A COMPARISON OF RECREATION CONFLICT FACTORS FOR DIFFEREENT WATER-BASED RECREATION ACTIVITIES

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Abstract: Previous studies point out recreation conflict may be affected by recreation goals, resource specificity, activity style, mode of experience, lifestyle tolerance, norms, problems perceived, visitor values and conflict sensitivity. However, people engaging in single or multiple activities may have different patterns when considering recreation conflict. A study of personal watercraft users, motorboat users and landowners in the New York State's Great Lake area was conducted to compare the recreation conflict factors. Three different types of questionnaires with a total of 4634 surveys were sent out and received an overall response rate of 42%. Eight subgroups were deduced based on their recreation activities and questionnaires answered. The results revealed the eight groups are common in the structure but not in the value of the conflict factors. Study results also showed a series of asymmetrical conflicts in which landowners were interfered with by both personal watercraft users and motorboaters, motorboaters were affected by personal watercraft users but not landowners, and personal watercraft users were not affected by either one.

Introduction

The popularity of personal watercraft has stirred controversy both for and against their use in state and National Parks, as well as across many waterways and lakes of the United States. How you view personal watercraft use and operator behavior depends, in part, on whether you own and operate a personal watercraft or not. Both recreation conflict and compatibility have been reported between personal watercraft users, motorboaters, and landowners in a variety of circumstances. Some of the recreation conflicts arise from personal watercraft users interfering with the experience of motorboaters by speeding, jumping their boat wakes, or crossing their boating path. Reportedly personal watercraft users interfere with coastal landowners because of the noise of the personal watercraft, potential safety problems near other recreational users, and some privacy issues of landowners.

Jacob and Schreyer (1980) defined recreation conflict as "goal interference attributed to another's behavior" and proposed four major dimensions of recreation conflict factors, including activity style, resource specification, mode of experience, and lifestyle tolerance. These dimensions of conflict factors were verified by several studies (Adelman et al., 1982; Watson et al., 1991; Ivy et al., 1992; Kajala, 1994; Watson et al., 1994; Gibbons et al., 1995; Ramthun, 1995; Vaske et al., 1995; Schuster, 1996). For example, Watson et al. (1994) used factor analysis to categorize recreation conflict factors and found that goal interference was affected by activity style, resource specificity, and mode of experience. In addition, Ivy et al. (1992) pointed out that individuals with lower tolerances will feel more conflict, and at the same tolerance level, canoeists will feel more conflict than motorboaters.

In addition to the four dimensions of conflict factors proposed by Jacob and Schreyer (1980), empirical studies found visitors norms (Ruddell and Gramann 1994), goal or motivations (Jackson 1982; Noe et al. 1981; Gibbons and Ruddell 1995), and conflict sensitivity (Ramthun 1995) also affect recreation conflict. Ruddell and Gramann (1994) suggested that the less tolerant a person's individual norm for noise levels, the more likely that violations of the social norm for radio volumes will be perceived as a source of interference. Jackson (1982) studied the conflict between skiers and snowmobilers and concluded that skiers were more natural environment oriented and snowmobilers were more escapism and socialization oriented. In addition, Ramthun (1995) proposed a model in which conflict factors contributed to an intermediate factor, sensitivity, and in turn caused the perceived interference.

Previous studies identified the potential conflict groups as specific activity participants, and did not mention that people engaging in single or multiple activities may have different patterns or different values for the factors when considering recreation conflict. For example, researchers pointed out interference between motorboating and nonmotorboating, but users with both experiences may have different interference levels from those with only one experience. Furthermore, users with both motorboating and nonmotorboating experiences may react differently when participating in motorboating and nonmotorboating activities. The purpose of this paper is a comparison of conflict factors across groups with different activity combinations.

Methods

New York's Great Lakes (NYGL) in this study included the U.S. side of St. Lawrence River, Lake Ontario, Niagara River, and Lake Erie. Compared to many inland bodies of water in New York State, NYGL has a larger water surface area and less public access overall. However, the potential recreation conflict problems usually do not happen in the middle of a lake, but in the coastal areas with public access, such as in bays, harbors, or near public beaches.

In order to get a sufficient sample size for each user and combination of users (e.g., landowners who own a motorboat), PWC users (n=1000) and motorboat users (n=3000) were selected systematically from the New York State watercraft registrations in the 10 coastal counties along the NYGL including: Jefferson, St. Lawrence,

Oswego, Wayne, Monroe, Niagara, Orleans, Erie, Chautauqua, and Cayuga counties. Landowners with coastal lands adjacent to NYGL were selected (n=634 and about 100 for each site) from the tax maps of six study sites including: Alexandria Bay, Sandy Pond, Sodus Bay, Olcott, Niagara River, and Hanford Bay. These six sites were selected because of their access to the Great Lakes and the significant use for boating, personal watercraft use, other water-based recreation activities, and proximity to private coastal property. By searching the tax maps, this study selected only those owners with residences (primary and secondary) adjacent to the NYGL but omitted those with vacant lands or only docks.

Three mail surveys with parallel questions were designed for personal watercraft owners (PWC), motorboat owners, and coastal landowners to measure the recreation conflict components and compatibility among users with various activity combinations. The term "jet ski" was used in all surveys instead of PWC because it was more commonly understand by the public. Each of the three mail surveys was designed from the research literature around nine reported dimensions of recreation conflict and were each measured by multiple questions. The surveys to users asked about their: recreation motives (19 questions), recreation activity style (11 questions), resource specificity for their recreation activity (10 questions), lifestyle tolerance (30 questions), mode of recreation experience (8 questions), norms for distance from recreational others (8 questions), problems from personal watercraft users and motorboaters (20 questions), sensitivity to recreation conflict (13 questions), and visitor values for recreation activities (13 questions). In addition, any actual recreation conflict perceived by the survey respondents was measured by an open-end question in which respondents were asked to describe the interference they had experienced while recreating in the NYGL during the past year.

An exploratory factor analysis was conducted on data using orthogonal varimax rotation to reduce the 132 items down to meaningful factors to describe the data set. The procedure to establish the factors were: (1) an eigenvalue of 1.0 was retained in factor analysis for each dimension, (2) the numbers of factors within each dimension across the 8 groups were checked to see the most common number of the factors, (3) factor numbers were set at the common number from the previous step and factor analysis run again, (4) factors within each dimension were interpreted based on loading and meaningful item combinations, and (5) Cronbach's alpha of greater than 0.50 was required for it to be retained because as a "rule of thumb" any solution should account for at least 50 percent of the total variance. The statistical package for the social sciences (SPSS version 10.0 for windows) was used to conduct this analysis.

Study Results

A total of 4,641 surveys were sent out. After two follow up reminder mailings, an overall adjusted response rate of 42% was achieved (personal watercraft owners = 33%, motorboat owners = 41% and landowners = 63%). Respondents were asked to report their ownership of motorboats, PWC, and coastal lands adjacent to the NYGL. Because each type of survey has four possible ownership combinations, the three surveys produced a total 12 types of owner group combinations (Table 1). To reduce the number of groups, ANOVA with Least Significant Distance was conducted within each type of survey to combine the similar groups together based on the 132 questions in the survey. Motorboat owners with a PWC and land (M-pwc-l) and motorboat owners with a PWC (M-pwc) were grouped together because they only differed in 9 of the 132 items. In addition, PWC owners with a motorboat and land (PWC-m-l), PWC owners with a motorboat (PWC-m) and PWC owners with land (PWC-l) were combined into the same group because they had less than 15 items different of the 132 questions. Landowners with a motorboat and a PWC (L-m-pwc) were similar to landowners with PWC (L-pwc) because only 4 of the 132 items differed. Therefore, the 12 ownership groups were reduced to 8 ownership groups with similar responses (see Table 1).

Please note that the results from similar ownership groups in the three different surveys can not be added together since each survey was designed from the perspective of owning either a motorboat, PWC, or coastal land. Thus, the PWC-m-l group is different from the L-m-pwc group because the first group answered the PWC survey and the second group answered the Landowner survey. In an effort to make it clear which survey a ownership group completed, capital letters on the group abbreviation will denote the type of mail survey for those respondents. For example, PWC-m-l denotes a Personal WaterCraft survey respondent who also owns a motorboat and/or coastal land along NYGLs.

Table 1. Group ownership[a] combinations based on results from NYGL mail survey respondents [b].

Original Ownership Group	Group Symbol	Group Combination	Group Symbol	Sample Size (n)
Motorboat Owner Survey				
Motorboater with pwc and land	M-pwc-l	Motorboater with pwc and/or land	M-pwc-l	49
Motorboater with pwc	M-pwc		M-pwc	
Motorboater with land	M-l	Motorboater with land only	M-l	244
Motorboater only	M	Motorboater only	M	694
PWC Owner Survey				
PWC with motorboat and land	PWC-m-l	PWC with motorboater and/or land	PWC-m-l	204
PWC with motorboat	PWC-m		PWC-m	
PWC with land	PWC-l		PWC-l	
PWC only	PWC	PWC only	PWC	82
Landowner Survey				
Landowner with motorboat and pwc	L-m-pwc	Landowner with pwc and/or motorboat	L-m-pwc	49
Landowner with pwc	L-pwc		L-pwc	
Landowner with motorboat	L-m	Landowner with motorboat only	L-m	189
Landowner only	L	Landowner only	L	76

[a] Ownership groups include: Landowners = L; Personal Water Craft owners = PWC; Motorboat owners = M.
[b] Capital letters denote the type of mail survey for those respondents.

Table 2. Recreation motives and average importance [a] by responding ownership groups in the NYGL surveys.

Motives	Group							
	PWC Owner		Motorboat Owner			Landowner		
	PWC-l-m	PWC	M-pwc-l	M-l	M	L-m-pwc	L-m	L
Nature Enjoyment To see the scenic beauty; To be outdoors; To be in natural surroundings	3.6	3.5	3.8	3.7	3.6	4.3	4.3	4.2
Relax, Rest & Get Away For relaxation and rest; To experience peace and quiet; To get away from job stress; To get away from daily routines; To get away from others	3.0	3.0	3.4	3.2	3.2	3.7	3.6	3.3
Social Interaction To be with my family; To meet new people like myself; To be with people who have similar values; To be with friends	2.7	2.8	3.0	2.9	2.8	3.6	3.0	2.8
Excitement & Exercise For excitement; For exercise	2.6	3.0	1.6	1.6	1.6	2.8	2.1	2.1
Skill & Equipment To improve my boating skills; To teach my skills to others; To test my equipment	2.2	2.3	1.9	2.1	2.2	1.9	1.7	0.2

[a] The number shown in the table is the mean value of importance for the motives from 0 = not important to 5 = very important.

Recreation Motivations of Users

In the factor analysis, two of the 19 motive questions were eliminated because of their low statistical reliability, and the remaining 17 questions were grouped into five factors including: Nature Enjoyment, Relax, Rest & Get Away, Social Interaction, Excitement & Exercise, and Skill & Equipment (Table 2). All ownership groups, especially landowners, reported that they enjoyed the NYGL's natural setting (3.5~4.3) and the chance to relax, rest & get away (3.0~3.7). Social Interaction was moderately important for all groups (2.7~3.6). Landowners liked to get their family together or make friends with their neighbors or visitors; PWC owners and motorboat owners liked to see others and be seen during their boating. Although Excitement & Exercise and Skill & Equipment were not important for all groups, PWC owners enjoyed the excitement more (3.0) and focused on their skill more (2.3) than the other groups. Landowners had low interest in Skill & Equipment (0.2), probably because they did not report owning a motorboat or PWC.

Activity Style

Activity style was measured by respondent reactions to 11 statements based on a scale from strongly disagree (-2) to neutral point (0) to strongly agree (2). Two of the 11 statements were dropped because of their low statistical reliability and the remaining 9 statements produced two factors, Self-identity and Value Sharing (Table 3). Landowners (0.6~1.0) somewhat identified themselves in Group Identity with other landowners. PWC owners without other ownerships (0.9) more identified themselves as PWC owners than those PWC owners with a motorboat or land (0.4). However, landowners without boats or PWC's (0.6) identified themselves as landowners less than those with a motorboat or a PWC (0.8~1.0). PWC owners disagree with Value Sharing (-0.3 ~ -0.2) with other PWC users; however, motorboat owners (0.3~0.4) and landowners (0.5~0.7) somewhat share their values with other motorboat owners and landowners respectively.

Comparing the two activity style factors within ownership groups, it was found that PWC owners identified well with

other PWC owners but reportedly didn't strongly share values with other PWC owners. On the other hand, landowners strongly identified with other landowners and they also reported that they shared common values with other landowners. Motorboat owners identified with other motorboat owners and they also reported that they shared common values with other motorboat owners.

Table 3. Activity style dimension and average response [a] to statements by responding ownership groups in the NYGL surveys.

Activity Style	Group							
	PWC Owner		Motorboat Owner			Landowner		
	PWC-m-l	PWC	M-pwc-l	M-l	M	L-m-pwc	L-m	L
Self-identity								
I am proud to be a xxx[b].								
I often describe my self to others by saying, "I am a xxx."								
I am glad I chose to participate in xxx rather than another activity.	0.4	0.9	0.5	0.5	0.5	1.0	0.8	0.6
I become irritated when I hear others criticize xxx.								
I talk up xxx to my friends as a great activity.								
Value sharing								
The xxx image in the community represents me well.								
I find that my values and the values of other xxx are very similar.	-0.3	-0.2	0.4	0.3	0.3	0.7	0.5	0.5
I find it is easy to identify my self with other xxx.								
I have a lot in common with other xxx on the coastal of NYGLs.								

[a] The number shown in the table is the mean value of agreement with the statement, from –2=strongly disagree to 2=strongly agree.

[b] For the three different surveys, xxx means jet skiers, motorboaters, and riparian landowners to the related respondents.

Table 4. Resource specification and average response [a] to statements by responding ownership groups in the NYGL surveys.

Factor	Group							
	PWC Owner		Motorboat Owner			Landowner		
	PWC-m-l	PWC	M-pwc-l	M-l	M	L-m-pwc	L-m	L
Best Place								
No other places can be compared with that area.	0.3	0.0	0.4	0.5	0.1	0.8	0.7	0.5
Being there makes me more satisfied than visiting any other places.								
I would not substitute this place with any other place to go jet skiing.								
Place Dependence								
The area means a lot to me.								
I identify strongly with the area.								
I feel attached to the area.	1.0	0.7	0.9	1.1	0.7	1.3	1.3	1.1
Much of my life centers on this area.								
New York's Great Lakes is my favorite place in my time off.								
Being on New York's Great Lakes is very important to me.								
When I jet ski there I can really be myself.								
Being there is one of the most pleasant things I can think of.								

[a] The number shown in the table is the mean value of agreement with the statement, from –2=strongly disagree to 2=strongly agree.

Resource Specificity

Respondents were asked to evaluate how strongly they agreed or disagreed with 11 questions to measure their resource specificity. Analysis of the 11 resource specificity questions produced two factors, Best Place and Place Dependence (Table 4). Although most respondents did not strongly agree (0.0~0.8) that the NYGL was the best place for water-based recreation, landowners (0.5~0.8) more often agreed it was the best place compared to motorboat and PWC owners (0.0~0.5). PWC owners (0.0) and motorboat owners (0.1) probably realized that, due to their mobility, they had the option to use other areas to enjoy their recreational activities. The factor Place Dependence indicated all owners were somewhat dependent on the NYGL area for their experiences (0.7~1.3), especially landowners (1.1~1.3). Generally, landowners depended more on the NYGL area because of their properties, whereas motorboat and PWC owners could more easily alternate their activities to other bodies of water.

Lifestyle Tolerance

Respondents were asked to evaluate their own group and the other two ownership groups to measure their lifestyle tolerance. One of the 10 questions was eliminated because of its low statistical reliability. The remaining 9 questions were grouped into one factor for each group evaluation

(Table 5). In the evaluation for PWC, all owners with PWC's evaluated PWC owners as somewhat good (0.2~0.4), but other landowners or motorboat owners without a PWC had negative evaluations for PWC owners (-0.5 ~ -0.2). This response pattern did not reoccur in the evaluations for motorboat owners and landowners, all users have relatively positive images for those two ownership groups. Comparing the values within each survey group, PWC owners thought they were similar to motorboat owners (0.3 vs. 0.3) but not too similar to landowners (0.3 vs. 0.5). All motorboat owners thought they were similar to landowners but not to PWC owners; however, landowners did not agree they were similar to the other two groups. Interestingly, PWC owners with land or a motorboat were similar to both PWC owners and motorboat owners. For example, their evaluation for PWC owners was the same as PWC owners (0.3), but like motorboat owners they thought motorboaters were similar to landowners. The possible reason is many respondents in this PWC group had motorboats. Also landowners had the highest self-evaluation (1.0~1.2), while PWC owners were not so confident in their self-evaluation (0.3). These results suggest a series of asymmetric interferences among those three groups—both PWC owners and motorboat owners affected landowners, motorboat owners were affected by PWC owners but not much by landowners, and PWC owners were not affected by the other two groups.

Table 5. Lifestyle tolerance and average response [a] to paired word comparisons by responding ownership groups in the NYGL surveys.

	Group							
	PWC Owner		Motorboat Owner			Landowner		
Lifestyle Tolerance	PWC-m-l	PWC	M-pwc-l	M-l	M	L-m-pwc	L-m	L
Evaluation of jet skiers Respectful–Risky; Quiet–Noisy; Similar to me–Different from me; Polite–Impolite; Courteous–Discourteous; Friendly–Unfriendly; Responsible–Irresponsible; Good–Bad; Unthreatening–Threatening.	0.3	0.3	0.2	-0.3	-0.2	0.4	-0.5	-0.2
Evaluation of motorboaters Respectful–Risky; Quiet–Noisy; Similar to me–Different from me; Polite–Impolite; Courteous–Discourteous; Friendly–Unfriendly; Responsible–Irresponsible; Good–Bad; Unthreatening–Threatening.	0.7	0.3	0.9	0.8	0.8	0.6	0.6	0.3
Evaluation of landowners Respectful–Risky; Quiet–Noisy; Similar to me–Different from me; Polite–Impolite; Courteous–Discourteous; Friendly–Unfriendly; Responsible–Irresponsible; Good–Bad; Unthreatening–Threatening.	0.7	0.5	0.9	1.0	0.8	1.1	1.0	1.2

[a] The number shown in the table is the mean value of agreement with the paired words, from –2=negative to 2=positive.

Table 6. Focus of experience and average response [a] to statements by responding ownership groups in the NYGL surveys.

	Group							
	PWC Owner		Motorboat Owner			Landowner		
Focus of Experience	PWC-m-l	PWC	M-pwc-l	M-l	M	L-m-pwc	L-m	L
Focus on safety I operate the jet ski (or motorboat) safely and comfortably I pay attention to the distances from other boats, jet skis, docks, etc.	4.6	4.5	4.4	4.5	4.4	—	—	—
Focus on speed and skill I pursue high speed and fun on jet skiing or motorboating I practice my jet skiing or motorboating skill	3.4	3.6	2.7	2.9	2.8	—	—	—
Focus on social and the nature I enjoy talking to or making friends; I enjoy ××× [b] with my family I enjoy the scenery during ×××; I look for fish, plants or wildlife	3.4	3.3	3.6	3.7	3.7	3.7	3.7	3.4

[a] The number shown in the table is the mean value of agreement with the statement, from –2=strongly disagree to 2=strongly agree.

[b] For the three different surveys, ××× means jet skiers, motorboaters, and riparian landowners to the related respondents.

Focus on Experience

PWC owners and motorboat owners were asked to evaluate how they focused on the 8 questions about their recreation experience. Only four of the 8 questions were used in the landowners' survey because they answered questions based on their enjoyment of their properties (Table 6). Both PWC owners and motorboat owners responded that they focused on safety seriously (4.4~4.6). PWC owners seemed more focused on speed and skill (3.4~3.6) than motorboat owners (2.7~2.9). Although PWC owners reported they moderately focused on social and nature settings (3.3~3.4), motorboat owners and landowners (3.4~3.7) had a slightly higher response than PWC owners. These results indicate that PWC owners are strongly speed and skill oriented and both PWC owners and motorboat owners care about safety issues and enjoy nature and social settings. Compared to

PWC owners, motorboat owners reported that they were seeking social and nature enjoyment but are not as focused on high speed and fun.

Perceived problems from PWC use and motorboat use

Respondents were asked to evaluate 10 statements about potential problems caused by PWC use and motorboat use (Table 7). The 10 potential problem statements related to PWC use were statistically grouped into two factors: Operator Behavior & Machine Impact Related Problems and Environmental Related Problems. Potential problem statements related to motorboat use were statistically grouped into three factors: Operator Behavior Related Problems, Machine Impact Related Problems, and Environmental Related Problems. Operator Behavior & Machine Impact Related Problems were grouped into the same factor for PWC use but separated for motorboating and that may indicate that when considering problems, respondnets consider PWC's and PWC use together but consider motorboats and motorboat use separately. Generally, the perceived problems from both PWC use and motorboating were reported as low to moderate in the NYGL area (0.9~3.1). Respondents perceived PWC users as having higher levels of Operator Behavior & Machine Impact Related Problems (1.0~3.1) than Environmental Related Problems (0.7~2.2). In addition, motorboaters perceived Operator Behavior & Machine Impact Related Problems from PWC use as higher than landowners did. All groups perceived Machine Impact Related Problems from motorboating more significant than Environmental Related Problems and Operator Behavior Related Problems from motorboating. Landowners seemed to perceive more trouble from motorboating than the other groups and they considered Machine Impact Related Problems from motorboats as serious as those from PWC's. Again, these results suggest a series of asymmetric interferences among the three groups—both PWC owners and motorboat owners affected landowners, motorboat owners were affected by PWC owners but not by landowners, and PWC owners were not generally affected by the other two groups

Table 7. Perceived problems from PWC use and motorboat use and average response [a] to statements by responding ownership groups in the NYGL surveys.

	Group							
	PWC Owner		Motorboat Owner			Landowner		
Perceived Problems From PWC Use And Motorboating	PWC-m-l	PWC	M-pwc-l	M-l	M	L-m-pwc	L-m	L
Operator behavior & machine impact related problems from PWC use Speeding; Noising; Waking; Distance Problems; Crowding; Meeting a PWC.	1.4	1.0	2.0	2.8	2.9	1.4	3.1	2.4
Environment related problems from PWC use Coast erosion; Impacts on wildlife; Impacts on fish; Water pollution	0.9	0.7	1.5	1.9	2.0	0.9	2.1	2.2
Machine impact related problems from motorboating Speeding; Noising; Waking	1.9	1.9	1.9	2.5	2.6	2.0	2.7	2.5
Environment related problems from motorboating Coast erosion; Impacts on wildlife; Impacts on fish; Water pollution	1.3	1.5	1.5	1.7	1.8	1.1	2.1	2.2
Operator behavior related problems from motorboating Distance Problems; crowding; Meeting a PWC.	1.1	1.1	1.2	1.6	1.5	2.0	1.9	1.7

[a] The number shown in the table is the mean problem level from 0 = not problem to 5 = serious problem.

Table 8. Visitor values and average response [a] to statements by responding ownership groups in the NYGL surveys.

	Group							
	PWC Owner		Motorboat Owner			Landowner		
Visitor values	PWC-m-l	PWC	M-pwc-l	M-l	M	L-m-pwc	L-m	L
Positive Statements								
PWC users are experienced.	-0.2	-0.1	-0.3	-0.8	-0.8	0.0	-0.8	-0.3
Motorboaters do not mind boating in sites used by PWC's.								
Meeting a PWC makes a boat trip more interesting.								
Negative Statements								
PWC users **do not** pay attention to their impacts on other users.								
When motorboats meet a PWC, boating safety problems become significant.	-0.5	-0.7	-0.1	0.6	0.5	-0.4	0.6	0.4
PWC use causes more environmental impact than motorboat use.								
PWC causes more impacts on other visitors than motorboat use.								
Seeing a PWC seems out-of-place.								
Motorboats are more appropriate than a PWC in the coastal area of NYGL's.								
Regulations								
Boating regulations are the same for motorboats and PWC's.	0.8	0.7	0.8	0.4	0.5	0.7	0.4	0.1
Speed limits for motorboats are the same as for PWC's.								

[a] The number shown in the table is the mean value of agreement with the statement, from –2=strongly disagree to 2=strongly agree.

Visitor Values

Thirteen statements were used to evaluate the compatibility between motorboating and PWC use. Two statements were eliminated because of their low statistical reliability. The remaining 11 statements were grouped into three factors: Positive Statements, Negative Statements, and Regulations (Table 8). All ownership groups, even PWC owners, disagree with the positive statements for PWC use, especially motorboat owners (-0.8) and motorboat owners with land (-0.8). However, PWC owners disagree (-0.1~-0.7) with the negative statements about PWC use, whereas people without PWCs agree with the negative statements about PWC use (0.4~0.6). Interestingly, evaluations from people without PWCs were negative towards PWC use and people with PWCs perceived they were not compatible with other users, but not as serious as other ownership groups thought. Although NYC speed and distance from fixed object regulations are the same for motorboat use and PWC use, all groups did not strongly agree with these true statements (0.1~0.8). This suggests that respondents were not completely familiar with boating regulations.

Recreation Conflict Sensitivity

Respondents were asked to evaluate their sensitivity to interference when they encountered 11 recreation activities. Factor analysis produced three factors: High Sensitivity, Medium Sensitivity and Low Sensitivity (Table 9). All groups were highly sensitive to PWC use, motorboating and water skiing. Water skiing was considered similar to PWC use and motorboating because of its high speed and large space requirements. Although all the 8 groups had a lower sensitivity to scuba diving, snorkeling, swimming and windsurfing, it is expected that users of those activities would be sensitivity to conflicts from motorboating and PWC use. Generally, all values in the table were less than 2.0, indicating recreation conflict existed but was not high in NYGL. However, all motorboaters and those landowners without PWCs had a higher sensitivity for conflict from PWC use, motorboating and water skiing than PWC users.

Distance Norms

Respondents were asked to report their preferred distance from their own activities to personal watercraft use. The 5 categories for preferred operating distance ranged from 100' to 1000' or above (Figure 1). The current NYS regulation is that personal watercraft and boats must operate at 5 m.p.h or less when within a 100 foot from shore or any other fixed object. Although many users with PWC reported the current NYS regulation was acceptable to them most motorboaters and landowners without PWCs preferred more distance from operating PWC. About 45% of PWC users preferred longer distances from other PWC users. In addition, a noticeable proportion of non-PWC users reported 1000 feet or more was needed from PWC users and this might indicate their negative experiences from PWC use.

Table 9. Recreation conflict sensitivity and average response [a] to statements by responding ownership groups in the NYGL surveys.

	Group							
	PWC Owner		Motorboat Owner			Landowner		
Recreation Conflict Sensitivity	PWC-m-l	PWC	M-pwc-l	M-l	M	L-m-pwc	L-m	L
High sensitivity PWC use; Motorboating; Water skiing	0.9	0.9	1.5	1.9	1.9	0.9	1.9	1.7
Medium sensitivity Boat fishing; Bank or shore fishing; Canoeing & kayaking; Sail boating	0.5	0.6	0.5	0.5	0.5	0.3	0.4	0.3
Low sensitivity Scuba diving; Snorkeling; Swimming; Windsurfing	0.4	0.6	0.4	0.4	0.4	0.2	0.3	0.2

[a] The number shown in the table is the mean value of sensitivity level, from 0=never interferes to 5=extremely interferes.

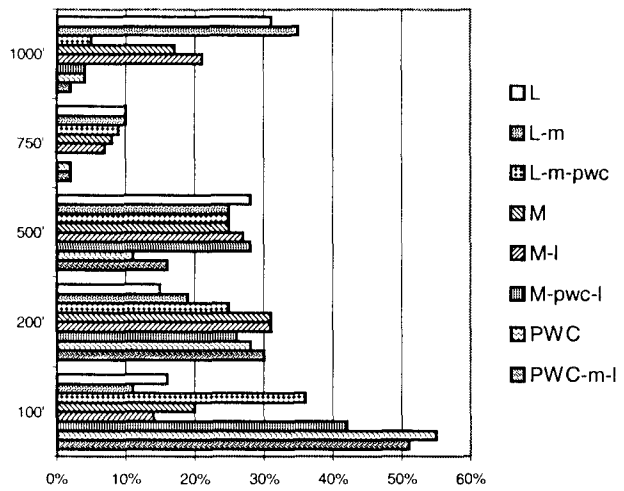

Figure 1. Preferred operating distances from PWC users.

Respondents were asked to report their preferred distance from their own activities to motorboating and their responses seemed more constant than for PWC use. For all groups, more than 60% reported a preferred distance of more than 100 feet from operating motorboats (Figure 2). Even 65% of motorboaters (M) preferred longer distances from other motorboats. And 24% of landowners (L) preferred 1000 feet or more from motorboating activities. These results indicate that landowners were affected by motorboating activities and the current NYS regulation for motorboats to allow a 100 foot zone of 5 m.p.h. from the shore and other fixed objects may not be sufficient from their perspective as coastal users.

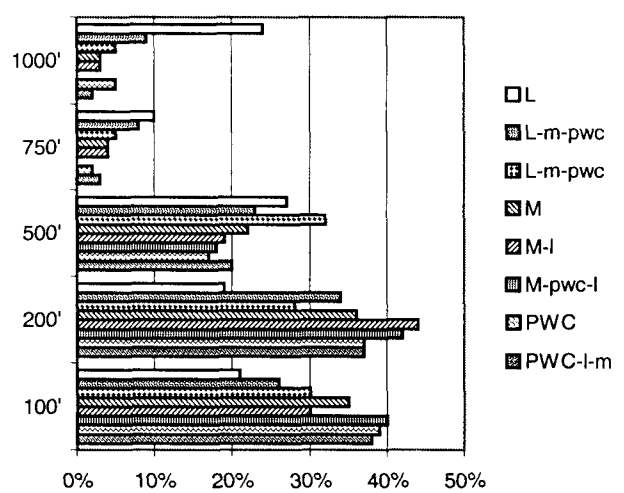

Figure 2. Preferred operating distances from motorboats.

Motorboat and PWC operators were asked to report their preferred distance from their own activities to shore line (Figure 3). The results were constant among most groups and about 70% of PWC users and motorboaters cumulatively reported preferred distances of more than 100 feet. These results indicate that the current NYS regulation for motorboaters and PWC operators to allow a 100 foot zone of 5 m.p.h. from the shore and other fixed objects may not be sufficient from the motorboaters and PWC operators perspectives as coastal users.

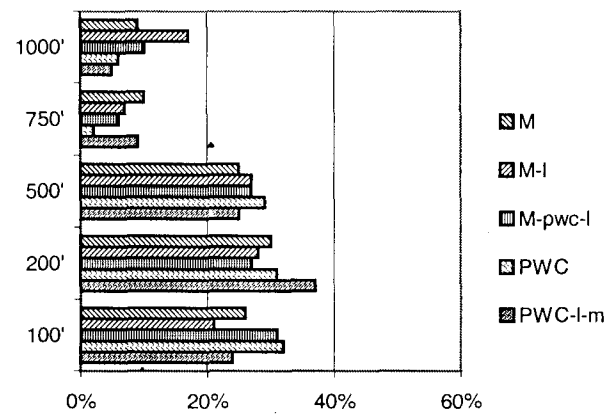

Figure 3. Preferred operating distances from shoreline.

Activity Interference

Recreation conflict was measured by asking respondents if they had any perceived activity interference during their recreational use of NYGLs. If respondents answered "yes", they were asked to describe their experiences. The experiences described were organized into four categories: physical problems and situations, interference from motorboaters, interference from PWC users, and interference from both motorboaters and PWC users. Physical problems and situations referred to such as low water levels in the lake, limited boating access, enforcement issues, water pollution, and other problems. PWC users were somewhat bothered by physical problems and motorboaters were bothered by PWC use and physical problems. Landowners were affect by both motorboating and PWC use (Table 10).

Table 10. Percent of respondents with perceived interference with water-based recreation activities in NYGL.

	No Problems	Physical Problems	Motorboat Use	PWC Use	PWC and Motorboat Use
PWC-m-I	85	7	3	5	0
PWC	74	14	5	4	3
M-pwc-I	78	8	2	8	4
M-I	60	11	4	16	9
M	80	9	2	1	8
L-m-pwc	69	0	12	5	14
L-m	40	1	6	25	28
L	61	1	4	11	23

Observations and Implications

The study results suggest several important implications and issues. First, a series of "asymmetric conflicts" were evident between landowners who were bothered by both PWC users and motorboaters, motorboaters who were bothered by PWC users but not much by landowners, and

PWC users who did not seem to be affected by either motorboaters or landowners. Resource dependence as is one possible reason to explain this situation. Landowners are more dependent on the NYGL because of their property ownership and this area is more meaningful for them and hard to substitute with other resources. However, PWC users and motorboaters are more flexible when using this area because alternative areas are available in NYGL or inland in NYS for their activities. PWC use usually interfere with motorboaters by speeding, jumping their wakes to close to the boat, or causing motorboaters to have to alter their boat direction to avoid PWC. However, both PWC use and motorboating interfered with landowners because of motor noise, concerns for safe watercraft and boat operating, and privacy issues when using coastal property at the waterfront.

Asymmetrical recreation conflicts are a common conclusion in many published studies (Adelman et al. 1982; Ruddell and Gramann 1994; Ramthun, 1995) and that concept is also supported by this study. The series of asymmetrical conflicts points out a potential problem in multiple use areas in which several activities could be available at the same time. Some users reported spatial or site-to-site displacement when experiencing recreation conflicts. Based on the concept of a series of asymmetrical conflicts, recreation planners and managers may have to identify the groups experiencing more interference and minimize potential conflict for the affected groups in multiple use zones. Place dependence and sensitivity to conflict could be possible indicators to identify potential conflict in a recreation area. Failing to maintain the recreation quality for visitors who are sensitive to conflict may cause the affected groups to be dissatisfied and could displace their activities.

The study suggests that education programs may help to reduce the conflict. In this study, PWC users perceived they were not appreciated by other users; however, they thought safety issues and their behaviors were not as bad as other groups thought. Motorboaters perceived interference from PWC use, but did not perceive that they also caused problems to landowners. Interestingly, both motorboaters and landowners with PWC had more sympathy for PWC use and users, possibly because these people had similar recreational motivations as PWC users and perceived what PWC users were feeling during their activities. A similar situation happened between motorboaters and landowners. Landowners with motorboats were not against motorboating as much as landowners without watercraft. This indicates that people participating in multiple activities, with the potential conflicts, may have more empathy and tolerance for other types of visitors. Therefore, recreation managers may reduce some perceived recreation conflict by increasing users' tolerance through "experience sharing" among different user groups.

PWC users are highly motivated on social interaction and nature enjoyment although less than motorboaters and landowners. PWC users focused on social interactions and nature as much as the other groups for their experiences. It is reasonable to educate PWC users what other groups concerns are about their machine disturbing the nature environment and their behavior can potentially interfere with other user groups experiences. Education programs could enhance users' perceptions about activity impacts on the social and natural environments and provide appropriate compensatory strategies to avoid conflict such as selecting a quieter 4-cycle PWC motor, participating in suitable and appropriate areas for PWC that minimize impacts, and acting courteously to other users to reduce conflict (e.g., understanding other user's motivations, the difficulties of operating larger boats, the rules of navigation for all types of boats).

User's perceptions of boating regulations (Table 8) suggest that many users do not understand the current NYS regulations for motorboating and PWC use. In addition, the landowner's responses indicate not only their unfamiliarity with NYS boating regulations but also their strong feelings against PWC use. Education strategies can offer opportunities to enhance user's knowledge of boating regulation and increase tolerance among different user groups.

Study results indicate that although the preferred operating distances between PWC, motorboats and riparian properties were different, the majority of users preferred more than 100 feet between these activites. Users preferring more distance between users may feel this way because of motor noise, concern for safety, perceptions of crowding, disruptive or unsafe behaviors, and privacy issues. Riparian landowners, for instance, felt noise and speeding from PWC use and motorboating disturbed their daily life and this type of use close to their properties caused privacy problems and may pose a safety concern for their family when wading, swimming, or fishing. PWC users reportedly bothered motorboaters by following them too close, jumping the boat wakes, or interrupting their boating course. Overall, most respondents in this study preferred longer distances between recreational activities which might be due to the fact that NYGL has a large water surface area for users to participate in various activities.

Although some changes are suggested by this study based on the distances preferred, other alternatives need more consideration, such as noise reduction through mechanical technology and changes in boat and PWC operator behavior. For example, studies about the impacts of motors on the nature environment or wildlife could help users to understand how these issues are directly related to distance from shore and other users activities (e.g., observing wildlife or fishing). New boat and PWC motor technology also helps to reduce noise levels and minimize the impacts to the natural environment. The types of water bodies and various bank or shoreline situations, are important considerations in distance regulations because large limits distance may be appropriate for open water areas like NYGL, but not in narrow rivers or bays because such distance restrictions may limit the use of PWC and motorboats in some areas altogether.

In summary, recreation conflicts among PWC use, motorboating and landowners are not serious in most NYGL areas probably because of its large water surface

area. However, problems emerged near coastal areas because of more interaction among those different users. Users with single and multiple recreation activity experiences are similar in the pattern of responses when considering recreation conflicts, but different in the value of each factor response. Study results reveal a series of asymmetrical conflicts that may imply current multiple use recreation may not be a good strategy in terms of reducing recreation conflict. The study also suggests education programs were needed to reduce conflict and increase compatibility between different user groups. However, preferences for large distances between users during their activities, and the implication that users may accept increases in the 100 foot limit in which boats must operate at 5 m.p.h or less from shore, should not be generalized to inland lakes or river systems because the physical environment (e.g. area, waves, wind, shoreline and adjacent lands) of the NYGL is different from those other inland NYS water areas.

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