous response variable (WTP_i) that takes on a value of 0 if respondent i stated they were “not willing to pay a payment type” or a 1 if respondent i stated they were “willing to pay”. The logit model begins with estimating the probability, P_i , that respondents were willing to pay the fee (i.e., $\text{Prob}(\text{event}) = P_i = WTP_i = 1$):

$$(1) \text{Prob}(\text{event}) = P_i = \frac{e^z}{1 + e^z}$$

where: z was $\beta_0 + \beta_1 X_1 + \dots + \beta_{11} X_{11}$, β_0 was the constant term, $\beta_1 - \beta_{11}$ were the logistic coefficients, X represented the independent variables where X_1 was on foot activities, X_2 was on bike activity, X_3 was satisfaction, X_4 was years recreating, X_5 was typically brings dogs when recreating, X_6 was living distance from nearest boundary, X_7 was gender, X_8 was age, X_9 was income, X_{10} was level of education, X_{11} was previous knowledge, and e was the base of the natural logarithms, approximately 2.718. Equation (2) was the logit distribution function. If P_i

was the probability of paying a fee, then $(1-P_i)$ was the probability of not paying a fee (i.e., Prob (no event) = $P_i = WTP_i = 0$). Therefore, the odds ratio of paying a fee can be written as:

$$(2) \frac{P_i}{1 - P_i} = \frac{1 + e^z}{1 + e^{-z}} = e^z$$

To understand the interpretation of the logistic coefficients, the logistic regression equation can be written in terms of the log of the odds ($\ln [\text{odds}]$, a.k.a. a logit). Taking the natural logarithm of equation (2) results in the logit model:

$$(3) \ln(\text{odds}) \left[\frac{\text{Prob}(\text{event})}{\text{Prob}(\text{no event})} \right] = \frac{P_i}{1 - P_i} = \beta_0 + \beta_1 X_1 + \dots + \beta_{11} X_{11}$$

OLS:

The stated amount respondents were willing to pay ($\$WTP_i$) was a continuous variable elicited from an open-ended contingent valuation method question format that was assumed to be normally distributed. $\$WTP_i$ was the final bid for willingness to pay amounts on each of the four payment types: a) voluntary money donation, b) mandatory annual use fee, c) mandatory seasonal use fee, and d) mandatory daily use fee. Thus, OLS was an appropriate estimator for this type of data. This $\$WTP_i$ model can be written as:

$$(4) \$WTP_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{11} X_{11} + \epsilon_i$$

where X represented the independent variables where X_1 was on foot activities, X_2 was on bike activity, X_3 was satisfaction, X_4 was years recreating, X_5 was typically brings dogs when recreating, X_6 was living distance from nearest boundary, X_7 was gender, X_8 was age, X_9 was income, X_{10} was level of education, X_{11} was previous knowledge. β 's were the parameters to be estimated, and ϵ_i was the independently and identically distributed error term.

Observational assessments were used to interpret the practical difference between significant independent variables for all four payment types. All models used were based on the assumptions that individuals understand their preference and make choices to maximize their welfare.

Probability values of $p < .1$, $p < .05$, and $p < .01$ were used to address significance in all statistical analysis in this report. Sample size of respondent's stating a willingness to pay value above zero ranges from 465 to 739 depending on payment type. For samples of approximately 400 respondents, $p < .05$ or $p < .01$ were commonly reported in the literature (Vaske, 2008).

Model application to 2018 survey

This study estimated willingness to pay models for four different payment types from the 2008 McDonald-Dunn Forest user data. 2008 willingness to pay models were then applied to the 2018 onsite user data collected from the same study site (McDonald-Dunn Forest, $\Delta = 10$ years). The survey methodologies were similar for the 2008 and 2018 data collection efforts; however, there were two primary differences in the level of information gathered between the two studies. First, the 2018 study did not collect willingness to pay data for any payment types for the forest. Second, both onsite users and forest-adjacent landowners were surveyed about their recreational use of the forests in the 2018 study, whereas the 2008 study only surveyed onsite users of the forests. The 2018 adjacent landowner data was not used in the model application analysis for this study.

Prediction values for 2018 were based on the model fitted to the 2008 data that provided willingness to pay estimates based on the 11 coefficients (Kramer & Mercer, 1997). These coefficients measure how willingness to pay varies systematically with the explanatory variables

for each payment type. Equation (5) was the final model created from the 2008 willingness to pay data collection that was used to estimate willingness to pay values for the 2018 data collection. Equation 5 can be written as:

$$(5) \hat{WTP} = \hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + \dots + \hat{\beta}_{11} X_{11}$$

where β 's were the estimated coefficients from the 2008 willingness to pay model and X_1 to X_{11} were the 2018 variable means.

Estimated 2018 willingness to pay values for each payment type were adjusted for inflation using the United States Department of Labor Consumer Price Index (CPI) Inflation Calculator (Labor, 2018). Confidence intervals were also adjusted for inflation. Annual potential revenue was estimated using model output. Table 3 outlines the steps involved in applying the 2008 willingness to pay model to the 2018 user data. To calculate potential revenue for voluntary money donation the percent of the population was multiplied times the willingness to pay amount and summed. To adjust for the respondents who were not willing to pay the mandatory use fee amount generated by the model, the percentage of respondents willing to pay was multiplied by the model willingness to pay amount to obtain an accurate potential revenue estimation.

Analysis of independent t-tests and chi-square tests were used to test for significance between 2008 and 2018 covariates mean values. For t-test analysis, an F -test was used to test whether the two populations have the same variance. Equal variances were assumed when the F -test for equality of variances were not statistically significant. Confidence intervals were generated for estimated willingness to pay values for each payment type.

Variables not collected in the 2018 survey were replaced with the 2008 data. This only

included the mean value for the previous knowledge variable used in the models. Census Bureau data was used to determine the median income for the 2018 population (Bureau, 2017). The 2018 survey did not investigate willingness to pay values for access to forest recreation so validation of the 2008 model was not possible. Therefore, this study focused on exploring the concept of comparing user population's willingness to pay, for different payment types, over time without access to information on current willingness to pay values.

RESULTS

2008 survey descriptive statistics

Sample sizes and response rates

Table 4 shows the number of completed questionnaires from all sites with a response rate of 73% (n = 1,068). Sample sizes and response rates at each site were: Lewisburg Saddle n = 284 (74% response), Oak Creek n = 283 (72% response), Peavy Arboretum n = 201 (76% response), Highway 99 n = 134 (76% response), Jackson Creek n = 107 (75% response), Sulphur Springs n = 48 (60% response [drop off / mail]), and 400 Rd. (Dunn Forest) n = 11 (52% response [drop off / mail]).

Activity characteristics

Table 5 shows that the primary outdoor recreation activity is hiking or walking in this forest (94%). In addition, 60% have walked dog(s), 55% have gone nature viewing, 52% have ran or jogged the trails, 47% have mountain biked, and 24% have gone bird watching in this forest. Fewer users have gone horseback riding (7%) or hunting (2%). Other activities listed from open response included mushroom picking and photography. The primary activities in which users typically participated at this forest were hiking or walking (42%), trail running or jogging (21%), dog walking (17%), and mountain biking (15%). Few users' primary typical activity was

horseback riding (3%), nature viewing (1%) or other activities (1%). No respondent reported bird watching or hunting as their primary activity at the forest. For analysis, the available activities were collapsed into three major groups of 'on foot', 'on bike', and 'other'. The 'on foot' main group consisted of hiking and walking, trail running and jogging, and dog walking. The 'on bike' main group consisted of mountain biking. The 'other' main group consisted of horseback riding, nature viewing, bird watching, hunting, and other. Table 6 shows the results of the groups that were collapsed based on primary activities. The main group of 'on foot' was the highest percentage of users (80%), followed by on bike (15%), then other (5%).

Satisfaction with recreation experience

Table 7 shows that overall satisfaction was high with 96% of users as very satisfied and satisfied. Independently, 66% of users were very satisfied and 30% of users were satisfied. A very small percentage of forest users were dissatisfied or neutral (4%).

Years recreating in forest

Table 8 shows that most of the users have spent between 10 to 19 years recreating in the forest (26%), while only 15% report recreating for 1 year. Forty-six percent of users have been recreating in this forest for 10 or more years showing a high number of repeat visitors. On average, users have spent 10.5 years recreating in this forest.

Dog(s)

Table 9 shows that approximately half of the users (51%) typically bring dog(s) with them to the forest. Forty-nine percent of the respondents answered no to bringing dog(s) to the forest.

Living distance

Sociodemographic characteristics are shown in table 10. Most respondents live between 1 to 5 miles away (43%) followed by 36% of respondents living more than 5 miles away. The lowest percentage of individuals live adjacent to the forest (4%) and the second lowest percentage live within ½ mile (6%). Twenty-one percent live within 1 mile of a forest boundary.

Gender

There were relatively equal portions of females (51%) and males (49%).

Age

The largest proportion of respondents were 50 to 59 years old (28%) and 40 to 49 years old (20%). The lowest percent of respondents were 70 plus years old (3%) and less than 20 years old (4%). The mean respondent age was 45 years old.

Income

Sixty-five percent of respondents were above median household income level and 35% of respondents were below median household income for Benton County, OR. The mean is \$64,000 USD.

Education

Respondents recreating in the forest were highly educated with 90% of individuals having a post-secondary degree and less than 1% of individuals having less than a high school diploma. Eight percent of respondents had a high school diploma or GED.

Previous knowledge of recreation management

Table 11 shows that 65% of respondents correctly identified revenue from timber harvests from the forest as the source of funding for recreation management. Respondents also selected grants and subsidies (50%), gifts and donations (47%), state taxes (47%), local taxes

(21%), federal taxes (16%), and unsure (29%). As respondents were able to select more than one option, the percentages do not add up to 100%. It is clear that there is some confusion among respondents about what sources pay for recreation management.

Proportion, type, and amount of users willing to pay

Research question one explored the proportion of users that were willing to pay, the type of fee users were willing to pay, and the amount users were willing to pay for forest recreation at the McDonald-Dunn Forest.

Proportion of users willing to pay a use fee

Results indicate about 90% of respondents were willing to pay a use fee while about 10% were not willing to pay a use fee to use the McDonald-Dunn Forest (Table 12). Overall, this is a high percentage of users who were willing to pay a use fee regardless of the payment type. The most preferred payment type was voluntary money donation (49%), followed by mandatory annual use fee (33%), mandatory seasonal use fee (6%), then mandatory daily use fee (3%). Preference of use fees decrease as the length of duration decreases.

Willingness to pay depending on payment types

Eighty-three percent of respondents would be willing to pay a voluntary money donation, 76% of respondents would be willing to pay a mandatory annual use fee, 67% of respondents would be willing to pay a mandatory seasonal use fee, and 50% of respondents would be willing to pay a mandatory daily use fee (Table 13). There is a wide range of variance between respondents across payment types. The least variance between respondents occurs in the voluntary money donation use fee, 17% not willing to pay and 83% willing to pay. The highest variance occurs in the mandatory daily use fee with response rates evenly divided between

respondents.

Willingness to pay amount for payment types

Table 14 shows the mean, median, and mode for all four payment types. For voluntary money donation the mean was \$30.80, the median was \$20.00, and the mode was \$5.00. The most frequently mentioned donation amounts were \$5.00, \$20.00, \$50.00, and \$100.00 per year. The mean, median and mode for mandatory annual use fee were \$35.98, \$25.00, and \$20.00, respectively. The most common listed amounts for annual use fee were \$20.00, \$25.00, and \$50.00. Additionally, for a mandatory seasonal use fee, the mean was \$20.98, the median 20.00, and the mode \$10.00 and the most common listed amounts were \$10.00, \$20.00, and \$25.00. Finally, for the mandatory daily use fee the mean was \$2.76, the median was \$2.00, and the mode was 2.00. The most common amounts for daily use fee were \$2.00, \$1.00, \$5.00, and \$3.00. As expected, the highest mean, median, and mode were in the mandatory annual use fee. However, it is important to refer to table 13 to review the percentage of respondents who stated they would be willing to pay a certain use fee to calculate cost benefit analysis.

Logistic regression

Research question two explored users' determinants of willingness to pay and how determinants differed across payment types. Logistic regression models were used to estimate the odds that respondents would be willing to pay or would not be willing to pay a use fee, for each payment type. Alpha levels of $p < 0.1$, $p < 0.05$, and $p < 0.01$ were used to test for significance. The LR models use a dichotomous dependent variable from the recoded open-ended willingness to pay question and 11 independent variables (Table 2). To reduce the number of dummy variables, the 11 variables were either dichotomous, continuous, or quasi-continuous.

Results were compared across each payment type.

Voluntary money donation use fee

The logistic regression model for voluntary money donation correctly classified 85% of all respondents, including 0% of those who would not be willing to pay and 100% of those who would be willing to pay (Table 15). Education positively influenced the odds of willingness to pay while age negatively influenced the odds of willingness to pay a voluntary money donation (Table 16). This indicates that the odds a user was willing to pay were estimated to be 1.122 times higher for a one unit increase in education, while the odds a user was willing to pay were estimated to be 0.984 times lower for a one unit increase in age. Only two significant variables for this payment type was not surprising because almost 85% of respondents said they would be willing to pay a voluntary money donation (Table 13). The Nagelkerke R^2 of .035 suggest that approximately 3.5% of the respondents' willingness to pay intentions were explained by the eleven independent variables regarding willingness to pay.

Mandatory annual use fee

The logistic regression model for mandatory annual use fee correctly classified 78% of all respondents, including 5% of those who would not be willing to pay and 99% of those who would be willing to pay (Table 17). Satisfaction, income, education, and previous knowledge positively influenced the odds of willingness to pay a mandatory annual use fee while on foot activities and age negatively influenced the odds of willingness to pay for a mandatory annual use fee (Table 18). Therefore, very satisfied users were estimated to be 2.32 times more likely to pay than satisfied users, users above the median income were estimated to be 1.982 times more likely than users below the median income, the odds a respondent was willing to pay were

estimated to be 1.093 times higher for a one unit increase in education and, users who correctly identified the recreation revenue source were estimated to be 1.510 times more likely than users who did not. Conversely, users participating in on foot activities were estimated to be 0.416 times less likely to pay than users not on foot and the odds a user was willing to pay were estimated to be 0.981 lower for a one unit increase in age. The Nagelkerke R^2 of .095 suggest that approximately 9.5% of the respondents' willingness to pay were explained by the eleven independent variables (Table 18).

Mandatory seasonal use fee

The logistic regression model for mandatory seasonal use fee correctly classified 69% of all respondents, including 6% of those who would not be willing to pay and 97% of those who would be willing to pay (Table 19). Satisfaction and income positively influenced the odds of willingness to pay while on foot activities, on bike activities, and age negatively influenced the odds of willingness to pay a mandatory seasonal use fee (Table 20). Therefore, very satisfied users were estimated to be 1.787 times more likely to pay than satisfied users and users above median income were estimated to be 1.403 times more likely to pay than those below the median income level. On the other hand, users participating in on foot activities were estimated to be 0.305 times less likely to pay than those not on foot, individuals participating in on bike activities were estimated to be 0.308 times less likely to pay than those not on bike, and the odds a user was willing to pay were estimated to be 0.977 times lower for a one unit increase in age. The Nagelkerke R^2 of .064 suggest that approximately 6.4% of the respondents' willingness to pay were explained by the eleven independent variables (Table 20).

Mandatory daily use fee

The logistic regression model for mandatory daily use fee correctly classified 60% of all respondents, including 52% of those who would not be willing to pay and 68% of those who would be willing to pay (Table 21). Satisfaction and living distance positively influenced the odds of willingness to pay while on bike activities and years recreating negatively influenced the odds of willingness to pay a mandatory daily use fee. Therefore, very satisfied users were estimated to be 1.764 times more likely to pay than satisfied users and the odds a user was willing to pay were estimated to be 1.133 times higher for a one unit increase in living distance. While users participating in on bike activities were estimated to be 0.456 times less likely than those not on bike and the odds a user was willing to pay were estimated to be 0.967 times lower with a one unit increase in age. The Nagelkerke R^2 of .088 suggest that approximately 8.8% of the respondents' willingness to pay were explained by the eleven independent variables (Table 22).

Comparisons using logistic regression model across payment types

Research question number two also explored how the odds of paying a use fee and the significant determinants differed across payment types. Table 23 provides an overview of the significant independent variables for each payment type and aids in conceptualizing a larger picture in comparing the determinants across payment types. Voluntary money donation had two significant independent variables: age and education. Mandatory annual use fee had six significant independent variables: on foot activities, satisfaction, age, income, education, and previous knowledge. Mandatory seasonal use fee had five significant independent variables: On foot activities, on bike activities, satisfaction, age, and income. Mandatory daily use fee had four significant independent variables: On bike activities, satisfaction, years recreating, and living

distance. Significant independent variables and odds of willingness to pay between payment types are:

Activities. On foot activities was significant in mandatory annual use fee and mandatory seasonal use fee- those participating in on foot activities were less likely to pay than those not participating in on foot activities. On bike activities was significant in mandatory seasonal use fee and mandatory daily use fee- those participating in on bike activities were less likely to pay than those not participating in on bike activities.

Satisfaction. Satisfaction was significant for mandatory annual use fee, mandatory seasonal use fee, and mandatory daily use fee – those who were very satisfied were more likely to pay than those who were satisfied.

Years Recreating. Years recreating was only significant in mandatory daily use fee – those who have been recreating fewer years were more likely to pay than those recreating for a longer period.

Living distance. Distance was only significant in mandatory daily use fee – those who live farther away were more likely to pay than those who live closer.

Age. Age was significant in voluntary money donation, mandatory annual use fee, and mandatory seasonal use fee – those that were older were less likely to pay than their younger counterparts.

Income. Income was significant in mandatory annual use fee and mandatory seasonal use fee – those above the median household income were more likely to pay than those below the median household income.

Education. Education was significant variables in voluntary money donation and

mandatory annual use fee – those with a higher education level were more likely to pay than those with a lower education level.

Previous Knowledge. Previous knowledge was only significant in mandatory annual use fee- those who know what pays for recreation management were more likely to pay than those who do not know what pays for recreation management.

Dog(s) and gender. Dog(s) and gender were the only two variables that were not significant in any of the payment types.

Ordinary least squares regression

Ordinary least squares (OLS) regression models were used to estimate the level of change in the mean dependent variable for each independent variable. These models were used to identify the strongest and weakest determinants of the mean amount users were willing to pay to use the McDonald-Dunn Forest, for each payment type. Alpha levels of $p < 0.1$, $p < 0.05$, and $p < 0.01$ were used to test for significance. The OLS models use a continuous dependent variable from the open-ended willingness to pay question and 11 independent variables (Table 2). To reduce the number of dummy variables, the 11 variables were either dichotomous, continuous, or quasi-continuous. Results were compared across each payment type.

Voluntary money donation use fee

Table 24 shows the OLS regression for voluntary money donation. Only two independent variables, living distance and income, were significant determinates of willingness to pay this type of use fee. Income positively influenced willingness to pay values with users above the median income willing to pay an estimated average of \$15.63 more than respondents below the median income level. Living distance negatively influenced mean willingness to pay values.

With a one unit increase in living distance the amount a user is willing to pay decreased by an estimated average of \$2.02.

Mandatory annual use fee

Table 25 shows the OLS regression for mandatory annual use fee. Satisfaction, dog(s), and income positively influenced mean willingness to pay values while living distance and age negatively influenced mean willingness to pay values. On average, very satisfied users were willing to pay an estimated \$9.20 more than satisfied users and users who brought dog(s) to the forest were willing to pay an estimated \$3.70 more than users who did not bring dog(s). Respondents above the median income were willing to pay an estimated average of \$9.57 more than respondent below the median income level. Additionally, with a one unit increase in living distance the amount a user is willing to pay decreased by an estimated average of \$2.24 and with a one unit increase in age the amount a user is willing to pay decreased by an estimated average of \$0.23.

Mandatory seasonal use fee

Table 26 shows the OLS regression for mandatory seasonal use fee. Satisfaction, dog(s), and income positively influenced the mean willingness to pay values while gender and age negatively influenced the mean willingness to pay values. For the satisfaction determinant, the very satisfied users were willing to pay an estimated average of \$4.66 more than satisfied users, users who brought dog(s) when recreating were willing to pay an estimated average of \$2.93 more than users who do not bring dog(s), and users above the median income level were willing to pay an estimated average of \$3.84 more than users below the median income level. Additionally, female users were willing to pay an estimated average of \$2.27 less than males and

with a one unit increase in age the amount a user is willing to pay decreased by an estimated average of \$0.13.

Mandatory daily use fee

Table 27 shows the results of an OLS regression for mandatory daily use fee.

Satisfaction, years recreating, living distance positively influenced the mean willingness to pay values and on foot activities, on bike activities, and previous knowledge negatively influenced the mean willingness to pay values. On average, very satisfied users were willing to pay an estimated \$0.49 more than satisfied users and with a one unit increase in living distance the amount users were willing to pay increased by an estimated \$0.19. Users participating in on foot activities were willing to pay an estimated average of \$0.45 less than users not participating in on foot activities and users participating in on bike activities were willing to pay an estimated average of \$0.63 less than users not participating in on bike activities. With a one unit increase in years recreating the amount a user decreased by an estimated average of \$0.03. Finally, users who responded with the correct answer to the previous knowledge question were willing to pay an estimated average \$0.24 less than those who answered the question incorrectly.

Comparisons using ordinary least squares regression model across payment types

Research question number two also explored how the mean willingness to pay values and the significant determinants differed across payment types for OLS. Table 28 provides an overview of the significant variables with mean willingness to pay values and aids in conceptualizing the larger picture in comparisons across payment types. Voluntary money donation had two significant independent variables: living distance and income. Mandatory annual use fee had six significant independent variables: satisfaction, dog(s), living distance, age,

income, and education. Mandatory seasonal use fee had six significant independent variables: On foot activities, on bike activities, satisfaction, living distance, age, and income. Mandatory daily use fee had six significant independent variables: On bike activities, satisfaction, years recreating, living distance, and previous knowledge. Significant independent variables and mean willingness to pay between payment types are:

Activities. On foot activities was significant in mandatory seasonal use fee and mandatory daily use fee (seasonal estimated average of \$.021 less, daily estimated average of \$0.49 less). On bike activities was significant in mandatory seasonal use fee and mandatory daily use fee (seasonal estimated average of \$0.21 less, daily estimated average of \$0.60 less).

Satisfaction. Satisfaction was significant in all three mandatory use fee types. The willingness to pay amounts change depending on type of fee (annual estimated average of \$9.20 more, seasonal estimated average of \$0.27 more, daily estimated average of \$0.12 more).

Years recreating. Years recreating was only significant in mandatory daily use fee. With a one unit increase in years recreating the amount a user was willing to pay decreased by an estimated average of \$0.03.

Dog(s). Dog(s) was only significant in mandatory annual use fee. Respondents who brought dog(s) when recreating were willing to pay an estimated average of \$3.70 more than users who did not bring dog(s) when recreating.

Living distance. Living distance was significant in all of the different payment types: voluntary money donation, mandatory annual use fee, mandatory seasonal use fee, and mandatory daily use fee. With a one unit increase in living distance the estimated mean amount a user was willing to pay increased or decreased depending on payment type (donation \$2.02 less,

annual \$0.77 less, seasonal \$0.11 more, and daily \$0.9 more).

Gender. Gender was only significant in mandatory seasonal use fee. Female respondents were willing to pay an estimated average of \$2.27 less than males.

Age. Age was significant in mandatory annual use fee and mandatory seasonal use fee. With a one unit increase in age the amount a user was willing to pay decreased by an estimated average of \$0.23 for an annual use fee and \$0.01 for a seasonal use fee.

Income. Income was significant in voluntary money donation, mandatory annual use fee, mandatory seasonal use fee (donation estimated average of \$14.92 more, annual estimated average of \$9.22 more, seasonal estimated average of \$0.07 more).

Previous knowledge. Previous knowledge was only significant in mandatory daily use fee. Respondents who answered correctly were willing to pay an estimated average of \$0.24 less.

Education. Education was not significant in any of the payment types.

Model application to 2018 survey

Research question three sought to apply willingness to pay models to other populations to estimate potential revenue. Table 29 shows the independent variable mean values for respondents' characteristics for the 2008 and 2018 user data. Table 2 provides information on coding of variables used in analysis to obtain mean values. Depending on type of variable, independent samples *t*-test and chi-square test were used to test for differences in the two study years (2008 vs. 2018). For *t*-test analysis, an *F*-test was used to test whether the two populations have the same variance. Equal variances were assumed when the *F*-test for equality of variances was not significant. These tests resulted in significant differences between ten of the eleven independent variable means ($p = .05$). Living distance was the only non-significant variable ($p =$

.061) however significance was trending at $p = .05$.

Table 30 shows the estimated amount users were willing to pay for each payment type for 2008 and 2018 based on the mean values of the 11 variables used in the 2008 ordinary least squares regression analysis. Users were willing to pay an estimated \$26.41 for a voluntary money donation in 2008 and \$27.93 in 2018 with a 95% C.I. of \$22.46 - \$30.39, and \$23.43 - \$32.39, respectively. This was an increase of \$1.52. Users were willing to pay an estimated \$26.42 for a mandatory annual use fee in 2008 and 26.45 in 2018 with a 95% C.I. of \$24.59 - \$28.25 and \$24.38 - \$28.53, respectively. This was an increase of \$0.04. Users were willing to pay an estimated \$14.11 for a mandatory seasonal use fee in 2008 and \$14.07 in 2018 with a 95% C.I. of \$12.82 - \$15.41 and \$12.59 - \$15.56, respectively. This was a decrease of \$0.04. Users were willing to pay an estimated \$1.27 for a mandatory daily use fee in 2008 and \$1.23 in 2018 with a 95% C.I. of \$1.13 - \$1.37 and \$1.08 - \$1.35, respectively. This was a decrease of \$0.04.

Table 31 shows the adjusted 2018 willingness to pay amount and confidence intervals for each payment type after adjusting for inflation using the CPI calculator. The McDonald-Dunn Forest had approximately 11,702 visitors in 2008 and 17,271 visitors in 2018. The number of total visits increased by 55,000 from 105,000 in 2008 to 156,000 in 2018. Visitation numbers were combined with the estimated willingness to pay values in table 30 and 31 to calculate the annual potential revenue for each of the four different payment types. Voluntary money donation, mandatory annual use fee, and mandatory seasonal use fee were multiplied by the total number of visitors willing to pay estimated amount. Voluntary money donation, mandatory annual use fee, and mandatory seasonal use fee types would only be a one-time annual payment.

However, mandatory daily use fee was multiplied by the number of total visits because this fee would be collected every time the respondent visits the recreation area. Table 32 shows the potential total revenue generated per payment type for 2008 and 2018 based on the application of the willingness to pay models. Voluntary money donation generated the highest annual revenue followed by mandatory annual use fee, mandatory seasonal use fee, then mandatory daily use fee. Table 32 represent a per person fee. Table 33 through 36 estimate the 2008 and 2018 annual potential revenue using the mean, median, and mode for mandatory annual use fee and mandatory day use fee for per person and per group fees. The average group size for 2008 was 1.87 and 1.78 for 2018. The estimates are based off percentage of people who stated they would be willing to pay that amount or higher. For the 2008 population an estimated 24%, 47.5%, and 62.8% of respondents stated they would be willing to pay the mandatory annual use fee mean, median and mode, respectively. For the 2008 population an estimated 18.7%, 35.1%, and 35.1% of respondents stated they would be willing to pay the mandatory daily use fee mean, median and mode, respectively. The percentage of respondents willing to pay increases as price of fee decreases and moves from mean, median, to mode.

CONCLUSION AND DISCUSSION

Willingness to pay for forest recreation

This study represents an application of the contingent valuation method to an environmental good. The outcomes of this study were guided by three research questions. The first research question focused on the proportion and amount users are willing to pay for forest recreation. The second research question focused on how determinants influence willingness to pay values for forest recreation. Both of these research questions investigated four different payment types and compared determinates across each payment type (i.e. voluntary money

donation, mandatory annual use fee, mandatory seasonal use fee, and mandatory daily use fee).

The third research question investigated the application of a previous willingness to pay model to the same population ten years later.

This study found that most users were willing to pay a use fee of some type to recreate in the McDonald-Dunn Forest with the highest proportion willing to pay a voluntary money donation, followed by mandatory annual, season, and daily use fees (Tables 12 and 13). These findings are similar to previous research that found most users were willing to pay a use fee with the preferred payment being a voluntary money donation (Fedler & Miles, 1989; Samnaliev, More, & Stevens, 2006). Only 13% of respondents stated that they would stop recreating in the forest altogether if they had to pay a use fee. The highest mean willingness to pay amount was mandatory annual use fee, as expected. This was followed by voluntary money donation, mandatory seasonal use fee, and mandatory daily use fee. This is consistent with previous literature that suggest when users are confronted with different payment mechanism, respondents state a somewhat higher willingness to pay on mandatory payment mechanisms than on voluntary payment mechanisms (Wiser, 2007). The amount users were willing to pay for mandatory payment types decreases with the length of time that the use fee allows (Table 14). There was a slight difference in mean values compared to preferred payment type because voluntary money donation had the second highest mean value.

The results of the regression models explained the determinants explanatory power for willingness to pay the four different payment types. In addition, significant determinants differed across payment types for the two different regression models, however, some key determinants were consistent across the payments types within each regression model.

Activity. This study found that respondents' participation in certain activities influenced the odds of willingness to pay and the mean willingness to pay amount. On foot and on bike activities negatively influenced the dependent variable for each regression model. These results support previous research that suggest different activities pay different per-day values depending on type of activity and region, and have different price tolerance (Howard & Selin, 1987; Rosenberger, 2016). Previous research also suggests that frequency of activity may influence willingness to pay and should be included into future models to increase the predictive ability of the model (Bernath & Roschewitz, 2008; Christensen et al., 1993; Samnaliev et al., 2006). Results from this study suggest that users with high frequency of visits for participation in certain activities, such as hiking or biking, may be willing to pay less, due to the number of visits and cost of use fee.

Satisfaction. Satisfaction was positively related to the odds of willingness to pay and the mean willingness to pay amount in all of the mandatory payment types. This is consistent with previous research that suggest satisfaction increases willingness to pay values (Homburg et al., 2005). Additionally, the amount very satisfied users were willing to pay decreased between mandatory annual and season payment types. Seasonal weather conditions may play a pivotal role in this decision making process as winter months in the Pacific Northwest bring increased rain and may decrease satisfaction with seasonal recreation experience. Users may be more interested in paying for a mandatory annual pass in order to have access to recreation areas during seasons related to high satisfaction. For future studies, including seasonal characteristics into data analysis may help researchers understand users' preferences.

Years recreating. Years recreating was negatively related to the odds of willingness to

pay and the mean amount users are willing to pay for a mandatory daily use fee. This is inconsistent with previous research where Lindsay (1992) found that years recreating had a positive relationship in influencing users willingness to pay for coastal beach protection (Lindsay et al., 1992). The number of years recreating can also represent repeat visits over time, and paying a daily fee can result in high cost over time. This may explain why years recreating negatively influenced this type of fee and not others. Additionally, number of years recreating and age were proportionally related and this study found age to be negatively related to willingness to pay as well.

Dog(s). Dog(s) participation was positively related to the amount users are willing to pay a mandatory annual use fee and mandatory seasonal use fee. To my knowledge, there is no existing literature on willingness to pay and dog(s) participation during recreation experiences. Additional research is needed to better understand this relationship. However, this study suggests that dog(s) participation should be a variable included in contingent valuation methods. Future recommendations suggest running models with and without this variable to compare Nagelkerke R^2 to see how much variable increases goodness of fit.

Gender. Gender was negatively related to the amount users are willing to pay for a mandatory seasonal use fee. This study found that females were willing to pay an average of \$2.27 less than males. Review of the literature found contradictory results on how gender influences willingness to pay values (Christensen et al., 1993; Dupont, 2001; Neff, 2006).

Age. Age was negatively related to the odds of willingness to pay a voluntary money donation, a mandatory annual use fee, and a mandatory seasonal use fee. It was also negatively related to the willingness to pay amount for mandatory annual use fee and mandatory seasonal

use fee. This is consistent with Luzar and Cosse (1998) who found age to be negatively related to willingness to pay however, inconsistent with previous research where age was found to be positively related to users willingness to pay values for recreational services (Khan et al., 2014). Additionally, previous research on other natural resources found age to have no effect on willingness to pay (Christensen et al., 1993). A decrease in demand for recreation and an increase in age are indirectly proportional. Therefore, an explanation of a decrease in odds and amount users are willing to pay with an increase in age may be explained by a decrease in use of certain recreation areas and activities.

Living distance. The distance of the respondent's home to the nearest forest boundary was positively related to the odds of paying a mandatory day use fee and both positively and negatively related to the amount users were willing to pay, depending on the payment type. Living distance was a positively related determinant in the mean amount users were willing to pay for day use fee and negatively related to voluntary money donation and mandatory annual use fee. This may be explained by a user living farther away and visiting less often, which makes a user less interested in paying for a long term pass. This can most likely be explained by the travel cost method, that states individuals who live farther away accrue more cost to reach destinations and that they will visit less often (Loomis & Walsh, 1997). This is why the mandatory daily payment type, the pass that offers the least amount of time and commitment, along with being the least expensive option, was positively related. Conversely, voluntary money donation and mandatory annual use fee were negatively related, supporting previous research (R. Rosenberger, Collins, & Svetlik, 2004; Sutherland & Walsh, 1985). Thus, living distance from a recreation area influences whether user will pay certain types of fees and how

much they are willing to pay.

Income. Income, as expected, was positively related to the odds of willingness to pay a mandatory annual use fee and a mandatory seasonal use fee. Additionally, it was positively related to the mean amount users are willing to pay for voluntary money donation, mandatory annual use fee, and mandatory seasonal use fees, this is consistent with previous research (Bowker et al., 1999; Cordell, 2012; Khan et al., 2014). This study also found that there was no influence on the odds or mean amount users are willing to pay for a mandatory daily use fee. These results may suggest that individuals with higher incomes are more interested in long term commitments and that high income users are looking for a higher utility option in relation to cost.

Education. Education was a significant determinant of the odds of willingness to pay a voluntary money donation and mandatory annual use fee. Education was not a significant determinant in the mean amount users were willing to pay but was trending close for mandatory annual use fee and mandatory seasonal use fee ($p = .108$ and $.170$, respectively). These findings supporting previous research that higher educated users are willing to pay more (Khan et al., 2014; Neff, 2006; Spash et al., 2009)

Previous knowledge. Previous knowledge was a significant determinant of the odds of willingness to pay a mandatory annual use fee and negatively influenced the mean amount users were willing to pay for a mandatory daily use fee. Previous studies suggest that the lack of explicit information about related environmental goods in contingent markets can contribute to a misstatement of willingness to pay (Whitehead & Blomquist, 1991). This study found 35% of participants were not able to identify the correct funding source for recreation management.

Therefore, the public and forest management may mutually benefit from education on recreation funding sources. This could be an area for future studies. It would be interesting to research individual's perception on harvest practices to see if willingness to pay is determined by previous knowledge or opinion on the provider.

Variables often used in contingent valuation models and ones that have often been found to be significantly related to odds of willingness to pay and mean willingness to pay amounts were of use in identifying influencers of willingness to pay certain recreation payment types. Interestingly, the number of significant variables increases from voluntary to mandatory fees and as mandatory fees decrease in duration of time allotted for fee. This could be due to the fact that users consider more determinates as a fee becomes mandatory or are concerned with price and bargains when making purchases. Scope of inference for this study is limited due to sample selection. The randomness in the study design aimed to achieve a representative sample of forest users at the McDonald-Dunn Forest. Inference to broader populations would require the 2008 survey data to be compared to an auxiliary source looking at the McDonald- Dunn Forest population and would not be generalizable to other populations. Using professional judgement about broader implications to other populations requires evidence that the McDonald-Dunn users are not a special group that is different than comparison populations and future research may be warranted to replicate similar studies, throughout the United States. Additionally, this study could be of use for benefit-transfer analysis for recreation managers.

One major concern with the final models developed from this study were the Nagelkerke R^2 for both regression models for all payment types. Previous research suggest that an R^2 value of at least 15% is required for reliable results of contingent valuation studies (Mitchell & Carson,

2013). Since the R^2 values presented here for the complete models vary from 3% to 9% for the logistic regression and 4% to 7% for the ordinary least squares regression, it is recommended that additional variables be incorporated into the model to increase predictive power for willingness to pay for forest recreation to address Mitchell and Carson (2013) concerns. For example, the addition of other measurable variables, such as attitude toward paying a use fee, should be included into the contingent valuation method for future research because they may do a better job of predicting willingness to pay responses than do socioeconomic and demographic variables (Ajzen & Fishbein, 1980; Luzar & Cosse, 1998; R. S. Rosenberger, Needham, Morzillo, & Moehrke, 2012).

Review of contradicting literature on determinants of willingness to pay using contingent valuation methods suggest that further evaluations of comparisons between studies need to be completed. Depending on the resource being evaluated different determinants were significantly related to willingness to pay. This may suggest that the scope of inference of these techniques is restricted or that researchers are making implications on too broad of populations. For example, comparing willingness to pay for coastal beach protection and forest recreation will not yield the same determinants of willingness to pay.

Additionally, this study demonstrated how a previous willingness to pay model could be used to estimate willingness to pay values in a later time period, reducing the overall information burden via data collection, or from the lack of data from budget constraints or time limitations. This is often referred to as benefit transfer which is the use of existing information, knowledge, or economic information from a study site to new contexts with similar resources and conditions known as the policy site (R. Rosenberger & Loomis, 2001). Unfortunately, the application of the

2008 willingness to pay model cannot be validated because the 2018 survey did not investigate willingness to pay values. Additional research should be completed to validate the application of a previous willingness to pay model to a later time period when budget constraints or time limitations are not a factor. Nonetheless, with the practical stability of the user demographics over time (2008 to 2018) for this recreation resource, these models can serve as a useful benefit transfer tool to calculate potential revenue using previous populations' willingness to pay values. The statistical and practical differences between user characteristics mean values are used as indicators to determine how the populations have changed. Statistically, the difference between the means would suggest that there would be a difference in willingness to pay from the 2008 to the 2018 population. However, it is also important to interpret the change in means from a practical standpoint and not just from a statistical standpoint. There are very small practical changes between the two samples which could reflect similar willingness to pay values in the estimation models. This study found similar willingness to pay between the two populations (Table 30). For example, the largest observable change in mean value is in the age variable ($\Delta = 4.5998$), which was significant ($p = <.001$), and the smallest observable change in mean value is in the on bike activities variable ($\Delta = 0.0326$), which was also significant. From a practical standpoint, it is highly unlikely to see a change in willingness to pay from a 45 and 49 year old. The small difference in mean values suggest willingness to pay being adequately determined by those factors included in the models, and without these determinants changing over time, willingness to pay should not either. In the late 2000s nearly eight million Americans lost their jobs as a result of a devastating global economic crisis known as the Great Recession (Grusky, Western, & Wimer, 2011). This may have influenced the 2008 willingness to pay values and the

estimates from the models may be reflective of this decline in economic activity. Therefore, the 2018 willingness to pay values could be an underestimation of annual potential revenue.

Managerial implications

In an ideal situation public policy should reflect the publics' values (More, 1999). To achieve this, forest recreation managers should have the flexibility to be able to incorporate public values into their professional framework for decision making. Besides being concerned with the current population, sustainable forest managers must also consider future goals and populations (Agyeman, Bullard, & Evans, 2003; Caradonna, 2014). Accurately measuring non-market goods and understanding determinants of willingness to pay of user populations, using contingent valuation techniques, enables researchers to provide useful information on how current and future population assign values. This facilitates managers with creating recreation policy decisions, thus reflecting public values and the ability to construct appropriate policy for natural resources, like forests. An additional purpose of contingent valuation methods studies is to make the best choice from available alternatives (i.e. different payment types) that yield the most productive overall outcome. Other groups that could benefit from this study include stakeholders, project influencers, planning officials, owners, and developers. Research suggests that managers who have access to research data found it useful when making management decisions (Absher et al., 1999). Care should be taken in implementing and monitoring new pricing policies, since they can alter recreation participation patterns.

The results of this study also highlight the differences and similarities of recreationists along with the effect those determinants have on whether or not recreationist' pay a use fee and the maximum amount they are willing to pay. In addition, the results identified the effect of these

determinants on different payment types and sought to create a model to help recreation managers make choices in regards to use fee implementation. Therefore, the results of this study focused on assisting recreation managers in making the best choice from available payment types and offer recreation managers insight into who is recreating and how recreationist make decisions based on circumstances in their lives about different types of use fees.

Recreation managers who identify user populations can effectively develop profitable programs to increase recreationists overall experiences, thus increasing revenue. Once managers understand user populations and available options of use fees, primary objectives can be established to create positive relationships with users. In addition to choosing fee types and price points that recreationists think are appropriate, they may also choose to create alternative use fees based off of users' payment preferences. An example of an alternative use fee offered by the USFS is The Interagency Volunteer Pass that is free of charge to recreationists who individually accrue 250 volunteer hours (USFS, 2019). The use of pricing as a demand management tool can be used to raise revenue to pay for site management, therefore, it is vital researchers include important determinants of willingness to pay into models or the model will not estimate future willingness to pay accurately. The lack of fit will decrease with appropriate variables incorporated into the model.

Understanding determinants of willingness to pay based on fee type empowers recreation managers to take actions on outreach programs to increase visitation of certain populations that have higher odds of paying certain use fees. For example, according to the results of this study, younger individuals have a higher odds of paying three of the four fee types. This suggest that outreach to a younger population could increase visitation while there would be high odds of

paying the certain types fees, thus increasing revenue. Another example from the results of this study suggest that recreationist who bring dog(s) with them are willing to pay \$3.70 more for a mandatory annual use fee than those who don't bring a dog(s) with them. Again, outreach to target groups may lead to an increase in visitation, thereby increasing revenue. Individuals tend to get more involved and show support if the outreach is simple, is personally relatable, holds congruent ideas, and hits close to home (Newton, 2001).

Once recreation management goals have been established, evolution of these goals need to be monitored and tracked. One way to do this is through the survey process. This study also aimed to understand determinants of willingness to pay to better aid forest recreation managers in monitoring indicators. That way managers can adjust management goals based on recreation population indicators. Key recreation indicators, like the independent variables used in this study, help managers: a) assess current conditions, b) monitor manager's goals, and c) eliminate negative impacts that threaten recreation areas like degradation from overcrowded areas. Using recreationist indicators is important for analyzing progress and comparing long-term effects of alternative management practices. Recreation managers must be willing to use active adaptive management and be flexible in making paramount decisions regarding recreation opportunities for the public. However, it is important to remind managers to not make decisions based on every new piece of information they receive. Rather, managers should collect all available data and teams should form a consensus about appropriate recreation management practices.

When making decisions about implementing a use fee to a recreation area, managers and planners should be cautious about the outcome of their decision. Managers may face choices that involve tradeoffs (Boyle, 2003). The net impacts of policy changes need to be considered when

making decisions. The best decision involves a mix of environmental and economic factors that is consistent with the highest aggregate of human well-being or value to individuals and goals of managers. It is also important for managers to incorporate non-economic value into the benefit cost decision process. For example, research shows that many users of the forest use it to 'get away' and 'get into nature'. With a decrease in forest budget, trails that are used to fill this desire will become overgrown and washed away from lack of trail maintenance.

The decision making process is complicated and complex. Conducting contingent valuation methods is important to better understand user values to make the best possible decisions. The decisions that managers make have both short term and long term consequences. There is no single, agreed upon way to conduct policy decisions. To better assist recreation managers in making decisions Stokey and Zeckhauser (1978) have developed a five step strategy: 1. Define the problem 2. Identify the alternative courses of action 3. Estimate the effects of each alternative 4. Value the effects a benefits and cost. 5. Choose the most beneficial alternative relative to cost.

Fees may cause a decline in user participation. According to Loomis and Walsh (1997), it may be efficient to allow free admission to recreation areas where the cost of use fee collection are likely to exceed the revenue collected. Additionally, fees may deter the participation of low income individuals and the cost of collection represents a significant proportion of the revenue collected. More research is needed in this area. For example, when an entrance fee of \$0.50 for adults and \$0.25 for children was implemented at the California Academy of Sciences in Golden Gate State Park, San Francisco raised net revenue of \$0.3 million USD in the first year. However, it was also estimated that those who were unwilling or unable to pay the fees was

estimated as \$0.4 million USD and thus social welfare declined when the entrance fee was implemented.

Finally, estimating future forest recreation consumption is complex and no single approach for forecasting future participation has been developed that is suitable for all purposes (Loomis & Walsh, 1997). It is also important to realize that significant variables in regression models will change over time. For example, with the creation of new activities there may be a shift in willingness to pay for other activities. This happened in the 1980s with windsurfing and in the 1990s with mountain biking. Therefore, the models created from this data set are both temporal and geo-centric, however, the models are a guideline to future forest managers when issuing future surveys. They can act as a guide to researchers as to what important questions to ask so that all necessary data is collected for data analysis. When forecasting in general it is important to consider level of population, geographic distribution of population in relation to study site, age, income, ethnicity, and rural versus urban values along with many other vital variables.

Research implication and future research

This study attempted to investigate many of the literature gaps related to determinants of willingness to pay for forest recreation and different payment types using contingent valuation methods. More than one study is needed to accomplish this task, and therefore, the need for future research remains. The number of discrepancies found while investigating previous literature could suggest that each population and resource being evaluated has different significant determinates influencing willingness to pay values. Future work that describes the relationship between determinants and willingness to pay can provide a better understanding of

contingent valuation application and more interpretation of how respondents assign a maximum willingness to pay value depending on the resource being investigated.

Understanding how determinants influence willingness to pay values is subjective to many factors. Previous studies are examples of including multiple variables into the analysis to estimate willingness to pay values (Khan et al., 2014; R. S. Rosenberger et al., 2012; Sutherland & Walsh, 1985). However, each contingent valuation study was widely different in the variables used, resource(s) investigated, and methods used for analysis. With the use of contingent valuation methods there is a great deal to take into consideration when designing research projects, but standard techniques on what variables should be included in contingent valuation methods to understand how determinants influence willingness to pay is still somewhat unclear. The exploration of using appropriate price in comparison to willingness to pay amount may lead to more appropriate price setting points for recreation services.

This study served the purpose of highlighting how eleven determinants are related to users' willingness to pay values for four different payment types. Future application of results from this study adds valuable information to contingent valuation research for researchers and managers across different types of use fees in forest. However, it is recommended that additional variables should be utilized in the final estimation model. These recommendations result from the low goodness of fit values which indicate the variables in the model are not fully explaining the population. Knowing that additional variables should be incorporated into the model will assist researchers in creating useful data collection questionnaires.

Hence, any additional research that attempts to include a variety of purposeful determinants of willingness to pay values (e.g. social psychology, demographic, spiritual) can

add valuable information to bridge knowledge gaps on how users make decisions. Future research should continue to focus on implementing quality surveys that capture a range of variables to identify meaningful determinants of willingness to pay. Results from high quality contingent valuation methods will help managers make effective and efficient policy decisions.

Results from this study made suggestions to engage high willingness to pay user from surrounding communities to participate in recreation to collect the maximum amount of revenue depending on type of fee being implemented. The outreach recommendations of this study are solely suggestions based on results of this study and are not backed by scientific literature. This study does not aim to investigate the success of outreach programs or environmental education. Review and application of outreach suggestions is recommended for future research projects. Additionally, it is important to note that this study does not aim to solve policy issues or advocate for policy. It simply hopes to contribute to a sounder policy decision making process with socially acceptable use fee programs along with tolerable fee prices.

Closing thoughts, many environmental practices and births of policy are created from an after-the-fact approach with the hope to regenerate, reclaim, restore, repair, reforest, and rebuild our ecological resources (Brundtland et al., 1987). The ability to anticipate and prevent environmental damage will come at the human cost and needs to be considered with other sectors, such as economics. In order for managers to successfully reach goals, collaboration from many different sectors and the use of adaptive management needs to occur. We must create a common interest where values and goals of what ecosystem services can provide to humans and what humans can provide to the environment. The birth of contingent valuation methods were created to assess human valuation of non-market goods such as environmental preservation and

access to recreation areas. Ultimately, these methods provide a means of testing the strength of values and the destiny of natural resources. Testing valuation over long periods of time could show if human values are leading to a reduction of certain environments. This study sought to identify determinants that significantly influence willingness to pay, thus understanding how users assign value and make decisions about having access to recreation areas. Human value of ecosystems is central to understanding the future of our planet. My final suggestion for future research would include identifying trends in valuation to determine if a relationship exists with the reduction of natural resources.

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TABLES AND FIGURES

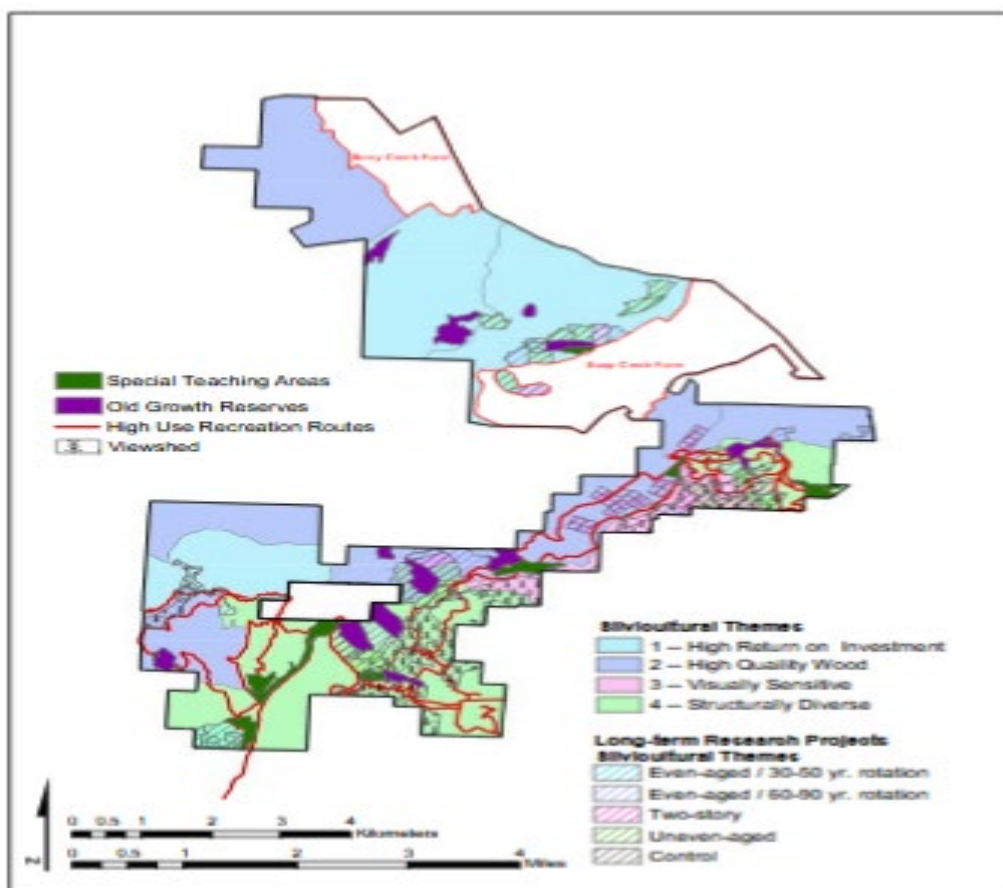


Figure 1. McDonald-Dunn Forest land allocation

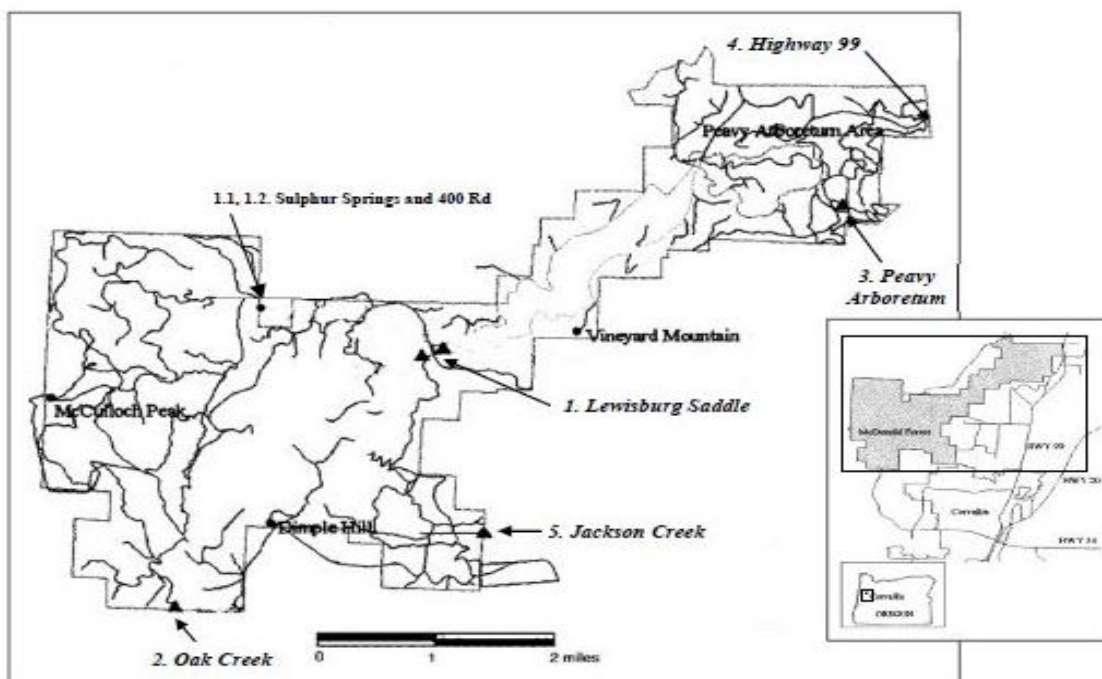


Figure 2. Map of study area and main sampling sites

Table 1. Seasonal sampling time periods for the 2008 survey

Season	Fall	Winter	Spring	Summer
Morning Sample	7:30am to 12:30pm	8:00am to 12:00pm	8:00am to 1:00pm	8:00am to 1:00pm
Afternoon Sample	12:30pm to 5:30pm	12:00pm to 4:00pm	1:00pm to 6:00pm	1:00pm to 6:00pm

Table 2. Variable description for analysis and question for the 2008 survey

Variables	Coding of variables
Question Number	Question
Dependent variables	
(LR) Behavioral intention WTP_i^a	Respondent's willingness to pay (dichotomous). Item coded as 0 = not willing to pay this type of fee, 1 = willing to pay this type of fee.
Question number ten	10. What is the maximum amount you would be willing to pay for <u>each</u> of the following to use McDonald-Dunn Forest for recreation? (write how much you would be willing to pay for EACH alternative; put "0" if you would not pay)
(OLS) Behavioral intention $\$WTP_i^b$	Respondent's willingness to pay (continuous). Item coded as respondent's stated maximum amount a respondent was willingness to pay.
Question number ten	10. What is the maximum amount you would be willing to pay for <u>each</u> of the following to use McDonald-Dunn Forest for recreation? (write how much you would be willing to pay for EACH alternative; put "0" if you would not pay)
Independent variables	
On Foot	Respondent's participation on foot based on activities during typical forest visits (hiking or walking, dog walking, trail running or jogging) (dichotomous). Variable coded as 0 = no, 1 = yes.
Question number one and three	1. Please check <u>all</u> activities in which you have <u>ever</u> participated at McDonald-Dunn Forest (check ALL THAT APPLY). 3. From the activities in question 1 above, what <u>ONE</u> primary activity do you <u>TYPICALLY</u> participate in at McDonald-Dunn Forest? Letter for <u>typical</u> primary activity)
On Bike	Respondent's participation on bike based on activities during typical forest visits (mountain biking) (dichotomous). Variable coded as 0 = no, 1 = yes.
Question number one and three	1. Please check <u>all</u> activities in which you have <u>ever</u> participated at McDonald-Dunn Forest (check ALL THAT APPLY). 3. From the activities in question 1 above, what <u>ONE</u> primary activity do you <u>TYPICALLY</u> participate in at McDonald-Dunn Forest? Letter for <u>typical</u> primary activity

Satisfaction	Respondent's satisfaction with recreation experience. (dichotomous) Variable coded as 0 = satisfied, 1 = very satisfied.
Question number five	5. Overall, how satisfied are you with your recreation experiences at McDonald-Dunn Forest? (check ONE)
Years recreating	Respondent's number of years recreating in the forest (continuous). Variable coded as respondent's self-reported value.
Question number twenty-two	22. In total, about how many years have you been recreating in McDonald-Dunn Forest?)
Dog(s)	Respondent's answer to typically brings dogs while recreating in the forest (dichotomous). Variable coded as 0 = no, 1 = yes.
Question number twenty-six	26. Do you typically bring any dogs with you when visiting McDonald-Dunn Forest? (check ONE)
Living distance	Respondent's living distance to the nearest forest boundary (quasi-continuous). Variable coded as 0 = adjacent, 0.5 = within a half mile, 1 = within one mile, 3 = between one and five miles, and 7 = more than 5 miles.
Question number thirty-five	35. Approximately how far away from the nearest forest boundary of McDonald-Dunn Forest do you currently live? (check ONE)
Gender	Respondent's gender (dichotomous). Variable coded as 0 = male, 1 = female.
Question number thirty	30. Are you: (check ONE)
Age	Respondent's age (continuous). Item coded as respondent's self-reported value.
Question number thirty-one	31. What is your age?
Income	Respondent's current annual household income before taxes (dichotomous). Variable coded as 0 = below median income, 1 = above median income.
Question number thirty-six	36. Which of these broad categories best describes your current annual household income before taxes ? (check ONE)
Education	Respondent's education level (quasi-continuous). Variable coded as 8 = less than high school diploma, 12 = high school diploma or GED, 14 = 2-year associates degree or trade school, 16 = 4-year college degree (for example: bachelor's degree), and 18 = advanced degree beyond 4-year degree (for example: masters, Ph.D., medical doctor, law degree).

Question number thirty-two	32. What is the highest level of education that you have completed? (check ONE)
Previous Knowledge	Respondent's answer to what they think currently pays for recreation management (dichotomous). Variable coded as 0 = incorrect answer, 1 = correct answer.
Question number seven	7. What do you think currently pays for recreation management at McDonald-Dunn Forest? (check ALL THAT APPLY)

^a (WTP_{*i*}) that takes on a value of 0 if respondent *i* stated they were "not willing to pay a payment type" or a 1 if respondent *i* stated they were "willing to pay"

^b \$WTP_{*i*} was the final bid for willingness to pay amount

Table 3. Methodology for applying the 2008 willingness to pay model to the 2018 user data

Step 1	Select payment type to evaluate (e.g. voluntary money donation, mandatory annual use fee, mandatory seasonal use fee, or mandatory daily use fee)
Step 2	Insert beta values from 2008 ordinary least squares regression analysis for the 11 coefficients
Step 3	Insert 2018 user data mean values for the 11 coefficients
Step 4	Sum the products to get the 2018 estimated willingness to pay value
Step 5	Adjust for inflation using the United States Department of Labor Consumer Price Index (CPI) Inflation Calculator
Step 6	Multiply total by number of 'visitors' for voluntary money donation, and mandatory annual and season and by number of 'visits' for mandatory daily use fee

Table 4. Sample sizes and response rates from the 2008 survey

Site	Contacted	Refused	Accepted (n)	Response rate (%)
Lewisburg Saddle (onsite)	383	99	284	74
Oak Creek (onsite)	395	112	283	72
Peavy Arboretum (onsite)	264	63	201	76
Highway 99 (onsite)	177	43	134	76
Jackson Creek (onsite)	142	35	107	75
Sulphur Springs (drop off / mail)	80	32	48	60
400 Rd. (Dunn Forest) (drop off / mail)	21	10	11	52
Total	1,463	394	1,068	73

Table 5. Respondent participation from the 2008 survey ^a

Activity	Activities done in forest ^b	Typical primary activity at forest
Hiking and walking	94	42
Trail running and jogging	52	21
Dog walking	60	17
Mountain biking	47	15
Horseback riding	7	3
Nature viewing	55	1
Bird watching	24	0
Hunting	2	0
Other ^c	8	1

^a Cell entries are percentages (%)^b Cell entries do not add to 100% because respondents could check more than one activity^c The most popular other activities were: mushroom picking / mushroom hunting, photography, research / workTable 6. Respondent main group participation from the 2008 survey ^a

Main group activity	Typical primary activity at forest in main groups
On foot ^b	80
On bike ^c	15
Other ^d	5

^a Cell entries are percentages (%)^b On foot main group consist of hiking and walking, trail running and jogging, and dog walking^c On bike main group consist of mountain biking^d Other main group consist of horseback riding, nature viewing, bird watching, and hunting

Table 7. Overall forest user satisfaction from the 2008 survey

Level of satisfaction	Percent (%)
Very satisfied	66
Satisfied	30
Dissatisfied or neutral	4

Table 8. Years recreating in forest from the 2008 survey ^a

Years	Percent (%)
1	15
2 to 4	21
5 to 9	18
10 to 19	26
20 or more	20
Mean	10.5 years

^a Open ended responses on years recreating range from 0 to 50 years

Table 9. Typically brings dog(s) from the 2008 survey

Response	Percent (%)
Yes	51
No	49

Table 10. Sociodemographic characteristics from the 2008 survey

	Percent (%)
Respondents current living distance from the nearest boundary Forest	
Adjacent (next to the forest)	4
Within ½ mile	6
Within 1 mile	11
1 to 5 miles	43
More than 5 miles	36
Gender	
Male	49
Female	51
Age	
Less than 20 years old	4
20 – 29 years	16
30 – 39 years	18
40 – 49 years	20
50 – 59 years	28
60 – 69 years	11
70 + years old	3
Average (mean years)	45
Annual household income before taxes ^a	
Below median	35
Above median	65
Approximate mean	\$64,000
Highest level of education	
Less than high school diploma	1
High school diploma or GED	8
2 – year associates degree or trade school	10
4 – year college degree (e.g. BS, BA)	37
Advanced degree beyond 4 – year degree (e.g. MS, Ph.D., MD, Law degree)	43

^a 2009 United States Census Bureau Benton County, OR Income Data

Table 11. Respondents perceived revenue source for recreation management from the 2008 survey ^a

Response	Percent (%)
Federal taxes	16
State taxes	47
Local taxes	21
Timber harvest from the forest ^b	65
Grants and subsidies	50
Gifts and donations	47
Unsure	29

^a Percentages do not add up to 100% because respondents could check more than one

^b Timber harvest from the forest is the correct answer

Table 12. Respondent's willingness to pay a use fee at McDonald-Dunn Forest from the 2008 survey

	Percent (%)	Number of Respondents (<i>n</i>)
Willing to pay ^a	90.5	880
Not willing to pay	9.5	92

^a Willing to pay includes voluntary money donation, mandatory daily use fee, mandatory seasonal use fee, or mandatory annual use fee

Table 13. Willingness to pay for different payment types from the 2008 survey ^a

	Willing to pay (%)	Number of Respondents (<i>n</i>)
Voluntary money donation		
No	17	146
Yes	83	733
Mandatory annual use fee		
No	24	235
Yes	76	739
Mandatory seasonal use fee		
No	33	305
Yes	67	626
Mandatory daily use fee		
No	50	465
Yes	50	465

^a 'Yes' percent indicating respondent would be willing to pay a dollar amount over \$0 USD and 'no' indicating respondents would not be willing to pay a dollar amount over \$0 USD

Table 14. Amount respondents were willing to pay for different payment types from the 2008 survey ^a

	Mean	Median	Mode
Voluntary money donation	30.80	20.00	5.00
Mandatory annual use fee	35.98	25.00	20.00
Mandatory seasonal use fee	20.98	20.00	10.00
Mandatory daily use fee	2.76	2.00	2.00

^a Amount (USD) for respondents willing to pay a dollar amount over \$0

Table 15. Logistic regression classification table for voluntary money donation (2008) ^a

Observed willingness to pay a voluntary money donation	Predicted willingness to pay a voluntary money donation		Percent correct
	Not willing to pay	Willing to pay	
Not willing to pay	0	108	0
Willing to pay	0	606	100
Overall percentage			84.9

^a Dependent variable: willingness to pay a voluntary money donation, where 0 = not willing to pay and 1 = willing to pay

Table 16. Logistic regression predicting willingness to pay a voluntary money donation (2008) ^a

	β	Standard error	Wald χ^2	<i>p</i> -value	Exp(β) Odds	95% C.I for Exp (β)	
						Lower	Upper
On foot activities	.322	.496	.421	.516	1.380	.522	3.650
On bike activities	-.034	.553	.004	.951	.966	.327	2.857
Satisfaction	.258	.224	1.328	.249	1.294	.835	2.007
Years recreating	-.009	.012	.525	.469	.991	.968	1.015
Dog(s)	-.109	.218	.250	.617	.897	.584	1.375
Living distance	.024	.044	.280	.596	1.024	.938	1.117
Gender	.187	.226	.685	.408	1.206	.774	1.877
Age	-.016	.009	3.127	.077*	.984	.967	1.002
Income	.128	.234	.298	.585	1.136	.718	1.799
Education	.116	.052	4.946	.026**	1.122	1.014	1.243
Previous knowledge	-.113	.237	.229	.633	.893	.561	1.420
Constant	.106	.961	.012	.912	1.112		

^a Dependent variable: willingness to pay a voluntary money donation, where 0 = not willing to pay and 1 = willing to pay. Nagelkerke $R^2 = .035$. * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$. df = 1

Table 17. Logistic regression classification table for mandatory annual use fee (2008) ^a

Observed willingness to pay a mandatory annual use fee	Predicted willingness to pay mandatory annual use fee		Percent Correct
	Not willing to pay	Willing to pay	
Not willing to pay	9	171	5.0
Willing to pay	7	603	98.9
Overall percentage			77.5

^a Dependent variable: willingness to pay a mandatory annual use fee, where 0 = not willing to pay and 1 = willing to pay

Table 18. Logistic regression predicting the influence of variables on willingness to pay a mandatory annual use fee (2008) ^a

Variables	β	Standard error	Wald χ^2	<i>p</i> -value	Exp(β) Odds	95% C.I for Exp (β)	
						Lower	Upper
On foot activities	-.876	.522	2.815	.093*	.416	.150	1.159
On bike activities	-.598	.576	1.078	.299	.550	.178	1.700
Satisfaction	.842	.183	21.135	<.001***	2.320	1.621	3.321
Years recreating	-.003	.010	.089	.766	.997	.977	1.017
Dog(s)	.157	.180	.759	.384	1.170	.822	1.666
Living distance	.009	.037	.062	.803	1.009	.939	1.085
Gender	.063	.185	.115	.735	1.065	.740	1.532
Age	-.019	.007	6.748	.009***	.981	.968	.995
Income	.684	.192	12.747	<.001***	1.982	1.362	2.886
Education	.089	.044	4.095	.043**	1.093	1.003	1.192
Previous knowledge	.412	.189	4.748	.029**	1.510	1.042	2.187
Constant	.071	.870	.007	.935	1.073		

^a Dependent variable: willingness to pay a mandatory annual use fee, where 0 = not willing to pay and 1 = willing to pay. Nagelkerke $R^2 = .094$. * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$. $df = 1$

Table 19. Logistic regression classification table for mandatory seasonal use fee (2008) ^a

Observed willingness to pay mandatory seasonal use fee	Predicted willingness to pay mandatory seasonal use fee		Percent correct
	Not willing to pay	Willing to pay	
Not willing to pay	14	218	6.0
Willing to pay	16	508	96.9
Overall Percentage			69.0

^a Dependent variable: willingness to pay a mandatory seasonal use fee, where 0 = not willing to pay and 1 = willing to pay

Table 20. Logistic regression predicting the influence of variables on willingness to pay a mandatory seasonal use fee (2008) ^a

Variables	β	Standard error	Wald χ^2	p-value	Exp(β) Odds	95% C.I for Exp (β)	
						Lower	Upper
On foot activities	-1.161	.514	5.093	.024**	.313	.114	.858
On bike activities	-1.141	.556	4.210	.040**	.319	.107	.950
Satisfaction	.580	.171	11.491	.001***	1.787	1.277	2.499
Years recreating	-.005	.009	.327	.567	.995	.976	1.013
Dog(s)	.187	.166	1.273	.259	1.206	.871	1.670
Living distance	.054	.034	2.493	.114	1.055	.987	1.128
Gender	-.024	.171	.019	.890	.977	.698	1.366
Age	-.023	.007	10.909	.001***	.977	.964	.991
Income	.343	.182	3.534	.060*	1.409	.986	2.014
Education	.050	.042	1.384	.239	1.051	.967	1.142
Previous knowledge	.241	.178	1.833	.176	1.272	.898	1.802
Constant	1.153	.843	1.873	.171	3.168		

^a Dependent variable: willingness to pay a mandatory seasonal use fee, where 0 = not willing to pay and 1 = willing to pay. Nagelkerke $R^2 = .065$. * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$. df = 1

Table 21. Logistic regression classification table for mandatory daily use fee (2008) ^a

Observed willingness to pay mandatory daily use fee	Predicted willingness to pay mandatory daily use fee		Percent Correct
	Not willing to pay	Willing to pay	
Not willing to pay	197	165	54.4
Willing to pay	134	254	65.5
Overall Percentage			60.1

^a Dependent variable: influence of variables on willingness to pay a mandatory daily use fee, where 0 = not willing to pay and 1 = willing to pay

Table 22. Logistic regression predicting the influence of variables on willingness to pay a mandatory daily use fee (2008) ^a

Variables	β	Standard error	Wald χ^2	<i>p</i> -value	Exp(β) Odds	95% C.I for Exp (β)	
						Lower	Upper
On foot activities	-.520	.411	1.600	.206	.594	.265	1.331
On bike activities	-.785	.457	2.955	.086*	.456	.186	1.116
Satisfaction	.568	.165	11.795	.001***	1.764	1.276	2.439
Years recreating	-.033	.009	12.316	<.001***	.967	.950	.985
Dog(s)	-.249	.157	2.528	.112	.780	.574	1.060
Living distance	.125	.032	15.413	<.001***	1.133	1.065	1.206
Gender	-.249	.162	2.371	.124	.779	.567	1.070
Age	-.004	.007	.324	.569	.996	.984	1.009
Income	.259	.172	2.280	.131	1.296	.926	1.813
Education	.037	.040	.864	.352	1.038	.960	1.122
Previous knowledge	-.034	.166	.042	.838	.967	.698	1.338
Constant	-.267	.763	.123	.726	.765		

^a Dependent variable: willingness to pay a mandatory daily use fee, where 0 = not willing to pay and 1 = willing to pay. Nagelkerke $R^2 = .092$. * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$. $df = 1$

Table 23. Logistic regression significant independent variables between payment types from the 2008 survey

Payment type	Significant independent variables	Odds of paying (factor)
Voluntary money donation	1. Age 2. Education	1. Older individuals (-.984) 2. Individuals with higher education level (+1.122)
Mandatory annual use fee	3. On foot activities 4. Satisfaction 5. Age 6. Income 7. Education 8. Previous knowledge	3. Individuals on foot (-.416) 4. Very satisfied individuals (+2.320) 5. Older individuals (-.981) 6. Individuals above median income (+1.982) 7. Individuals with higher education level (+1.093) 8. Individuals with correct previous knowledge (+1.510)
Mandatory seasonal use fee	9. On foot activities 10. On bike activities 11. Satisfaction 12. Age 13. Income	9. Individuals on foot (-.313) 10. Individuals on bike (-.319) 11. Very satisfied individuals (+1.787) 12. Older individuals (-.977) 13. Individuals above median income (+1.409)
Mandatory daily use fee	14. On bike activities 15. Satisfaction 16. Years recreating 17. Living distance	14. Individuals on bike (-.456) 15. Very satisfied individuals (+1.764) 16. Individuals with higher years recreating (-.967) 17. Individuals who live farther away (+1.133)

Table 24. Ordinary least squares regression for voluntary money donation (2008)^a

Variables	β	S.E.	Standardized coefficients beta	T_{702}	p -value ^b	Collinearity Statistics Tolerance VIF	
On foot activities	-.483	10.576	-.004	-.046	.964	.222	4.497
On bike activities	-.859	11.721	-.006	-.073	.942	.215	4.660
Satisfaction	4.053	4.375	.035	.926	.355	.967	1.035
Years recreating	.224	.240	.039	.935	.350	.791	1.264
Dog(s)	5.251	4.107	.048	1.278	.202	.945	1.058
Living distance	-2.019	.834	-.091	-2.421	.016**	.957	1.045
Gender	-5.962	4.225	-.055	-1.411	.159	.893	1.120
Age	-.059	.173	-.015	-.344	.731	.687	1.455
Income	15.633	4.509	.138	3.467	.001***	.864	1.157
Education	1.119	1.051	.042	1.064	.288	.889	1.125
Prev. knowledge	-4.603	4.384	-.040	-1.050	.294	.921	1.085
Constant	7.444	19.816		.376	.707		

^a Dependent variable: Open-ended response for amount willing to pay a voluntary money donation^b * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$. Nagelkerke $R^2 = .045$ Table 25. Ordinary least squares regression for mandatory annual use fee (2008)^a

Variables	β	S.E.	Standardized coefficients beta	T_{778}	p -value ^b	Collinearity Statistics Tolerance VIF	
On foot activities	-4.866	4.817	-.072	-1.010	.313	.232	4.319
On bike activities	-2.680	5.403	-.036	-.496	.620	.219	4.561
Satisfaction	9.202	2.034	.158	4.525	<.001***	.972	1.029
Years recreating	.043	.112	.015	.385	.700	.788	1.269
Dog(s)	3.698	1.912	.069	1.934	.054**	.945	1.059
Living	-.765	.389	-.069	-1.970	.049**	.956	1.046
Gender	-2.137	1.972	-.040	-1.084	.279	.889	1.125
Age	-.233	.080	-.121	-2.916	.004***	.693	1.443
Income	9.573	2.105	.168	4.548	<.001***	.873	1.146
Education	.784	.487	.059	1.610	.108	.889	1.125
Prev. knowledge	2.073	2.047	.036	1.013	.312	.918	1.090
Constant	16.313	9.201		1.773	.077		

^a Dependent variable: Open-ended response for amount willing to pay a mandatory annual use fee^b * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$. Nagelkerke $R^2 = .077$

Table 26. Ordinary least squares regression for mandatory seasonal use fee (2008) ^a

Variables	β	S.E.	Standardized coefficients beta	T_{744}	p -value ^b	Collinearity Statistics Tolerance VIF
On foot activities	-1.150	3.404	-.025	-.338	.736	.228 4.391
On bike activities	.613	3.802	.012	.161	.872	.217 4.615
Satisfaction	4.663	1.432	.119	3.255	.001***	.970 1.031
Years recreating	.079	.079	.040	1.000	.318	.785 1.274
Dog(s)	2.929	1.355	.080	2.162	.031**	.942 1.061
Living distance	-.028	.276	-.004	-.100	.920	.952 1.051
Gender	-2.272	1.394	-.062	-1.630	.104*	.890 1.124
Age	-.133	.058	-.100	-2.311	.021**	.681 1.468
Income	3.840	1.489	.099	2.579	.010*	.865 1.155
Education	.472	.344	.053	1.374	.170	.877 1.140
Prev. knowledge	-.650	1.451	-.017	-.448	.654	.915 1.093
Constant	6.893	6.452		1.068	.286	

^a Dependent variable: Open-ended response for amount willing to pay a mandatory seasonal use fee

^b * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$. Nagelkerke $R^2 = .042$

Table 27. Ordinary least squares regression for mandatory daily use fee (2008) ^a

Variables	β	S.E.	Standardized coefficients beta	T	p -value ^b	Collinearity Statistics Tolerance VIF
On foot activities	-.448	.314	-.106	-1.425	.155	.229 4.367
On bike activities	-.601	.351	-.131	-1.711	.087*	.218 4.589
Satisfaction	.273	.131	.075	2.083	.038**	.971 1.030
Years recreating	-.026	.007	-.141	-3.474	.001***	.775 1.291
Dog(s)	-.074	.124	-.022	-.594	.553	.937 1.067
Living distance	.088	.025	.129	3.518	<.001***	.953 1.049
Gender	-.020	.128	-.006	-.156	.876	.882 1.133
Age	-.001	.005	-.012	-.279	.781	.682 1.465
Income	.089	.136	.025	.657	.512	.863 1.159
Education	.022	.031	.027	.700	.484	.886 1.129
Prev. knowledge	-.242	.132	-.068	-1.836	.067*	.915 1.093
Constant	1.292	.597		2.163	.031	

^a Dependent variable: Open-ended response for amount willing to pay a mandatory daily use fee

^b * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$. Nagelkerke $R^2 = .06$

Table 28. Ordinary least squares regression significant independent variables between payment types from the 2008 survey

Payment type	Significant independent variables	Mean amount willing to pay ^a
Voluntary money donation	1. Living distance 2. Income	1. (-) With a one unit increase in distance, respondents were willing to pay an average of \$2.02 less 2. (+) Respondents above the median income were willing to pay an average of \$15.63 more
Mandatory annual use fee	3. Satisfaction 4. Dog(s) 5. Living distance 6. Age 7. Income	3. (+) Very satisfied respondents were willing to pay an average of \$9.20 more than satisfied respondents 4. (+) Respondents who brought dog(s) when recreating were willing to pay an average of \$3.70 more than individuals who don't bring dog(s) when recreating 5. (-) With a one unit increase in distance, respondent was willing to pay an average of \$0.77 less 6. (-) With a one unit increase in age, respondent was willing to pay an average of \$0.23 less 7. (+) Respondents with an income above the median income were willing to pay an average of \$9.57 more
Mandatory seasonal use fee	8. Satisfaction 9. Dog(s) 10. Gender 11. Age 12. Income	8. (+) Very satisfied respondents were willing to pay an average of \$4.66 more than satisfied respondents 9. (+) Respondents who bring dog(s) when recreating were willing to pay an average of \$2.99 more than individuals who don't bring dog(s) when recreating 10. (-) Females were willing to pay an average of \$2.27 less than males 11. (-) With a one unit increase in age, respondent was willing to pay an average of \$0.13 less 12. (+) Respondents with an income above the median income were willing to pay an average of \$3.84 more

Mandatory daily use fee	13. On bike activities 14. Satisfaction 15. Years recreating 16. Living distance 17. Previous knowledge	13. (-) Respondents participating in on bike activities were willing to pay an average of \$0.60 less 14. (+) Very satisfied respondents were willing to pay an average of \$0.27 more than satisfied respondents 15. (-) with a one unit increase in years recreating, respondents were willing to pay an average of \$0.03 less 16. (+) With a one unit increase in distance, respondent was willing to pay an average of \$0.08 more 17. (-) Respondents who answered correctly were willing to pay an average of \$0.24 less
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^a United States Dollars

Table 29. Differences in mean values for independent variables from 2008 and 2018 ^a

Variable	2008 mean value	2018 Onsite mean value	t-value	Chi-square	p-value	Δ (+/-) mean value
On foot activities	.8027	.8634	-	14.8372	<.001*	0.0607
On bike activities	.1511	.1185	-	5.0982	.024*	-0.0326
Satisfaction	.6834	.7361	-	7.6508	.006*	0.0527
Years recreating	10.50	13.2592	6.145	-	<.001*	2.7592
Dog(s)	.51	.4289	-	13.8945	<.001*	-0.0811
Gender	.51	.5615	-	5.5766	.018*	0.0515
Age	44.52	49.1198	7.036	-	<.001*	4.5998
Living distance	3.9520	4.0276	-	9.0050	.061	0.0756
Income	.6491	.7306	-	47.9022	<.001*	0.0815
Education	16.2267	16.7372	-	28.8049	<.001*	0.5105
Prev. knowledge ^b	.6462	n/a ^c	n/a	n/a	n/a	n/a
		(.6462)	(.000)	(.000)	(1.000)	

^a $p = 0.05$, * = significant

^b Previous knowledge = 2008 mean values were used for 2018 mean value

^c n/a means data not available. Data from 2008 survey will be used in 2018 analysis for this category

Table 30. Estimated amount the average user was willing to pay per payment type in 2008 and 2018 ^a

Payment type	2008 WTP	S.E.	2018 WTP	S.E.	Δ (+/-) (\$)
Voluntary money donation	\$ 26.41	2.01	\$ 27.93	2.28	1.52
Mandatory annual use fee	\$ 26.42	0.93	\$ 26.45	1.06	0.04
Mandatory seasonal use fee	\$ 14.11	0.66	\$ 14.07	0.756	-0.04
Mandatory daily use fee	\$ 1.27	0.06	\$ 1.23	0.07	-0.04

^a United Stated DollarsTable 31. Adjusted 2018 willingness to pay values per payment types after inflation ^a

Payment type	2018 Willingness to pay	<u>95% C.I</u>	
		Lower	Upper
Voluntary money donation	\$ 32.80	27.50457	37.25978
Mandatory annual use fee	\$ 31.06	28.98696	33.1448
Mandatory seasonal use fee	\$ 16.52	15.04165	18.00952
Mandatory daily use fee	\$ 1.44	1.28856	1.55808

^a United Stated Dollars

Table 32. Estimated total annual revenue generated per payment type for a per person fee for 2008 and 2018 ^{a b}

Payment type	2008 total annual revenue	Adjusted 2008 total annual revenue	2018 total annual revenue ^c	Δ (+/-)
Voluntary money donation	\$ 297,102.08	\$ 348,881.00	\$ 434,175.67	\$ 85,294.67
Mandatory annual use fee ^d	\$ 102,922.58	\$ 120,859.92	\$ 178,626.06	\$ 57,766.14
Mandatory seasonal use fee ^e	\$ 69,526.91	\$ 81,644.05	\$ 120,116.92	\$ 38,472.87
Mandatory daily use fee ^f	\$ 46,886.73	\$ 55,058.15	\$ 78,791.04	\$ 23,732.89

^a 2008 annual visitors= 11,702^b 2018 annual visitors = 17,271^c 2018 values represent values after adjusted for inflation^d Percent of population willing to pay fee amount = 33.3%^e Percent of population willing to pay fee amount = 35.2%^f Percent of population willing to pay fee amount = 35.2%Table 33. 2008 estimated total annual revenue generated per payment type for a per person fee using the mean, median, and mode ^a

	2008 Mean	2008 total annual revenue	2008 Median	2008 total annual revenue	2008 Mode	2008 total annual revenue
Mandatory annual use fee ^b	\$ 35.98	\$ 101,031.84	\$ 25.00	\$ 138,950.00	\$ 20.00	\$ 146,960.00
Mandatory daily use fee ^c	\$ 2.76	\$ 6,038.88	\$ 2.00	\$ 8,214.00	\$ 2.00	\$ 8,214.00

^a 2008 annual visitors= 11,702^b Percent of population willing to pay amount: mean = 24%, median = 47.5%, mode = 62.8%^c Percent of population willing to pay amount: mean = 18.7%, median = 35.1%, mode = 35.1%

Table 34. 2008 estimated total annual revenue generated per payment type for a per group fee using the mean, median, and mode ^{a b}

	2008 Mean	total annual revenue	2008 Median	total annual revenue	2008 Mode	total annual revenue
Mandatory annual use fee ^c	\$ 35.98	\$ 54,027.72	\$ 25.00	\$ 74,304.81	\$ 20.00	\$ 78,588.24
Mandatory daily use fee ^d	\$ 2.76	\$ 3,229.35	\$ 2.00	\$ 4,392.51	\$ 2.00	\$ 4,392.51

^a 2008 annual visitors = 11,702

^b 2008 average group size = 1.87

^c Percent of population willing to pay amount: mean = 24%, median = 47.5%, mode = 62.8%

^d Percent of population willing to pay amount: mean = 18.7%, median = 35.1%, mode = 35.1%

Table 35. 2018 estimated total annual revenue generated per payment type for a per person fee using the mean, median, and mode after inflation ^a

	2018 Mean	total annual revenue	2018 Median	total annual revenue	2018 Mode	total annual revenue
Mandatory annual use fee ^b	\$ 42.25	\$ 175,156.25	\$ 29.36	\$ 240,840.08	\$ 23.49	\$ 254,772.54
Mandatory daily use fee ^c	\$ 3.24	\$ 10,461.96	\$ 2.35	\$ 14,306.32	\$ 2.35	\$ 14,245.70

^a 2018 annual visitors= 17,271

^b Percent of population willing to pay amount: mean = 24%, median = 47.5%, mode = 62.8%

^c Percent of population willing to pay amount: mean = 18.7%, median = 35.1%, mode = 35.1%

Table 36. 2018 estimated total annual revenue generated per payment type for a per group fee using the mean, median, and mode after inflation ^{a b}

	2018 Mean	total annual revenue	2018 Median	total annual revenue	2018 Mode	total annual revenue
Mandatory annual use fee ^c	\$ 42.25	\$ 98,385.53	\$ 29.36	\$ 135,303.42	\$ 23.49	\$ 143,130.64
Mandatory daily use fee ^d	\$ 3.24	\$ 5,877.51	\$ 2.35	\$ 8,037.26	\$ 2.35	\$ 8,003.20

^a 2018 annual visitors = 17,271

^b 2018 average group size = 1.78

^c Percent of population willing to pay mamount: mean = 24%, median = 47.5%, mode = 62.8%

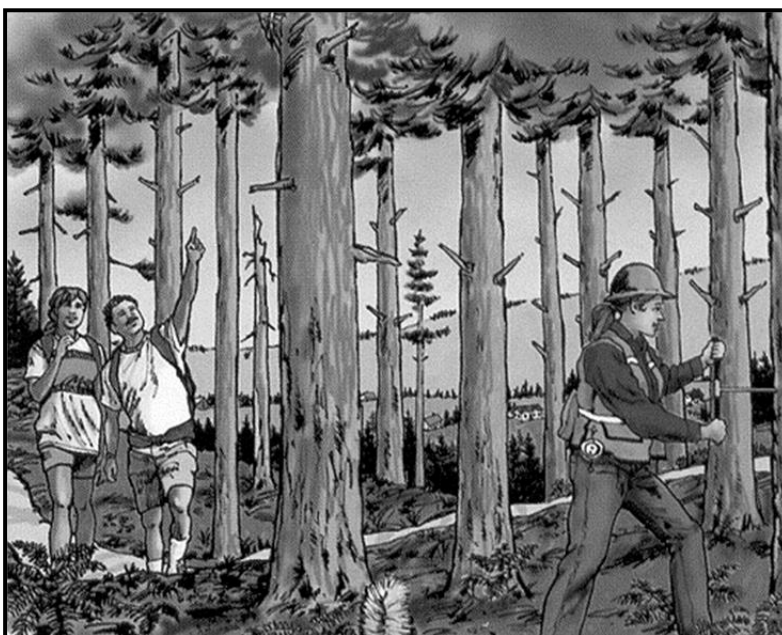
^d Percent of population willing to pay amount: mean = 18.7%, median = 35.1%, mode = 35.1%

APPENDICES

Appendix A: 2008 Onsite Survey Instrument

Recreationists' Experiences and Preferences at McDonald-Dunn Forest

Important Questions for McDonald-Dunn Forest Visitors



Please Complete this Survey and Return it to the Researcher

Participation is Voluntary and Responses are Anonymous

Thank You for Your Participation

We are conducting this survey to learn about your experiences at McDonald-Dunn Forest and your opinions about how to manage this forest. Your input is important and will assist managers. **Please answer all questions and return it to the researcher.**

- Please check all activities in which you have ever participated at McDonald-Dunn Forest. (**check ALL THAT APPLY**)

☐ A. Hiking or walking	☐ D. Mountain biking	☐ G. Horseback riding
☐ B. Dog walking	☐ E. Nature viewing	☐ H. Hunting
☐ C. Trail running or jogging	☐ F. Bird watching (e.g., owls)	☐ I. Other (please specify) _____
- From activities in Question 1 above, what ONE primary activity are you participating in at McDonald-Dunn Forest TODAY? (**write ONE letter that matches your response**)
 Letter for today's primary activity _____
- From activities in Question 1 above, what ONE primary activity do you TYPICALLY participate in at McDonald-Dunn Forest?
 Letter for typical primary activity _____
- How would you rate your skill level in this activity you TYPICALLY participate in at McDonald-Dunn Forest? (**check ONE**)

☐ Beginner	☐ Novice	☐ Intermediate	☐ Advanced	☐ Expert
-----------------------------------	---------------------------------	---------------------------------------	-----------------------------------	---------------------------------
- Overall, how satisfied are you with your recreation experiences at McDonald-Dunn Forest? (**check ONE**)

☐ Very Dissatisfied	☐ Dissatisfied	☐ Neither	☐ Satisfied	☐ Very Satisfied
--	---------------------------------------	----------------------------------	------------------------------------	---
- Listed below are characteristics of McDonald-Dunn Forest. On the left, rate how important it is to you that each characteristic is provided at this forest. Then, on the right, rate how dissatisfied or satisfied you are with each characteristic at this forest.
Answer both the importance (on left) and satisfaction (on right) questions by circling numbers for EACH characteristic.

Rate IMPORTANCE					Characteristics of McDonald-Dunn Forest	Rate SATISFACTION				
Not Important	Neither		Very Important			Very Dissatisfied	Neither		Very Satisfied	
1	2	3	4	5		1	2	3	4	5
1	2	3	4	5	Amount of parking for vehicles	1	2	3	4	5
1	2	3	4	5	Amount of parking for horse trailers	1	2	3	4	5
1	2	3	4	5	Toilets / bathrooms	1	2	3	4	5
1	2	3	4	5	Trash cans	1	2	3	4	5
1	2	3	4	5	Trail maps / brochures	1	2	3	4	5
1	2	3	4	5	Trailhead signs with information / regulations	1	2	3	4	5
1	2	3	4	5	Directional signs on trails / roads	1	2	3	4	5
1	2	3	4	5	Trail maintenance	1	2	3	4	5
1	2	3	4	5	Number of trails	1	2	3	4	5
1	2	3	4	5	Amount of litter	1	2	3	4	5
1	2	3	4	5	Amount of <i>dog</i> waste / excrement	1	2	3	4	5
1	2	3	4	5	Amount of <i>horse</i> waste / excrement	1	2	3	4	5
1	2	3	4	5	Presence of management personnel	1	2	3	4	5
1	2	3	4	5	Pay no fee to use this forest	1	2	3	4	5
1	2	3	4	5	Opportunity to experience nature	1	2	3	4	5
1	2	3	4	5	Opportunity for scenic views	1	2	3	4	5
1	2	3	4	5	Opportunity to escape from crowds of people	1	2	3	4	5
1	2	3	4	5	Opportunity to learn about a working forest	1	2	3	4	5
1	2	3	4	5	Timber harvesting	1	2	3	4	5
1	2	3	4	5	Safety from logging / forestry operations	1	2	3	4	5

7. What do you think **currently** pays for recreation management at McDonald-Dunn Forest? (**check ALL THAT APPLY**)

☐ Federal taxes ☐ Local taxes ☐ Grants and subsidies ☐ Unsure
☐ State taxes ☐ Timber harvest from the forest ☐ Gifts and donations

8. Many organizations and agencies charge use fees to access and recreate on local, private, state, and federal lands.

Have you ever paid use fees for recreation on any of these types of lands? (**check ONE**) ☐ No ☐ Yes ☐ Unsure

9. Access to McDonald-Dunn Forest is currently provided free of charge, but the budget to manage recreation is declining and costs are increasing. Managers are exploring several options to help cover costs of recreation. To what extent do you oppose or support each of the following possible alternatives to help cover costs? (**circle ONE number for EACH alternative**)

	Strongly Oppose	Oppose	Neither	Support	Strongly Support
Voluntary money donation.	1	2	3	4	5
Mandatory daily use fee.	1	2	3	4	5
Mandatory seasonal use fee / pass.	1	2	3	4	5
Mandatory annual (year) use fee / pass.	1	2	3	4	5
Endowment (e.g., sponsor / name a trail).	1	2	3	4	5
Volunteer time to help management (e.g., trail maintenance).	1	2	3	4	5
Other (please specify)	1	2	3	4	5

10. What is the **maximum** amount you would be willing to pay for **each** of the following to use McDonald-Dunn Forest for recreation? (**write how much you would be willing to pay for EACH alternative; put "0" if you would not pay**)

Voluntary money donation \$ _____
Mandatory daily use fee \$ _____
Mandatory seasonal use fee / pass \$ _____
Mandatory annual (year) use fee / pass \$ _____

11. What would be your most preferred method of payment to use McDonald-Dunn Forest for recreation? (**check ONE**)

☐ Voluntary money donation ☐ Mandatory seasonal use fee / pass ☐ I am not willing to pay to use
☐ Mandatory daily use fee ☐ Mandatory annual (year) use fee / pass McDonald-Dunn Forest

12. To what extent do you disagree or agree with each of the following statements regarding paying a use fee to recreate at McDonald-Dunn Forest? (**circle ONE number for EACH statement**)

<i>Paying a use fee to recreate at McDonald-Dunn Forest would ...</i>	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
... make me feel like I would be helping to protect this forest.	1	2	3	4	5
... make me more willing to comply with the rules / regulations.	1	2	3	4	5
... make me feel good because I would be helping to cover costs to manage recreation in this forest.	1	2	3	4	5
... improve my enjoyment of this forest.	1	2	3	4	5
... cause me to expect better maintenance of facilities / services.	1	2	3	4	5
... cause me to expect more facilities / services in this forest.	1	2	3	4	5
... cause me to still recreate in this forest, but less often.	1	2	3	4	5
... cause me to stop recreating in this forest altogether.	1	2	3	4	5
... make recreating in this forest too expensive for me.	1	2	3	4	5

13. Do you think that recreation users should help pay for recreation management at McDonald-Dunn Forest? (**check ONE**)

☐ No ☐ Yes ☐ Unsure

Version 1:

The next four questions each present two hypothetical management options for McDonald-Dunn Forest where:

- Amount of parking is **SAME** or **MORE** as now
- Toilets at trailheads are **SAME (PORTABLE)** as now or **PERMANENT / VAULT** TOILETS
- Number of trash cans is **SAME** or **MORE** as now
- Number of trail direction / information signs is **SAME** or **MORE** as now
- Number of trails is **SAME** or **MORE** as now
- Annual (year) use fee / pass of \$5, \$10, \$25, or \$50 per year

DIRECTIONS: *For EACH question carefully read EACH option and CHOOSE THE ONE OPTION YOU MOST PREFER. No questions or options are the same, so answer all four questions. Make choices independent of questions preceding it.*

14. Which one of the following two management options would you prefer at McDonald-Dunn Forest? (check only ONE option)

	OPTION 1	OPTION 2
Parking	SAME as now	MORE than now
Toilets at trailheads	PERMANENT TOILETS	SAME (PORTABLE) as now
Trash cans	MORE than now	SAME as now
Trail direction / information signs	SAME as now	SAME as now
Number of trails	MORE than now	MORE than now
Annual (year) use fee / pass	\$5 per year	\$10 per year

CHOOSE ONE → ☐ I prefer Option 1 ☐ I prefer Option 2 ☐ I prefer neither

15. Which one of the following two management options would you prefer at McDonald-Dunn Forest? (check only ONE option)

	OPTION 1	OPTION 2
Parking	MORE than now	SAME as now
Toilets at trailheads	PERMANENT TOILETS	SAME (PORTABLE) as now
Trash cans	MORE than now	MORE than now
Trail direction / information signs	SAME as now	SAME as now
Number of trails	SAME as now	MORE than now
Annual (year) use fee / pass	\$10 per year	\$50 per year

CHOOSE ONE → ☐ I prefer Option 1 ☐ I prefer Option 2 ☐ I prefer neither

16. Which one of the following two management options would you prefer at McDonald-Dunn Forest? (check only ONE option)

	OPTION 1	OPTION 2
Parking	MORE than now	SAME as now
Toilets at trailheads	SAME (PORTABLE) as now	SAME (PORTABLE) as now
Trash cans	MORE than now	MORE than now
Trail direction / information signs	MORE than now	MORE than now
Number of trails	MORE than now	SAME as now
Annual (year) use fee / pass	\$5 per year	\$10 per year

CHOOSE ONE → ☐ I prefer Option 1 ☐ I prefer Option 2 ☐ I prefer neither

17. Which one of the following two management options would you prefer at McDonald-Dunn Forest? (check only ONE option)

	OPTION 1	OPTION 2
Parking	SAME as now	MORE than now
Toilets at trailheads	PERMANENT TOILETS	PERMANENT TOILETS
Trash cans	MORE than now	SAME as now
Trail direction / information signs	MORE than now	MORE than now
Number of trails	SAME as now	SAME as now
Annual (year) use fee / pass	\$25 per year	\$5 per year

CHOOSE ONE → ☐ I prefer Option 1 ☐ I prefer Option 2 ☐ I prefer neither

18. To what extent do you oppose or support each of the following possible management actions at McDonald-Dunn Forest?
(circle ONE number for EACH possible management action)

	Strongly Oppose	Oppose	Neither	Support	Strongly Support
Better inform visitors about appropriate behavior.	1	2	3	4	5
Provide more technical / challenging trails.	1	2	3	4	5
Provide trails designated only for mountain biking.	1	2	3	4	5
Provide more trails designated only for people on foot (hike, walk, jog).	1	2	3	4	5
Provide trails designated only for horseback riding.	1	2	3	4	5
Provide directional trails (e.g., uphill only, downhill only).	1	2	3	4	5
Require that dogs be kept on leash.	1	2	3	4	5
Increase presence of management personnel.	1	2	3	4	5
Do not change anything / keep things as they are now.	1	2	3	4	5

Version 2:

The next four questions each present two hypothetical management options for McDonald-Dunn Forest where:

- Amount of parking is **SAME** or **MORE** as now
- Toilets at trailheads are **SAME (PORTABLE)** as now or **PERMANENT / VAULT TOILETS**
- Number of trash cans is **SAME** or **MORE** as now
- Number of trail direction / information signs is **SAME** or **MORE** as now
- Number of trails is **SAME** or **MORE** as now
- Annual (year) use fee / pass of \$5, \$10, \$25, or \$50 per year

DIRECTIONS: *For EACH question carefully read EACH option and CHOOSE THE ONE OPTION YOU MOST PREFER. No questions or options are the same, so answer all four questions. Make choices independent of questions preceding it.*

14. Which one of the following two management options would you prefer at McDonald-Dunn Forest? (check only ONE option)

	OPTION 1	OPTION 2
Parking	SAME as now	MORE than now
Toilets at trailheads	SAME (PORTABLE) as now	SAME (PORTABLE) as now
Trash cans	SAME as now	MORE than now
Trail direction / information signs	SAME as now	SAME as now
Number of trails	SAME as now	SAME as now
Annual (year) use fee / pass	\$5 per year	\$25 per year

CHOOSE ONE → ☐ I prefer Option 1 ☐ I prefer Option 2 ☐ I prefer neither

15. Which one of the following two management options would you prefer at McDonald-Dunn Forest? (check only ONE option)

	OPTION 1	OPTION 2
Parking	MORE than now	SAME as now
Toilets at trailheads	PERMANENT TOILETS	PERMANENT TOILETS
Trash cans	SAME as now	SAME as now
Trail direction / information signs	SAME as now	SAME as now
Number of trails	MORE than now	SAME as now
Annual (year) use fee / pass	\$25 per year	\$50 per year

CHOOSE ONE → ☐ I prefer Option 1 ☐ I prefer Option 2 ☐ I prefer neither

16. Which one of the following two management options would you prefer at McDonald-Dunn Forest? (check only ONE option)

	OPTION 1	OPTION 2
Parking	MORE than now	SAME as now
Toilets at trailheads	SAME (PORTABLE) as now	PERMANENT TOILETS
Trash cans	SAME as now	SAME as now
Trail direction / information signs	MORE than now	MORE than now
Number of trails	SAME as now	MORE than now
Annual (year) use fee / pass	\$50 per year	\$10 per year

CHOOSE ONE → ☐ I prefer Option 1 ☐ I prefer Option 2 ☐ I prefer neither

17. Which one of the following two management options would you prefer at McDonald-Dunn Forest? (check only ONE option)

	OPTION 1	OPTION 2
Parking	MORE than now	SAME as now
Toilets at trailheads	PERMANENT TOILETS	SAME (PORTABLE) as now
Trash cans	MORE than now	SAME as now
Trail direction / information signs	MORE than now	MORE than now
Number of trails	MORE than now	MORE than now
Annual (year) use fee / pass	\$50 per year	\$25 per year

CHOOSE ONE → ☐ I prefer Option 1 ☐ I prefer Option 2 ☐ I prefer neither

18. To what extent do you oppose or support each of the following possible management actions at McDonald-Dunn Forest?
(circle ONE number for EACH possible management action)

	Strongly Oppose	Oppose	Neither	Support	Strongly Support
Better inform visitors about appropriate behavior.	1	2	3	4	5
Provide more technical / challenging trails.	1	2	3	4	5
Provide trails designated only for mountain biking.	1	2	3	4	5
Provide more trails designated only for people on foot (hike, walk, jog).	1	2	3	4	5
Provide trails designated only for horseback riding.	1	2	3	4	5
Provide directional trails (e.g., uphill only, downhill only).	1	2	3	4	5
Require that dogs be kept on leash.	1	2	3	4	5
Increase presence of management personnel.	1	2	3	4	5
Do not change anything / keep things as they are now.	1	2	3	4	5

19. What is the ONE agency or organization **currently** responsible for managing McDonald-Dunn Forest? (check only ONE)

- | | |
|--|--|
| ☐ United States Forest Service | ☐ Oregon State University (OSU) / College of Forestry |
| ☐ United States Bureau of Land Management | ☐ Corvallis Parks and Recreation Department |
| ☐ Oregon Department of Forestry | ☐ Benton County Parks |
| ☐ Oregon Parks and Recreation Department | ☐ Unsure |

20. During your visits to McDonald-Dunn Forest, how often have you seen the following? (circle ONE number for EACH)

	Never	Once or Twice	Sometimes	Many Times
Mountain bikers riding too fast.	0	1	2	3
Mountain bikers being rude or discourteous.	0	1	2	3
Mountain bikers not yielding the right of way.	0	1	2	3
Mountain bikers failing to give verbal warnings upon approach.	0	1	2	3
Horseback riders riding too fast.	0	1	2	3
Horseback riders being rude or discourteous.	0	1	2	3
Horseback riders not yielding the right of way.	0	1	2	3
Horseback riders failing to give verbal warnings upon approach.	0	1	2	3
People on foot (hikers, walkers, joggers) being rude or discourteous.	0	1	2	3
People on foot (hikers, walkers, joggers) not yielding the right of way.	0	1	2	3
People on foot failing to give verbal warnings upon approach.	0	1	2	3

21. To what extent do you feel each of the following is a problem at McDonald-Dunn Forest? (circle ONE number for EACH)

	Not a Problem	Slight Problem	Moderate Problem	Extreme Problem
Mountain bikers riding too fast.	0	1	2	3
Mountain bikers being rude or discourteous.	0	1	2	3
Mountain bikers not yielding the right of way.	0	1	2	3
Mountain bikers failing to give verbal warnings upon approach.	0	1	2	3
Horseback riders riding too fast.	0	1	2	3
Horseback riders being rude or discourteous.	0	1	2	3
Horseback riders not yielding the right of way.	0	1	2	3
Horseback riders failing to give verbal warnings upon approach.	0	1	2	3
People on foot (hikers, walkers, joggers) being rude or discourteous.	0	1	2	3
People on foot (hikers, walkers, joggers) not yielding the right of way.	0	1	2	3
People on foot failing to give verbal warnings upon approach.	0	1	2	3

22. In total, about how many **years** have you been recreating in McDonald-Dunn Forest? _____ year(s)

23. In what ONE season do you typically visit McDonald-Dunn Forest MOST OFTEN? (check only ONE)

- ☐ Spring ☐ Summer ☐ Fall ☐ Winter

24. About how often have you visited McDonald-Dunn Forest in the past 12 months? (check ONE)

- | | |
|---|---|
| ☐ Less than once a month (less than 12 times per year) | ☐ About once a week (46 to 80 times per year) |
| ☐ About once a month (12 to 18 times per year) | ☐ About twice a week (81 to 130 times per year) |
| ☐ About two or three times a month (19 to 45 times per year) | ☐ Three or more times a week (over 130 times per year) |

25. On a typical visit, about how many **hours** do you spend recreating in McDonald-Dunn Forest? _____ hour(s)

26. Do you typically bring any dogs with you when visiting McDonald-Dunn Forest? (check ONE) ☐ No ☐ Yes

Finally, we would like to ask you a few questions about yourself and your group to help us learn about the backgrounds of respondents and allow us to compare your answers with those of other respondents. You will remain anonymous.

27. **INCLUDING YOURSELF**, how many people are accompanying you at McDonald-Dunn Forest **today**? _____ person(s)

28. How many people in your group at McDonald-Dunn Forest **today** are **under 16 years of age**? _____ person(s)

29. How did you get to McDonald-Dunn Forest **today**? (check ONE)

☐ Drove motorized vehicle here ☐ Rode bicycle here ☐ Rode horse here ☐ Walked / jogged here

30. Are you: (check ONE) ☐ Male ☐ Female

31. What is your age? _____ years old

32. What is the **highest** level of education that **you** have completed? (check ONE)

☐ Less than high school diploma ☐ 4-year college degree (for example: bachelors degree)
☐ High school diploma or GED ☐ Advanced degree beyond 4-year degree (for example: masters, Ph.D., medical doctor, law degree)
☐ 2-year associates degree or trade school

33. Are you **currently** a student? (check ONE)

☐ No
☐ Yes → if yes, what high school, college, or university do you attend? (please specify) _____

34. In what city or town do you **currently** live? (check ONE)

☐ Corvallis ☐ Albany
☐ Philomath ☐ Other (please specify) _____
☐ Adair Village

35. Approximately how far away from the nearest boundary of McDonald-Dunn Forest do you **currently** live? (check ONE)

☐ Adjacent (next to forest) ☐ Within 1 mile ☐ More than 5 miles
☐ Within 1/2 mile ☐ 1 to 5 miles ☐ Unsure

36. Which of these broad categories best describes your **current annual household income before taxes**? (check ONE)

☐ Less than \$10,000 ☐ \$90,000 to \$109,999
☐ \$10,000 to \$29,999 ☐ \$110,000 to \$129,999
☐ \$30,000 to \$49,999 ☐ \$130,000 to \$149,999
☐ \$50,000 to \$69,999 ☐ \$150,000 to \$169,999
☐ \$70,000 to \$89,999 ☐ \$170,000 or more

If you have any other comments, please write them here:

Thank you, your input is important! **Please return this survey to the researcher.**

RESEARCHER COMPLETES THIS SECTION:

Date: _____ Time: _____ Site: _____ Version: _____

Appendix B: 2018 Onsite Survey Instrument

Your Opinions about Recreation in OSU's McDonald and Dunn Forests



Thank You for Your Participation

1. Please **check all** the activities in which you have **ever** participated at McDonald and Dunn Forests. (**check all that apply**).
- ☐ A. Hiking or walking ☐ D. Mountain biking ☐ G. Horseback riding
☐ B. Dog walking ☐ E. Nature viewing ☐ H. Hunting
☐ C. Trail running or jogging ☐ F. Bird watching ☐ I. Other (please specify) _____
2. From the activities in Question 1 above, what **ONE** primary activity are you participating in at McDonald and Dunn Forests **TODAY**? (write ONE letter that matches your response) _____
3. From the activities in Question 1 above, what **ONE** primary activity do you **TYPICALLY** participate in at the McDonald and Dunn Forests? (write ONE letter that matches your response) _____
4. How would you rate your skill level in this activity you **TYPICALLY** participate in at McDonald and Dunn Forests? (**check ONE**)
- ☐ Beginner ☐ Novice ☐ Intermediate ☐ Advanced ☐ Expert
5. In total, about how many **years** have you been recreating at McDonald and Dunn Forests? _____ year(s)
6. About how often have you visited McDonald and Dunn Forests **in the past 12 months**? (**check ONE**)
- ☐ This is my first visit ☐ About once a week (about 52 times/year)
☐ Less than once a month (less than 12 times/year) ☐ About twice a week (about 104 times/year)
☐ About once a month (about 20 times/year) ☐ Three or more times a week (over 130 times)
☐ About two or three times a month (about 40 times/year)
7. On a typical visit, about how many **hours** do you spend recreating at McDonald and Dunn Forests? _____ hour(s)
8. Do you typically bring any dogs with you when visiting McDonald and Dunn Forests? (**check only ONE**)
- ☐ No
☐ Yes → How many dogs do you bring with you on a typical visit? _____
→ How do you recreate with your dog? (**check ONE**)
☐ Keep dog(s) on leash all the time ☐ Keep dog(s) off leash all the time
☐ Restrain dog(s) when encountering other visitors ☐ Leash dog(s) in busy areas
9. Overall, how dissatisfied or satisfied are you with your recreation experiences at McDonald and Dunn Forests? (**check ONE**)
- ☐ Very Dissatisfied ☐ Dissatisfied ☐ Neither ☐ Satisfied ☐ Very Satisfied
- Please Explain _____
10. Please indicate how crowded the following areas were during your visit at McDonald and Dunn Forests **today**. (Please circle ONE number for each item).

	Not at all Crowded	Slightly Crowded	Neither	Moderately Crowded	Extremely Crowded
People seen at trailheads	1	2	3	4	5
Vehicles seen at trailheads	1	2	3	4	5
People seen on forest trails	1	2	3	4	5
People seen on forest roads	1	2	3	4	5

11. About how many people did you see at the trailhead you used today? _____ people
12. About how many people did you see on forest trails today? _____ people
13. About how many people did you see on roads inside the McDonald and Dunn forest today? _____ people
14. About how many vehicles did you see at the trailhead you used today? _____ Vehicles
15. Listed below are characteristics of McDonald and Dunn Forests. Please rate how important each characteristic is to you at this forest. (Answer questions by circling one number for EACH characteristic)

Characteristics	Not at all Important	Slightly Important	Important	Fairly Important	Extremely Important
Amount of parking space available for vehicles	1	2	3	4	5
Safety from logging/forestry operations	1	2	3	4	5
Availability of trash-cans at trailheads	1	2	3	4	5
Availability of free brochures at trailheads	1	2	3	4	5
Number of directional signs on trails/roads	1	2	3	4	5
Quality of trail maintenance	1	2	3	4	5
Availability of single-track forest trails	1	2	3	4	5
Amount of litter seen	1	2	3	4	5
Amount of dog waste seen	1	2	3	4	5
Amount of horse waste seen	1	2	3	4	5

16. Listed below are characteristics of McDonald and Dunn Forests. Please rate how satisfied you are with each characteristic at this forest. (Answer questions by circling one number for EACH characteristic)

Characteristics	Very Unsatisfied	Unsatisfied	Neither	Satisfied	Very Satisfied
Amount of parking space available for vehicles	1	2	3	4	5
Safety from logging/forestry operations	1	2	3	4	5
Availability of trash-cans at trailheads	1	2	3	4	5
Availability of free brochures at trailheads	1	2	3	4	5
Number of directional signs on trails/roads	1	2	3	4	5
Quality of trail maintenance	1	2	3	4	5
Availability of single-track forest trails	1	2	3	4	5
Amount of litter seen	1	2	3	4	5
Amount of dog waste seen	1	2	3	4	5
Amount of horse waste seen	1	2	3	4	5

17. During your visits to the McDonald and Dunn Forests, how often have you seen the following? (circle ONE number for EACH)

	Never	Once or Twice	Sometimes	Many Times
Mountain bikers riding too fast	0	1	2	3
Mountain bikers being rude or discourteous	0	1	2	3
Mountain bikers not yielding the right of way	0	1	2	3
Mountain bikers failing to give verbal warning upon approach	0	1	2	3
Horseback riders riding too fast	0	1	2	3
Horseback riders being rude or discourteous	0	1	2	3
Horseback riders failing to give verbal warning upon approach	0	1	2	3
People on foot (with no dog) being rude or discourteous	0	1	2	3
People on foot (with no dog) not yielding the right of way	0	1	2	3
People on foot (with no dog) failing to give verbal warning upon approach	0	1	2	3
People with dogs not under vocal control	0	1	2	3
People with dogs being rude or discourteous	0	1	2	3
People with dogs not yielding right of way	0	1	2	3
People with dogs failing to give verbal warning upon approach	0	1	2	3

18. To what extent do you feel each of the following is a problem at McDonald and Dunn Forests? (circle ONE number for EACH)

	Not a Problem	Slight Problem	Neither	Moderate Problem	Extreme Problem
Mountain bikers riding too fast	1	2	3	4	5
Mountain bikers being rude or discourteous	1	2	3	4	5
Mountain bikers not yielding the right of way	1	2	3	4	5
Mountain bikers failing to give verbal warning	1	2	3	4	5
Horseback riders riding too fast	1	2	3	4	5
Horseback riders being rude or discourteous	1	2	3	4	5
Horseback riders failing to give verbal warning upon approach	1	2	3	4	5
People on foot (with no dog) being rude or discourteous	1	2	3	4	5
People on foot (with no dog) not yielding the right of way	1	2	3	4	5
People on foot (with no dog) failing to give verbal warning upon approach	1	2	3	4	5
People with dogs not under vocal control	1	2	3	4	5
People with dogs being rude or discourteous	1	2	3	4	5
People with dogs not yielding right of way	1	2	3	4	5
People with dogs failing to give verbal warning upon approach	1	2	3	4	5

19. To what extent do you **oppose** or **support** each of the following potential management actions at McDonald and Dunn Forests? **(Please circle ONE number for EACH possible management action)**

Potential Management Actions	Strongly Oppose	Oppose	Neither	Support	Strongly Support
Develop and install trail difficulty rating system to help people know what to expect	1	2	3	4	5
Provide additional trash-cans along the trails	1	2	3	4	5
Provide additional dog-bag dispensers for dog waste/excrement	1	2	3	4	5
Increase the size of parking areas, for more parking spaces	1	2	3	4	5
Provide bike racks at trailheads	1	2	3	4	5
When building new trails, use natural surface and have wet weather restrictions on trail use	1	2	3	4	5
When building new trails, use gravel surface and have trails accessible all year-round	1	2	3	4	5
Develop easy trails for novice mountain bikers	1	2	3	4	5
Develop trails designated primarily for mountain biking	1	2	3	4	5
Develop more trails designated only for people on foot	1	2	3	4	5
Require that dogs be kept on leash in specific high volume areas	1	2	3	4	5
Require that dogs be kept on leash everywhere in the forest	1	2	3	4	5
Provide more information at trailhead kiosks	1	2	3	4	5
Provide more signage, informing visitors about the forest management activities and closures	1	2	3	4	5
Provide more signage, informing visitors of appropriate behavior	1	2	3	4	5
Increase enforcement of trail use rules and regulations	1	2	3	4	5
Provide more signage, explaining forest resources, research, ecology, and management	1	2	3	4	5
Improve the availability of free maps at trailheads	1	2	3	4	5
Provide more electronic tools to be used for way-finding and information sharing	1	2	3	4	5
Provide more way-finding signage along trails and roads	1	2	3	4	5
Provide information through email and web communication	1	2	3	4	5
Do not change anything / keep things as they are now	1	2	3	4	5

20. Have you seen the free brochure with map available at trailhead kiosks?

- ☐ No (if no, skip to question 22)
☐ Yes (if yes, answer question 21)

21. Do you find the information provided in the brochure useful to you? (check ONE)

- ☐ No → Please suggest one thing that could be improved _____
☐ Yes → Please suggest one thing that could be improved _____

22. Did you look at the trailhead kiosk today?

- ☐ No (if no, skip to question 24)
☐ Yes (if yes, answer question 23)

23. Do you find the information provided on the trailhead kiosk very useful? (check ONE)

- ☐ No → Please suggest one thing that could be improved _____
☐ Yes → Please suggest one thing that could be improved _____

24. Have you ever volunteered for the McDonald and Dunn Forests? (**check ONE**)

☐ No

☐ Yes → How many times have you volunteered in the past 12 months? __times.

25. Do you receive information updates on McDonald and Dunn Forests? (**check ONE**)

☐ No

☐ Yes → Please indicate how you receive McDonald and Dunn Forests information _____

26. Have you ever heard of the Forest Connection Fundraising Program? (**check ONE**)

☐ No (**if no, skip to question 28**)

☐ Yes (**if yes, answer question 27**)

27. Are you a member of the Forest Connection Fundraising Program? (**check ONE**)

☐ No

☐ Yes

28. To what extent do you prefer to receive each of the following sources of information about McDonald and Dunn Forests (**Please circle ONE number for each source of information**)

	Not Preferred	Slightly Preferred	Neither	Moderately Preferred	Extremely Preferred
Newsletters	1	2	3	4	5
Trailhead kiosks	1	2	3	4	5
Newspapers	1	2	3	4	5
Local magazines	1	2	3	4	5
Trail signs	1	2	3	4	5
Email	1	2	3	4	5
Neighborhood meetings	1	2	3	4	5
Conversation with forest officials	1	2	3	4	5
Community programs (churches, schools, scouts)	1	2	3	4	5
Guided field visits	1	2	3	4	5
Facebook	1	2	3	4	5
Open cycle map	1	2	3	4	5
OSU research forests website	1	2	3	4	5
Online videos	1	2	3	4	5
Other	1	2	3	4	5

29. We would like to know how **effective our information program is** in helping you to understand more about each of the following items (**Please circle ONE number for each item**).

	Very Ineffective	Ineffective	Neither	Effective	Extremely Effective
McDonald and Dunn Forests' goals and mission	1	2	3	4	5
Recreation programs or events	1	2	3	4	5
Management decisions	1	2	3	4	5
Location and timing of timber harvest closures	1	2	3	4	5
Information needed to plan your visit	1	2	3	4	5
Regulations for recreating at McDonald and Dunn Forests	1	2	3	4	5
Research at McDonald and Dunn Forests	1	2	3	4	5

30. Do you identify as: (**check ONE**) ☐ Male ☐ Female ☐ Transgender ☐ Do not identify as male, female or transgender.
31. What year were you born? _____
32. When asked to identify your racial or ethnic identity, how do **you** identify? (**check all that apply**)
☐ White/Caucasian ☐ Hispanic/Latino/Spanish ☐ Black/African American
☐ Asian/Asian American ☐ American Indian/Alaska Native ☐ Native Hawaiian/Pacific Islander
☐ Two or more races ☐ Other _____
33. What is the **highest** level of education that **you** have completed? (**check ONE**)
☐ Less than high school diploma ☐ Some college education
☐ High school diploma or GED ☐ 4-year college degree (i.e., bachelors degree)
☐ 2-year associates degree or trade school ☐ Advanced degree beyond 4-year degree (e.g., masters, Ph.D., Medical Doctor, Law degree)
34. Are you **currently** a student? (**check ONE**)
☐ No
☐ Yes → Which school do you attend? (**please specify**) _____
35. In what city or town, do you **currently** live? (**check ONE**)
☐ Corvallis ☐ Adair Village ☐ Philomath ☐ Albany ☐
 Other (please specify) _____
36. Approximately how far away from the nearest boundary of McDonald and Dunn Forests do you **currently** live? (**check ONE**)
☐ Adjacent (next to) ☐ Within 1 mile ☐ More than 5 miles
☐ Within 1/2 mile ☐ 1 to 5 miles ☐ Unsure
37. Which of these broad categories best describes your **current annual household income before taxes**? (**check ONE**)
☐ Under \$15,000 ☐ \$75,000 to \$99,999
☐ \$15,000 to \$24,999 ☐ \$100,000 to \$149,999
☐ \$25,000 to \$34,999 ☐ \$150,000 to \$199,999
☐ \$35,000 to \$49,999 ☐ \$200,000 and over
☐ \$50,000 to \$74,999
38. **INCLUDING YOURSELF**, how many people are accompanying you at McDonald and Dunn Forests **today**? _____ person(s)
39. How many people in your group at McDonald and Dunn Forests **today** are **under 16 years of age**? _____ person(s)
40. How did you get to McDonald and Dunn Forests **today**? (**check ONE**)
☐ Drove motorized vehicle ☐ Rode bicycle ☐ Rode horse ☐ Walked/jogged
41. If you have any other comments, please write them here:

RESEARCHER COMPLETES THIS SECTION: Date _____ Time : _____ Exit Gate: _____