RECREATIONAL BOATERS VERSUS PERSONAL WATERCRAFT: A STUDY OF CONFLICT

By

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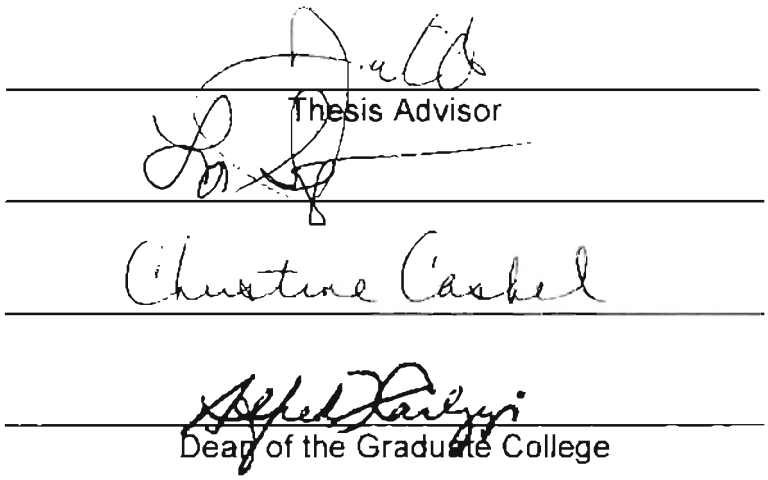

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CHAPTER I

INTRODUCTION

Since their introduction in 1974, personal watercraft (PWC) have become a popular form of water recreation and at the same time a source of increasing controversy. PWCs are smaller than other types of watercraft, carrying from one to three persons. Most have an inboard motor that forces a jet of pressurized water out through the back of the craft, propelling it forward and, at the same time, serving as a steering mechanism. Some PWCs are powerful enough to pull a water-skier (Holland, Pybas, and Sanders 1992).

PWCs have various nicknames including "water scooters," "motorcycles on water," "cruise craft," "water bikes," and "wave runners" (after the Yamaha WaveRunner). Perhaps the most common name is "jet ski" after the first PWC, the Kawasaki Jet Ski (Youngs 1993). Despite the ubiquity of their use, it should be noted that "jet ski" and "wave runner" are trademark names that laws protect from general use (Holland, Pybas, and Sanders 1992; Smallwood 1998). The term personal watercraft (PWC) will be used for the purpose of this study.

Controversy surrounding PWCs has grown since their introduction. For example, there are reports of behavior by PWC operators that range from inconsiderate to dangerous ("Growing Jet Ski Threat" 1988; Gibbs 1989; Skorupa 1989; Holland, Pybas, and Sanders 1992; Taylor 1992; Alger 1996; "Jet Ski Etiquette" 1996; Smallwood 1998). In addition, PWCs are involved in a

disproportionate number of accidents. As a result of these problems, some state and other government agencies have banned or restricted PWC operation on some lakes and waterways (Gibbs 1989; Skorupa 1989; Holland, Pybus, and Sanders 1992; Alger 1996; Morgan 1997; Hodges 1998; "New personal watercraft regs..." 1998; Smallwood 1998). Others are considering bans or restrictions (Cook 1997; McCartney 1998; "U.S. National Park Service proposes jet ski ban" 1998). Genmar Holdings, Inc., the world's largest independent manufacturer of powerboats, withdrew from the National Marine Manufacturers Association (NMMA) in 1997, because of the PWC controversy. Irwin L. Jacobs, founder and chairman of Genmar Holdings, stated that it was impossible for him to continue in the NMMA while it supports PWC manufacturers because of boaters' negative reaction to PWCs (Jacobs 1998).

In addition to public nuisance and safety issues, there is also concern over environmental impacts associated with PWC use. For example, PWC riders are reported to have harassed or endangered wildlife (Skorupa 1989; Holland, Pybus, and Sanders 1992; Alger 1996; Morgan 1997). The two-stroke engines that power PWCs are blamed for polluting water with unburned fuel and oil (Morgan 1997; Gorant 1998).

In an attempt to head-off additional bans on PWC use, the Personal Watercraft Industry Association (PWIA) has developed model regulations for legislatures that are considering the implementation of PWC laws. Their recommendations emphasize education and safety (McMurray 1998; National Transportation Safety Board 1998). Amidst the controversy surrounding PWC

use, it is important to remember that personal watercraft have a place in safe recreation, law enforcement, and resource management (Holland, Pybas, and Sanders 1992; Cook 1997; Smallwood 1998).

Purpose of the Study

Because of differing opinions, PWCs can cause conflict among other water recreationists. Conflict occurs when the presence or behavior of a person or group causes negative feelings or reactions in another person or group. For example, people can create conflict by behaving in a fashion that endangers themselves and others. This would require heightened vigilance on the part of other recreationists that diminishes their enjoyment of the recreation activity. Or recreationists who desire a recreation experience that includes quiet and/or solitude would perceive conflict with noise and/or the presence of others. Or persons with environmental concerns might perceive conflict with behaviors that endanger wildlife or air and water quality.

Recreation area managers strive to minimize conflict among recreationists. Therefore, a great deal of the research in recreation issues studies the parameters of conflict perception, often under the terms "crowding" (Nielsen, Shelby, and Haas 1977; Ditton, Fedler, and Graefe 1983) or "goal interference" (Jacob and Schreyer 1980; Gramann and Burdge 1981; Parker 1981; Ivy, Stewart, and Lue 1992; Ruddell and Gramann 1994; Gibbons and Ruddell 1995). PWCs have not been the subject of conflict research before this, probably due to their relative newness on the recreation scene.

This study investigates whether conflict was perceived by persons who visited Lake Carl Blackwell, Stillwater, Oklahoma (LCB) during 1999. In particular, it compares perceived conflict levels among personal watercraft operators and recreational boaters. It also compares perceived conflict levels of people with different socioeconomic and recreational user characteristics in an attempt to identify types of visitors who may be more sensitive to conflict. Terms used in this study are defined in Appendix A.

Research Questions

The following hypotheses are tested:

H_{01}: Conflict is symmetrical with similar levels of conflict being perceived by all persons. No statistically significant difference in perception of conflict exists among Boaters and PWC operators.

Most of the literature on recreation conflict suggests asymmetrical levels of perceived conflict among different types of recreationists, usually based on alternative travel modes. This means one recreation type perceives conflict at higher levels than another recreation type. The best examples are hikers versus stock users or mountain bikers (Blahna, Dale, and Anderson 1994; Watson, Niccolucci, and Williams 1994; Ramthun 1995) and motorized versus nonmotorized (Knopp and Tyger 1973; Gramann and Burdge 1981; Parker 1981;

Ivy, Stewart, and Lue 1992). Studies also find asymmetrical levels of perceived conflict among similar recreation types, for example, rock climbers using different climbing methods (Berl and Chilman 1981).

H_{02}: No statistically significant difference in perception of conflict exists among people with more experience in water recreation (10 or more times participating in activity) and people with less experience in water recreation (less than 10 times).

Absher and Lee (1981) find indications that experience levels generally lead to greater tolerance for use intensity in their study on perceptions of crowding within wilderness areas. Rejection of the null hypothesis could indicate a like tolerance for PWCs. However, studies by Ditton, Fedler, and Graefe (1983) and Schreyer, Lime, and Williams (1984) find that more experienced recreationists reported conflict at higher levels than less experienced recreationists.

H_{03}: No statistically significant difference in perception of conflict exists among long-term users of a recreation site (five or more times) and short-term or first time users of the site (less than 5 times).

Parker (1981) finds a positive correlation between resource specificity, or identification with the recreation site, and perceived conflict among boat

fishermen and water-skiers. In another study, Gibbons and Ruddell (1995) find that reports of goal interference are higher among nonmotorized backcountry skiers who are place dependent.

H_{04}: No statistically significant difference in perception of conflict exists among local recreationists (persons living within 25 or fewer miles) and non-local recreationists (persons living 26 or more miles away).

This question is based on an intuitive belief that local recreationists would identify more closely with the lake and have a proprietary attitude towards it. They would therefore be more sensitive to perceptions of conflict. Few studies address this visitor characteristic in relation to conflict. Schreyer, Lime, and Williams (1984) find that a group of river recreationists they identify as "local" are more likely to perceive conflict than some other groups. However, their definition of local is based on number of float trips on the study river and number of trips on other rivers. It is not based on distance of residence from the study river. The distance a visitor lives from the resource is not addressed in any previous research.

H_{05}: No statistically significant difference in perception of conflict exists among recreationists from large urban areas (population $\geq$100,000) and recreationists from small urban or rural areas (population <100,000).

This is a question that does not appear to have been previously addressed. The belief is that people from urban areas are more accustomed to diverse activities within limited spaces and will be less sensitive to the presence and actions of others. The test of hypotheses H_{01} through H_{05} is done with The Chi-Square (X^2) Goodness-of-fit test for a proportional or unequal distribution, with the null hypothesis rejected at the α=0.05 level of significance (McGrew and Monroe 1993).

H_{06}: There is no correlation between education level and perceived conflict.

Absher and Lee (1981) find that education level is not a significant factor in the explanation of perceived crowding. However, it is more significant in the explanation of experiential motives for recreation which, in turn, are weak predictors of perceived crowding. This hypothesis tests if education levels could have a relationship with conflict perception. A positive correlation between education levels and perceived conflict could indicate that persons with more education are more sensitive to conflict. The Spearman's Rank Correlation (r_s) Analysis is used to determine if there is any correlation between perceived conflict and education level (McGrew and Monroe 1993).

In addition to the hypotheses listed above, a descriptive analysis of two other issues is carried out. First, this study tries to determine if interpersonal

conflict appears to exist regarding personal watercraft. Vaske et al. (1995) identifies what is termed "interpersonal conflict" between different recreation types, which results from objections to certain activities due to personal values rather than the direct observation of those activities. PWCs are the subject of so much controversy that it is possible that they may generate similar levels of interpersonal conflict. A series of questions soliciting the opinions of respondents regarding the banning of PWCs is used to determine whether they object or do not object to PWCs, and the reasons behind their opinions.

Secondly, this study investigates the distances from PWCs required for people to feel comfortable as they engage in various recreation activities. Respondents are asked to indicate the closest distance they prefer between themselves and various recreation types.

Hopefully, the results of this study will provide insights about the parameters of recreation conflict associated with PWCs. Since conflict is essentially the negative *opinions* of an individual about the presence or actions of another individual or group, the term becomes difficult to quantify. However, the opinions held by individuals affect their decisions about how and where they spend their time and money, and those decisions are of importance to providers of goods and services. Identifying levels of perceived conflict and characteristics of conflict-sensitive recreation types may help recreation resource managers reduce conflict through resource planning and management.

Study Area

Lake Carl Blackwell (LCB) is located seven miles west of Stillwater, Oklahoma, in Payne County (Fig. 1-1). It is accessible via State Highway 51 from Stillwater, U.S. 177, and U.S. 412 (the Cimarron Turnpike) from the east and Interstate 35 from the west. From Highway 51, State Highway 51C leads to the most developed portion of the Lake, approximately one mile from the dam at the Lake's east end. State Highway 86 leads from Highway 51 to the west end of the Lake, and provides access to persons traveling from Perry, Oklahoma, located 10 miles due north on Highway 86 (Howick, Wilhm, Toetz, and Burks 1982; "The roads of Oklahoma" 1997; Cross 1998).

LCB was created in 1938 as part of a federal government land utilization project. Stillwater Creek, a third-order intermittent stream that flows east-southeast into the Cimarron River, was dammed to create LCB. The federal government leased the LCB area to Oklahoma State University (OSU) in 1947 for 99 years. In 1954, the area was deeded to OSU for $1.00 with the stipulation that it be maintained as a recreation area (Cross 1998). In addition to recreation, the Lake has provided flood control and, after 1950, water for OSU and Stillwater (Cross 1998; Howick, Wilhm, Toetz, and Burks 1982). Until the 1980s, when Stillwater began receiving water from Kaw Reservoir, water sales supplied 30 percent of the Lake's revenue. The recent construction of a golf course near LCB may help to increase income from water sales. Because it receives no tax monies, LCB relies on income from water sales and use permits to fund

personnel and facilities. Federal grants provide funds for special projects such as road paving (Cross 1998). Table 1-1 lists some statistics about LCB.

Table 1-1

Lake Carl Blackwell Statistics

Length (exclusive of arms)	5 miles
Width (exclusive of arms)	0.87 miles
Shoreline	53 miles
Average depth	17 feet
Deepest point (at spillway)	48 feet
Total area of land and water	22,155 acres
Area available for public recreational use: (excluding hunting, hiking and backpacking)	
Campground area	295 acres
Cabin area	20 acres
Archery range area	95 acres
Spillway area	90 acres

(Cross 1998)

The Headquarters area is located at the north end of Highway 51C and is the most developed area at LCB. This development includes the lake manager's office, the park store, 18 rental cabins, camping and picnic grounds, boat ramps, designated swimming areas, and a softball field. An archery area located southeast of the Highway 51C bridge is maintained by the North Central Oklahoma Bowman's Association (NCOBA) and is open to public use. Horseback riding trails are available to those with their own animals. The recreation activities available at LCB also include fishing, sailing, water-skiing,

PWC use, hiking, backpacking, and hunting (Howick, Wilhm, Toetz, and Burks 1982; Cross 1998).

Security during the summer recreation season consists of three to four OSU police officers reassigned to lake duty. These officers have special training in water rescue and watercraft operation (Altman 2001). Patrol personnel have the use of two PWCs and a cruising boat for patrolling the 3,000 plus acres of Lake surface waters. Ignorance of the basic rules of watercraft operation is a common problem at the Lake. The smallest fine is $90 for operating equipment without proper gear. The largest is $280 for creating a wake in a no-wake zone (Collins 1998). See Appendix B for LCB rules and regulations.

According to Altman (2001) conflict regarding PWCs is a "significant" problem, especially with fishermen, water-skiers, swimmers, and campers. The Lake Patrol tries to minimize problems by patrolling on land and water, observing visitors for law violations and unsafe behaviors. Sometimes they use plainclothes officers on PWCs to catch the PWC operators that obey the rules when in the presence of an officer but disobey them once they are out of sight. Once a problem is detected the officers can issue a citation, impose a fine, or ban the individual from the lake for a specified time determined on a case-by-case basis.

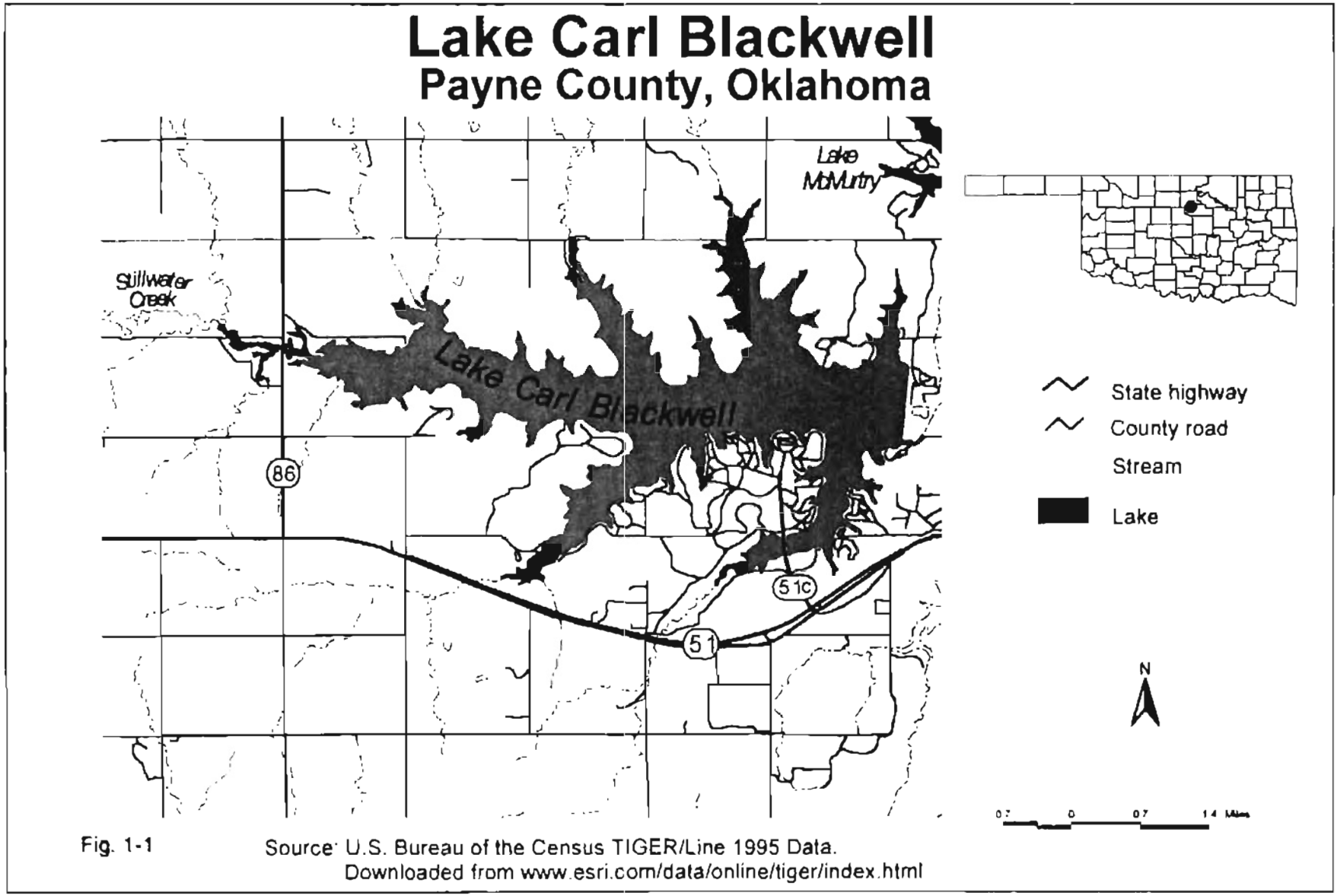


Fig. 1-1 Source: U.S. Bureau of the Census TIGER/Line 1995 Data.
Downloaded from www.esri.com/data/online/tiger/index.html

CHAPTER II

LITERATURE REVIEW

Personal Watercraft

Despite their popularity and the controversy surrounding them, PWCs have not been the subject of serious research. One important issue is that PWCs are relative newcomers to the recreation scene. The first PWC, Kawasaki's Jet Ski, was introduced in 1974. The Jet Ski operated in a standing position, very much like traditional water-skiing, and required practice to achieve the skill and balance necessary for successful operation. The Jet Ski remained the industry leader until Yamaha introduced the WaveRunner in 1986. The WaveRunner was easier to ride since it allowed the operator and passengers to ride in a seated position (Youngs 1993).

After the introduction of the more user-friendly WaveRunner, the popularity of PWCs increased dramatically. PWCs number over 1.3 million and approximately 200,000 are sold annually (U.S. Department of Interior, 1998b). Currently the fastest growing segment of recreational boat sales (Morgan 1997; McMurry 1998; Smallwood 1998), their popularity is the result of several factors. For example, they are less expensive than boats, relatively simple to operate, easy to tow, simple to store, and capable of speeds up to 70 mph. However, ease of owning and operating a PWC means that they attract many young and inexperienced operators (Smallwood 1998). According to recreation experts, operators who are young, inexperienced or sometimes careless can endanger

people and property (Dankert 1996; Cook 1997; Smallwood 1998). Risky types of behavior include wake jumping, attempting to splash other craft or individuals, playing tag or "chicken," and speeding in no-wake zones. PWC users have even been observed using swimmers as pylons for races (Gibbs 1989; Holland, Pybas, and Sanders 1992; "Jet Ski etiquette" 1996). The popularity of "splashing," where PWC operators rush at something such as a boat, a dock, or swimmers, then turn sharply and send a wave splashing over the object or person, results in accidents. In some cases operators lose control and collide with what they are trying to splash resulting in serious injury or death for either the PWC riders or their targets (Gibbs 1989; Holland, Pybas, and Sanders 1992; "Jet Ski etiquette" 1996; Smallwood 1998).

The operation of PWCs in dangerous situations is different compared to other vehicles, aggravating problems caused by risky behavior. Most vehicles require the operator to slow down to avoid collisions. With PWCs the operator must accelerate to avoid accidents because PWCs lose maneuverability when they slow down since the jet propulsion also provides the steering mechanism (Dankert 1997; McMurray 1998). Therefore, PWCs require more concentration on the part of the inexperienced user to avoid potential hazards (Smallwood 1998).

Inexperience and risky behavior result in a disproportionate number of accidents that involve PWCs. For example, in Alabama, PWCs represent 6% of the total number of water craft, but were involved in 40% of the injuries that occurred on waterways in 1997 (Smallwood 1998). U.S. Coast Guard statistics

for 1996 show that PWCs represented 36% of the total number of water vessels involved in the record 8,026 recreational boating accidents reported that year (McMurry 1998; Smallwood 1998). Many states that track PWC accidents report similar statistics (Cook 1996; "Growing Jet Ski threat" 1998).

In a study of PWC-related injuries treated in hospital emergency departments (EDs), Branche, Conn, and Annest (1997) use data from the National Electronic Injury Surveillance System (NEISS), a system designed by the Consumer Product Safety Commission to obtain information about product-related injuries. PWCs were added to the list of products in 1989. According to the study, PWC-related injuries increased from approximately 2,860 in 1990 to over 12,000 in 1995. Injuries from PWC use treated in EDs were 8.5 times higher across this time period than ED-treated injuries from motorboat use. On the other hand, higher proportions of the motorboat injuries were hospitalized (15.4%) compared to PWC injuries (3.5%). Lacerations were the most common type of injury reported (30.8%), followed by contusions (25.4%), strain/sprains (18.7%), and fractures (12.4%).

In addition to the accidents involving PWCs, controversy exists regarding nuisance and ecological hazard complaints. The behaviors that often cause accidents may be problematic even when they do not result in an accident. Among the greatest nuisance complaints is noise (Gibbs 1989; Holland, Pybas, and Sanders 1992; Taylor 1992; Alger 1996; "Jet Ski etiquette" 1996; Morgan 1997; "Growing Jet Ski threat" 1998; "U.S. National Park Service proposes Jet Ski ban" 1998). The sound produced by PWC motors is compared to chainsaws

("Citizen citations for watercraft violations" 1998), lawnmowers, or motorcycles (Holland, Pybas, and Sanders 1992). Becoming airborne while jumping wakes increases the noise level and with constant changes in acceleration the noise becomes even more annoying (Jacobs 1998). PWCs generate complaints when operated for extended periods of time near picnic areas, camping sites, and shoreline residences. In addition, PWCs are perceived to have "invaded" areas once considered peaceful and relaxing by other water users (Gibbs 1989; Holland, Pybas, and Sanders 1992; Alger 1996).

PWCs' two-stroke engines require an oil and gasoline mixture for fuel. Up to a third of this fuel mix passes unburned into the water and air (Morgan 1997; McCartney 1998). Research at Michigan State University shows that the fuel pollution damages plankton necessary to aquatic life. Because the pollution's toxicity is increased 50,000 times by ultraviolet light, a typical PWC operated for one hour produces smog-generating pollutants equivalent to a car driven 800 miles (Whiteman 1997). Such pollution is a major concern to governments and environmental groups. Laws have been enacted and proposed that would reduce this pollution. Solutions include restricting in-water refueling, zoning, and banning two-stroke engines in some waterways (Morgan 1997; Gorant 1998; "Growing Jet Ski threat" 1998; McCartney 1998). Manufacturers are addressing some of the pollution concerns with new engines that reduce hydrocarbon emissions by over 70% (Gorant 1998).

Pollution endangers wildlife, but it is not the only threat to wildlife posed by PWCs. A high degree of maneuverability and ability to operate in shallow water

allows PWCs to enter shallow coves and inlets that must be avoided by most other boaters. Doing so often disturbs marine mammals, fish, and birds. There are reports of birds being frightened from their nests by PWCs, leaving eggs vulnerable to predation (Morgan 1997; Burger 1998). Biologists in California report seal pups being separated from seal herds as a result of PWC activity. Hawaii has restricted PWCs to protect humpback whales that visit the island waters to spawn. In Florida, manatees have been struck by PWCs (Morgan 1997). Marine life, particularly manatees, dolphins and whales are more vulnerable to collisions with PWCs because PWCs lack a propeller, making them quieter underwater compared to other watercraft (Whiteman 1997). The most disturbing danger may be irresponsible operators who have been observed chasing water birds or harassing marine animals (Skorupa, 1989; Morgan 1997; Whiteman 1997).

Due to concerns for public health and safety, PWCs have been restricted or banned in many state and locally managed waterways (Gibbs 1989; Skorupa 1989; Holland, Pybas, and Sanders 1992; Alger 1996; Morgan 1997; Hodges 1998; McCartney 1998; Smallwood 1998). In 1998, the National Park Service (NPS) announced rules for managing PWC use within the boundaries of NPS sites. There are two methods of authorizing PWC use set forth in the proposed rule. The first is locally-based where the decision to allow PWC use is not considered to change the use patterns of the area, degrade area resources, materially alter resource management objectives, or produce controversy. Acknowledging that PWC use is an appropriate activity in some areas based on

the NPS units' enabling legislation, the NPS named eleven National Recreation Areas and two National Seashores where PWC use could continue through locally-based decision-making, although continuance was not mandatory. The second method of authorizing PWC use is through Federal Register unit-specific rulemaking, when the above conditions are not met. In such instances, the proposed rule provides for a two-year evaluation process to allow for public input during which time PWC use may or may not be banned at the discretion of the superintendent. At two National Recreation Areas, seven National Seashores and three National Lakeshores, PWC use could continue while the two-year evaluation is conducted. PWC use occurs at these areas, though the appropriateness of their use is less clear-cut. Appendix D provides a list of these units. PWC use would be banned at all other NPS units (U.S. Department of Interior 1998a; U.S. Department of Interior 1998b).

The Personal Watercraft Industry Association (PWIA) drafted a Model Personal Watercraft Operations Act in an attempt to stave off more PWC bans. PWIA seeks to encourage states to adopt the restrictions set forth in the model act instead of banning PWC use. The National Association of State Boating Law Administrators formulated similar draft legislation (National Transportation Safety Board 1998). Appendix C shows the text of these two model acts.

When operated responsibly, personal watercraft can be an enjoyable and safe form of water recreation (Cook 1997). PWCs also have practical uses in wildlife management, recreation, and law enforcement. For example, lifeguards use them to reach distant areas quickly. Because they do not have a propeller,

PWCs provide a safe form of transportation for rangers and game wardens of state and national parks to gain access to backwater areas in a way that minimizes disturbances (Holland, Pybas, and Sanders 1992). Alabama began using unmarked PWCs in 1996 to patrol for unsafe operators and illegal activities (Smallwood 1998). The Lake Carl Blackwell patrol uses two Kawasaki 1100 PWCs for plain-clothes patrols. They are also useful in towing stranded boats to shore and in contacting boaters on the lake (Collins 1998, Altman 2001).

A majority of literature describing PWCs focuses on reviews of features and new PWC models. Many of these articles present a negative viewpoint towards laws regulating PWC use, due mainly to the fact that the authors are PWC enthusiasts (Skorupa 1989; Taylor 1992). In most cases, even these enthusiasts acknowledge that considerable controversy exists regarding personal watercraft.

Recreation Conflict

Participation in leisure and recreation activities has increased dramatically in the United States during the twentieth century. Changes in work patterns such as the 40-hour workweek and paid vacation now provide the average American with more leisure time than was common at the beginning of the century. Improvements in transportation now allow people to travel farther for recreation and advancements in recreation equipment allow them to participate in recreation activities that at one time were open only to the wealthy or very hardy. Managers of recreation areas are committed to providing recreation opportunities for a multitude of diverse persons while sustaining the resource. However, many

managers have become concerned that rising use levels will cause degradation to the resource and negatively affect the recreation experience of all users.

Most of the research on recreation focuses on information needed by managers to provide the best recreation experience possible while minimizing impacts. Perceptions of conflict and satisfaction are a major part of this research. Jacob and Schreyer (1980) call for the study of cause in conflict research. They identify four major factors in recreation conflict: 1) activity style, or the feelings the individual has for the recreation activity process; 2) resource specificity, or how important the recreation resource is to the individual; 3) mode of experience, or how intensely the individual focuses on the environment; and 4) lifestyle tolerance, or the acceptance or rejection of differing lifestyles.

Nielsen, Shelby, and Haas (1977) discuss tolerance of others in their theory of the "Last Settler Syndrome." They state that persons who visit a particular area or participate in an activity will base their tolerance for crowding on the levels of use during their first visit or participation. Persons whose first participation was at a higher use level will have more tolerance for crowding than those whose first experience happened at lower use levels. With rising recreation use levels, people who have been participating for a shorter time period should be more tolerant of crowding that those who have been participating for a longer time period.

Schreyer, Lime, and Williams' (1984) national survey of river recreationists supports this theory. They find that higher levels of perceived conflict are reported by people with more experience in river recreation. Ditton, Fedler, and Graefe (1983) also support these findings in their study of floaters on the Buffalo River in Arkansas.

Absher and Lee (1981) disagree with the theory of the "Last Settler Syndrome." They state that recreation experience levels are negatively

correlated to the perception of crowding in backcountry settings. The main thrust of their findings is that use levels alone cannot be employed to determine the amount of crowding perceived by recreationists and, therefore, their satisfaction levels. Instead, perceptions of crowding are more closely correlated to visitor's motives. For example, there is a positive correlation between crowding and desire for quiet and a negative correlation between crowding and involvement with nature and sharing experiences. Variables relating to visitors' characteristics, such as age, sex, and education, are also more highly correlated to crowding perceptions than use levels.

Conflict research is often conducted in wilderness areas. For example, Absher and Lee (1981) survey backcountry visitors to Yosemite National Park; Blahna, Smith, and Anderson (1995) study backcountry visitors to evaluate the acceptability of llama packing; and Watson, Niccolucci, and Williams (1994) study hikers and stock users in the John Muir Wilderness. Considerable research focuses on conflict between user types who share the same recreation resource, such as hikers versus pack animal users; for example, conflict among llama packers, horse packers and hikers (Blahna, Smith, and Anderson 1995), and conflict between hikers and stock users (Watson, Niccolucci, and William 1994). Other incompatible user types are mechanical versus nonmechanical recreation; for example, helicopter skiers versus nonmotorized skiers (Gibbons and Ruddell 1995), motorboats versus canoes (Ivy, Stewart, and Lue 1992), snowmobiles versus skiers (Knopp and Tyger 1973), and hikers versus mountain bikers (Ramthun 1995).

The majority of research suggests that conflict perceived by recreationists is low. Conflict that is perceived may be due to incompatibility between the recreation modes of different users in the same location. Vaske, et al. (1995) distinguish interpersonal conflict versus social-values conflict among hunters and

non-hunters at Mt. Evans, Colorado. They find that the terrain minimizes interpersonal conflict. However, some people perceive conflict because of differences in their social values with regard to hunting.

Ramthun (1995) studies conflict between mountain bikers and hikers on the Big Water trail system in Millcreek Canyon, near Salt Lake City, Utah. He finds that conflict is asymmetrical, or one-way in that hikers perceive more conflict with mountain bikers than mountain bikers perceive with hikers. Ramthun also finds that perception of conflict is tied to the recreationist's sensitivity to interference. Sensitivity to interference is influenced by frequency of participation, years of experience, amount of personal identification with the activity, and perception of persons in other activity groups.

Blahna, Smith, and Anderson (1995) study perceptions of conflict and appropriateness to the use of llamas in backcountry trekking. They find little conflict between llama users and horseback riders or hikers. Most of the perceived conflict is due to unfamiliarity with llamas. They determine that more education in the use of llamas would reduce the perception of conflict.

Berl and Chilman (1981) study conflict between different types of rock climbers at Giant City State Park, Illinois. Again, very little conflict is perceived and conflict that is perceived to exist could be tied to different methods of rock climbing. However, some conflict is perceived due to the unsafe behavior of some participants, for example, drinking, tossing objects from the top of the cliffs, and dangerous climbing techniques.

Ruddell and Gramann (1994) investigate conflict associated with the behavior of visitors to Padre Island National Seashore in Texas. Their research is based on the theory that satisfaction in recreation participation is a result of meeting recreation goals. Conflict associated with loud radios is examined in terms of goal interference. They find that the type of recreation experience

desired by a person greatly influences their vulnerability to noise conflict. For example, people looking for solitude or quiet interaction with friends perceive conflict more often than those desiring a more social experience. They also discuss social norms of behavior, defined as the types of behavior expected of recreationists by the majority of recreation users. People whose personal norms differ from that of the social norm are more likely to either cause or perceive conflict.

Goal interference is the subject of Gibbons and Ruddell's (1995) study of helicopter skiing in the Wasatch Mountains. Helicopter skiing is the accessing of backcountry skiing areas via helicopter. In general, nonmotorized backcountry skiers are found to perceive more conflict with helicopter skiers than helicopter skiers do with nonmotorized skiers. Helicopter skiers report higher levels of conflict in regard to discourteous behaviors.

Gramann and Burdge (1981) test the goal interference model as a cause of recreation conflict between fishermen and water skiers at Lake Shelbyville, Illinois. The test shows only weak support for the model. However, they do acknowledge that the conflict indicator they use, "reckless boating," might not be sufficient to determine goal interference within the complex causes of water skier/boater conflict.

River recreation is the focus of Anderson and Foster's (1985) research on the effects of environmental change on visitor use. They study visitor response to perceived river environment changes associated with the Ozark National Scenic Riverways in southeastern Missouri. Reported changes include increased use, natural river course changes, amount of litter, and types of watercraft. Visitors report various responses to the perceived changes in the river. Some change their use times or use areas to avoid crowds, and some their behavior or activity.

Very little research on conflict specific to lake recreation exists. Gramann and Burdge's (1981) study on conflict among water skiers and fishermen mentioned previously is one. In another such study, Parker (1981) investigates the perception of conflict between boat fishermen and water skiers at Lake Arbuckle, Oklahoma. His findings suggest that neither group perceives much conflict. However, the boat fishermen perceive more conflict than do the water skiers.

A final note is the response of recreationists to perceived conflict. Schneider and Hammitt (1995) note that recreationists may respond to conflict in one of three ways. The first of these is through a product shift in which they change their attitude toward the activity. Another is displacement, which is the most problematic from a researcher's point of view. In displacement, persons move to different recreation areas or stop participating in particular activities when the recreation experience ceases to give them satisfaction. This is a problem for researchers because it is difficult to identify and study these persons through traditional survey methods. The last method is rationalization of the experience to turn it to a positive experience no matter what the conditions. In other words, people are determined to have a good time and therefore ignore or rationalize experiences that interfere with their goal. This method seems to only be used when considerable expense and effort has gone into the recreation experience. To help understand these coping strategies, the authors developed a model to study visitor response to conflict.

Summary

While most of the recreation conflict research does not address water recreation specifically, it is still useful because of the insights provided into

people's recreation motivations and perceptions. It is very likely that research in water recreation would show similar results to the studies reviewed here. This does not mean that more research is not needed. Technological developments introduce choices into the mix of recreation uses. In addition, increases in population mean that increases in use are inevitable since the amount of recreation land is finite. Finally, what is not perceived as causing conflict today could become associated with conflict as recreation use pressures increase.

CHAPTER III

METHODOLOGY

The purpose of this study is to evaluate the perception of conflict among personal watercraft operators and other water recreationists. In particular, the analysis seeks to determine if there are significant levels of perceived conflict among boaters and personal watercraft operators at Lake Carl Blackwell.

Survey Method

A questionnaire was chosen as the best method of gathering data for the study as it provides standardized responses that are best for quantitative analysis. The drawback is that standardized questionnaires do not provide the motivation behind the answers that an interview method might provide.

Ross Willingham, manager of Lake Carl Blackwell, Stillwater, Oklahoma, granted permission to utilize the addresses of persons who obtained use permits for Lake Carl Blackwell during 1999. A sample of 500 persons was selected from the addresses supplied. The sample was determined by the first 500 names/addresses that could be read from the use permit carbon copies supplied by Mr. Willingham. While the sample was believed to be representative of LCB users, persons with poor handwriting or who did not press hard enough to register on the carbon were excluded with this method.

Survey instruments were distributed based on a modified technique as suggested by Dillman (1978). Each person was mailed a survey packet that

included a cover letter explaining the nature of the study, a questionnaire, and a self-addressed, stamped envelope for returning the completed questionnaire. To preserve the anonymity of the subjects, no identifying marks were used and respondents were advised not to place their name or address on the questionnaire. A follow-up mailing consisting of a postcard thank you/reminder was sent one to two weeks later. Appendix E provides a sample of the survey instrument.

Of the 500 surveys mailed, 45 were non-deliverable, 2 were returned without answers, and 163 were returned completed. This constitutes 33 percent of the original 500 questionnaires, or 36 percent of the 455 deliverable questionnaires. Questionnaires were numbered as they arrived for the purpose of tracking responses. Coded data were entered into a computer spreadsheet for statistical calculations.

Research Questions

The following hypotheses were tested:

H_{01}: Conflict is symmetrical. No statistically significant difference in perception of conflict exists among Boaters and PWC operators.

H_{A1}: Perceived conflict is asymmetrical. Boaters have a statistically higher level of perceived conflict towards PWC operators, than PWC operators do with Boaters.

H_{02}: No statistically significant difference in perception of conflict exists among people with more experience in water recreation (10 or more times participating in activity) and people with less experience in water recreation (less than 10 times).

H_{A2}: People with more experience in water recreation and people with less experience in water recreation have statistically significant different levels of perceived conflict.

H_{03}: No statistically significant difference in perception of conflict exists among long-term users of a recreation site (five or more times) and short-term or first time users of the site (less than 5 times).

H_{A3}: Long term-users of a recreation site have a statistically higher level of perceived conflict compared to short-term or first time users of the site.

H_{04}: No statistically significant difference in perception of conflict exists among local recreationists (persons living within 25 or fewer miles) and non-local recreationists (persons living 26 or more miles away).

H_{A4}: Local recreationists have a statistically higher level of perceived conflict compared to non-local recreationists.

H_{05}: No statistically significant difference in perception of conflict exists among recreationists from large urban areas (population $\geq$100,000) and recreationists from small urban or rural areas (population <100,000).

H_{A5}: Recreationists from large urban areas have a statistically lower level of perceived conflict compared to recreationists from small urban or rural areas.

H_{06}: There is no correlation between education level and perceived conflict.

H_{A6}: There is a positive correlation between education level and perceived conflict.

The tests of hypotheses H_{01} through H_{05} were done with The Chi-Square (X^2) Goodness-of-fit test for a proportional or unequal distribution, with the null hypothesis rejected at the α=0.05 level of significance (McGrew and Monroe 1993). Analysis procedures for hypotheses H_{01} through H_{05} were essentially the same. The survey contained questions designed to determine which of two or more categories the respondents fit depending on the hypothesis being addressing. For example, the first hypothesis compared perceived conflict among Boaters, PWC users, and Other recreationists. Question "A" asked the respondent to identify which water related activity they engage in most often.

Respondents were assigned to one of three categories based on the activity chosen. Persons selecting boat fishing (#2), motorboating (#4), waterskiing (#5), or sailing (#7) were assigned to the Boater category, coded 1 on the spreadsheet. Persons selecting riding personal watercraft (#6) were assigned to the PWC category, coded 2. Persons selecting bank fishing (#1) or swimming (#2) were assigned to the Other category, coded 3. Some respondents selected more than one activity. Of those some ranked their responses or indicated a preferred activity in some way that was used to determine their category. Those that did not indicate a preferred activity were assigned to categories based on the activities they selected. If riding personal watercraft was one of their choices they were assigned to the PWC category. If they selected any boater activity other than riding personal watercraft they were assigned to the Boater category, otherwise they were assigned to the Other category.

Additional questions on the survey were used to determine levels of perceived conflict. Question 'I' consisted of 10 parts, each naming a behavior many water recreationists find offensive (Gibbs 1989; Holland, Pybas, and Sanders 1992; "Jet Ski etiquette" 1996; Smallwood 1998). Respondents were asked if their enjoyment of Lake Carl Blackwell was interfered with by anyone exhibiting these behaviors. They were asked to indicate the degree of interference on a five-category Likert-type scale from None to Very Serious. The degree of interference was entered into the spreadsheet with 1=None, 2=Slight, 3=Moderate, 4=Serious, and 5=Very Serious. Then the number of respondents from each category that reported interferences at each level was totaled.

Returning to hypothesis H_{01} as an example, 28 Boaters, 13 PWC users, and 7 Others reported a Slight level of interference for the behavior **Speeding in no wake zones** (question I, part 1).

The next step was to apply the Chi-Square (X^2) Goodness-of-fit test for a proportional or unequal distribution to evaluate each behavior. The Chi-Square Goodness-of-fit test for a proportional or unequal distribution was used because levels of conflict perception were not equal and not expected to be equal across all categories. Furthermore, the Chi-Square test is appropriate for the nominal or ordinal level data collected by the survey. Chi-Square requires that if there are three or more categories no more than one fifth of the expected frequencies should be less than five and no expected frequency should be less than two (McGrew and Monroe 1993). Some of the interference level categories were collapsed to meet this minimum expected frequency count requirement. In the example used above, the Moderate, Serious and Very Serious categories were collapsed so that no expected frequency count would fall below 2. Each behavior was analyzed separately as the number of levels that needed to be collapsed varied with each behavior.

In a separate question respondents were given the same set of ten behaviors as was used earlier. They were asked to indicate which recreation activity they most associated with the behavior. In order to satisfy Chi-square requirements the activities were aggregated into None, Boater, and PWC. **Moving too slowly** was the only behavior that failed to meet Chi-square requirements when aggregated because expected frequency counts of the PWC

activity class were zero for all categories. Therefore, a Chi-square value was not calculated for this behavior.

Hypothesis H_{06} was analyzed using the Spearman's Rank Correlation (r_s) Analysis. Respondents indicated their education level in one of eight categories ranging from **8th grade or less** to **Graduate study**. Then a difference was calculated between the rank of their education category and the rank of their perceived conflict level for each part of question "I." The sum of the squares of the differences in rank were used to calculate the Spearman's rank correlation coefficient (r_s), which was then used to calculate the Z distribution to test for significance.

In addition to the hypotheses listed above, a descriptive analysis of two other issues was carried out. First, this study tried to determine if interpersonal conflict appears to exist regarding personal watercraft. Vaske et al. (1995) identified what was termed "interpersonal conflict" between different recreation types, which resulted from objections to certain activities due to personal values rather than the direct observation of those activities. PWCs have been the subject of so much controversy that it is possible that they may generate similar levels of interpersonal conflict. A series of questions soliciting the opinions of respondents regarding the banning of PWCs was used to determine whether they object to or do not object to PWCs, and the reasons behind their opinions. Persons who responded either positively or negatively regarding PWCs on all three questions were counted according to their recreation category of Boater,

PWC, or Other. Then the percentage of persons in each category who were favorable towards, against, or neutral towards PWCs was calculated.

Secondly, this study investigated the distances from PWCs required for people to feel comfortable as they engage in various recreation activities. Respondents were asked to indicate the closest distance they would prefer between themselves and various recreation types. The questionnaire contained four distance scales, one each for motorboat, water-skier, personal watercraft, and sailboat. The scales indicated distances ranging from 10 to 310 feet. Respondents circled the closest distance they felt comfortable having that type of craft come to them. The number of responses for each distance was counted and graphed on a duplicate of the scale. Then the mode, median, and mean were calculated and represented on the scale. When none of these calculations provided any meaningful information, an Analysis of Variance (ANOVA) was performed to determine if there was a statistically significant difference in the means of the four scales.

CHAPTER IV

FINDINGS

As noted in previous chapters, the purpose of this study is to determine if recreationists at Lake Carl Blackwell (LCB) with different socioeconomic and recreational user characteristics perceive conflict at different levels. Survey respondents are considered to perceive conflict if they report that persons exhibiting various behaviors, identified in the research literature as problematic, interfere with their enjoyment of LCB. Tests are performed on the data to determine if differences in conflict perception are statistically significant.

H_{01}: Boaters vs. PWC Operators

Hypothesis H_{01} compares conflict among Boaters and PWC operators. Levels of perceived conflict are measured for Boaters, PWC operators, and Others for 10 behaviors. Appendix F-1 contains the actual and expected counts for each recreation category by perceived conflict level. Appendix F-2 contains the collapsed categories and Chi-square calculations.

Chi-square (X^2) goodness-of-fit test compares actual frequency counts to expected frequency counts to determine if responses for each category are similar to the entire sample. The p-value is calculated from the Chi-square value and provides the probability of getting that test statistic if the null hypothesis of no difference is true. The lower the p-value the lower the probability that the null hypothesis is true. Thus a p-value close to 1 indicates that a high degree of trust

can be placed in the null hypothesis' validity, while a p-value approaching 0 indicates that little trust can be placed in the null hypothesis.

Wake jumping is the only behavior that shows a statistically significant difference in perception of conflict (Fig.4-1, part 1-7). Both the Boater (X^2=18.9519, p-value=0.0042) and Other (X^2=15.473, p-value=0.0172) categories have p-values which are significant to the α=0.05 level. The PWC category (X^2=12.3020) is close at p-value=0.0556. The Boater category has higher than expected frequency counts at the Moderate and Serious-Very Serious levels. Frequency counts at the None and Slight levels are lower than expected. In contrast, the PWC category shows higher than expected frequency counts at the None, Slight, and Moderate levels and lower than expected counts at the Serious-Very Serious level. The Other category shows higher than expected frequency counts at the None level and lower than expected counts at the Slight, Moderate, and Serious-Very Serious levels.

This indicates that boaters at LCB, as a group, perceive conflict in regard to wake jumping at higher levels than LCB users as a whole. Lower levels of perceived conflict in the PWC category correlate with wake jumping as a popular activity with PWC operators. This supports the findings of Holland, Pybas and Sanders (1992) and Smallwood (1998) that wake jumping is a controversial behavior popular with PWC operators but unpopular with other water recreationists. These findings are consistent with the knowledge that wake jumping is perceived as being more dangerous to persons moving on the water in or on watercraft than to persons engaged in swimming or bank fishing. Of

course, that is providing that all users are observing swimming, fishing and boating regulations.

None of the other behaviors show a statistically significant difference in conflict perception. The p-values are higher than 0.05 in all cases. Due to the high p-values for most of the behaviors, the null hypothesis is not rejected.

Comparing actual to expected frequency counts for the other behaviors provides some interesting information about perceived conflict among the different recreation types (Fig.4-1). For all behaviors, Boaters show lower than expected frequency counts at the None level. Boater frequency counts are higher than expected at the Slight level for the behavior **Speeding in no wake zones**. They are higher than expected at the higher conflict levels for all other behaviors. In contrast, PWC frequency counts are higher than expected at the None and lower conflict levels for all behaviors except **In-water refueling**. The Other category shows higher than expected frequency counts at the higher conflict levels for **Speeding in no wake zones**, **Making too much noise**, and **Splashing others**. For all other behaviors, Other frequency counts are higher than expected at the None and/or lower perceived conflict levels. This indicates that boaters at LCB perceive conflict at higher levels than PWC operators and others, though the difference in perception is not statistically significant. These findings support those of Berl and Chilman (1981), Parker (1981), Blahna, Smith, and Anderson (1995), Gibbons and Ruddell (1995), Ramthun (1995), and Vaske, et al. (1995) in that little conflict is perceived among groups involved in various

Fig. 4-1: Boater vs. PWC operators - actual and expected frequency counts.

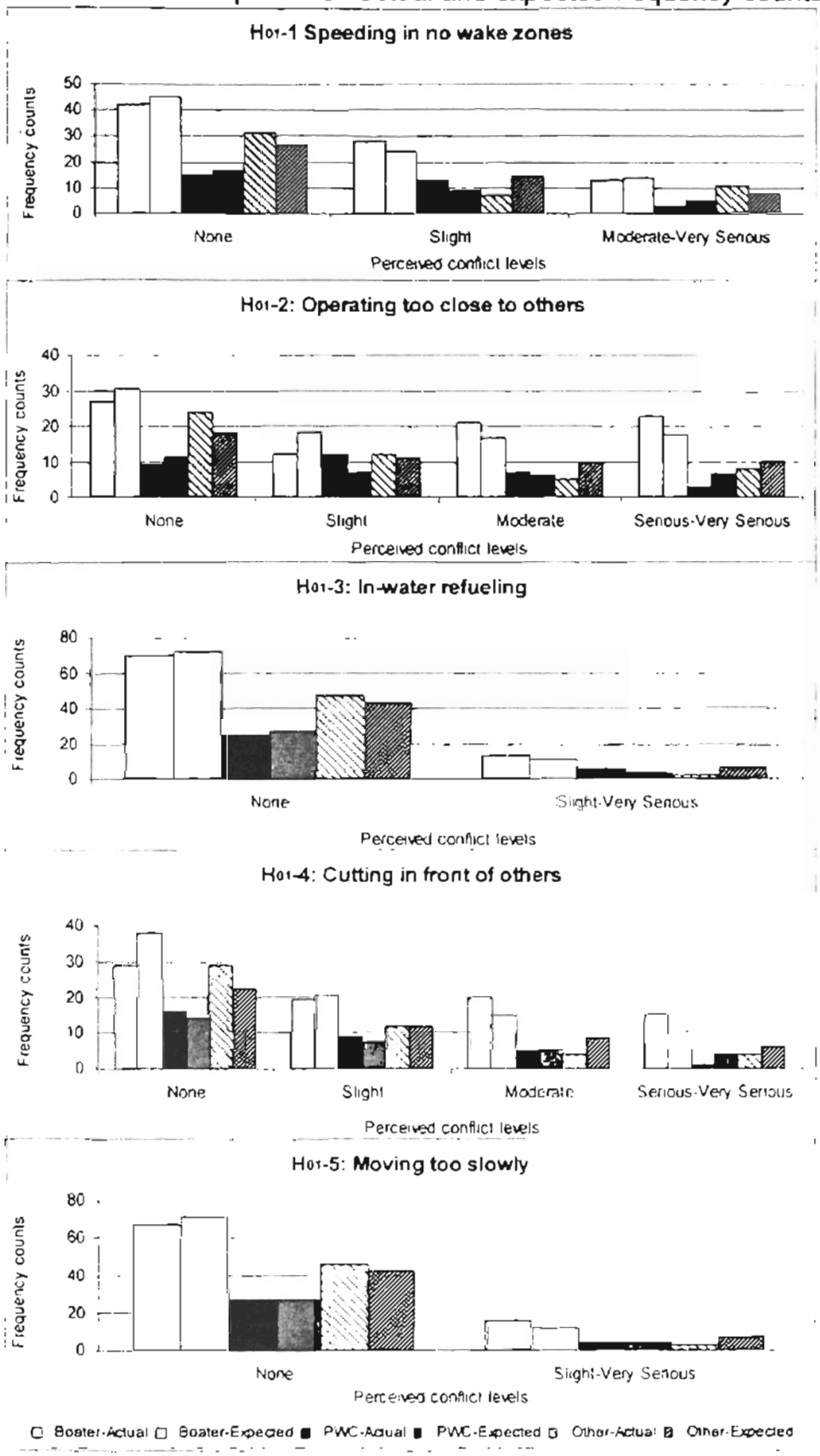
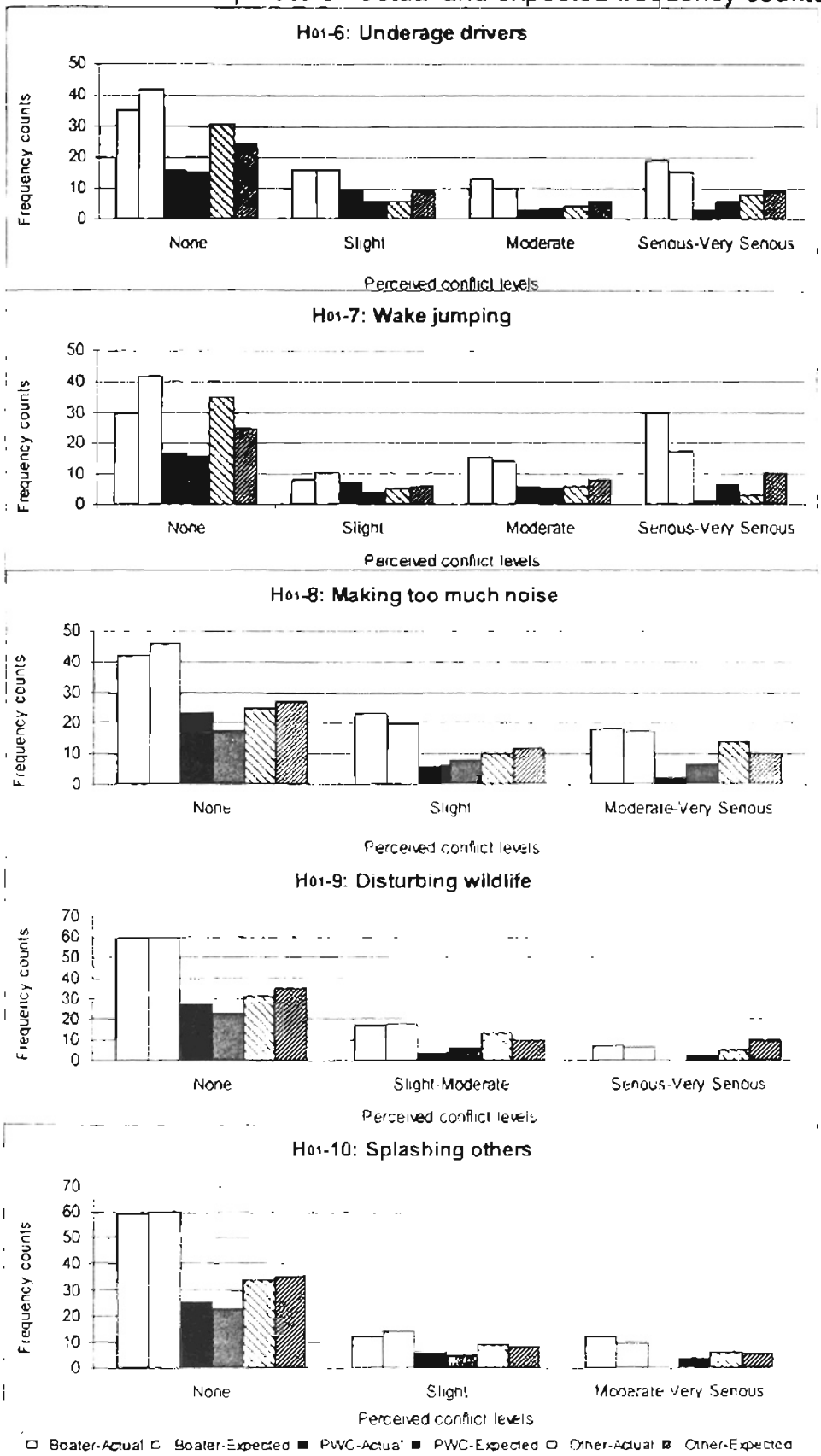


Fig. 4-1: Boater vs. PWC operators - actual and expected frequency counts. (cont.)



activities. What conflict is perceived tends to be asymmetrical, higher for one group than another.

Scrutinizing how the conflict levels collapse to satisfy Chi-square requirements indicates which behaviors cause the least and the most perceived conflict. **In-water refueling** and **Moving too slowly** collapse down to two levels: None and Slight-Very Serious. This indicates that Lake Carl Blackwell users perceive the least conflict with regard to these behaviors. The Moderate, Serious and Very Serious levels collapse into one for **Speeding in no wake zones**, **Making too much noise**, and **Splashing others**. This indicates slightly higher levels of perceived conflict among LCB users. Only the Serious and Very Serious levels collapse for the behaviors **Operating too close to others**, **Cutting in front of others**, **Underage drivers**, and **Wake jumping**. This indicates that LCB users perceive even higher levels of conflict with these behaviors.

Respondents are also asked to identify a recreation activity they most associated with each problem behavior. The purpose is to determine if PWCs are associated with the behavior at higher levels than other activity types. For the comparison between Boaters and PWC operators, the number of responses is calculated by category and recreation activity for each behavior. Some respondents indicated more than one recreation activity for each behavior so that total counts do not match those of the conflict level analysis. Appendix G-1 contains the actual and expected frequency counts. Appendix G-2 contains the collapsed categories and Chi-square calculations.

The PWC category has statistically significant differences in frequency counts for the behaviors **In-water refueling** (p-value=0.0467) and **Making too much noise** (p-value=0.0006). None of the other Chi-square calculations showed a statistical significance.

Comparisons of actual to expected frequency counts shows somewhat mixed results (Fig. 4-2). Boaters associate PWCs with the behaviors **Operating too close to others**, **Underage drivers**, **Making too much noise**, **Disturbing wildlife**, and **Splashing others** at higher the expected frequency counts. However, they associate boating with **Speeding in no wake zones**, **Cutting in front of others**, **Moving too slowly**, and **Underage drivers** at higher than expected counts. The PWC category is more one sided. PWC operators associate PWCs with only two behaviors at higher than expected frequencies: **In-water refueling** and **Wake jumping**. They associate boating with all other behaviors at higher than expected counts. This indicates that PWC operators at LCB are more likely to consider Boaters as causing problems than Boaters are to consider PWC operators as causing problems. This supports the findings of previous research in that conflict perception is asymmetrical (Berl and Chilman 1981; Parker 1981; Blahna, Smith, and Anderson 1995; Gibbons and Ruddell 1995; Ramthun 1995; Vaske, et al. 1995). It does not, however, support the null hypothesis that boaters will perceive more conflict in regard to PWCs.

Fig. 4-2: Association of behaviors to activity types - actual and expected frequencies.

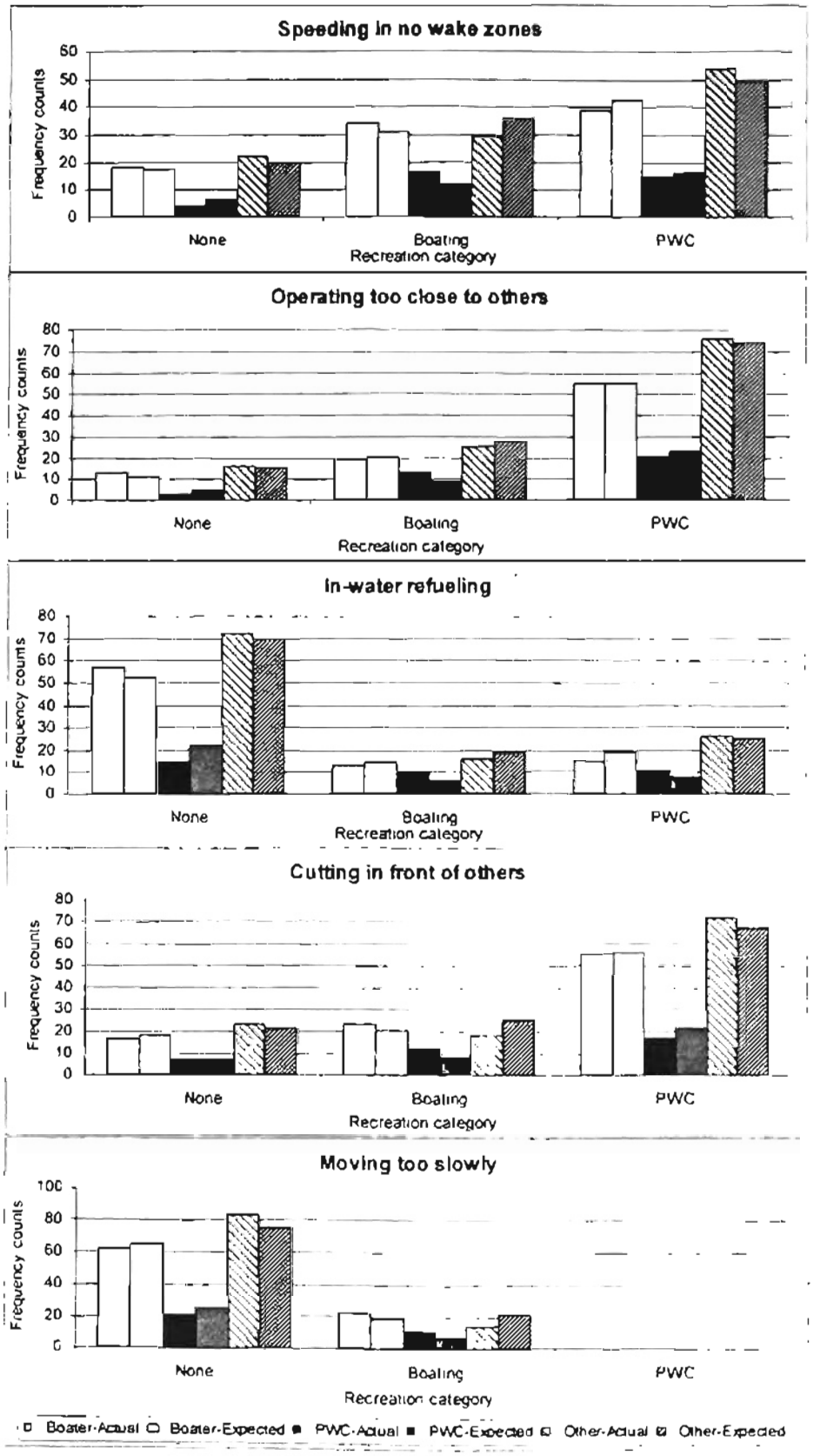
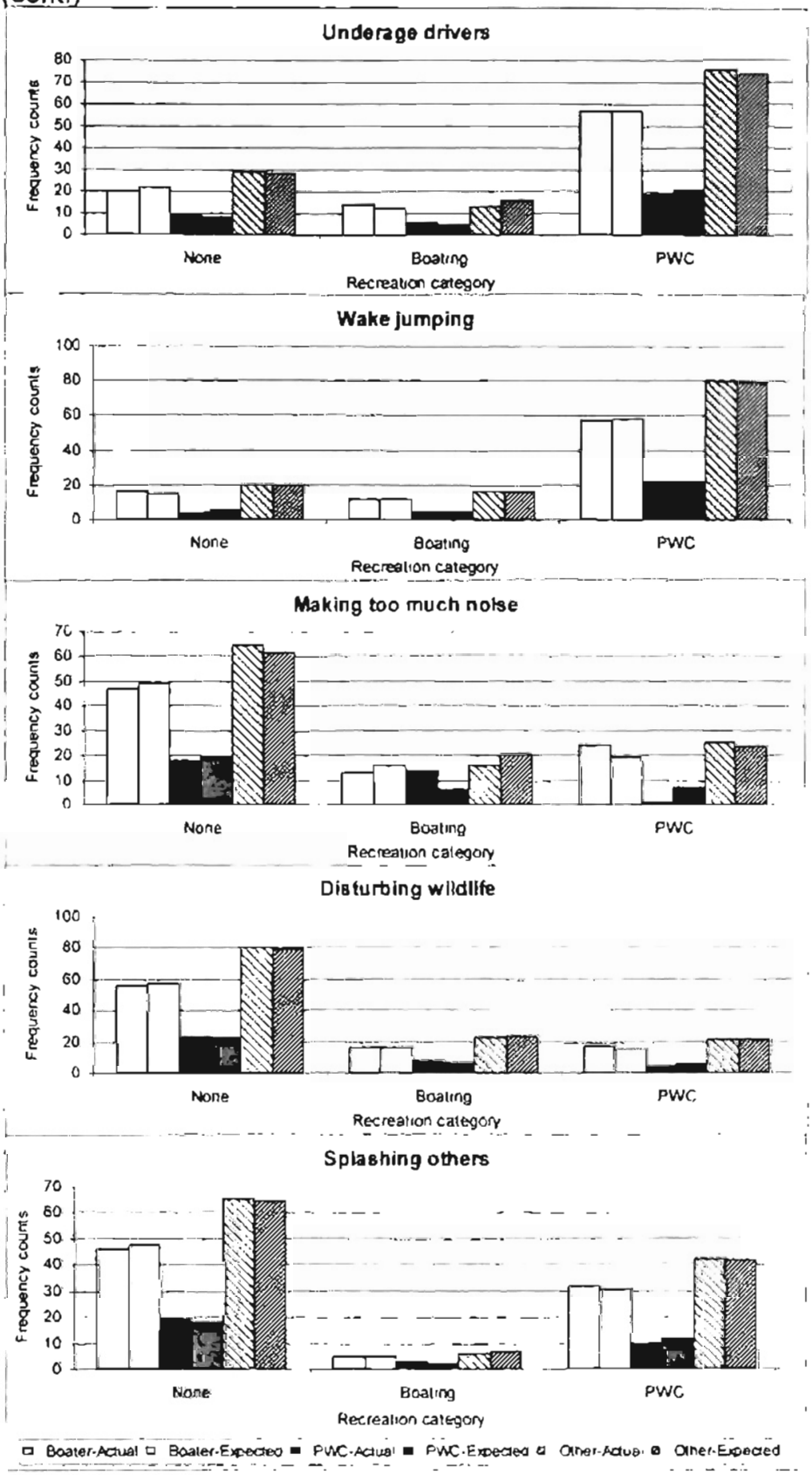


Fig. 4-2: Association of behaviors to activity types - actual and expected frequencies. (cont.)



H_{02}: More Experience vs. Less Experience

Hypothesis H_{02} compares conflict levels between users with different amounts of experience in water recreation. For the purposes of this study persons who have participated in an activity less than 10 times are considered Less experienced, while persons who have participated in an activity ten or more times are considered More experienced. Appendix H-1 contains the actual and expected counts for each recreation category by perceived conflict level. Appendix H-2 contains the collapsed categories and Chi-square calculations. Neither category show significant differences in perceived conflict for any of the behaviors investigated. Because all p-values are higher than 0.05 the null hypothesis should not be rejected.

Comparing the actual frequency counts to the expected frequency counts indicates that persons with More experience perceive more conflict than persons with Less experience, though not at levels statistically significant enough to reject the null hypothesis (Fig. 4-3). In nine of ten behavior comparisons, persons with Less experience show higher than expected frequency counts at levels ranging from None to Slight-Moderate, while those with More experience show higher than expected frequency counts at higher levels of perceived conflict. Those ranged from Slight-Very Serious to Serious-Very Serious depending on how the levels are collapsed to satisfy Chi-square requirements. **Operating too close to others** is the only behavior in which More experienced users show higher than expected frequency counts at the None level and Less experienced users show

Fig. 4-3: Less experience vs. More experienced - actual and expected frequency counts

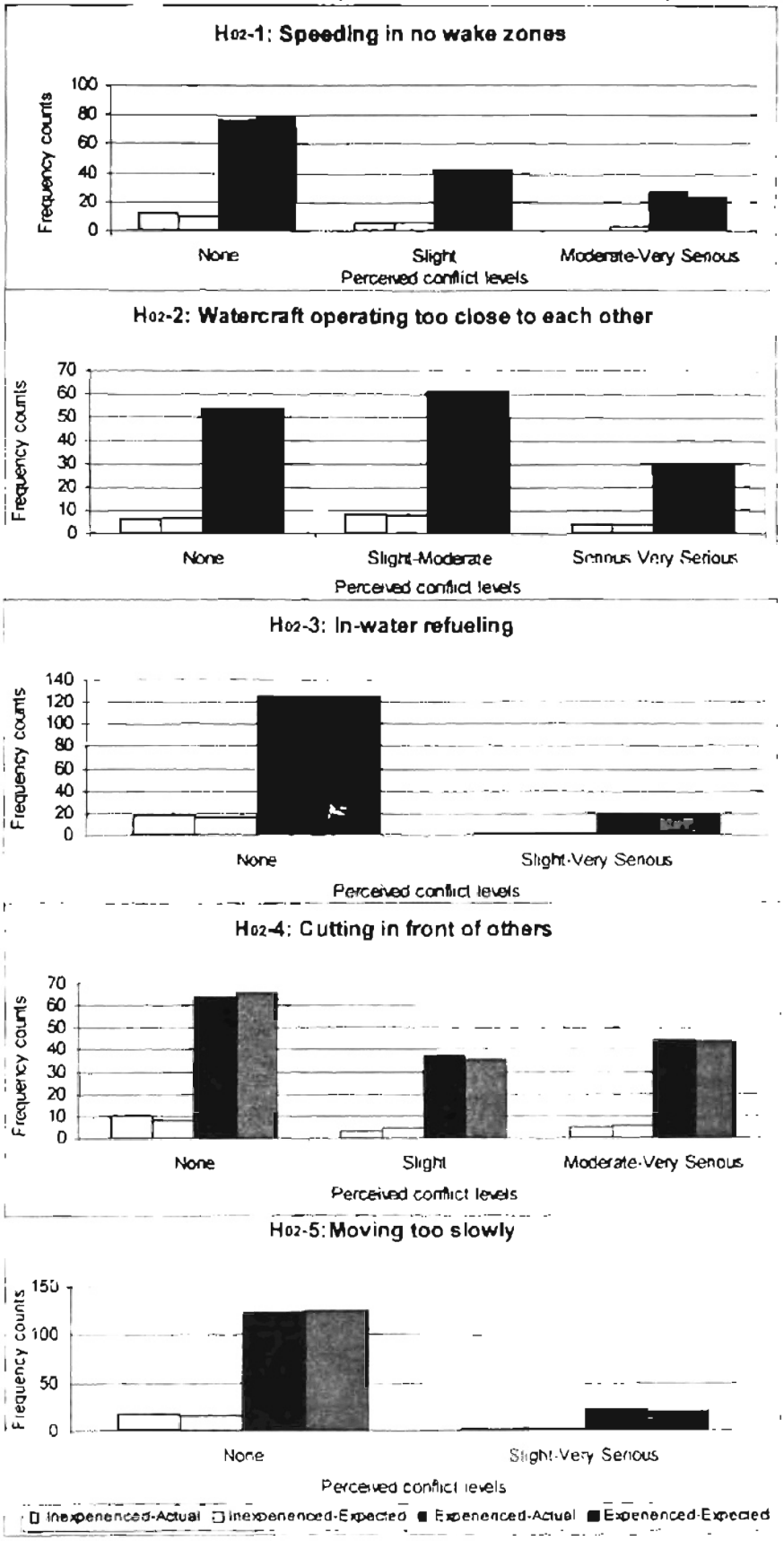
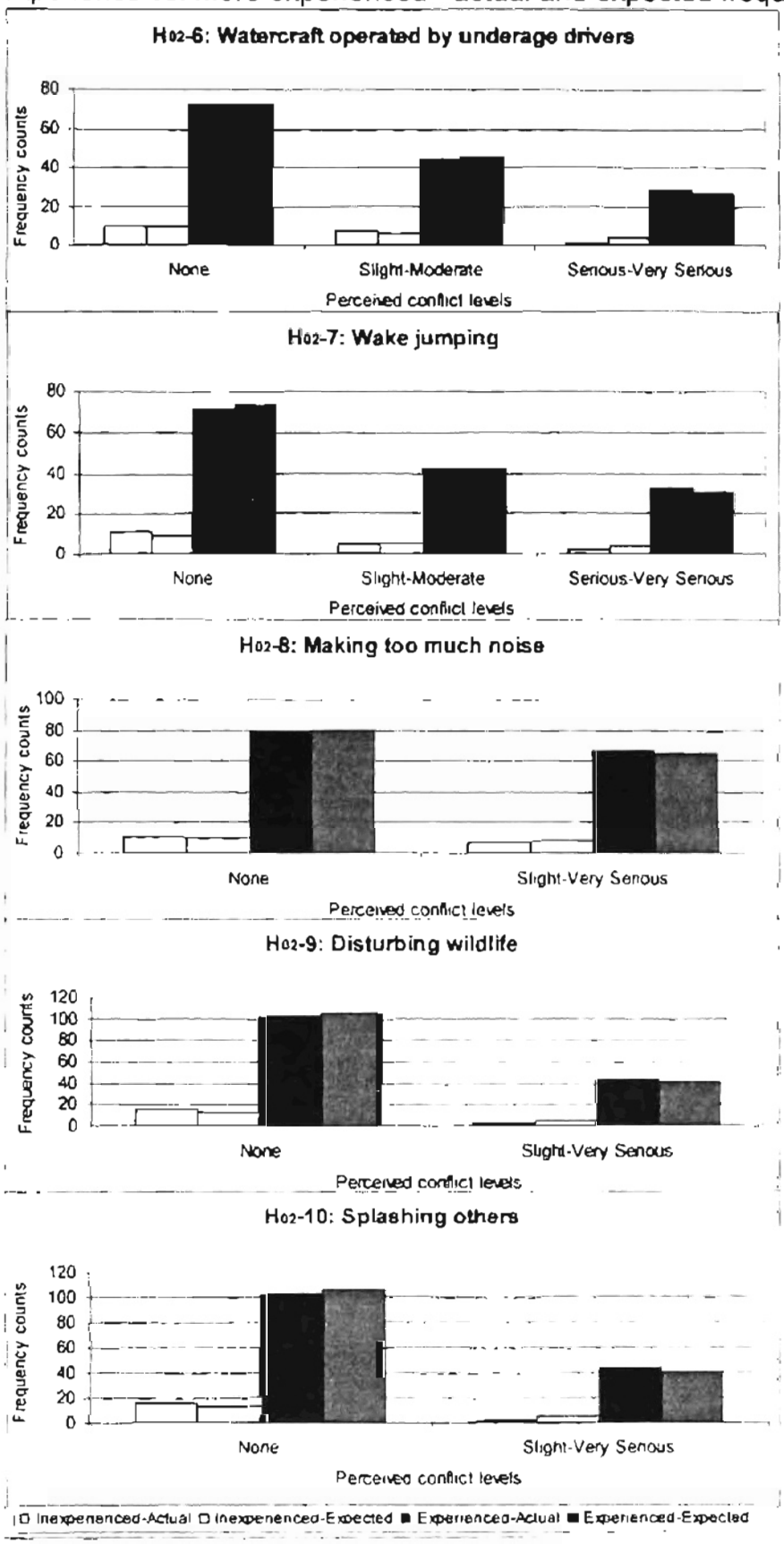


Fig. 4-3: Less experience vs. More experienced - actual and expected frequency counts. (cont.)



higher than expected counts at the Slight-Moderate and Serious-Very Serious levels.

Past research shows conflicting findings as to whether persons with more experience or those with less experience are more likely to perceive conflict. The findings of this study appear to be more consistent with those of Ditton, Fedler, and Graefe (1983) and Schreyer, Lime, and Williams (1984) as opposed to those of Absher and Lee (1981). The more experienced recreationist is probably less tolerant of dangerous behaviors because of a better knowledge of the regulations and courtesies of water recreation and the consequences of disobeying rules.

H_{03}: Long-time Site Users vs. Short-time Site Users

Hypothesis H_{03} compares perceived conflict levels between persons who are Long-time users of LCB, defined as five or more visits, and persons who are Short- or first-time users, defined as less than five visits. Appendix I-1 contains the actual and expected counts for each recreation category by perceived conflict level. Appendix I-2 contains the collapsed categories and Chi-square calculations.

The Chi-square calculations show a statistically significant difference in perceived conflict between the two groups for the behavior of **Cutting in front of others**. Chi-square and p-values for Short-time users are 10.6190 and 0.0140, respectively. For Long-time users they are 2.3953 and 0.4945, respectively. **Splashing others** also shows statistical significance with X^2=4.6536 and p-value=0.0310 (Short-time) versus X^2=1.0497 and p-value=0.3056 (Long-time).

Fig. 4-4: Long-term vs. Short-term users - actual and expected frequency counts.

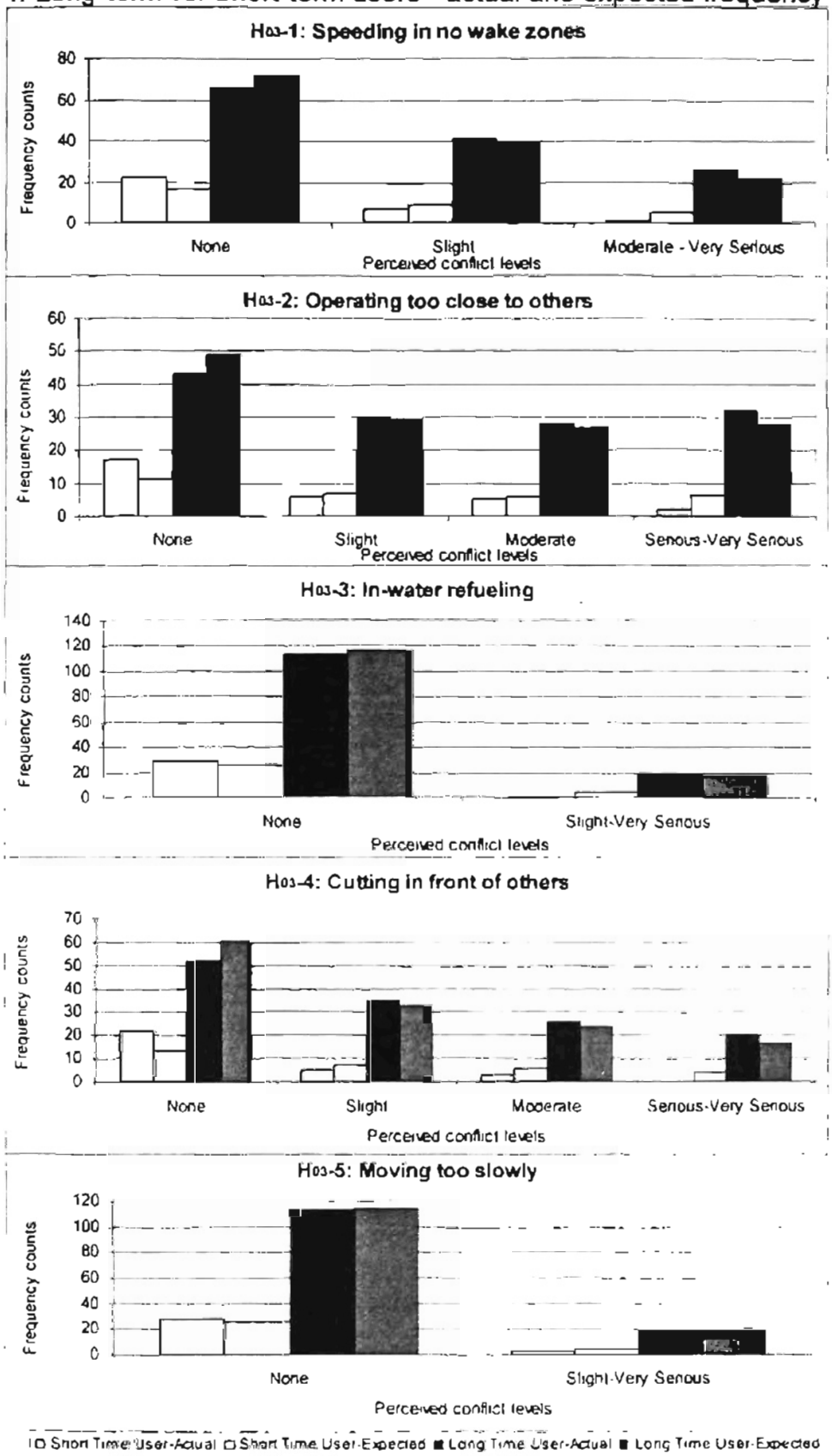
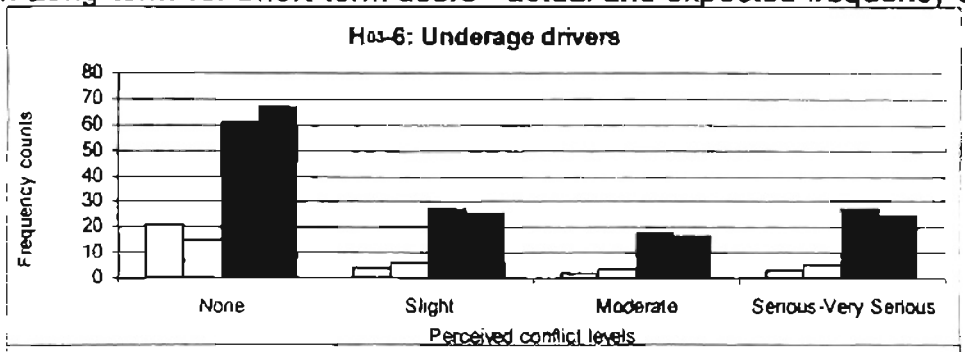
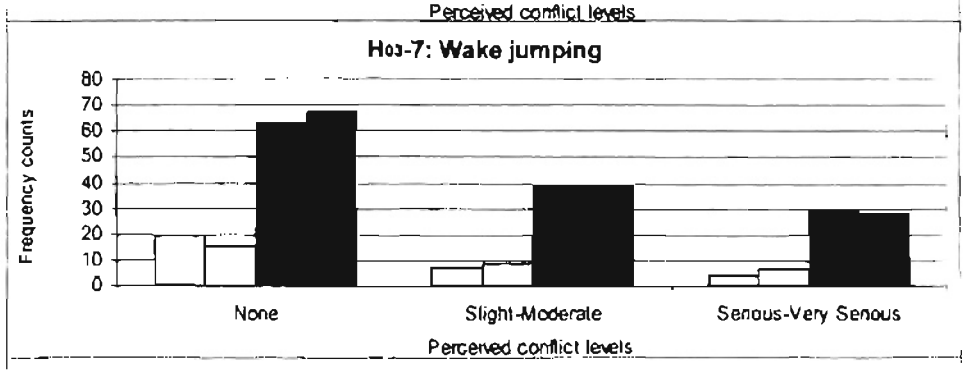
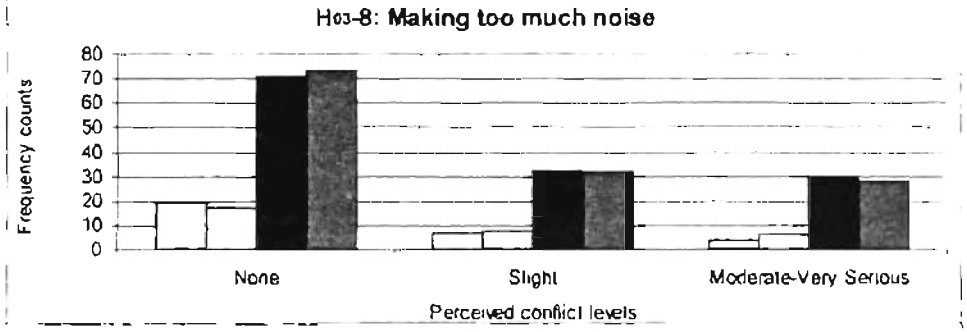


Fig. 4-4: Long-term vs. Short-term users - actual and expected frequency counts. (cont.)







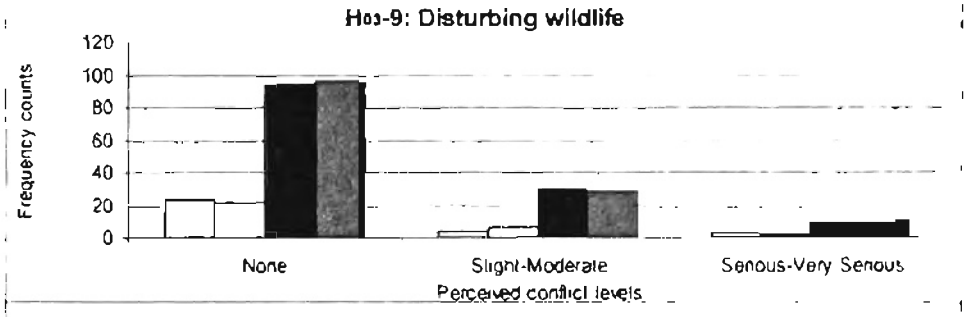
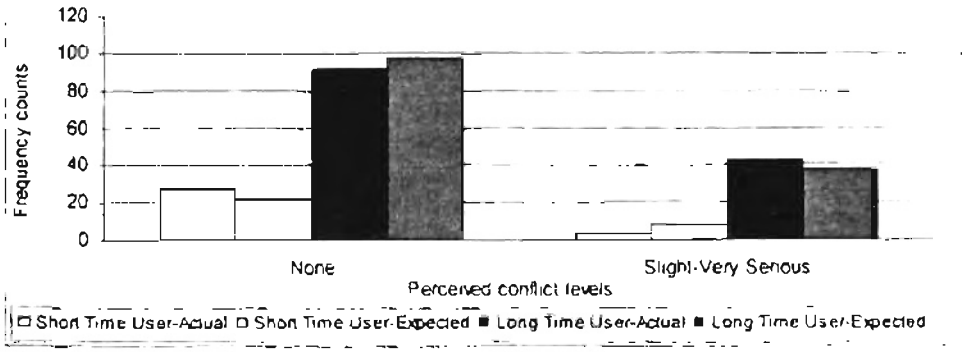


Fig. 3-10: Splashing others



Speeding in no wake zones approaches statistical significance with X^2=5.6311 and p-value=0.0599 (Short-time) versus X^2=1.2702 and p-value=0.5299 (Long-time). However, the majority of the behaviors show p-values higher than 0.05, so the null hypothesis should not be rejected.

Every behavior comparison shows that Short-time users have higher than expected frequency counts at the None level and Long-time users have higher than expected frequency counts at all of the conflict levels (Fig.4-4). Though length of time visiting LCB is not a strong indicator of perceived conflict, these findings support those of Parker (1981) and Gibbons and Ruddell (1995) that persons who identify with a recreation site are more sensitive to perceived conflict.

H_{04}: Local vs. Non-Local

Hypothesis H_{04} compares perceived conflict levels between persons living within 25 miles of LCB (Local) and persons living more than 25 miles from LCB (Non-local). Appendix J-1 contains the actual and expected counts for each recreation category by perceived conflict level and Appendix J-2 the collapsed categories and Chi-square calculations.

There are no statistically significant differences in levels of conflict between Local and Non-local recreationists so distance from the site is a very poor predictor of conflict perception. All p-values are well above 0.05, therefore, the null hypothesis is not rejected.

Fig. 4-5: Local vs. Non-local: actual and expected frequency counts.

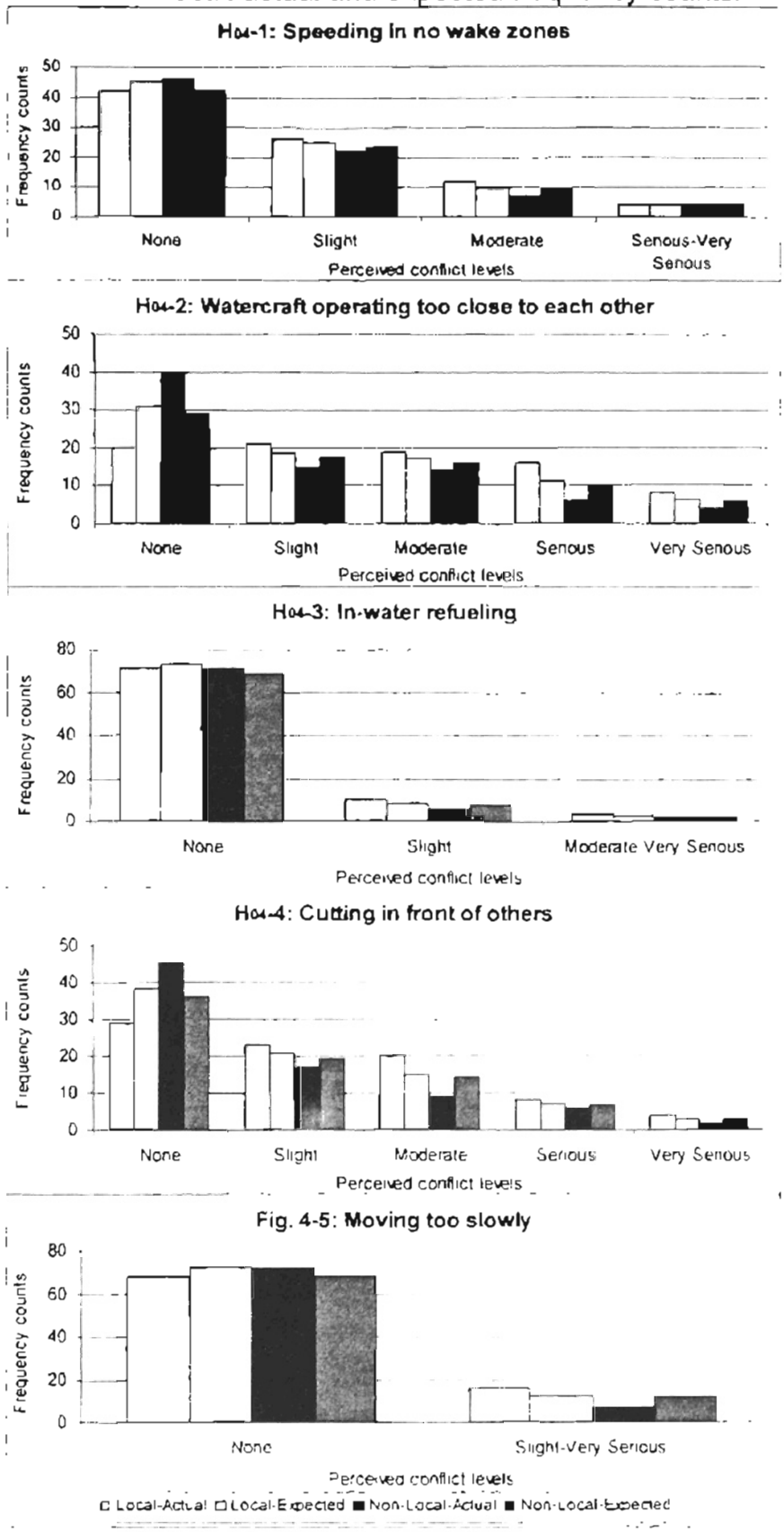
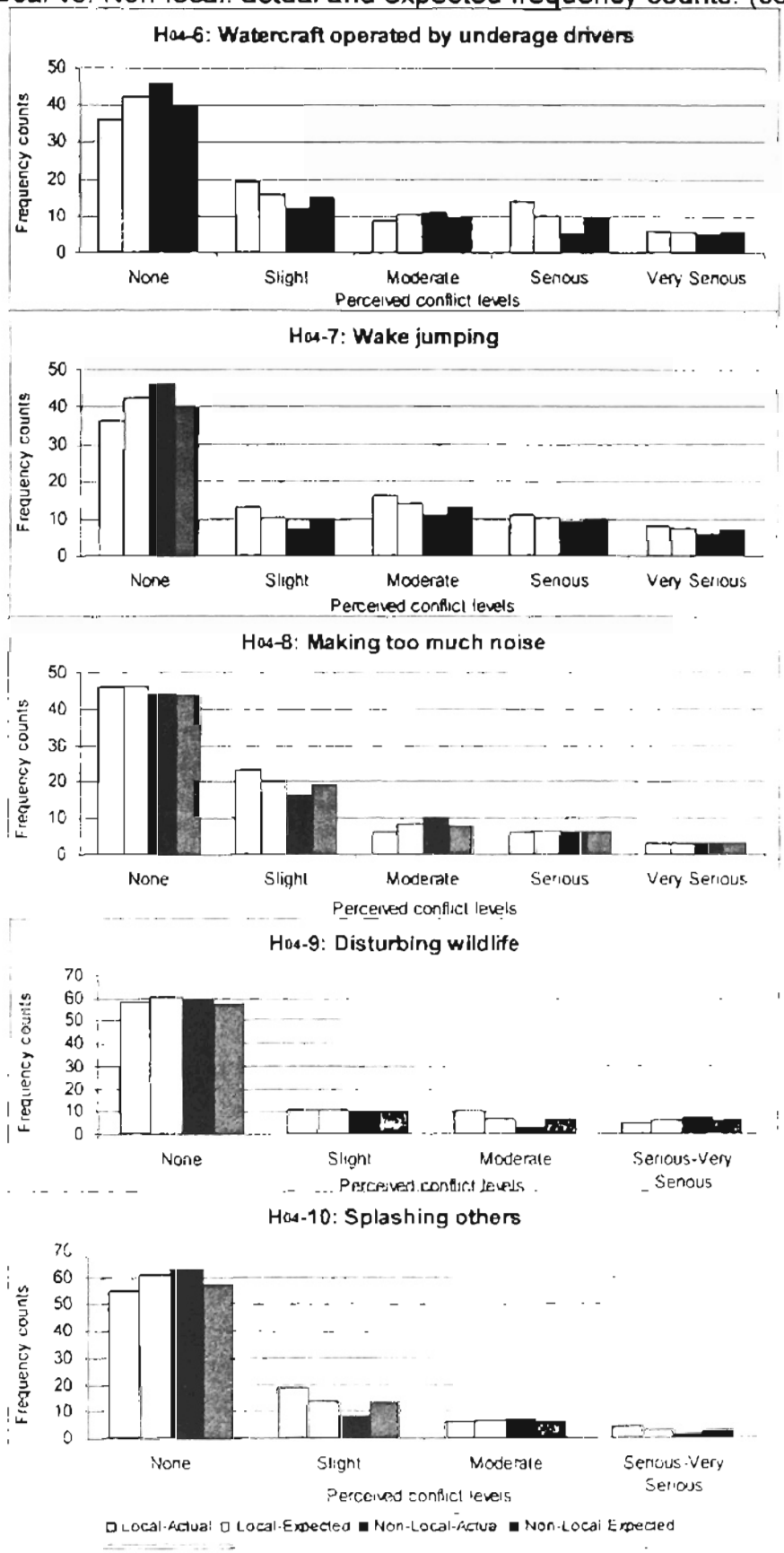


Fig. 4-5: Local vs. Non-local: actual and expected frequency counts. (cont.)



It is interesting to note that comparisons of actual and expected frequency counts do support the theory that Local recreationists are more sensitive to perceived conflict than Non-local recreationists even if the difference is not statistically significant (Fig. 4-5). Non-local users show higher than expected frequency counts at the None level for all behaviors while Local users show lower than expected frequency counts. This is reversed for the two groups at the Slight through Very-Serious levels for the behaviors **Operating too close to others**, **In-water refueling**, **Cutting in front of others**, **Moving too slowly**, and **Wake jumping**. The other behaviors show a mixture of higher frequency counts between Local and Non-local. For **Speeding in no wake zones**, **Underage drivers**, **Disturbing wildlife**, and **Splashing others**, Local show higher than expected frequency counts at the most conflict levels. In only one behavior are frequency counts higher for Non-local at the highest conflict levels. This is **Making too much noise**, which is understandable considering the fact that LCB is frequented by students from Oklahoma State University, who often hold parties at the various shelters. These students would fall into the Local category and would be less sensitive to noise related conflict while attending parties. Though the definitions of "local" differ between the two studies, these findings agree with those of Schreyer, Lime, and Williams (1984), who find that "local" visitors are more likely to perceive conflict than "non-local" visitors are.

H_{05}: Small Urban vs. Large Urban

Hypothesis H_{05} compares perceived conflict levels between persons living in Small urban areas (population under 100,000) and persons living in Large urban areas (population 100,000 or more). Appendix K-1 contains the actual and expected counts for each recreation category by perceived conflict level. Appendix K-2 contains the collapsed categories and Chi-square calculations.

Again this comparison shows no statistically significant difference in perceived conflict between recreationists from Small urban and Large urban areas. Again the p-values are much higher than 0.05 meaning that the null hypothesis should not be rejected.

Though not statistically significant, the comparisons of actual to expected frequency counts does support the theory that recreationists from Large urban areas are less sensitive to perceived conflict than those from Small urban areas (Fig. 4-6). The Large urban category shows higher than expected frequency counts at the None level for all behaviors. The Small urban category shows higher than expected frequency counts at the highest conflict levels for all behaviors and at the lower conflict levels for most behaviors. The Large urban category shows higher than expected counts at the low conflict levels for only two behaviors, **Cutting in front of others** and **Wake jumping**. There is no supporting research regarding this question either way, as it does not appear to have been addressed in previous studies.

Fig. 4-6:Small urban vs. Large urban: actual and expected frequency counts.

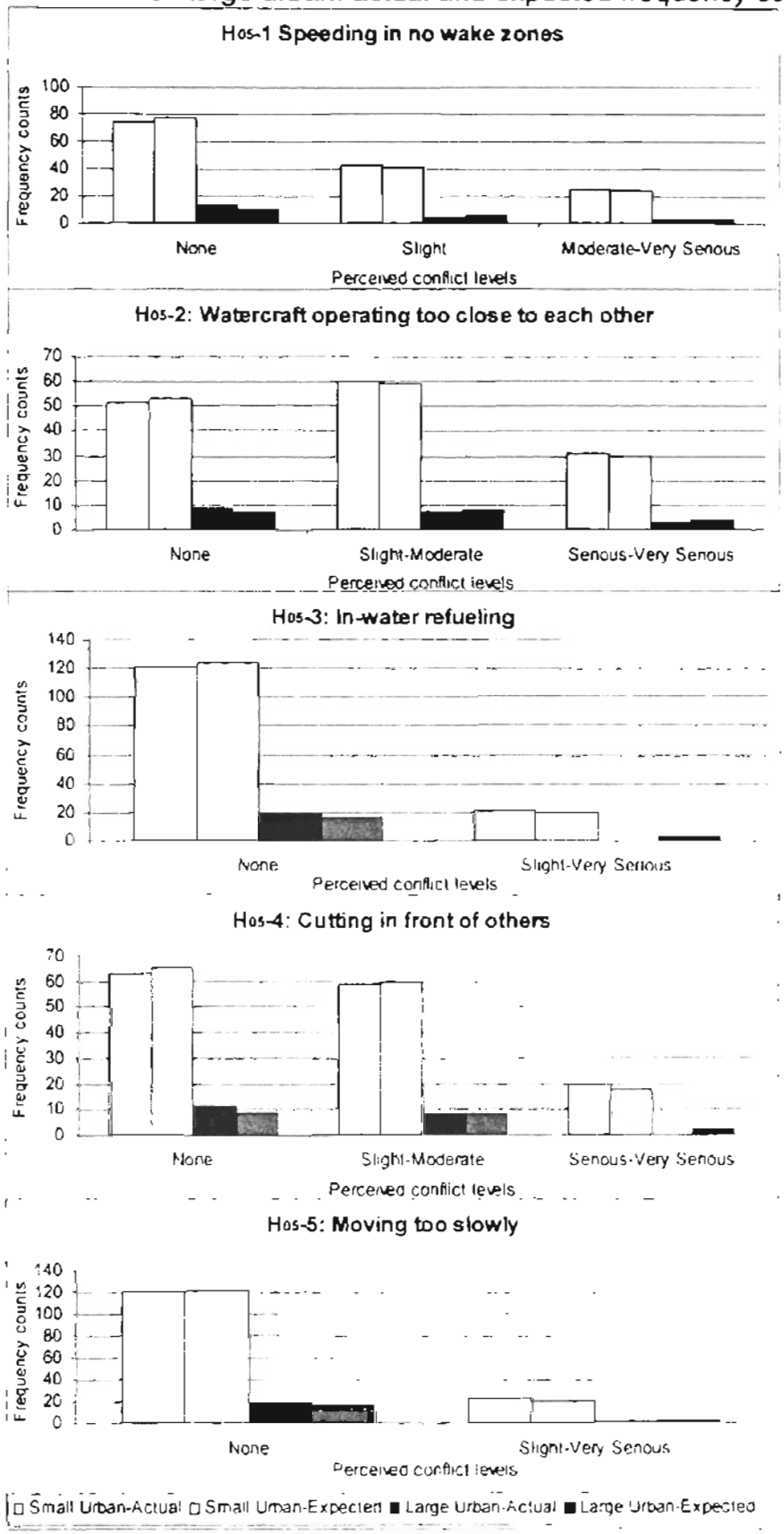
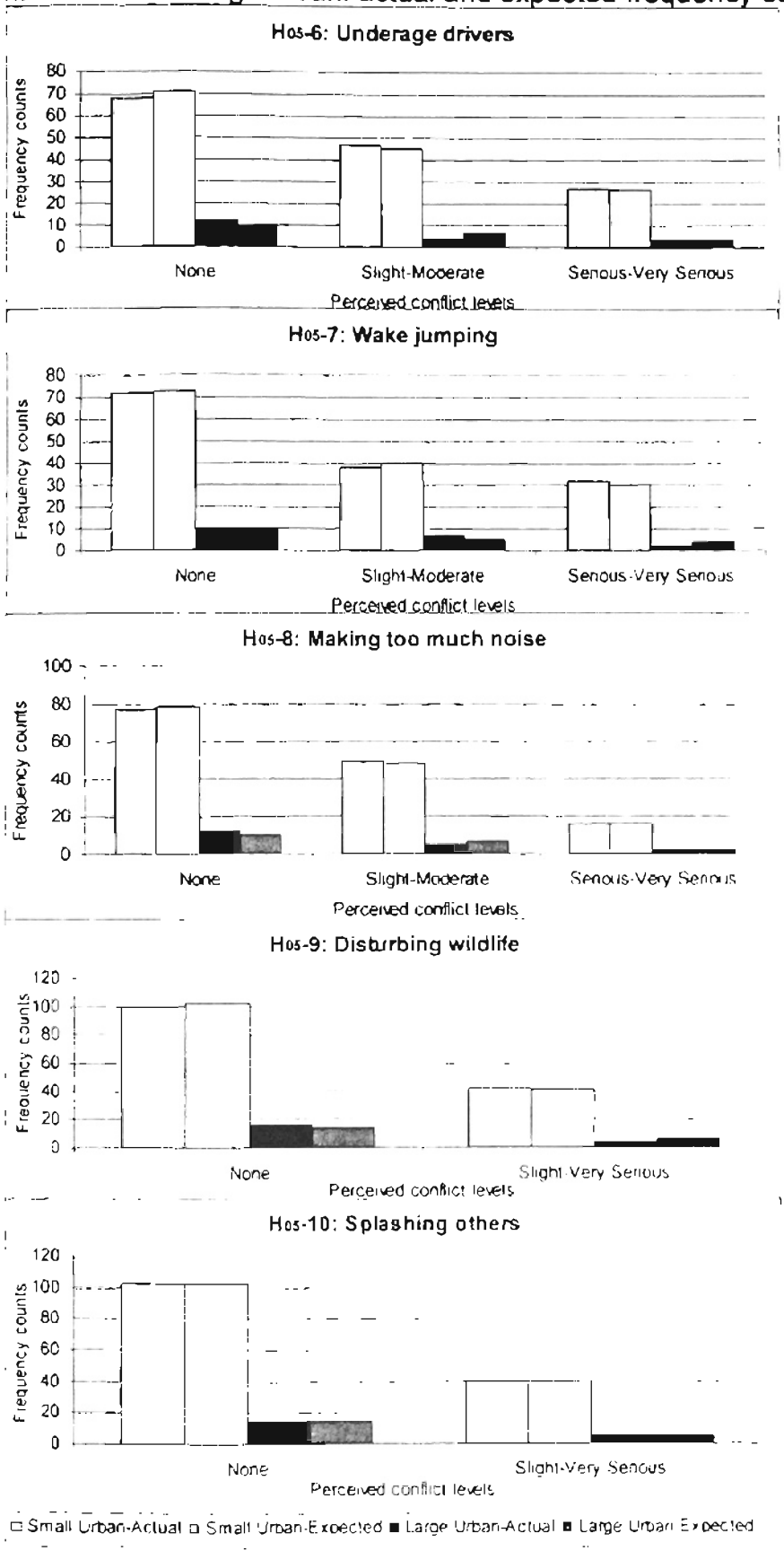


Fig. 4-6: Small urban vs. Large urban: actual and expected frequency counts. (cont.)



H_{06}: Education Level and Perceived Conflict Correlation

Hypothesis H_{06} investigates whether there is a correlation between perceived conflict and education levels. The Spearman's Rank Correlation analysis shows a strong positive correlation between education levels and perceived conflict for all behaviors investigated. The rank coefficient approaches 1.0 in all cases. This is statistically significant at the 0.05 level, as the p-value for each correlation is 0.0000 (Table 4-1). Therefore the null hypothesis that there is no correlation should be rejected.

Table 4-1: Education and Perceived Conflict Correlation

	Rank coefficient	p-value
Speeding in no wake zones	0.9964	0.0000
Operating too close to others	0.9971	0.0000
In-water refueling	0.9957	0.0000
Cutting in front of others	0.9968	0.0000
Moving too slowly	0.9957	0.0000
Underage drivers	0.9968	0.0000
Wake jumping	0.9969	0.0000
Making too much noise	0.9966	0.0000
Disturbing wildlife	0.9962	0.0000
Splashing others	0.9960	0.0000

Absher and Lee (1981) find that education levels explain recreation motives, which are weak predictors of perceived crowding. This study does not investigate recreation motives. Therefore, it is unknown if conflict perception is tied to recreation motives, which are in turn explained by education level. However, the findings do suggest a possible connection between education level

and perception of conflict. It is possible that persons with higher levels of education are more aware of the regulations pertaining to water recreation and any studies done regarding recreation controversies. If this is so then that knowledge probably influences their opinions of others' actions.

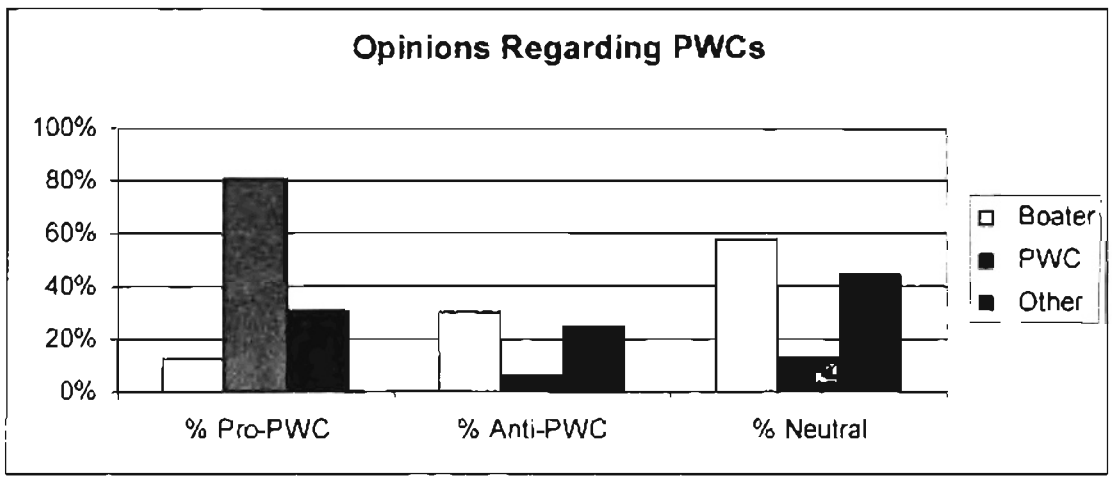
Interpersonal Conflict

Vaske et al. (1995) find that interpersonal conflict between different recreation types lead to objections to certain activities even when those activities are not directly observed. This study attempts a descriptive analysis to determine if a similar interpersonal conflict exists at LCB regarding PWCs. Three questions are asked to determine respondents' opinions of PWCs as a recreation activity. The first question asks their opinion of the National Park Service proposed PWC ban. An answer supporting the ban is considered to be against PWCs and one against the ban to be supporting PWCs. The second question asks if they prefer to visit a lake where PWCs are permitted or one where they are banned. The third question asks if they feel the presence of PWC add to, detract from, or have no effect on their enjoyment of LCB. Persons are considered to be pro-PWC if they answered all three questions in support of PWCs. They are considered to be anti-PWC if all three answers are against PWCs. If their answers are mixed, some pro and some against, they are considered neutral regarding PWCs.

Of the 83 persons in the boater category, 10 (12%) are pro-PWC, 25 (30%) are anti-PWC, and 48 (58%) are neutral (Fig.4-7). Of the 31 PWC

operators, 25 (81%) are pro-PWC, 2 (6%) are anti-PWC, and 4 (13%) are neutral. Of the 49 persons in the other category, 15 (31%) are pro-PWC, 12 (24%) are anti-PWC, and 22 (45%) are neutral. The percentage of persons in each category that are neutral towards PWCs is larger than the percentage of persons that are against PWCs. This analysis indicates that there is not strong interpersonal conflict regarding PWCs at LCB.

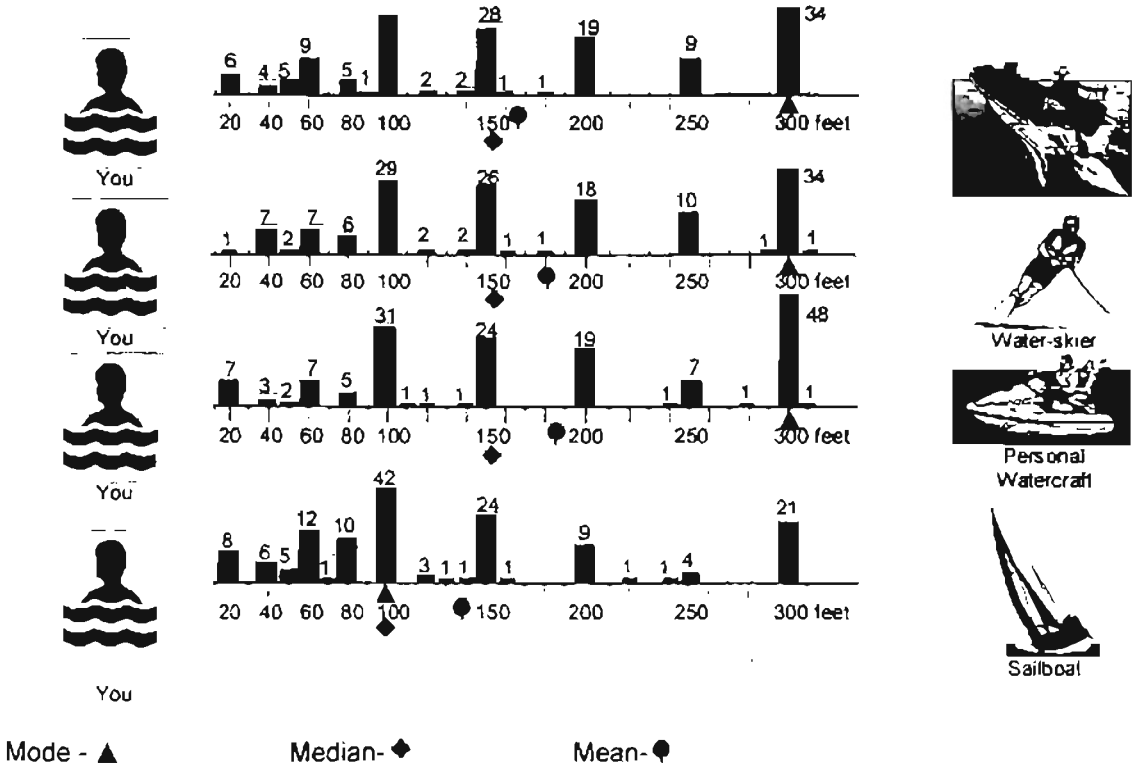
Fig. 4-7



Comfort Distance

This study investigates whether people participating in their favorite water recreation activity are more comfortable with PWCs at greater distances from them than other watercraft. Respondents indicate on distance scales the closest distance they prefer motorboats, water-skiers, PWCs, and sailboats come to them while they are recreating. The scale measures from 10 to 310 feet. The mode and median for motorboats, water-skiers, and PWCs are 300 feet and 150 feet, respectively. For sailboats mode and median are both 100 feet (Fig. 4-8).

Fig. 4-8: Comfort distances for various water recreation activities



Since neither of these measurements reveals any information about differences in comfort distances, the mean distances are calculated for each recreation type. PWCs have the highest mean at 182.5786. Next comes water-skiers at 180.3774 and motorboats at 165.9748. Sailboats have the lowest mean at 139.5597. An Analysis of Variance (ANOVA) test is conducted to determine if these means vary significantly from each other (Table 4-2). The test figure, F=7.9036, indicates that the sample means are significantly different. When the ANOVA test is conducted without the sailboat category the test figure, F=1.5674, approaches 1.0 which indicates that the means for motorboats, water-skiers, and PWCs are not significantly different. The conclusion is that lake users at LCB prefer that motorboats, water-skiers, and PWCs stay approximately the same

distance from them when they are engaged in their favorite water recreation activity.

Table 4-2: Analysis of Variance (ANOVA) Test for Comfort Distance Study

Number of observations in each sample - 159

Number of samples - 4

Total number of observations in all samples - 636

Recreation activity

	Motorboat	Water-skier	Personal Watercraft	Sailboat
Means	165.9748*	180.3774*	182.5786*	139.5597*
Squared means	27547.6484*	32535.9915*	33334.9511*	19476.9234*

	ANOVA for all four samples	ANOVA for three samples (omitting sailboat)
Between-group sum of squares	186921.2264*	25862.0545*
Between-group mean squares	62307.0755*	12931.0273*
Within-group sum of squares	4982313.2075*	3910444.025*
Within-group mean squares	7883.4070*	8249.881910*
F=	7.9036*	1.5674*

*Figure rounded to four decimal places

CHAPTER V

CONCLUSION

The purpose of this study is to investigate the perception of conflict among Lake Carl Blackwell (LCB) visitors with different socioeconomic and recreation user characteristics. Conflict occurs when the presence or behavior of an individual or group interferes with another individual or group's enjoyment of a recreation area or activity. Recreation area managers attempt to minimize conflict in order to maximize the recreation experience for all visitors. To do this they need to know whether conflict exists and what behaviors or activities generate it. Studies such as this help to identify the levels and parameters of perceived conflict.

Hypotheses H_{01} through H_{05} test the difference in conflict perception among Lake Carl Blackwell visitors according to different criteria. The five hypotheses are not rejected, as the Chi-square Goodness-of-fit test does not show a statistically significant difference in conflict perception among any of the groups studied.

Hypothesis H_{01} examines the difference in perception of conflict between Boaters and PWC operators. Though there is no statistically significant difference between the groups, Boaters do show a slightly higher perception of conflict than PWC operators. However, the level of perceived conflict is relatively low for most of the behaviors studied. As the studied behaviors are ones reported in the literature as causing the most problems in water recreation (Gibbs

1989; Holland, Pybas, and Sanders 1992; "Jet Ski etiquette" 1996; Smallwood 1998), indications are that overall levels of perceived conflict at LCB are also low. Studies by Berl and Chilman (1981), Parker (1981), Blahna, Smith, and Anderson (1995), Gibbons and Ruddell (1995), Ramthun (1995), and Vaske, et al. (1995) found similar low perceptions of conflict among different types of recreationists. What conflict is perceived tends to be asymmetrical, higher for one group than another, as demonstrated by the Boater category. Altman (2001) reports conflict levels that contradict the findings of this study. This may be an example of rationalization as explained by Schneider and Hammitt (1995), where recreationists are so determined to enjoy themselves they "rationalize" any negative experience to mitigate its impact on their enjoyment. Or it could indicate that the Lake Patrol is doing a good job of curtailing conflict-generating behaviors before they impact most other visitors' enjoyment.

Hypothesis H_{02} analysis shows a similar relatively low level of perceived conflict between Less experienced and More experienced recreationists. More experienced recreationists indicate slightly higher conflict levels than Less experienced recreationists. This tends to support the theory of the "Last Settler Syndrome" formulated by Nielsen, Shelby, and Haas (1977), which is also supported by Ditton, Fedler, and Graefe (1983), and Schreyer, Lime, and Williams (1984). However, it is inconsistent with the findings of Absher and Lee (1981), who find a negative correlation between experience and perception of crowding. Ramthun (1995) also finds that experience influences sensitivity to interference, which is tied to perception of conflict.

The analysis for hypothesis H_{03} indicates that Long-time users of LCB perceive conflict at slightly higher levels than do Short-time users, though again with no statistically significant differences. Parker (1981) finds a positive correlation between identification with the site and perceived conflict. Gibbons and Ruddell (1995) report similar findings among skiers who are place dependent.

Hypothesis H_{04} studies conflict perception between Local and Non-local recreationists. There is no statistically significant difference found in conflict perception, but the analysis shows that Local recreationists generally have higher levels of perceived conflict than Non-local recreationists. Schreyer, Lime, and Williams (1984) report similar findings in regard to river recreationists they define as "local."

Hypothesis H_{05} addresses perception of conflict between recreationists from Large urban areas and from Small urban areas. Recreationists from Small urban areas show slightly higher levels of perceived conflict than ones from Large urban areas. This criterion does not appear to have been studied before given that no articles are found regarding population of place of residence and conflict. The findings support the theory that persons from large urban areas are less sensitive to conflict though the differences are not statistically significant.

Despite the fact that the data do not support any of the alternative hypotheses for the above analyses, interesting information is gathered regarding conflict at LCB. This study indicates that there are some behaviors that concern recreationists at LCB more than others. All groups reported conflict at higher

levels for the behaviors of **Operating too close to others**, **Cutting in front of others**, **Underage drivers,** and **Wake jumping**. These behaviors have the potential to result in personal injury and property damage, so this concern is understandable. Another behavior that could also cause injury and damage, **Splashing others**, does not show a like conflict level except in the study between Local and Non-local. This could mean that recreationists at LCB do not usually engage in this behavior, or that most are unaware of its potential danger.

Hypothesis H_{06} is rejected because the Spearman's rank correlation coefficient analysis shows a positive correlation between conflict perception and education level. Though this study does not prove that higher education levels cause higher perceived conflict, the correlation indicates the two factors could be related. Absher and Lee (1981) find an indirect relationship between education and perceived crowding, which appears to support these findings.

The controversy surrounding PWCs could easily lead to interpersonal conflict in regard to them, such as Vaske et al. (1995) describe. This would be where people's enjoyment of a site is interfered with by the mere presence of PWCs rather than from the behavior of their operators. There is no evidence of interpersonal conflict regarding PWCs at LCB. In more than one instance, respondents indicate that they enjoy watching PWCs on the lake. There are also many comments indicating a "there's room for all" attitude on the part of lake visitors. This is further evidence of the low conflict levels found in this study.

LCB visitors appear to have a similar comfort distance in regard to PWCs as they have for other types of watercraft. While the mean comfort distance for

PWCs is greater than the mean comfort distance for other watercraft, it is not significantly greater. Lake visitors prefer that motorboats and water-skiers stay almost as far away as PWCs. Apparently they view all motor-powered craft as similarly dangerous. Sailboats are the only craft where the mean comfort distance is significantly less. Respondents obviously consider the slower moving sailboats less threatening than the faster moving motor-powered craft.

LCB is in a rural type setting at sufficient distance from Stillwater, the nearest urban area, to require some effort to visit. Students from Oklahoma State University are frequent visitors. The findings of this study may hold true for lakes in similar circumstances. However, it is not within the scope of this study to determine if similar findings would be found at lakes similar to LCB, or those located in urban areas, or with different visitor characteristics, or that are larger or smaller than LCB. Therefore, no suggestions for managers are advanced except to use observations of management personnel or promote a similar study located at their recreation area to determine perceived conflict levels for their circumstances. This study does indicate that PWCs probably do not generate high levels of perceived conflict. Due to the low levels of perceived conflict this study finds it is unlikely that LCB managers need to change any management policies. However, they might do well to continue monitoring Boater-PWC operator interactions in case this situation changes in the future.

Summary

Despite the controversy surrounding PWCs, this study indicates that recreationists at Lake Carl Blackwell do not perceive a significant amount of conflict regarding PWCs. It is not within the scope of this study to determine if there is a lower than average occurrence of problem behaviors at LCB compared to other recreation sites. Neither is it possible to tell with the data collected if LCB users are less or more sensitive to perceived conflict than recreationists at other areas. Therefore, it cannot be categorically stated that perceived conflict regarding PWCs is low nationally or even statewide. It can be stated that PWCs do not appear to interfere with LCB users' enjoyment of the lake to any marked degree.

Analysis of hypotheses H_{01} through H_{05} shows that a statistically significant difference of conflict perception does not exist among different groups of recreationists. Comparisons of actual and expected values does indicate that if such a difference of perception does exist it is likely be in the direction of the alternative hypothesis in each instance. Future research could determine if this trend continues.

Suggestions for Further Research

This study concentrates on LCB visitors' perceptions of conflict. Additional studies could be done at lakes with characteristics similar to LCB and at lakes with characteristics very different from LCB. This would determine if the results obtained in this study are site specific or representative of the recreation

population. Different types of recreation areas that should be studied include lakes that are close to large urban areas, lakes that are more remote from urban areas, lakes with more recreation development and ones with less development, and lakes that are much larger or smaller than LCB. Also, a study that compares perceived conflict levels at two separate lakes would be helpful. For example, a comparison of conflict perception at a lake that strictly zones PWCs and one that does not zone at all would be interesting. Another possible study is one that compares conflict perception at areas with different management agencies, i.e. municipal, state, federal, or private.

Conflict perception could be tied to criteria not addressed in this study. Possible criteria include: whether the respondent is alone or with a group when visiting the lake; whether the group consisted of family, friends, or a mix; whether the group is large or small; or how much money is spent for the recreation experience. Studies that investigate different criteria could contribute much to the understanding of conflict perception.

The only hypothesis rejected is the one regarding correlation of conflict perception with education level. Further studies could investigate the parameters of this correlation. Perhaps a study could determine if the relationship is causal or just coincidental.

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APPENDIX A Definitions

The following definitions apply to the terms used in this thesis:

Conflict - feelings of dissatisfaction, annoyance, or anger perceived to be caused by the presence or behavior of others.

Asymmetrical conflict - conflict perceived by one individual or group in regard to another individual or group that is not perceived by the second individual or group in regard to the first individual or group.

Personal Watercraft or PWC(s) - any watercraft up to 16 feet in length, designed to hold three or fewer people, and propelled by an inboard motor that forces a jet of water to the rear of the craft.

Recreational Boater - any person using a boat to pursue a recreation activity. Those activities may include boat fishing, motorboating, sailing, and water-skiing.

Recreation - any activity engaged in voluntarily for the purposes of relaxation, personal enrichment, or challenge.

Recreationist - any person engaged in a recreation activity.

Resource (or Recreation Resource) - any site or area designated or designed for recreational activities. For the purposes of this study, resource will most commonly refer to a lake.

Recreational User - any person engaged in a recreation activity at a specific site.

Visitor - any person at a recreation resource who is not employed by the recreation management and not engaged in official duties.

APPENDIX B

Rules and Regulations for Lake Carl Blackwell

General Boating

All boats and watercraft and their operators using Lake Carl Blackwell must comply with University regulations and the Boat & Water Rules, Regulations and Safety Laws of the State of Oklahoma. Any boat, watercraft, or operator not in compliance is subject to citation or removal from the Lake.

A current Lake Carl Blackwell permit must be obtained for all boats or watercraft used on the Lake. Annual or monthly permits must be affixed to the bow of the vessel on the port (left) side and in front of the registration numbers. Boating permits are nontransferrable.

Boats or watercraft may not be left unattended on or near the Lake for more than 24 hours except in designated areas. Unlicensed, illegal, or abandoned vessels or equipment on the Lake or adjacent land are subject to impoundment.

Trailered boats must be launched and loaded on launching ramps. Launching ramps and the access to ramps must be kept clear. Towing vehicles and trailers should not occupy a ramp for a longer time than necessary to launch or load a boat. Vehicles and trailers must be parked in designated parking areas at least 100 feet from ramps and ramp access.

Fishing or swimming from ramps or docks is not permitted.

Boats shall be operated at a no-wake speed (not to exceed 5 miles per hour) within 300 feet of any launching ramp or dock.

Water skiing, pleasure boating, swimming, and other similar water activities are permitted in designated areas as shown on a map on display at the Lake Headquarters. Swimming, wading, and the use of inner tubes or other floating devices outside designated swimming areas is at your own risk. In no case may a person swim or use a floating device over 30 yards off shore.

No boat may enter a designated swimming area.

Each boat or water vessel must have on board an approved personal floatation device (PFD) for every person in the vessel.

Jet Skis, Wet Bikes and similar craft which are designed to be ridden upon rather than carrying the operator and passengers within the hull shall not be operated out of the area open to water-skiing.

Any group, organization, or person(s) who organize, sponsor, or conduct a regatta, marine parade, boat race, diving event, fishing tournament, or other marine event or exhibition on Lake Carl Blackwell must register the event in advance with the Lake Carl Blackwell office and receive written authorization from the Lake Resource Manager.

Certain areas of water normally specified for fishing, skiing, or swimming may have the privileges temporarily withdrawn during hunting season, when research is being conducted, or for other purposes as determined by the Lake Resource Manager for the protection and safety of the public.

Since Lake Carl Blackwell is owned and operated by Oklahoma State University, the rules and regulations regarding parking and traffic and personal behavior as adopted on campus shall apply to the Lake and surrounding areas.

From: Lake Carl Blackwell rules and regulations for boating.

Fishing - Specific Regulations

All persons between the ages of 16 and 65 must have a Lake Carl Blackwell fishing permit before fishing in the Lake, Stillwater Creek within the Lake Carl Blackwell area boundaries or any ponds on Lake Carl Blackwell lands which may be open to fishing. Fishing privileges granted by these permits are subject to the Fish and Game Laws of the State of Oklahoma. Fishing permits are not transferrable.

A current State fishing license is required by State Law for all persons over the age of 16 who were born after January 1, 1923. All non-residents of Oklahoma over the age of 16 must have a current nonresident fishing license.

No type of net, trap or gun may be used to take fish from the lake.

Trotlines and throwlines are permitted only in areas designed by the Lake Resource Manager and must comply with Sate laws.

No person granted a permit shall offer for sale or market any fish taken from the waters of Lake Carl Blackwell.

"Noodling" or hand fishing is not permitted.

From: Lake Carl Blackwell rules and regulations for fishing, 1994.

Water Skiing - Specific Regulations

A water skiing permit is required to water ski on Lake Carl Blackwell. A daily permit may be issued to individual water-skiers or annual or 30-day water-

skiing permits may be issued to boats. There will be no restrictions on the water-skiers who may be towed by boats with monthly or yearly water-skiing permits.

Boats towing water-skiers must travel in a counterclockwise pattern in the skiing area.

All water-skiers must wear an approved personal floatation device (PFD).

Boats towing water-skiers must stay at least 300 feet from swimming areas; the entrance to covers or areas where launching ramps and/or docks are located; shores where people are fishing, wading or swimming; sailboats, rowboats, canoes or other nonmotor powered craft; any boat standing dead in the water to let off or pick up skiers; any anchored boat; or any fishing boat not under way by its main engine.

Source: Lake Carl Blackwell rules and regulations for water-skiing.

Lake Carl Blackwell rules and regulations for boating.

Appendix C-1 Model PWC Operations Acts (Source: National Transportation Safety Board 1998)

MODEL PERSONAL WATERCRAFT OPERATIONS ACT
Personal Watercraft Industry Association, 1998

Section 1. (Short Title) This act may be cited as the Personal Watercraft Operations Act.

Section 2. (Definitions) As used in this act:

(1) "Personal Watercraft" shall mean a vessel which uses an inboard motor powering a water jet pump as its primary source of motive power and which is designed to be operated by a person sitting, standing, or kneeling on the vessel, rather than the conventional manner of sitting or standing inside the vessel.

(2) Specialty-Prop-Craft shall mean a vessel which is similar in appearance and operation to a personal watercraft but which is powered by an outboard motor or propeller driven motor.

Section 3. (Uniformity of State Law)

(1) If any provision of this act is in conflict with any other provision, limitation, or restriction under any law, rule, regulation, or ordinance of this state or any political subdivision, municipality, or agency, this act shall control and such law, rule, regulation, or ordinance shall be deemed superseded.

Section 4. (Regulation of Personal Watercraft)

(1) No person under the age of sixteen (16) shall operate a personal watercraft on the waters of this state.

(2) A person may not operate a personal watercraft unless each person on board or being towed behind is wearing a type I, type II, type III, or type V personal flotation device approved by the United States Coast Guard. Inflatable personal flotation devices do not meet the requirements of this section.

(3) A person operating a personal watercraft equipped by the manufacturer with a lanyard-type engine cutoff switch must attach such lanyard to his/her person, clothing, or personal flotation device as appropriate for the specific vessel.

(4) A person may not operate a personal watercraft at anytime between the hours of sunset and sunrise. However, an agent or employee of a fire rescue, emergency rescue unit, or law enforcement division is exempt from this subsection while performing his/her official duties.

(5) A personal watercraft must at all times be operated in a reasonable and prudent manner. Maneuvers which unreasonably or unnecessarily endanger life, limb, or property shall constitute reckless operation of a vessel and shall include, but not be limited to:

(a) Weaving through congested traffic:

(b) Jumping the wake of another vessel unreasonably or unnecessarily close to such other vessel or when visibility around such other vessel is obstructed or restricted;

(c) Becoming airborne or completely leaving the water while crossing the wake of another vessel within 100 feet of the vessel creating the wake;

(d) Operating at grater than slow/no-wake speed within 100 feet of an anchored or moored vessel, shoreline, dock, pier, swim float, marked swim areas, swimmers, surfers, persons engaged in angling, or any manually powered vessel;

(e) Operating contrary to navigation rules including following too closely to another vessel, including another personal watercraft. For the purpose of this subsection, "following too closely" shall be construed as proceeding in the same direction and operating at a speed in excess of 10 mph within 100 feet to the rear of 50 feet to the side of another vessel which is underway, unless said vessels are operating in a narrow channel, in which case personal watercraft may operate at the speed and flow of the other vessel traffic within the channel.

Section 5. (Required Education except as provided for in Section (7))

(1) No person born after January 1, 19__, (Date to establish age at 16) shall operate on the waters of this state a personal watercraft powered by a motor of 10 Horse Power or greater (unless the operator has successfully completed either a safe boater course approved by the National Association of State Boating Law Administrators and the state, or a proficiency examination that tests the knowledge of information included in the curriculum of the course or examination).

(2) If a non-resident of the state and operating a personal watercraft within the waters of this state, operator would be subject to the rules and regulations of subsection 5. (2) For education but may hold in his/her possession proof that he/she has completed within the state of residence, an education course or equivalency test that meets or exceeds the requirements of subsection 5. (2).

(3) Any operator, resident or non-resident, is required to have available proof of completion of such course on board the personal watercraft while operating on the waters of this state.

Section 6. (Towing Water Skiers and Towables)

(1) No person shall operate a personal watercraft towing another person on water skis or other towables unless the personal watercraft has, on board, in addition to the operator, a rear-facing observer who shall monitor the progress of the person(s) being towed.

(2) No personal shall operate a personal watercraft towing another person on water skis or other towables unless the total number of persons operating, observing and being towed does not exceed the specified number of passengers as identified by the manufacturer as the maximum safe load for the vessel.

Section 7. (Regulation of Liveries)

(1) A livery may not lease, hire, or rent a personal watercraft to or for operation by any person under 18 years of age.

(2) A livery must carry liability insurance in the amount of one million dollars.

(3) Livery operators must administer boating safety instruction in compliance with department established rules and guidelines to all operators of rental vessels not having a valid safe boating certificate and valid identification.

(4) In addition, the livery must supply to the operator(s) in print, prior to rental:

(a) The operational characteristics of personal watercraft;

(b) The boating regulations peculiar to the area of rental including but not limited to no-entry zones, no-wake zones, channel routes and water hazards, and tidal flow.

(c) The common courtesies of operating a vessel on the water and the effect on wildlife, the environment, and other water users.

Section 8. (Exemptions)

(1) The provisions of section(s) (4) and (5) shall not apply to a performer engaged in a professional exhibition or a person engaging in an officially sanctioned regatta, race, marine parade, tournament, exhibition, or water safety demonstration.

(2) The provisions of section(s) (4) and (5) shall not apply to a person who holds a valid master's, mate's, or operator's license issued by the United States Coast Guard.

Section 9. (Regulation of Specialty Prop-Craft) The provisions of sections (4), (5) and (6) shall apply to specialty prop-craft.

Section 10. (Uniformity of Law) It is the policy of _____ to encourage uniform laws for all vessels. Except as provided in this chapter and other laws of the state; laws, including local laws, ordinances and regulations, that are applicable to the operation of powered vessel shall be uniformly applicable to all types of powered vessels. Local laws, ordinances and regulations shall be operative only so long and to the extent that they are identical to provisions of this chapter, amendments thereto, regulations issued thereunder or other applicable laws of the state. The provisions of this chapter and of other applicable laws of this state shall govern the operation and all other matters related to vessels, provided that nothing in this section shall be construed to prevent adoption of local laws, ordinances or regulations relating to reasonable vessel speed zones and reasonable idle speed zones or vessel exclusion zones (i.e. for swim areas) within their jurisdiction.

The state should consider an age ratchet-up approach to education so that adequate instructors, classes and materials can be made available to train users without overloading and/or taxing the system.

Appendix C-2 Model PWC Operations Acts (Source: National Transportation Safety Board 1998)

NASBLA MODEL ACT FOR PERSONAL WATERCRAFT. 1996

General In addition to all other boating laws and regulations in this state the following shall apply to personal watercraft:

Section 1. (Definitions.) As used in this chapter:

(a) "Personal Watercraft" shall mean a vessel, less than 16 feet, propelled by a water-jet pump or other machinery as its primary source of motor propulsion which is designed to be operated by a person sitting, standing or kneeling on, rather than being operated by a person sitting or standing inside the vessel.

Section 2. (Regulations of Personal Watercraft.)

(a) No person shall operate a personal watercraft unless each person aboard is wearing a type I, type II, type III or type V personal flotation device approved by the United States Coast Guard, provided no person aboard a personal watercraft shall use an inflatable personal flotation device to meet the PFD requirement of this subsection.

(b) A person operating a personal watercraft equipped by the manufacturer with a lanyard type engine cutoff switch shall attach such lanyard to his person, clothing, or personal flotation device as appropriate for the specific vessel.

(c) No person shall operate a personal watercraft at any time between sunset and sunrise.

(d) No person under the age of 16 shall operate a personal watercraft on the waters of this state, except a person 12 to 16 years of age my operate a personal watercraft if a person at least 18 years of age is aboard the vessel.

(e) Every personal watercraft shall at all times be operated in a reasonable and prudent manner. No person shall operated a personal watercraft in an unsafe manner. Unsafe personal watercraft operation shall include, but not be limited to the following:

i. Becoming airborne or completely leaving the water while crossing the wake of another vessel within 100 ft. of the vessel creating the wake.

ii. Weaving through congested traffic.

iii. Operating at greater than slow no wake speed within 100 feet of an anchored or moored vessel, shoreline*, dock, pier, swim float, marked swim area, swimmer(s), surfers, persons engaged in angling or any manually operated propelled vessel.

iv. Operating contrary to the "Rules of the Road" or following too close to another vessel, including another personal watercraft. For the purposes of this section, following too close shall be construed as proceeding in the same direction and operating at a speed in excess of 10 MPH when approaching within

one hundred feet to the rear or fifty feet to the side of another motor boat or sail boat which is underway unless such vessel is operating in a narrow channel, in which case a personal watercraft may operate at speed and flow of other vessel traffic.

(f) No person who owns a personal watercraft or who has charge over or control of a personal watercraft shall authorize or knowingly permit the personal watercraft to be operated in violation of this act.

Section 3. (Exemptions.)

(a) The provisions of Section 2 shall not apply to a person participating in an officially sanctioned regatta, race, marine parade, tournament, or exhibition.

Section 4. (Mandatory Safety Instruction by Rental Operators.)

(a) No person shall rent a personal watercraft to another person without first providing safety instruction to that person. Such instruction shall include, but not be limited to: (1) operational characteristics of personal watercraft; (2) laws and regulations, boating rules of the road, personal responsibility; and (3) local characteristics of the waterway to be used.

Section 5. (Towing Water Skiers.)

(a) No person shall operate a personal watercraft towing another person on waterskis or other device(s), unless the personal watercraft has, on board, in addition to the operator, an observer who shall monitor the progress of the person(s) being towed.

(b) No person shall operate a personal watercraft towing another person on waterskis or other device(s), unless there is adequate seating space available on the craft for the operator, the observer, and each person being towed.

* Special consideration should be given to operation on rivers and other narrow bodies of water, particularly when the personal watercraft is operating in strong current requiring speed greater than slow/no wake speed to maintain steerage and make headway.

Appendix D

National Park Service units where PWC use could be allowed

National Recreation Areas:

Amistad, Texas
Bighorn Canyon, Montana
Chickasaw, Oklahoma
Curecanti, Colorado
Gateway, New York-New Jersey
Glen Canyon, Arizona-Utah
Golden Gate, California
Lake Mead, Nevada-Arizona
Lake Meredith, Texas
Lake Roosevelt, Washington
Whiskeytown-Shasta-Trinity, California

National Seashores:

Gulf Islands, Florida-Mississippi
Padre Island, Texas

National Park Service units where PWC use could be evaluated in two years:

National Seashores:

Assateague Island, Maryland
Canaveral, Florida
Cape Cod, Massachesetts
Cape Hatteras, North Carolina
Cape Lookout, North Carolina
Cumberland Island, Georgia
Fire Island, New York

National Lakeshores

Indiana Dunes, Indiana
Pictured Rocks, Michigan
Sleeping Bear Dunes, Michigan

National Recreation Areas:

Chattahoochee River, Georgia
Delaware Water Gap, Pennsylvania- New Jersey

(Source: National Park Service 1998)

Appendix E-1 Survey instrument - Questionnaire

Water Recreation Issues Survey

The purpose of this survey is to find out the opinions of lake visitors like yourself about some water recreation issues. Your opinions about these issues are important to lake managers in making their decisions, so that they can help make your visits to their lakes more enjoyable.

People's opinions come from their experiences, so I would like to begin by asking you a few questions about your water recreation background.

A. Which of the following water related recreation activities do you engage in most often. (Circle the number in front of your answer)

1 BANK FISHING ..... (49)
2 BOAT FISHING ..... (51)
3 SWIMMING ..... (76)
4 MOTORBOATING ..... (39)
5 WATERSKIING ..... (52)
6 RIDING PERSONAL WATERCRAFT (JET SKI, WAVERUNNER, ETC.) ..... (35)
7 SAILING ..... (3)
8 OTHER ..... (14)

B. How long have you been engaged in this activity? (Circle number)

1 LESS THAN 1 YEAR ..... (4)
2 1 to 5 YEARS. ..... (40)
3 6 TO 10 YEARS ..... (27)
4 11 TO 15 YEARS ..... (18)
5 MORE THAN 15 YEARS. ..... (74)

C. Approximately how many times a year do you engage in this activity? (Circle number)

1 1 TO 5 ..... (26)
2 6 TO 10 ..... (30)
3 11 TO 15 ..... (22)
4 16 TO 20 ..... (20)
5 MORE THAN 20 ..... (65)

D Approximately how many times have you visited Lake Carl Blackwell? (Circle the number)

1 1 TO 5 ..... (30)
2 6 TO 10 ..... (14)
3 11 TO 15 ..... (10)
4 16 TO 20 ..... (10)
5 MORE THAN 20 ..... (99)

E In what year did you first visit Lake Carl Blackwell? (Earliest date-1950 Latest date-1999)

F Approximately how far must you travel from your home to reach Lake Carl Blackwell? (Circle number)

1 25 MILES OR LESS ..... (84)
2 26 TO 50 MILES ..... (42)
3 51 TO 100 MILES ..... (27)
4 101 TO 200 MILES ..... (2)
5 201 TO 300 MILES ..... (3)
6 MORE THAN 300 MILES ..... (5)

G. Have you ever visited any other lakes besides Lake Carl Blackwell? (Circle number)

1 NO ..... (3)
2 YES ..... (159)
WHICH ONES? _____

_____

H Of all the lakes you have visited, which did you visit most often?

_____

The next few questions are about some lake recreation issues.

I. Think back to the times you visited Lake Carl Blackwell within the last two years. Do you believe your enjoyment of the lake was interfered with by anyone doing the things listed below?

DID NOT INTERFERE - Circle NONE
SLIGHT INTERFERENCE - Circle SLIGHT
MODERATE INTERFERENCE - Circle MODERATE
SERIOUS INTERFERENCE - Circle SERIOUS
VERY SERIOUS INTERFERENCE - Circle V SERIOUS

	Amount of Interference (Circle your answer)				
1 Speeding in no wake zones	NONE (88)	SLIGHT (48)	MODERATE (19)	SERIOUS (7)	V. SERIOUS (1)
2 Watercraft operating too close to each other	NONE (60)	SLIGHT (36)	MODERATE (33)	SERIOUS (22)	V.SERIOUS (12)
3 In-water refueling	NONE (142)	SLIGHT (16)	MODERATE (4)	SERIOUS (0)	V.SERIOUS (1)
4 Cutting in front of others	NONE (74)	SLIGHT (40)	MODERATE (29)	SERIOUS (14)	V.SERIOUS (6)
5 Moving too slowly	NONE (140)	SLIGHT (19)	MODERATE (4)	SERIOUS (0)	V.SERIOUS (0)
6 Watercraft operated by underage drivers	NONE (82)	SLIGHT (31)	MODERATE (20)	SERIOUS (19)	V.SERIOUS (11)
7 Wake jumping	NONE (82)	SLIGHT (20)	MODERATE (27)	SERIOUS (20)	V SERIOUS (14)
8 Making too much noise	NONE (90)	SLIGHT (39)	MODERATE (16)	SERIOUS (12)	V SERIOUS (6)
9 Disturbing wildlife (fish birds animals)	NONE (117)	SLIGHT (21)	MODERATE (13)	SERIOUS (10)	V SERIOUS (2)
10 Splashing or attempting to splash others	NONE (118)	SLIGHT (27)	MODERATE (9)	SERIOUS (4)	V SERIOUS (5)

J Were there any activities other than those mentioned above that you consider were a

1 VERY SERIOUS INTERFERENCE? _____

2 SERIOUS INTERFERENCE? _____

3 MODERATE INTERFERENCE? _____

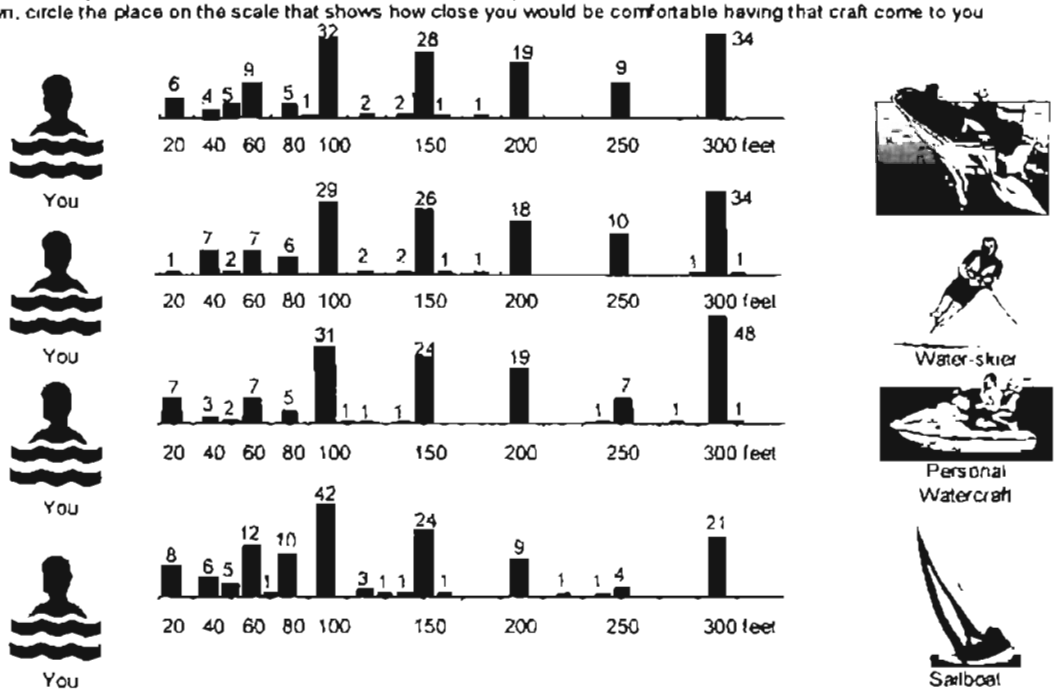
4 SLIGHT INTERFERENCE? _____

K. Choose the recreational activity that you most often associate with each of the practices listed below.

NO RECREATION TYPE - Circle NONE
BOAT FISHING - Circle FISHING
MOTOR BOATING - Circle MOTOR
WATER SKIING - Circle WATERSKI
PERSONAL WATERCRAFT (JET SKI) - Circle PWC
SAILING - Circle SAIL

1 Speeding in no wake zones	NONE (35)	FISHING (17)	MOTOR (48)	WATERSKI (14)	PWC (76)	SAIL (0)
2 Watercraft operated too close to each other.	NONE (27)	FISHING (5)	MOTOR (25)	WATERSKI (27)	PWC (104)	SAIL (0)
3 In-water refueling	NONE (101)	FISHING (6)	MOTOR (28)	WATERSKI (5)	PWC (37)	SAIL (0)
4 Cutting in front of others	NONE (42)	FISHING (3)	MOTOR (23)	WATERSKI (25)	PWC (94)	SAIL (2)
5 Moving too slowly	NONE (120)	FISHING (23)	MOTOR (0)	WATERSKI (0)	PWC (0)	SAIL (24)
6 Watercraft operated by underage drivers	NONE (49)	FISHING (1)	MOTOR (12)	WATERSKI (16)	PWC (104)	SAIL (4)
7 Wake jumping	NONE (36)	FISHING (1)	MOTOR (10)	WATERSKI (22)	PWC (107)	SAIL (0)
8 Making too much noise	NONE (90)	FISHING (8)	MOTOR (27)	WATERSKI (8)	PWC (40)	SAIL (0)
9 Disturbing wildlife (fish, birds, animals)	NONE (104)	FISHING (12)	MOTOR (23)	WATERSKI (10)	PWC (37)	SAIL (2)
10 Splashing or attempting to splash others	NONE (94)	FISHING (1)	MOTOR (5)	WATERSKI (8)	PWC (62)	SAIL (0)

L. Imagine that you are on a lake enjoying the activity you engage in most often. With each type of watercraft shown, circle the place on the scale that shows how close you would be comfortable having that craft come to you



Next I would like to ask you a few questions about your opinions on personal watercraft

M. Have you ever ridden on a personal watercraft? (Circle number)

1 NO (46)
2 YES
HOW MANY TIMES AS DRIVER? (84)
HOW MANY TIMES AS PASSENGER? (80)

N. In 1998, the National Park Service announced that it would ban personal watercraft on most of the waterways that it manages. What is your opinion of this decision?

_____

_____

O If you had a choice between visiting a lake where personal watercraft are permitted or visiting a similar lake where they are not permitted, which one would you prefer? (Circle number)

1 LAKE WHERE PERSONAL WATERCRAFT ARE PERMITTED ..... (82)
2 LAKE WHERE PERSONAL WATERCRAFT ARE NOT PERMITTED ..... (71)

P Do personal watercraft add to, detract from, or have no effect on your enjoyment of Lake Carl Blackwell? (Circle number)

1 ADD TO ENJOYMENT ..... (52)
2 DETRACT FROM ENJOYMENT ..... (58)
3 HAVE NO EFFECT ON ENJOYMENT ..... (51)

Finally, I would like to ask a few questions about yourself to help interpret the results.

Q. What is your sex? (Circle the number of your answer)

1 MALE ..... (62)
2 FEMALE ..... (101)

R What is your age? (Circle number)

1 18 TO 25 ..... (32)
2 26 TO 35 ..... (47)
3 36 TO 45 ..... (46)
4 46 TO 55 ..... (26)
5 56 TO 65 ..... (10)
6 66 OR OLDER ..... (2)

S Which category best describes the education you have completed? (Circle number)

1 8TH GRADE OR LESS ..... (8)
2 SOME HIGH SCHOOL ..... (0)
3 COMPLETED HIGH SCHOOL ..... (8)
4 TECHNICAL SCHOOL ..... (25)
5 SOME COLLEGE ..... (29)
6 ASSOCIATES DEGREE ..... (44)
7 BACHELORS DEGREE ..... (9)
8 GRADUATE STUDY ..... (29)

T Which category best describes the place where you live? (Circle number)

1 RURAL ..... (55)
2 LESS THAN 50,000 POPULATION ..... (57)
3 50,000 TO 99,000 POPULATION ..... (30)
4 100,000 TO 249 000 POPULATION ..... (5)
5 250,000 TO 499,000 POPULATION ..... (8)
6 500,000 TO 999,000 POPULATION ..... (3)
7 1,000,000 OR MORE POPULATION ..... (3)

Please return the completed survey to: Elaine Lynch, Department of Geography, 225 Scott Hall, Oklahoma State University, Stillwater, OK 74078-4073. Questions or comments may be directed to the same address. If you wish to receive a summary of the survey results, write "copy of results requested" on the back of the return envelope and print your name and address below it. Do not put this information on the questionnaire itself.

Appendix E-1 Survey instrument - Cover letter

OSU

College of Arts and Sciences
Department of Geography
Oklahoma State University
Stillwater, Oklahoma 74078-4076
(405) 744-6040 FAX (405) 744-5630

January 26, 2000

Mr. John Smith
1010 First Street
Hometown, OK 74001

Dear Mr. Smith:

The managers of lake resources want to provide a pleasant place for recreation activities, but they need information from lake users such as yourself to do this. Your name was selected in a random sample of use permit holders at Lake Carl Blackwell, Oklahoma to give your opinion on some water-based recreation issues. It is important that each questionnaire be completed and returned so that the study results will truly represent the opinions of lake users.

You must be 18 years of age or older to participate in this study. If you are not at least 18, please pass the questionnaire to someone in your household who is and has visited Lake Carl Blackwell, or return the blank questionnaire to me. Please return the completed questionnaire by February 29, 2000. You may be assured of complete confidentiality.

The results of this research will be made available to the managers of Lake Carl Blackwell and all interested parties. You may receive a summary of results by writing "copy of results requested" on the back of the return envelope and printing your name and address below it. Please do not put this information on the questionnaire itself.

I would be happy to answer any questions you might have. Please contact me at the address above. Your assistance with this study will be appreciated.

Sincerely,

Elaine Lynch
Graduate Student
Department of Geography

Bringing Dreams to Life

Appendix F-1 Perceived conflict levels by recreation activity.

	None	Slight	Moderate	Serious	VerySerious	Total
I-1 Speeding in no wake zones						
Actual Frequency						
Boater	42	28	9	3	1	83
PWC	15	13	3	0	0	31
Other	31	7	7	4	0	49
Total	88	48	19	7	1	163
Expected Frequency						
Boater	44 8098	24.4417	9.6748	3.5644	0 5092	
PWC	16 7362	9.1288	3.6135	1.3313	0 1902	
Other	28.4540	14.4294	5.7117	2.1043	0.3006	
Total	0.5399	0.2945	0.1166	0.0429	0.0061	
I-2 Operating too close to others						
Actual Frequency						
Boater	27	12	21	14	9	83
PWC	9	12	7	3	0	31
Other	24	12	5	5	3	49
Total	60	36	33	22	12	163
Expected Frequency						
Boater	30.5521	18 3313	16.8037	11.2025	6 1104	
PWC	11 4110	6.8466	6.2761	4.1840	2 2822	
Other	18.0368	10.8221	9.9202	6.6135	3 6074	
Total	0 3681	0.2209	0.2025	0.1350	0.0736	
I-3 In-water refueling						
Actual Frequency						
Boater	70	9	3	0	1	83
PWC	25	6	0	0	0	31
Other	47	1	1	0	0	49
Total	142	16	4	0	1	163
Expected Frequency						
Boater	72.3067	8.1472	2 0368	0 0000	0 5092	
PWC	27.0061	3.0429	0.7607	0.0000	0 1902	
Other	42 6871	4 8098	1.2025	0 0000	0.3006	
Total	0.8712	0 0982	0 0245	0.0000	0 0061	
I-4 Cutting in front of others						
Actual Frequency						
Boater	29	19	20	9	6	83
PWC	16	9	5	1	0	31
Other	29	12	4	4	0	49
Total	74	40	29	14	6	163
Expected Frequency						
Boater	37 6810	20 3681	14.7669	7 1288	3 0552	
PWC	14.0736	7.6074	5.5153	2.6626	1 1411	
Other	22.2454	12 0245	8 7178	4.2086	1 8037	
Total	0 4540	0 2454	0 1779	0.0859	0 0368	
I-5 Moving too slowly						
Actual Frequency						
Boater	67	14	2	0	0	83
PWC	27	3	1	0	0	31
Other	46	2	1	0	0	49
Total	140	19	4	0	0	163
Expected Frequency						
Boater	71.2883	9 6748	2.0368	0 0000	0 0000	
PWC	26.6258	3.6135	0 7607	0 0000	0 0000	
Other	42 0859	5 7117	1 2025	0 0000	0 0000	
Total	0 8589	0 1166	0 0245	0 0000	0 0000	

Appendix F-1 Perceived conflict levels by recreation activity - cont.

	None	Slight	Moderate	Serious	VerySerious	Total
I-6 Underage drivers						
Actual Frequency						
Boater	35	16	13	11	8	83
PWC	16	9	3	1	2	31
Other	31	6	4	7	1	49
Total	82	31	20	19	11	163
Expected Frequency						
Boater	41 7546	15.7853	10 1840	9.6748	5 6012	
PWC	15 5951	5 8957	3.8037	3.6135	2.0920	
Other	24.6503	9.3190	6.0123	5.7117	3.3067	
Total	0.5031	0 1902	0.1227	0.1166	0.0675	
I-7 Wake jumping						
Actual Frequency						
Boater	30	8	15	17	13	83
PWC	17	7	6	1	0	31
Other	35	5	6	2	1	49
Total	82	20	27	20	14	163
Expected Frequency						
Boater	41.7546	10.1840	13 7485	10 1840	7 1288	
PWC	15.5951	3.8037	5.1350	3 8037	2.6626	
Other	24.6503	6.0123	8 1166	6.0123	4.2086	
Total	0.5031	0 1227	0.1656	0.1227	0 0859	
I-8 Making too much noise						
Actual Frequency						
Boater	42	23	10	4	4	83
PWC	23	6	2	0	0	31
Other	25	10	4	8	2	49
Total	90	39	16	12	6	163
Expected Frequency						
Boater	45 8282	19 8589	8 1472	6 1104	3 0552	
PWC	17 1166	7.4172	3 0429	2 2822	1 1411	
Other	27.0552	11 7239	4 8098	3.6074	1 8037	
Total	0.5521	0 2393	0 0982	0 0736	0 0368	
I-9 Disturbing wildlife						
Actual Frequency						
Boater	59	10	7	7	0	83
PWC	27	4	0	0	0	31
Other	31	7	6	3	2	49
Total	117	21	13	10	2	163
Expected Frequency						
Boater	59 5767	10.6933	6 6196	5.0920	1.0184	
PWC	22 2515	3 9939	2 4724	1 9018	0.3804	
Other	35 1718	6.3129	3 9080	3.0061	0 6012	
Total	0.7178	0.1288	0 0798	0.0613	0 0123	
I-10 Splashing others						
Actual Frequency						
Boater	59	12	7	2	3	83
PWC	25	6	0	0	0	31
Other	34	9	2	2	2	49
Total	118	27	9	4	5	163
Expected Frequency						
Boater	60.0859	13.7485	4 5828	2 0368	2 5460	
PWC	22 4417	5 1350	1 7117	0 7607	0 9509	
Other	35.4724	8 1166	2 7055	1 2025	1 5031	
Total	0 7239	0 1656	0 0552	0 0245	0 0307	

Appendix F-2 Chi-square calculations for perceived conflict levels by recreation activity.

I-1 Speeding in no wake zones								
Actual Frequency	None	Slight	Moderate-Very Serious		Total		Chi-square	p-value
Boater	42	28	13		83		2.2358	0.6925
PWC	15	13	3		31		5.2984	0.2580
Other	31	7	11		49		9.0493	0.0599
Total	88	48	27		163			
Expected Frequency	None	Slight	Moderate-Very Serious					
Boater	44.8098	24.4417	13.7485					
PWC	16.7362	9.1288	5.1350					
Other	26.4540	14.4294	8.1166					
Total	0.5399	0.2945	0.1656					
I-2 Operating too close to others								
Actual Frequency	None	Slight	Moderate	Serious-Very Serious	Total		Chi-square	p-value
Boater	27	12	21	23	83		9.7037	0.1377
PWC	9	12	7	3	31		10.7440	0.0966
Other	24	12	5	8	49		9.0615	0.1701
Total	60	36	33	34	163			
Expected Frequency								
Boater	30.5521	18.3313	16.8037	17.3129				
PWC	11.4110	6.8466	6.2761	6.4663				
Other	18.0368	10.8221	9.9202	10.2209				
Total	0.3681	0.2209	0.2025	0.2086				
I-3 In-water refueling								
Actual Frequency	None	Slight-Very Serious			Total		Chi-square	p-value
Boater	70	13			83		1.5980	0.4498
PWC	25	6			31		2.5306	0.2821
Other	47	2			49		5.4392	0.0659
Total	142	21			163			
Expected Frequency								
Boater	72.3067	10.6933						
PWC	27.0061	3.9939						
Other	42.6871	6.3129						
Total	0.8712	0.1288						
I-4 Cutting in front of others								
Actual Frequency	None	Slight	Moderate	Serious-Very Serious	Total		Chi-square	p-value
Boater	29	19	20	15	83		10.6097	0.1012
PWC	16	9	5	1	31		5.7508	0.4517
Other	29	12	4	4	49		9.3948	0.1526
Total	74	40	29	20	163			
Expected Frequency								
Boater	37.6810	20.3681	14.7669	10.1840				
PWC	14.0736	7.6074	5.5153	3.8037				
Other	22.2454	12.0245	8.7178	6.0123				
Total	0.4540	0.2454	0.1779	0.1227				
I-5 Moving too slowly								
Actual Frequency	None	Slight-Very Serious			Total		Chi-square	p-value
Boater	67	16			83		3.4707	0.1763
PWC	27	4			31		0.3323	0.8469
Other	46	3			49		4.4469	0.1082
Total	140	23			163			
Expected Frequency								
Boater	71.2883	11.7117						
PWC	26.6258	4.3742						
Other	42.0859	6.9141						
Total	0.8589	0.1411						

Appendix F-2 Chi-square calculations for perceived conflict levels by recreation activity - cont.

I-6 Underage drivers							
Actual Frequency	None	Slight	Moderate	Serious-Very Serious	Total	Chi-square	p-value
Boater	35	16	13	19	83	5.9708	0.4265
PWC	16	9	3	3	31	6.4299	0.3768
Other	31	6	4	8	49	7.1495	0.3072
Total	82	31	20	30	163		
Expected Frequency							
Boater	41.7546	15.7853	10.1840	15.2761			
PWC	15.5951	5.8957	3.8037	5.7055			
Other	24.6503	9.3190	6.0123	9.0184			
Total	0.5031	0.1902	0.1227	0.1840			
I-7 Wake jumping							
Actual Frequency	None	Slight	Moderate	Serious-Very Serious	Total	Chi-square	p-value
Boater	30	8	15	30	83	18.9519	0.0042
PWC	17	7	6	1	31	12.3020	0.0556
Other	35	5	6	3	49	15.4273	0.0172
Total	82	20	27	34	163		
Expected Frequency							
Boater	41.7546	10.1840	13.7485	17.3129			
PWC	15.5951	3.8037	5.1350	6.4663			
Other	24.6503	6.0123	8.1166	10.2209			
Total	0.5031	0.1227	0.1656	0.2086			
I-8 Making too much noise							
Actual Frequency	None	Slight	Moderate-Very Serious		Total	Chi-square	p-value
Boater	42	23	18		83	2.4380	0.6558
PWC	23	6	2		31	8.7395	0.0680
Other	25	10	14		49	4.0062	0.4052
Total	90	39	34		163		
Expected Frequency							
Boater	45.8282	19.8589	17.3129				
PWC	17.1166	7.4172	6.4663				
Other	27.0552	11.7239	10.2209				
Total	0.5521	0.2393	0.2086				
I-9 Disturbing wildlife							
Actual Frequency	None	Slight-Moderate	Serious-Very Serious		Total	Chi-square	p-value
Boater	59	17	7		83	0.8469	0.9320
PWC	27	4	0		31	7.3126	0.1203
Other	31	13	5		49	6.9041	0.1410
Total	117	34	12		163		
Expected Frequency							
Boater	59.5767	17.3129	6.1104				
PWC	22.2515	6.4663	2.2822				
Other	35.1718	10.2209	10.2209				
Total	0.7178	0.2086	0.0736				
I-10 Splashing others							
Actual Frequency	None	Slight	Moderate-Very Serious		Total	Chi-square	p-value
Boater	59	12	12		83	2.9180	0.5716
PWC	25	6	0		31	6.8309	0.1451
Other	34	9	6		49	1.0940	0.8952
Total	118	27	18		163		
Expected Frequency							
Boater	60.0859	13.7485	9.1656				
PWC	22.4417	5.1350	3.4233				
Other	35.4724	8.1166	5.4110				
Total	0.7239	0.1656	0.1104				

Appendix G-1: Recreation types associated with problem behaviors.

	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-1 Speeding in no wake zones							
Actual Frequency							
Boater	18	6	22	6	39	0	91
PWC	4	3	11	2	15	0	35
Other	13	8	15	6	22	0	64
Total	35	17	48	14	76	0	190
Expected Frequency							
Boater	16.7632	8.1421	22.9895	6.7053	36.4000	0.0000	
PWC	6.4474	3.1316	8.8421	2.5789	14.0000	0.0000	
Other	11.7895	5.7263	16.1684	4.7158	25.6000	0.0000	
% of Total Responses	0.1842	0.0895	0.2526	0.0737	0.4000	0.0000	
	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-2 Operating too close to others							
Actual Frequency							
Boater	13	2	7	10	55	0	87
PWC	3	1	6	6	21	0	37
Other	11	2	12	11	28	0	64
Total	27	5	25	27	104	0	188
Expected Frequency							
Boater	12.4947	2.3138	11.5691	12.4947	48.1277	0.0000	
PWC	5.3138	0.9840	4.9202	5.3138	20.4681	0.0000	
Other	9.1915	1.7021	8.5106	9.1915	35.4043	0.0000	
% of Total Responses	0.1436	0.0266	0.1330	0.1436	0.5532	0.0000	
	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-3 In-water refueling							
Actual Frequency							
Boater	57	1	11	1	15	0	85
PWC	15	2	8	0	11	0	36
Other	29	3	9	4	11	0	56
Total	101	6	28	5	37	0	177
Expected Frequency							
Boater	48.5028	2.8814	13.4463	2.4011	17.7684	0.0000	
PWC	20.5424	1.2203	5.6949	1.0169	7.5254	0.0000	
Other	31.9548	1.8983	8.8588	1.5819	11.7062	0.0000	
% of Total Responses	0.5706	0.0339	0.1582	0.0282	0.2090	0.0000	
	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-4 Cutting in front of others							
Actual Frequency							
Boater	16	1	9	12	55	1	93
PWC	7	1	5	5	17	1	35
Other	19	1	9	8	22	0	59
Total	42	3	23	25	94	2	187
Expected Frequency							
Boater	20.8877	1.4920	11.4385	12.4332	46.7487	0.9947	
PWC	7.8610	0.5615	4.3048	4.6791	17.5936	0.3743	
Other	13.2513	0.9465	7.2567	7.8877	29.6578	0.6310	
% of Total Responses	0.2246	0.0160	0.1230	0.1337	0.5027	0.0107	
	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-5 Moving too slowly							
Actual Frequency							
Boater	62	8	0	0	0	14	70
PWC	21	5	0	0	0	6	26
Other	37	10	0	0	0	4	47
Total	120	23	0	0	0	24	143
Expected Frequency							
Boater	58.7413	11.2587	0.0000	0.0000	0.0000	11.7483	
PWC	21.8182	4.1818	0.0000	0.0000	0.0000	4.3636	
Other	39.4406	7.5594	0.0000	0.0000	0.0000	7.8881	
% of Total Responses	0.8392	0.1608	0.0000	0.0000	0.0000	0.1678	

Appendix G-1: Recreation types associated with problem behaviors. (cont.)

	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-6 Underage drivers							
Actual Frequency							
Boater	20	0	5	9	57	0	91
PWC	9	0	2	2	19	2	32
Other	20	1	5	5	28	2	59
Total	49	1	12	16	104	4	182
Expected Frequency							
Boater	24.5000	0.5000	6.0000	8.0000	52.0000	2.0000	
PWC	8.6154	0.1758	2.1099	2.8132	18.2857	0.7033	
Other	15.8846	0.3242	3.8901	5.1868	33.7143	1.2967	
% of Total Responses	0.2692	0.0055	0.0659	0.0879	0.5714	0.0220	
	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-7 Wake jumping							
Actual Frequency							
Boater	16	1	3	8	57	0	85
PWC	4	0	1	4	23	0	32
Other	16	0	6	10	27	0	59
Total	36	1	10	22	107	0	176
Expected Frequency							
Boater	17.3864	0.4830	4.8295	10.6250	51.6761	0.0000	
PWC	6.5455	0.1818	1.8182	4.0000	19.4545	0.0000	
Other	12.0682	0.3352	3.3523	7.3750	35.8693	0.0000	
% of Total Responses	0.2045	0.0057	0.0568	0.1250	0.6080	0.0000	
	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-8 Making too much noise							
Actual Frequency							
Boater	47	4	6	3	24	0	84
PWC	18	1	12	1	1	0	33
Other	25	3	9	4	15	0	56
Total	90	8	27	8	40	0	173
Expected Frequency							
Boater	43.6994	3.8844	13.1098	3.8844	19.4220	0.0000	
PWC	17.1676	1.5260	5.1503	1.5260	7.6301	0.0000	
Other	29.1329	2.5896	8.7399	2.5896	12.9480	0.0000	
% of Total Responses	0.5202	0.0462	0.1561	0.0462	0.2312	0.0000	
	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-9 Disturbing wildlife							
Actual Frequency							
Boater	56	4	8	3	17	1	88
PWC	24	3	3	1	4	1	35
Other	24	5	12	6	16	0	63
Total	104	12	23	10	37	2	186
Expected Frequency							
Boater	49.2043	5.6774	10.8817	4.7312	17.5054	0.9462	
PWC	19.5699	2.2581	4.3280	1.8817	6.9624	0.3763	
Other	35.2258	4.0645	7.7903	3.3871	12.5323	0.6774	
% of Total Responses	0.5591	0.0645	0.1237	0.0538	0.1989	0.0108	
	None	Fishing	Motor	Waterski	PWC	Sail	Total
K-10 Splashing others							
Actual Frequency							
Boater	46	1	1	3	32	0	83
PWC	19	0	2	1	10	0	32
Other	29	0	2	4	20	0	55
Total	94	1	5	8	62	0	170
Expected Frequency							
Boater	45.8941	0.4882	2.4412	3.9059	30.2706	0.0000	
PWC	17.6941	0.1882	0.9412	1.5059	11.6706	0.0000	
Other	30.4118	0.3235	1.6176	2.5882	20.0588	0.0000	
% of Total Responses	0.5529	0.0059	0.0294	0.0471	0.3647	0.0000	

Appendix G-2: Chi-square calculations for recreation types associated with problem behaviors.

K-1 Speeding in no wake zones						
Actual Frequency	None	Boating	PWC	Total	Chi-square	p-value
Boater-Actual	18	34	39	91	1.9470	0.7455
PWC-Actual	4	16	15	35	5.0599	0.2812
Other-Actual	22	29	54	105	4.3220	0.3642
Total	44	79	108	231		
Expected Frequency						
Boater-Expected	17.3333	31.1212	42.5455			
PWC-Expected	6.6667	11.9697	16.3636			
Other-Expected	20.0000	35.9091	49.0909			
% of Total Responses	0.1905	0.3420	0.4675			
K-2 Operating too close to others						
Actual Frequency	None	Boating	PWC			
Boater-Actual	13	19	55	87	1.3107	0.8596
PWC-Actual	3	13	21	37	5.7510	0.2185
Other-Actual	16	25	76	117	1.3981	0.8445
Total	32	57	152	241		
Expected Frequency						
Boater-Expected	11.5519	20.5768	54.8714			
PWC-Expected	4.9129	8.7510	23.3361			
Other-Expected	15.5353	27.6722	73.7925			
% of Total Responses	0.1328	0.2365	0.6307			
K-3 In-water refueling						
Actual Frequency	None	Boating	PWC			
Boater-Actual	57	13	15	85	3.2531	0.5164
PWC-Actual	15	10	11	36	9.6518	0.0467
Other-Actual	72	16	26	114	1.8498	0.7634
Total	144	39	52	235		
Expected Frequency						
Boater-Expected	52.0851	14.1064	18.8085			
PWC-Expected	22.0596	5.9745	7.9660			
Other-Expected	69.8553	18.9191	25.2255			
% of Total Responses	0.6128	0.1660	0.2213			
K-4 Cutting in front of others						
Actual Frequency	None	Boating	PWC			
Boater-Actual	16	23	55	94	1.7529	0.7811
PWC-Actual	7	12	17	36	5.7982	0.2147
Other-Actual	23	18	72	113	4.7143	0.3179
Total	46	53	144	243		
Expected Frequency						
Boater-Expected	17.7942	20.5021	55.7037			
PWC-Expected	6.8148	7.8519	21.3333			
Other-Expected	21.3909	24.6461	66.9630			
% of Total Responses	0.1893	0.2181	0.5926			
K-5 Moving too slowly						
Actual Frequency	None	Boating	PWC			
Boater-Actual	62	22	0	84		
PWC-Actual	21	11	0	32		
Other-Actual	83	14	0	97		
Total	166	47	0	213		
Expected Frequency						
Boater-Expected	65.4648	18.5352	0.0000			
PWC-Expected	24.9390	7.0610	0.0000			
Other-Expected	75.5962	21.4038	0.0000			
% of Total Responses	0.7793	0.2207	0.0000			

Appendix G-2: Chi-square calculations for recreation types associated with problem behaviors. (cont.)

K-6 Underage drivers						
Actual Frequency	None	Boating	PWC	Total	Chi-square	p-value
Boater-Actual	20	14	57	91	1 4380	0.8376
PWC-Actual	9	6	19	34	2.2685	0.6865
Other-Actual	29	13	76	118	2.0928	0 7187
Total	58	33	152	243		
Expected Frequency						
Boater-Expected	21 7202	12.3580	56.9218			
PWC-Expected	8 1152	4.6173	21.2675			
Other-Expected	28 1646	16.0247	73.8107			
% of Total Responses	0.2387	0.1358	0.6255			
K-7 Wake jumping						
Actual Frequency	None	Boating	PWC			
Boater-Actual	16	12	57	85	0.9355	0.9194
PWC-Actual	4	5	23	32	1.7702	0.7779
Other-Actual	20	16	80	116	0.2374	0 9935
Total	40	33	160	233		
Expected Frequency						
Boater-Expected	14.5923	12.0386	58.3691			
PWC-Expected	5.4936	4.5322	21.9742			
Other-Expected	19.9142	16.4292	79.6567			
% of Total Responses	0 1717	0.1416	0.6867			
K-8 Making too much noise						
Actual Frequency	None	Boating	PWC			
Boater-Actual	47	13	24	84	4 4776	0.3452
PWC-Actual	18	14	1	33	19.5308	0.0006
Other-Actual	65	16	25	106	3 0452	0.5503
Total	130	43	50	223		
Expected Frequency						
Boater-Expected	48 9686	16 1973	18.8341			
PWC-Expected	19.2377	6.3632	7.3991			
Other-Expected	61 7937	20.4395	23.7668			
% of Total Responses	0 5830	0 1928	0.2242			
	None	Fishing	PWC			
K-9 Disturbing wildlife						
Actual Frequency	None	Boating	PWC			
Boater-Actual	56	16	17	89	1 3688	0 8496
PWC-Actual	24	8	4	36	2 6338	0 6208
Other-Actual	80	23	21	124	0 1920	0 9957
Total	160	47	42	249		
Expected Frequency						
Boater-Expected	57 1888	16 7992	15 0120			
PWC-Expected	23 1325	6 7952	6 0723			
Other-Expected	79.6787	23 4056	20.9157			
% of Total Responses	0.6426	0 1888	0 1687			
K-10 Splashing others						
Actual Frequency	None	Boating	PWC			
Boater-Actual	46	5	32	83	0 7196	0 9489
PWC-Actual	19	3	10	32	2 4456	0 6544
Other-Actual	65	6	42	113	0 8284	0 9346
Total	130	14	84	228		
Expected Frequency						
Boater-Expected	47 3246	5 0965	30 5789			
PWC-Expected	18 2456	1.9649	11 7895			
Other-Expected	64 4298	6.9386	41 6316			
% of Total Responses	0 5702	0 0614	0.3684			

Appendix H-1 Perceived conflict levels by recreation experience

	None	Slight	Moderate	Serious	Very Serious		Total
I-1 Speeding in no wake zones							
Actual Frequency							
Short Time	12	6	0	0	0		18
Long Time	76	42	19	7	1		145
Total	88	48	19	7	1		163
Expected Frequency							
Short Time	9.7178	5 3006	2.0982	0.7730	0.1104		
Long Time	78.2822	42.6994	16.9018	6.2270	0.8896		
Total	0.5399	0.2945	0.1166	0.0429	0.0061		
I-2 Operating too close to others							
Actual Frequency							
Short Time	6	4	4	3	1		18
Long Time	54	32	29	19	11		145
Total	60	36	33	22	12		163
Expected Frequency							
Short Time	6.6258	3.9755	3.6442	2.4294	1.3252		
Long Time	53.3742	32.0245	29.3558	19.5706	10.6748		
Total	0.3681	0.2209	0.2025	0 1350	0.0736		
I-3 In-water refueling							
Actual Frequency							
Short Time	17	1	0	0	0		18
Long Time	125	15	4	0	1		145
Total	142	16	4	0	1		163
Expected Frequency							
Short Time	15 6810	1.7669	0.4417	0.0000	0.1104		
Long Time	126 3190	14.2331	3.5583	0 0000	0.8896		
Total	0 8712	0.0982	0 0245	0 0000	0.0061		
I-4 Cutting in front of others							
Actual Frequency							
Short Time	10	3	4	1	0		18
Long Time	64	37	25	13	6		145
Total	74	40	29	14	6		163
Expected Frequency							
Short Time	8 1718	4 4172	3.2025	1 5460	0 6626		
Long Time	65.8282	35.5828	25.7975	12 4540	5 3374		
Total	0 4540	0.2454	0.1779	0 0859	0.0368		
I-5 Moving too slowly							
Actual Frequency							
Short Time	17	1	0	0	0		18
Long Time	123	18	4	0	0		145
Total	140	19	4	0	0		163
Expected Frequency							
Short Time	15.4601	2.0982	0.4417	0 0000	0 0000		
Long Time	124.5399	16 9018	3 5583	0 0000	0 0000		
Total	0 8589	0 1166	0 0245	0 0000	0 0000		

Appendix H-1 Perceived conflict levels by recreation experience - cont.

	None	Slight	Moderate	Serious	Very Serious		Total
I-6 Underage drivers							
Actual Frequency							
Short Time	10	6	1	0	1		18
Long Time	72	25	19	19	10		145
Total	82	31	20	19	11		163
Expected Frequency							
Short Time	9.0552	3.4233	2.2086	2.0982	1.2147		
Long Time	72.9448	27.5767	17.7914	16.9018	9.7853		
Total	0.5031	0.1902	0.1227	0.1166	0.0675		
I-7 Wake jumping							
Actual Frequency							
Short Time	11	3	2	1	1		18
Long Time	71	17	25	19	13		145
Total	82	20	27	20	14		163
Expected Frequency							
Short Time	9.0552	2 2086	2.9816	2.2086	1.5460		
Long Time	72.9448	17.7914	24.0184	17.7914	12.4540		
Total	0.5031	0.1227	0 1656	0.1227	0 0859		
I-8 Making too much noise							
Actual Frequency							
Short Time	11	5	2	0	0		18
Long Time	79	34	14	12	6		145
Total	90	39	16	12	6		163
Expected Frequency							
Short Time	9 9387	4.3067	1 7669	1 3252	0.6626		
Long Time	80.0613	34.6933	14.2331	10.6748	5.3374		
Total	0.5521	0.2393	0.0982	0.0736	0 0368		
I-9 Disturbing wildlife							
Actual Frequency							
Short Time	15	3	0	0	0		18
Long Time	102	18	13	10	2		145
Total	117	21	13	10	2		163
Expected Frequency							
Short Time	12.9202	2.3190	1 4356	1.1043	0 2209		
Long Time	104.0798	18.6810	11 5644	8 8957	1 7791		
Total	0.7178	0.1288	0.0798	0 0613	0.0123		
I-10 Splashing others							
Actual Frequency							
Short Time	16	2	0	0	0		18
Long Time	102	25	9	4	5		145
Total	118	27	9	4	5		163
Expected Frequency							
Short Time	13 0307	2.9816	0.9939	0 4417	0.5521		
Long Time	104 9693	24 0184	8 0061	3 5583	4 4479		
Total	0 7239	0 1656	0 0552	0 0245	0 0307		

Appendix H-2 Chi-square calculations for perceived conflict levels by recreation experience

I-1 Speeding in no wake zones							
Actual Frequency	None	Slight	Moderate-Very Serious	Total		Chi-square	p-value
Short Time	12	6	0	18		3.6099	0.1645
Long Time	76	42	27	145		0.4481	0.7993
Total	88	48	27	163			
Expected Frequency							
Short Time	9.7178	5.3006	2.9816				
Long Time	78.2822	42.6994	24.0184				
Total	0.5399	0.2945	0.1656				
I-2 Operating too close to others							
Actual Frequency	None	Slight-Moderate	Serious-Very Serious	Total		Chi-square	p-value
Short Time	6	8	4	18		0.0941	0.9540
Long Time	54	61	30	145		0.0117	0.9942
Total	60	69	34	163			
Expected Frequency							
Short Time	6.6258	7.6196	3.7546				
Long Time	53.3742	61.3804	30.2454				
Total	0.3681	0.4233	0.2086				
I-3 In-water refueling							
Actual Frequency	None	Slight-Very Serious		Total		Chi-square	p-value
Short Time	17	1		18		0.8612	0.3534
Long Time	125	20		145		0.1069	0.7437
Total	142	21		163			
Expected Frequency							
Short Time	15.6810	2.3190					
Long Time	126.3190	18.6810					
Total	0.8712	0.1288					
I-4 Cutting in front of others							
Actual Frequency	None	Slight	Moderate-Very Serious	Total		Chi-square	p-value
Short Time	10	3	5	18		0.8949	0.6393
Long Time	64	37	44	145		0.1111	0.9460
Total	74	40	49	163			
Expected Frequency							
Short Time	8.1718	4.4172	5.4110				
Long Time	65.8282	35.5828	43.5890				
Total	0.4540	0.2454	0.3006				
I-5 Moving too slowly							
Actual Frequency	None	Slight-Very Serious		Total		Chi-square	p-value
Short Time	17	1		18		1.0870	0.2971
Long Time	123	22		145		0.1349	0.7134
Total	140	23		163			
Expected Frequency							
Short Time	15.4601	2.5399					
Long Time	124.5399	20.4601					
Total	0.8589	0.1411					

Appendix H-2 Chi-square calculations for perceived conflict levels by recreation experience - cont.

I-6 Underage drivers						
Actual Frequency	None	Slight-Moderate	Serious-Very Serious	Total	Chi-square	p-value
Short Time	10	7	1	18	2.0456	0.3596
Long Time	72	44	29	145	0.2539	0.8808
Total	82	51	30	163		
Expected Frequency						
Short Time	9.0552	5.6319	3.3129			
Long Time	72.9448	45.3681	26.6871			
Total	0.5031	0.3129	0.1840			
I-7 Wake jumping						
Actual Frequency	None	Slight-Moderate	Serious-Very Serious	Total	Chi-square	p-value
Short Time	11	5	2	18	1.2446	0.5367
Long Time	71	42	32	145	0.1545	0.9257
Total	82	47	34	163		
Expected Frequency						
Short Time	9.0552	5.1902	3.7546			
Long Time	72.9448	41.8098	30.2454			
Total	0.5031	0.2883	0.2086			
I-8 Making too much noise						
Actual Frequency	None	Slight-Very Serious		Total	Chi-square	p-value
Short Time	11	7		18	0.2531	0.6149
Long Time	79	66		145	0.0314	0.8593
Total	90	73		163		
Expected Frequency						
Short Time	9.9387	8.0613				
Long Time	80.0613	64.9387				
Total	0.5521	0.4479				
I-9 Disturbing wildlife						
Actual Frequency	None	Slight-Very Serious		Total	Chi-square	p-value
Short Time	15	3		18	1.1863	0.2761
Long Time	102	43		145	0.1473	0.7012
Total	117	46		163		
Expected Frequency						
Short Time	12.9202	5.0798				
Long Time	104.0798	40.9202				
Total	0.7178	0.2822				
I-10 Splashing others						
Actual Frequency	None	Slight-Very Serious		Total	Chi-square	p-value
Short Time	16	2		18	2.4509	0.1175
Long Time	102	43		145	0.3042	0.5812
Total	118	45		163		
Expected Frequency						
Short Time	13.0307	4.9693				
Long Time	104.9693	40.0307				
Total	0.7239	0.2761				

Appendix I-1 Perceived conflict levels by length of time visiting LCB

	None	Slight	Moderate	Serious	Very Serious		Total
I-1 Speeding in no wake zones							
Actual Frequency							
Short Time User	22	7	1	0	0		30
Long Time User	66	41	18	7	1		133
Total	88	48	19	7	1		163
Expected Frequency							
Short Time User	16 1963	8.8344	3 4969	1 2883	0.1840		
Long Time User	71.8037	39.1656	15.5031	5.7117	0.8160		
Total	0.5399	0.2945	0.1166	0.0429	0.0061		
I-2 Operating too close to others							
Actual Frequency							
Short Time User	17	6	5	1	1		30
Long Time User	43	30	28	21	11		133
Total	60	36	33	22	12		163
Expected Frequency							
Short Time User	11.0429	6.6258	6.0736	4.0491	2 2086		
Long Time User	48.9571	29.3742	26.9264	17.9509	9.7914		
Total	0 3681	0.2209	0.2025	0 1350	0 0736		
I-3 In-water refueling							
Actual Frequency							
Short Time User	29	0	0	0	1		30
Long Time User	113	16	4	0	0		133
Total	142	16	4	0	1		163
Expected Frequency							
Short Time User	26 1350	2.9448	0.7362	0 0000	0 1840		
Long Time User	115.8650	13.0552	3 2638	0.0000	0 8160		
Total	0.8712	0.0982	0 0245	0.0000	0 0061		
I-4 Cutting in front of others							
Actual Frequency							
Short Time User	22	5	3	0	0		30
Long Time User	52	35	26	14	6		133
Total	74	40	29	14	6		163
Expected Frequency							
Short Time User	13.6196	7 3620	5 3374	2 5767	1 1043		
Long Time User	60 3804	32 6380	23.6626	11.4233	4 8957		
Total	0 4540	0 2454	0 1779	0.0859	0 0368		
I-5 Moving too slowly							
Actual Frequency							
Short Time User	27	3	0	0	0		30
Long Time User	113	16	4	0	0		133
Total	140	19	4	0	0		163
Expected Frequency							
Short Time User	25 7669	3 4969	0 7362	0 0000	0 0000		
Long Time User	114.2331	15 5031	3 2638	0 0000	0 0000		
Total	0.8589	0.1166	0 0245	0 0000	0 0000		

Appendix I-1 Perceived conflict levels by length of time visiting LCB - cont.

	None	Slight	Moderate	Serious	Very Serious		Total
I-6 Underage drivers							
Actual Frequency							
Short Time User	21	4	2	2	1		30
Long Time User	61	27	18	17	10		133
Total	82	31	20	19	11		163
Expected Frequency							
Short Time User	15.0920	5.7055	3.6810	3.4969	2.0245		
Long Time User	66 9080	25.2945	16.3190	15 5031	8.9755		
Total	0.5031	0.1902	0.1227	0.1166	0.0675		
I-7 Wake jumping							
Actual Frequency							
Short Time User	19	2	5	4	0		30
Long Time User	63	18	22	16	14		133
Total	82	20	27	20	14		163
Expected Frequency							
Short Time User	15 0920	3.6810	4.9693	3 6810	2 5767		
Long Time User	66.9080	16.3190	22.0307	16.3190	11.4233		
Total	0 5031	0 1227	0 1656	0 1227	0 0859		
I-8 Making too much noise							
Actual Frequency							
Short Time User	19	7	1	1	2		30
Long Time User	71	32	15	11	4		133
Total	90	39	16	12	6		163
Expected Frequency							
Short Time User	16 5644	7 1779	2.9448	2 2086	1 1043		
Long Time User	73 4356	31 8221	13.0552	9 7914	4 8957		
Total	0.5521	0.2393	0 0982	0 0736	0 0368		
I-9 Disturbing wildlife							
Actual Frequency							
Short Time User	23	2	2	2	1		30
Long Time User	94	19	11	8	1		133
Total	117	21	13	10	2		163
Expected Frequency							
Short Time User	21.5337	3.8650	2.3926	1.8405	0 3681		
Long Time User	95.4663	17.1350	10.6074	8 1595	1 6319		
Total	0 7178	0 1288	0.0798	0 0613	0 0123		
I-10 Splashing others							
Actual Frequency							
Short Time User	27	0	3	0	0		30
Long Time User	91	27	6	4	5		133
Total	118	27	9	4	5		163
Expected Frequency							
Short Time User	21.7178	4.9693	1 6564	0 7362	0 9202		
Long Time User	96 2822	22 0307	7 3436	3 2638	4 0798		
Total	0.7239	0 1656	0 0552	0 0245	0 0307		

Appendix I-2 Chi-square calculations for perceived conflict levels by length of time visiting LCB

I-1 Speeding in no wake zones									
Actual Frequency	None	Slight	Moderate - Very Serious			Total		Chi-square	p-value
Short Time User	22	7	1			30		5.6311	0.0599
Long Time User	66	41	26			133		1.2702	0.5299
Total	88	48	27			163			
Expected Frequency									
Short Time User	18.1963	8.8344	4.9693						
Long Time User	71.8037	39.1656	22.0307						
Total	0.5399	0.2945	0.1656						
I-2 Operating too close to others									
Actual Frequency	None	Slight	Moderate	Serious-Very Serious		Total		Chi-square	p-value
Short Time User	17	6	5	2		30		6.3593	0.0954
Long Time User	43	30	28	32		133		1.4344	0.6975
Total	60	36	33	34		163			
Expected Frequency									
Short Time User	11.0429	6.6258	6.0736	6.2577					
Long Time User	48.9571	29.3742	26.9264	27.7423					
Total	0.3681	0.2209	0.2025	0.2086					
I-3 In-water refueling									
Actual Frequency	None	Slight-Very Serious				Total		Chi-square	p-value
Short Time User	29	1				30		2.4378	0.1184
Long Time User	113	20				133		0.5499	0.4584
Total	142	21				163			
Expected Frequency									
Short Time User	26.1350	3.8650							
Long Time User	115.8650	17.1350							
Total	0.8712	0.1288							
I-4 Cutting in front of others									
Actual Frequency	None	Slight	Moderate	Serious-Very Serious		Total		Chi-square	p-value
Short Time User	22	5	3	0		30		10.6190	0.0140
Long Time User	52	35	26	20		133		2.3953	0.4945
Total	74	40	29	20		163			
Expected Frequency									
Short Time User	13.6196	7.3620	5.3374	3.6810					
Long Time User	60.3804	32.6380	23.6626	16.3190					
Total	0.4540	0.2454	0.1779	0.1227					
I-5 Moving too slowly									
Actual Frequency	None	Slight-Very Serious				Total		Chi-square	p-value
Short Time User	27	3				30		0.4182	0.5178
Long Time User	113	20				133		0.0943	0.7587
Total	140	23				163			
Expected Frequency									
Short Time User	25.7669	4.2331							
Long Time User	114.2331	18.7669							
Total	0.8589	0.1411							

Appendix I-2 Chi-square calculations for perceived conflict levels by length of time visiting LCB - cont.

I-6 Underage drivers									
Actual Frequency	None	Slight	Moderate	Serious-Very Serious		Total		Chi-square	p-value
Short Time User	21	4	2	3		30		4.7417	0.1917
Long Time User	61	27	18	27		133		1.0696	0.7844
Total	82	31	20	30		163			
Expected Frequency									
Short Time User	15.0920	5.7055	3.6810	5.5215					
Long Time User	66.9080	25.2945	16.3190	24.4785					
Total	0.5031	0.1902	0.1227	0.1840					
I-7 Wake jumping									
Actual Frequency	None	Slight-Moderate	Serious-Very Serious			Total		Chi-square	p-value
Short Time User	19	7	4			30		2.1413	0.3428
Long Time User	63	40	30			133		0.4830	0.7854
Total	82	47	34			163			
Expected Frequency									
Short Time User	15.0920	8.6503	6.2577						
Long Time User	66.9080	38.3497	27.7423						
Total	0.5031	0.2883	0.2086						
I-8 Making too much noise									
Actual Frequency	None	Slight	Moderate-Very Serious			Total		Chi-square	p-value
Short Time User	19	7	4			30		1.1771	0.5551
Long Time User	71	32	30			133		0.2655	0.8757
Total	90	39	34			163			
Expected Frequency									
Short Time User	16.5644	7.1779	6.2577						
Long Time User	73.4356	31.8221	27.7423						
Total	0.5521	0.2393	0.2086						
I-9 Disturbing wildlife									
Actual Frequency	None	Slight-Moderate	Serious-Very Serious			Total		Chi-square	p-value
Short Time User	23	4	3			30		1.1980	0.5494
Long Time User	94	30	9			133		0.2702	0.8736
Total	117	34	12			163			
Expected Frequency									
Short Time User	21.5337	8.2577	2.2086						
Long Time User	95.4663	27.7423	9.7914						
Total	0.7178	0.2086	0.0736						
I-10 Splashing others									
Actual Frequency	None	Slight-Very Serious				Total		Chi-square	p-value
Short Time User	27	3				30		4.6536	0.0310
Long Time User	91	42				133		1.0497	0.3056
Total	118	45				163			
Expected Frequency									
Short Time User	21.7178	8.2822							
Long Time User	96.2822	36.7178							
Total	0.7239	0.2761							

Appendix J-1 Perceived conflict levels by distance of residence from LCB

	None	Slight	Moderate	Serious	Very Serious		Total
I-1 Speeding in no wake zones							
Actual Frequency							
Local	42	26	12	3	1		84
Non-Local	46	22	7	4	0		79
Total	88	48	19	7	1		163
Expected Frequency							
Local	45.3497	24.7362	9 7914	3 6074	0.5153		
Non-Local	42.6503	23.2638	9 2086	3.3926	0 4847		
Total	0.5399	0.2945	0 1166	0.0429	0.0061		
I-2 Operating too close to others							
Actual Frequency							
Local	20	21	19	16	8		84
Non-Local	40	15	14	6	4		79
Total	60	36	33	22	12		163
Expected Frequency							
Local	30.9202	18 5521	17 0061	11.3374	6.1840		
Non-Local	29 0798	17.4479	15.9939	10 6626	5 8160		
Total	0.3681	0.2209	0.2025	0.1350	0.0736		
I-3 In-water refueling							
Actual Frequency							
Local	71	10	3	0	0		84
Non-Local	71	6	1	0	1		79
Total	142	16	4	0	1		163
Expected Frequency							
Local	73.1779	8 2454	2.0613	0 0000	0 5153		
Non-Local	68.8221	7 7546	1 9387	0 0000	0 4847		
Total	0.8712	0 0982	0 0245	0 0000	0 0061		
I-4 Cutting in front of others							
Actual Frequency							
Local	29	23	20	8	4		84
Non-Local	45	17	9	6	2		79
Total	74	40	29	14	6		163
Expected Frequency							
Local	38.1350	20 6135	14 9448	7 2147	3 0920		
Non-Local	35.8650	19.3865	14 0552	6.7853	2 9080		
Total	0 4540	0 2454	0.1779	0 0859	0 0368		
I-5 Moving too slowly							
Actual Frequency							
Local	68	14	2	0	0		84
Non-Local	72	5	2	0	0		79
Total	140	19	4	0	0		163
Expected Frequency							
Local	72 1472	9 7914	2 0613	0 0000	0 0000		
Non-Local	67 8528	9.2086	1 9387	0 0000	0 0000		
Total	0 8589	0 1166	0 0245	0 0000	0 0000		

Appendix J-1 Perceived conflict levels by distance of residence from LCB - cont.

	None	Slight	Moderate	Serious	Very Serious		Total
I-6 Underage drivers							
Actual Frequency							
Local	36	19	9	14	6		84
Non-Local	46	12	11	5	5		79
Total	82	31	20	19	11		163
Expected Frequency							
Local	42.2577	15.9755	10.3067	9.7914	5.6687		
Non-Local	39 7423	15.0245	9.6933	9.2086	5.3313		
Total	0.5031	0.1902	0 1227	0.1166	0.0675		
I-7 Wake jumping							
Actual Frequency							
Local	36	13	16	11	8		84
Non-Local	46	7	11	9	6		79
Total	82	20	27	20	14		163
Expected Frequency							
Local	42.2577	10.3067	13.9141	10.3067	7.2147		
Non-Local	39 7423	9 6933	13.0859	9 6933	6 7853		
Total	0.5031	0 1227	0.1656	0 1227	0 0859		
I-8 Making too much noise							
Actual Frequency							
Local	46	23	6	6	3		84
Non-Local	44	16	10	6	3		79
Total	90	39	16	12	6		163
Expected Frequency							
Local	46 3804	20 0982	8 2454	6 1840	3 0920		
Non-Local	43 6196	18 9018	7 7546	5 8160	2 9080		
Total	0 5521	0 2393	0.0982	0 0736	0 0368		
I-9 Disturbing wildlife							
Actual Frequency							
Local	58	11	10	4	1		84
Non-Local	59	10	3	6	1		79
Total	117	21	13	10	2		163
Expected Frequency							
Local	60 2945	10 8221	6 6994	5.1534	1 0307		
Non-Local	56.7055	10 1779	6 3006	4 8466	0 9693		
Total	0 7178	0.1288	0 0798	0 0613	0 0123		
I-10 Splashing others							
Actual Frequency							
Local	55	19	5	1	4		84
Non-Local	63	8	4	3	1		79
Total	118	27	9	4	5		163
Expected Frequency							
Local	60 8098	13 9141	4 6380	2 0613	2 5767		
Non-Local	57 1902	13 0859	4 3620	1 9387	2 4233		
Total	0.7239	0 1656	0 0552	0 0245	0 0307		

Appendix J-2 Chi-square calculations for perceived conflict levels by distance of residence from LCB

I-1 Speeding in no wake zones									
Actual Frequency	None	Slight	Moderate	Serious-Very Serious		Total		Chi-square	p-value
Local	42	26	12	4		84		0.8138	0 8462
Non-Local	46	22	7	4		79		0.8653	0 8338
Total	88	48	19	8		163			
Expected Frequency									
Local	45.3497	24 7362	9 7914	4 1227					
Non-Local	42.6503	23.2638	9.2086	3.8773					
Total	0.5399	0.2945	0 1166	0.0491					
I-2 Operating too close to others									
Actual Frequency	None	Slight	Moderate	Serious	Very Serious	Total		Chi-square	p-value
Local	20	21	19	16	8	84		6.8643	0 1432
Non-Local	40	15	14	6	4	79		7.2987	0 1209
Total	60	36	33	22	12	163			
Expected Frequency									
Local	30.9202	18.5521	17 0061	11.3374	6 1840				
Non-Local	29.0798	17.4479	15.9939	10.6626	5 8160				
Total	0.3681	0.2209	0.2025	0 1350	0.0736				
I-3 In-water refueling									
Actual Frequency	None	Slight	Moderate-Very Serious			Total		Chi-square	p-value
Local	71	10	3			84		0.5077	0 7758
Non-Local	71	6	2			79		0 5399	0 7634
Total	142	16	5			163			
Expected Frequency									
Local	73 1779	8.2454	2 5767						
Non-Local	68 8221	7 7546	2.4233						
Total	0.8712	0.0982	0 0307						
I-4 Cutting in front of others									
Actual Frequency	None	Slight	Moderate	Serious	Very Serious	Total		Chi-square	p-value
Local	29	23	20	8	4	84		4 5266	0 3394
Non-Local	45	17	9	6	2	79		4 8131	0 3070
Total	74	40	29	14	6	163			
Expected Frequency									
Local	38 1350	20 6135	14 9448	7 2147	3 0920				
Non-Local	35.8650	19 3885	14.0552	6 7853	2 9080				
Total	0 4540	0 2454	0 1779	0 0859	0 0368				
I-5 Moving too slowly									
Actual Frequency	None	Slight-Very Serious				Total		Chi-square	p-value
Local	68	16				84		1 6895	0 1937
Non-Local	72	7				79		1 7964	0 1801
Total	140	23				163			
Expected Frequency									
Local	72 1472	11 8528							
Non-Local	67 8528	11 1472							
Total	0 8589	0 1411							

Appendix J-2 Chi-square calculations for perceived conflict levels by distance of residence from LCB - cont.

I-6 Underage drivers									
Actual Frequency	None	Slight	Moderate	Serious	Very Serious	Total		Chi-square	p-value
Local	36	19	9	14	6	84		3 4933	0 4789
Non-Local	46	12	11	5	5	79		3.7144	0 4460
Total	82	31	20	19	11	163			
Expected Frequency									
Local	42 2577	15.9755	10.3067	9.7914	5.8687				
Non-Local	39 7423	15.0245	9 6933	9 2086	5.3313				
Total	0 5031	0 1902	0 1227	0 1166	0.0675				
I-7 Wake jumping									
Actual Frequency	None	Slight	Moderate	Serious	Very Serious	Total		Chi-square	p-value
Local	36	13	16	11	8	84		2 0752	0 7219
Non-Local	46	7	11	9	6	79		2 2068	0 6978
Total	82	20	27	20	14	163			
Expected Frequency									
Local	42 2577	10.3067	13.8141	10.3067	7 2147				
Non-Local	39.7423	9 6933	13.0859	9 6933	6.7853				
Total	0 5031	0 1227	0 1656	0.1227	0.0859				
I-8 Making too much noise									
Actual Frequency	None	Slight	Moderate	Serious	Very Serious	Total		Chi-square	p-value
Local	46	23	6	6	3	84		1 0418	0 9034
Non-Local	44	16	10	6	3	79		1 1077	0.8930
Total	90	39	16	12	6	163			
Expected Frequency									
Local	46.3804	20.0982	8 2454	6 1840	3.0920				
Non-Local	43.6196	18 9018	7.7546	5.8160	2 9080				
Total	0.5521	0 2393	0 0982	0 0736	0.0368				
I-9 Disturbing wildlife									
Actual Frequency	None	Slight	Moderate	Serious-Very Serious		Total		Chi-square	p-value
Local	58	11	10	5		84		1 9431	0 5843
Non-Local	59	10	3	7		79		2 0661	0 5588
Total	117	21	13	12		163			
Expected Frequency									
Local	60 2945	10 8221	6 6994	6 1840					
Non-Local	56.7055	10 1779	6.3006	5 8160					
Total	0 7178	0 1288	0 0798	0 0736					
I-10 Splashing others									
Actual Frequency	None	Slight	Moderate	Serious-Very Serious		Total		Chi-square	p-value
Local	55	19	6	4		84		3 2733	0 3514
Non-Local	63	8	7	1		79		3 4805	0 3233
Total	118	27	13	5		163			
Expected Frequency									
Local	60.8098	13 9141	6 6994	2 5767					
Non-Local	57 1902	13 0859	6 3006	2 4233					
Total	0 7239	0 1656	0 0798	0 0307					

Appendix K-1 Perceived conflict levels by population of place of residence

	None	Slight	Moderate	Serious	Very Serious		Total
I-1 Speeding in no wake zones							
Actual Frequency							
Small Urban	74	43	19	5	1		142
Large Urban	13	4	0	2	0		19
Total	87	47	19	7	1		161
Expected Frequency							
Small Urban	76.7329	41.4534	16.7578	6.1739	0.8820		
Large Urban	10.2671	5.5466	2.2422	0.8261	0.1180		
Total	0.5404	0 2919	0.1180	0.0435	0.0062		
I-2 Operating too close to others							
Actual Frequency							
Small Urban	51	32	28	21	10		142
Large Urban	9	3	4	1	2		19
Total	60	35	32	22	12		161
Expected Frequency							
Small Urban	52 9193	30.8696	28 2236	19 4037	10.5839		
Large Urban	7.0807	4.1304	3.7764	2.5963	1 4161		
Total	0.3727	0.2174	0 1988	0.1366	0 0745		
I-3 In-water refueling							
Actual Frequency							
Small Urban	121	16	4	0	1		142
Large Urban	19	0	0	0	0		19
Total	140	16	4	0	1		161
Expected Frequency							
Small Urban	123 4783	14 1118	3.5280	0 0000	0 8820		
Large Urban	16.5217	1 8882	0 4720	0 0000	0 1180		
Total	0.8696	0 0994	0 0248	0.0000	0.0062		
I-4 Cutting in front of others							
Actual Frequency							
Small Urban	63	35	24	14	6		142
Large Urban	11	4	4	0	0		19
Total	74	39	28	14	6		161
Expected Frequency							
Small Urban	65 2671	34 3975	24.6957	12 3478	5 2919		
Large Urban	8.7329	4.6025	3 3043	1 6522	0 7081		
Total	0 4596	0 2422	0 1739	0 0870	0.0373		
I-5 Moving too slowly							
Actual Frequency							
Small Urban	120	18	4	0	0		142
Large Urban	18	1	0	0	0		19
Total	138	19	4	0	0		161
Expected Frequency							
Small Urban	121.7143	16.7578	3 5280	0 0000	0 0000		
Large Urban	16.2857	2 2422	0 4720	0.0000	0 0000		
Total	0 8571	0 1180	0 0248	0.0000	0 0000		

Appendix K-1 Perceived conflict levels by population of place of residence - cont.

	None	Slight	Moderate	Serious	Very Serious		Total
I-6 Underage drivers							
Actual Frequency							
Small Urban	68	29	18	17	10		142
Large Urban	12	2	2	2	1		19
Total	80	31	20	19	11		161
Expected Frequency							
Small Urban	70.5590	27.3416	17.6398	16.7578	9.7019		
Large Urban	9.4410	3.6584	2.3602	2.2422	1.2981		
Total	0.4969	0.1925	0.1242	0.1180	0.0683		
I-7 Wake jumping							
Actual Frequency							
Small Urban	72	17	21	19	13		142
Large Urban	10	2	5	1	1		19
Total	82	19	26	20	14		161
Expected Frequency							
Small Urban	72.3230	16.7578	22.9317	17.6398	12.3478		
Large Urban	9.6770	2.2422	3.0683	2.3602	1.6522		
Total	0.5093	0.1180	0.1615	0.1242	0.0870		
I-8 Making too much noise							
Actual Frequency							
Small Urban	77	34	15	11	5		142
Large Urban	12	4	1	1	1		19
Total	89	38	16	12	6		161
Expected Frequency							
Small Urban	78.4969	33.5155	14.1118	10.5839	5.2919		
Large Urban	10.5031	4.4845	1.8882	1.4161	0.7081		
Total	0.5528	0.2360	0.0994	0.0745	0.0373		
I-9 Disturbing wildlife							
Actual Frequency							
Small Urban	100	19	13	9	1		142
Large Urban	15	2	0	1	1		19
Total	115	21	13	10	2		161
Expected Frequency							
Small Urban	101.4286	18.5217	11.4658	8.8199	1.7640		
Large Urban	13.5714	2.4783	1.5342	1.1801	0.2360		
Total	0.7143	0.1304	0.0807	0.0621	0.0124		
I-10 Splashing others							
Actual Frequency							
Small Urban	102	25	8	2	5		142
Large Urban	14	2	1	2	0		19
Total	116	27	9	4	5		161
Expected Frequency							
Small Urban	102.3106	23.8137	7.9379	3.5280	4.4099		
Large Urban	13.6894	3.1863	1.0621	0.4720	0.5901		
Total	0.7205	0.1677	0.0559	0.0248	0.0311		

Appendix K-2 Chi-square calculations for perceived conflict levels by population of place of residence

I-1 Speeding in no wake zones								
Actual Frequency	None	Slight	Moderate-Very Serious		Total		Chi-square	p-value
Small Urban	74	43	25		142		0.2141	0.8985
Large Urban	13	4	2		19		1.6004	0.4492
Total	87	47	27		181			
Expected Frequency								
Small Urban	76.7329	41.4534	23.8137					
Large Urban	10.2671	5.5466	3.1863					
Total	0.5404	0.2919	0.1677					
I-2 Operating too close to others								
Actual Frequency	None	Slight-Moderate	Serious-Very Serious		Total		Chi-square	p-value
Small Urban	51	60	31		142		0.1177	0.9428
Large Urban	9	7	3		19		0.8797	0.6441
Total	60	67	34		161			
Expected Frequency								
Small Urban	52.9193	59.0932	29.9876					
Large Urban	7.0807	7.9068	4.0124					
Total	0.3727	0.4161	0.2112					
I-3 In-water refueling								
Actual Frequency	None	Slight-Very Serious			Total		Chi-square	p-value
Small Urban	121	21			142		0.3813	0.5369
Large Urban	19	0			19		2.8500	0.0914
Total	140	21			161			
Expected Frequency								
Small Urban	123.4783	18.5217						
Large Urban	16.5217	2.4783						
Total	0.8696	0.1304						
I-4 Cutting in front of others								
Actual Frequency	None	Slight-Moderate	Serious-Very Serious		Total		Chi-square	p-value
Small Urban	63	59	20		142		0.3947	0.8209
Large Urban	11	8	0		19		2.9499	0.2288
Total	74	67	20		161			
Expected Frequency								
Small Urban	65.2671	59.0932	17.6398					
Large Urban	8.7329	7.9068	2.3602					
Total	0.4596	0.4161	0.1242					
I-5 Moving too slowly								
Actual Frequency	None	Slight-Very Serious			Total		Chi-square	p-value
Small Urban	120	22			142		0.1690	0.6810
Large Urban	18	1			19		1.2632	0.2611
Total	138	23			161			
Expected Frequency								
Small Urban	121.7143	20.2857						
Large Urban	16.2857	2.7143						
Total	0.8571	0.1429						

Appendix K-2 Chi-square calculations for perceived conflict levels by population of place of residence - cont.

I-6 Underage drivers								
Actual Frequency	None	Slight-Moderate	Serious-Very Serious		Total		Chi-square	p-value
Small Urban	68	47	27		142		0.1944	0.9074
Large Urban	12	4	3		19		1.4531	0.4836
Total	80	51	30		161			
Expected Frequency								
Small Urban	70.5590	44.9814	26.4596					
Large Urban	9.4410	6.0186	3.5404					
Total	0.4969	0.3168	0.1863					
I-7 Wake jumping								
Actual Frequency	None	Slight-Moderate	Serious-Very Serious		Total		Chi-square	p-value
Small Urban	72	38	32		142		0.2084	0.9010
Large Urban	10	7	2		19		1.5576	0.4590
Total	82	45	34		161			
Expected Frequency								
Small Urban	72.3230	39.6894	29.9876					
Large Urban	9.6770	5.3106	4.0124					
Total	0.5093	0.2795	0.2112					
I-8 Making too much noise								
Actual Frequency	None	Slight-Moderate	Serious-Very Serious		Total		Chi-square	p-value
Small Urban	77	49	16		142		0.0691	0.9661
Large Urban	12	5	2		19		0.5163	0.7725
Total	89	54	18		161			
Expected Frequency								
Small Urban	78.4969	47.6273	15.8758					
Large Urban	10.5031	6.3727	2.1242					
Total	0.5528	0.3354	0.1118					
I-9 Disturbing wildlife								
Actual Frequency	None	Slight-Very Serious			Total		Chi-square	p-value
Small Urban	100	42			142		0.0704	0.7907
Large Urban	15	4			19		0.5263	0.4682
Total	115	46			161			
Expected Frequency								
Small Urban	101.4286	40.5714						
Large Urban	13.5714	5.4286						
Total	0.7143	0.2857						
I-10 Splashing others								
Actual Frequency	None	Slight-Very Serious			Total		Chi-square	p-value
Small Urban	102	40			142		0.0034	0.9537
Large Urban	14	5			19		0.0252	0.8739
Total	116	45			161			
Expected Frequency								
Small Urban	102.3105	39.6894						
Large Urban	13.6894	5.3106						
Total	0.7205	0.2795						

Appendix L Interferences reported in comment section (Quoted as written on questionnaire)

Very Serious

- Jet ski's coming in to close.
- Boat observed trimed all the way driver had no vision in front of her.
- Personel water craft following in your wake when you have a skier behind you.
- Wave runners following boats too closely, operating in unsafe manner.
- There are lots of cops trying to give people tickets for things that don't matter.
- PWC drivers not paying attention and driving recklessly in general. They need their own area.
- Had car broken into & items stolen from camp.
- Dirty toilet areas.
- Unclear rules & enforcement. Educate instead of irradicate (OSU should adopt this policy).
- Dirty restroom. The last $price increase should to something about this! Don't you think so? It would make us go boating more often.
- Disrespectful Jetski operators.
- Jet ski's.
- Drinking & operating a boat/ski jet.
- Underage children operating jetskis, cutting in front and across wake of skiers/boats.
- (Fuel) was not open when I was there.
- Jet skis and wave runners.
- Not having an area for waverunners or jet ski to stay confined in.
- Drinking & driving water crafts & vehicles.
- Operators of p.w.c. & boats not obeying right of way laws.
- I am concerned with the personal watercrafts these people operating these vehicles have no concern for others well being.
- Campers next to us stole our beer; orig. site was "double-booked".
- Not enough boat ramps.
- Jet ski's returning to swimming area.

- People coming into campsites for several hours after midnight. Very very loud.
- Young people drinking & bothering overnight campers - coming in late after hours.
- Driving too fast in camping areas.
- After hours kids partying at boat ramp.
- Drunk people - ? no Police available.
- Adults as well as kids not knowing the rules of the lake but operating watercraft of any kinds. Also operating watercraft (PWC mainly) w/out knowing how dangerous they can be. The risks are high of injury.
- People driving boats & watercraft while intoxicated – only happened twice.
- Too few camping areas c electric.
- Boats that pull skiers, tubes, etc. They turn to go pick up the person that has fallen & don't bother looking to see if anyone is around. Last year we had to avoid accidents, due to their neglegence. We were legal, it was the way they made their turns.
- Speeding cars.
- Too close to shore.
- Fees to high.
- Watercraft to close to swiming on bank.
- Jetskis (riders often pay no attention).
- Wave Runners, to fast to close, to young operaters.
- Motorized craft not recognizing and/or obeying right-of-way rules, especially with regard to non-motorized craft.
- Nudity (Womans bathing suits not covering breast or groan area).
- Being disturbed and stolen from while camping .

<u>Serious</u>

- Late night noise for rowdy campers.
- Inappropriate handling of jet ski's.
- -Waverunners-
- Gnats at night.

- Not enough trash cans on holidays.
- The water is disgusting.
- Dirty picnic tables. The last $price increase should to something about this! Don't you think so? It would make us go boating more often.
- Pulling boats to shore w/o regard to swimmers.
- Floating on watercraft & boats in high traffic areas.
- Depree in lake.
- Dirty bathrooms -- Speeding motor vehicles.
- Jet skis operating to close to shore, speeding in wake zone, by camping grounds.
- Skinny dipping & no Police available.
- Boats comming to close while fishing.
- To many watercraft in one area.
- Keep wildlife away from camping spots (skunks, possumes, armdillows) or do the best you all can.
- No water in camping areas.
- Boats to close to swiming on bank.
- A couple of years ago while fishing from bank a person with water craft kept speeding to close to where we were fishing. Last year (summer) while fishing from bank, the bass began biting and we caught a few fish (one 4 lb black bass) then a ski boat came verry close and began to make three sharp circles, towing a skiier; and we did not get another bite that day.
- Boats with or without skiers to close to the banks. Same with PWC.

Moderate

- Personal watercrafts speeding close to shore.
- Drunk people.
- Noise made after quiet hours while camping!
- Some heavy drinking.
- Need more police patrolling on campsites at night.
- Trashy campsites.
- Swimmers swimming to far out.

- Boat dock access.
- Driving (boating) too close to canoes on the lake.
- People under alcoholic influence.
- Kids, running loss after dark going threw other camp grounds.
- Fishing at swimming area.
- People drinking/throwing containers on ground.
- People fighting - I some to many of those!

Slight

- Dog leash laws.
- People comming to the swimming area with jet ski.
- Trash.
- PWC close to bank fishing.
- Not enough restrooms with running water.
- Toilets all tipped or clogged. Prank.
- Dog fighting - a few times I seen some very bloody fight, my six year old daughter was very disturbed by the sight of blood!
- People blocked boat ramp unnecessarily.

Appendix M Opinions on NPS PWC Ban (Quoted as written on questionnaire)

- I don't think its fare to ban them, just limit where they can be operated.
- Sounds good to me.
- All taxpayers have the right to use these parks.
- I don't think they should be banned, but maybe limited at to numbers.
- I think they need their own marked place on the lake, away from boating, swimming & fishing.
- None - Don't use PWC's , but don't particularly mind them.
- I think it was irresponsible. If they are having problems with PWC's, then they need to find a better solution than just banning it. (P. Have no effect on enjoyment - if used & managed responsibly.)
- No don't ban them. Give them special areas. (P. Add to enjoyment - if kept their distance.)
- Good decision.
- People choose different types of rec. I have no problem if rules are followed.
- Fine with me.
- To harsh. Just give them their own area.
- Stricter rules should be created and enforced instead of a ban.
- I think there should be a maximum amount to prevent accidents.
- I don't think its fair. As long a driver is smart and responsible, PWC's should be allowed.
- I agree with it.
- Okay in the right place with the right facilities. (P. Either way depending on my plans to camp or fish.
- There is no controling the people that drive them. They are dangerous. I totally agree with ban. That is also reason we use McMurtry.
- No opinion.
- I have noticed oil build up from said crafts around the edges on the banks of the Lakes, Not pleasant to swim in or around.
- Obviously I am against it. I am ** years old w/* grown children and grandchildren who all enjoy a day on the lake w/the 2 Sea Doo's . We are safe and thoughtfull PWC operators. While I see others who use poor judgment I think it is an enforcement issue. If lake manges ticket those who abuse the priviledge you can stop it. I saw it happen on Lake Tinkiller where I owned a lake home. Set the rules and make those who break the rules pay

fines substantial enough to make your point. I too am a fisherman. If you want to protect the fisherman set a time during which the PWC's can't be on the lake ie before 8:00 AM & after 4:00 PM. (* - information withheld for privacy reasons)

- It feel it is a very good idea. and I hope they get on the ball with this issue.
- It's unfair. We pay usage fees like everyone else & should have the same rights. It's bad enough that the price is so much higher for PWC.
- I think there are too many rules, regulations and bans now. We don't need more!
- I believe that parks are for recreational activities and enjoying a personal watercraft at park is a priviledge and should be allowed to continue.
- Personal watercraft have taken over much of the smaller lakes.
- I agree with the ban – we nee designated areas or lakes only for PWC.
- I don't think that is right/ Personal watercrafts are enjoyable. I think that there should be age limits to who can manage the watercraft (15+ yrs.).
- I think that this is really unfair, because the people that have PWC, have to go somewhere else.
- Personal watercraft have no effect on our enjoyment for the majority of our lake visits unless friends join us with personal watercraft.
- Disagree - They could enforce stricter rules or designate PWC areas.
- Fine for NPS. Perhaps designating PWC areas could permit use by all crafts or prohibit certain PWC activities such as cutting across traffic patterns, wave jumping around other craft.
- The National Park Service should not ban personal water craft, because I like to water ski Lake Carl Blackwell.
- Its OK, just need to keep patrols & rules enforced.
- Great.
- Concur. They are noisy.
- I think it unreasonable to ban them, but like at Arcadia Lake they should be placed into their own area.
- I don't think they should ban them from having fun, but they should control where they go! (designate areas). (P. It was cold! I have never been there when the season was in full swing!).
- PWC's are a great thing but need to be strictly managed and rules upheld by everyone.
- Good idea.

- PWC have as much right to be on the lake as anyone, as long as they are opperated safely.
- I don't believe they need to be banned. They do need stricted laws that must be inforced such as age requirements.
- There is no need to ban PWC; setting rules & regulations (as with any other watercraft) seems to be effective.
- Should not be banned only policed more closely.
- No.
- Totally agree.
- PWC's are a way for people to handle their emotions, let them be!
- A person should be able to use whatever they want in the water as long as they use them responsibly.
- I don't agree with the decision.
- I agree with the ban.
- I think a complete ban is harsh. They need their own area to operate in and more guidelines regulating their use.
- Its rediculous. Personal watercraft operators have as much right to enjoy their National parks as any other American.
- I wouldn't like it unless I knew there was a serious safety problem - which I guess is why the NPS is considering this.
- They have as much right as any one else has.
- I don't think it should be banned.
- They should not be banned but better rules & enforcement of the rules.
- Nonsense - There are rules & laws in effect for these craft ... enforce the laws!! Hold operators responsible! (P. simply watching others enjoy is a great pleasure.)
- I would ask what is the difference between loud jet boats, 70 mph+ speedboats, & underage/drunk drivers. It's not the vehicle, but the operator. Simple solution, Driver's license & tickets for all vessels.
- My opinion is that personal watercrafts are fun and add enjoyment to my visits.
- Personal watercraft are very dangerous & should be under stricter control. (P. Detract from enjoyment *very much*.)
- OK by me.
- Don't like it.

- That's fine with me! Most PWC drivers belong off the water. Although Lake C.B. has some good ones.
- Can you make an area just for these? They are fun & growing in popularity. (O. Lake where Personal Watercraft are not permitted *when water skiing*.)
- I wouldn't stand behind the ban of PWC. As long as the rules were obeyed PWC wouldn't be a problem. I feel motor boats are some problem to a lake also.
- Excellent idea.
- I would like to see a law where the jet ski were ban to one area of the lake only.
- As an owner of a personal watercraft I hope that this does not happen!
- Good.
- I don't approve. This is the only watercraft some people have.
- I think their should be some ground rules set on personal watercraft.
- Good.
- I feel personal watercrafts should have to follow the same rules/regulations as boats.
- Good!
- If you ban the use of than the sell of should be banned also.
- I do not think they should ban them. I think they could be enjoyable if they were operated with care and maybe they had a designated area. I am uncomfortable pulling a skier & trying to watch them.
- Yes!
- I think you need to manage it - ban underage & breaking of rules - don't punish those who are responsible drivers.
- I think it is a good idea and should be inforced
- I believe better restrictions would be more appropriate than a ban.
- I don't think you should do this. But they need to follow the rules just like everyone else.
- No to a ban.
- Don't have one.
- Ban all personal watercraft - too much pollution.
- I think they should have designated areas.
- I think there should be only designated areas for their use.

- I think there should be a specified area for PWC and they cannot ride in the main body of the lake. (P. We like to ride them and are planning on buying one. But all our problems at the lake have been with PWC.)
- I support the decision of the Nat Park Service.
- My opinion is that it would not be a good idea. Personal watercraft are safe if operated properly and should not be banned from any lake.
- I don't think they should be ban however laws should be enforced equally just like they are on the highways between cars and motorcycles.
- If they are responsible & law abiding they should be able to use the lakes like everyone else.
- I disagree, but they are unsafe if not driven responsibly.
- As long as the drivers are cautious of others I don't feel they should be banned.
- Bad descision, PWC are most popular family rec. Just keep strict rules & areas. (P. Have no effect on enjoyment *if rules are enforced.*)
- Underage operators & unsafe operators influenced this decision. It's not fair for people that are mature enough to operate a PWC to lose their riding areas.
- I would not want to damage the people that have others safety in mind, but I feel there are too many PWC & jetski's.
- I think if operated safely, they would be ok. I will not go to a lake that doesn't allow Jet Ski.
- I feel this a bad decision that will only lead to less use of Carl Blackwell.
- Unfortunate to ban any type of recreation but the majority of people on them do not pay attention to surroundings.
- We enjoy watercrafts and feel that that they are safe as long as people watch what they are doing not not act like fools.
- It stinks, but if you would designate certain areas for PWC that might be better.
- Would not like it.
- I think they should ban because to many people are getting hurt of killed on them.
- I disagree with it because it would take away a huge part of fun, but I know why it is being done.
- Great! Example: Jet Ski's & Waverunners.

- If PWC drivers presented themselves as consciensious and respectful, this announcement would not have been derived. They do not. I think age is a significant problem in the operation of PWCs.
- Definatley no. They are small, not to loud, and alot of fun.
- Alot of people use there heads, but the few that chooses to make the wronge choices can ruin if for everyone. Only punish the ones that can't follow the rules.
- As long as they stay in certain areas and do not disturb other people. (O. would depend). (P. Very little affect except they start to early in morning).
- Wouldn't like that decision. I don't owne one but it fun family activity. and fun is why people go to lake.
- I think they need a seperate area on the lake, they have rights also.
- Do not think this is nessary, but P.W.C. need to stay in a zone for P.W.C. only. (O. Everyone needs to be able to use the lake.) (P. Detract from enjoyment *only when wake jumping*.)
- I would like laws to regulate PWC's that are enforced rather than a ban.
- License the drivers instead of banning the vehicles. (O. Not considered in decision.)
- I understand everyone is entitled to the use of the lake. The PWC are seeming to grow in numbers & at time out of hand.
- No. Like watching them entertains us while sitting on shore.
- I support it totally, people who use watercrafts (Jet-ski) have no respect for anyone else on the bank, they cut in front of boats.
- If drivers are responsible I am against it.
- I think this is a good idea. (O. Both. depends on why we are going.) (P Detract from enjoyment *lake is to small*.)
- I don't think they should ban them But, the drivers need to know the lake rules.
- No opinion. (P. Love to go camping year around (no effect).)
- Make an area for them (only).
- It makes sense to me since people wont accept being respectful & responsible towards others.
- Fine - too many kids are drivers and they act dangerously - would rather an age limit be established. PWC with responsible drivers are great fun - set up an age limit $\geq$ 16 and most trouble will decrease.
- I don't think that it is right because if that is the case there shouldn't be boat on waterways.

- I think it's a weak attempt to make things saffer, and not focousing on making people listen!
- No comment.
- I think that is what most of your visitors are there for, including myself. It is not the PWC that is the problem, it is the young teenagers, that don't know what they are doing that cause some problems. I enjoy Lake Carl Blackwell, & have never had any major problems there. (P. I enjoy watching other people do tricks & seeing what other types on PWC there are - I have met many other Sea-Doo owners there, myself.)
- Good idea.
- It's not fair. Most of the troubles we experience are by boats. If you teach your riders the rules & make them keep to them then there won't be a problem you will lose a lot of business if you outlaw PWC.
- I wouldn't ban them, but there needs to be stricter penalties for dangerous activities.
- It is wrong.
- The watercraft is not the problem, its the person operating it.
- OK if it also bans motorboats & fishing boats.
- The personal watercrafts are made and bought. Why buy one if you can't use it? So I figure It wasn't a very good decision.
- Great ideal.
- Why punish everyone for the few that need it.
- People enjoy boating and other water activities, so it shouldn't ban them.
- Shouldnt be banned.
- Good idea.
- I would support it.
- It's stupid, but safe.
- I feel that an outright ban was a knee-jerk reaction that doesn't solve the problem. Personal WaterCraft isn't the problem, ignorant and underage operators are. Personal WaterCraft cause less damage to their environment than ski and fishing boats. The answer lies in implementing an age limit on operators and a mandatory safety course for all watercraft operators. To automatically brand all PWC operators as irresponsible and reckless is insulting to those of us who respect the rules and aren't causing trouble.
- I agree.

- Don't mind watercraft But lake patrol need to do Better job of keeping them away for people swiming on bank were you have your trailer parked. (P. Detract *if not operated properly.*)
- We are interested in wildlife watching & fishing. If personal watercraft is referring to jet ski & one person craft with noisy motors, I am all for it.
- I think this ruling is appropriate in National Parks. (P. No effect - *did not see any at time I visited.*)
- The only other solution would be to patrol for irresponsible riders.
- Agree with very much so.
- I feel that if there were designated areas for PWC's only and age limits or maybe a few more rules it wouldn't be a problem. They are fun but should be operated by adults with sence enogh to handle it.
- Sounds fine to me.
- Not good.
- Unnecessary decision. With proper guidelines, can be very safe & enjoyable.
- I admire them for it & contributed to research project on Colorado River/Cataract Canyon.
- I don't own or like to be on PWC however this really angered me, I belive the NPS was very wrong to ban some peoples form of fun!
- Probably a good idea.
- I have no problem with that. Most are operated by kids who don't care or respect anything.
- Good.

Appendix N General comments made in questionnaire margins (Quoted as written on questionnaire)

- Use the no ski area on the west end of the lake for PWC use only. Lot's of water that's not used very much.

- We visited Table Rock Lake 3 times and I like there rule that they have for the lake. You have to buy this bright orange flag & you put it up on your boat when you are sking so that other people see it when you are pulling a skier. If any type of watercraft comes within 150 yards of that skier they get a ticket and taken off the lake. I really like this because my kids were safe. Please look into this for Lake Carl I think this will help alot. Thank you.

- Making too much noise *party barges* (motor).

- Most of the problems I see are from men ages 18-30. Both boats, PWC & skiers. They are more outgoing & tend to get wilder. I don't believe its the PWC at all.

Appendix O-1: Institutional Review Board Approval

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

DATE: 01-11-99 **IRB #:** AS-99-026

Proposal Title: **RECREATIONAL BOATERS VERSUS PERSONAL WATERCRAFT: A STUDY OF CONFLICT**

Principal Investigator(s): Tomas Wikle, Elaine Lynch

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Signature: [illegible] Date: January [illegible], 1999

Carol Olson, Director of University Research Compliance

cc: Elaine Lynch

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modifications to the research project approved by the IRB must be submitted for approval. Approved projects are subject to monitoring by the IRB. Expedited or exempt projects may be reviewed by the full Institutional Review Board.

Appendix O-2: Institutional Review Board Approval - Modification/Continuation

Oklahoma State University
Institutional Review Board

Protocol Expires: 9/13/01

Date: Thursday, September 14, 2000 IRB Application No AS99026

Proposal Title: RECREATIONAL BOATERS VERSUS PERSONAL WATERCRAFT: A STUDY OF CONFLICT

Principal Investigator(s):

Elaine Lynch	Tomas Wikle
225 Scott Hall	225 Scott Hall
Stillwater, OK 74078	Stillwater, OK 74078

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved **Modification/Continuation**

Signature: [illegible] Date: [illegible]

[illegible] Olson, Director of University Research Compliance

Approvals are valid for one calendar year [illegible] [illegible] approved [illegible] [illegible] [illegible] Institutional Review Board.

VITA

Elaine Adkins Lynch

Candidate for the Degree of

Master of Science

Thesis: RECREATIONAL BOATERS VERSUS PERSONAL WATERCRAFT: A STUDY OF CONFLICT

Major Field: Geography

Biographical:

Education: Graduated from Perkins-Tryon High School, Perkins, Oklahoma in May 1974; received Bachelor of Science degree in Geography from Oklahoma State University, Stillwater, Oklahoma in July 1993. Completed the requirements for the Master of Science degree with a major in Geography at Oklahoma State University in May 2001.

Experience: Issues Scoping Workshop for the Water Resources Management Plan of the Chickasaw National Recreation Area, Sulphur, Oklahoma.

Professional Memberships: Association of American Geographers.