RECREATION DISPLACEMENT OF BASS FISHERMEN FROM CENTRAL COAST LAKES

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ABSTRACT

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The purpose of this study was to assess the impacts of aquatic invasive species preventative measures on recreation displacement of bass fishermen from Central Coast lakes. A self-administered questionnaire was distributed to participants at a local bass fishing tournament. Thirty-six respondents completed the questionnaire. The results indicated that boat inspection procedures do not necessarily cause bass fishermen to displace. This study found that fishermen are likely to avoid recreating at a Central Coast lake in fishing practice conditions rather than in tournament conditions, and are likely to avoid tournaments at their least favorite lake if boat inspection procedures take too long. It is recommended that Central Coast lake counties assess why the boat inspection process is not consistent in duration among these lakes, and land management agencies should consider implementing uniform inspection procedures at all three lake counties.

Keywords: aquatic invasive species, constraint, coping, crowding, motivation, place attachment, recreation displacement

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Chapter 1

INTRODUCTION AND REVIEW OF LITERATURE

Background of Study

Bass fishing is a popular recreational activity in California. The Central Coast is home to five lakes: San Antonio Lake, Nacimiento Lake, Santa Margarita Lake, Lopez Lake, and Cachuma Lake. Within driving distance of one another, four of these five, San Antonio Lake, Nacimiento Lake, Santa Margarita Lake, and Cachuma Lake, are considered to be among the top 41 "greatest lakes" in California ("California's 40 greatest lakes index," 2013). A threat to all water bodies globally, including these lakes, is the Quagga mussel.

Introduced to the Great Lakes region in 1989, Quagga mussels (*Dressena rostriformis bugensis*), an aquatic invasive species, were carried to the United States in the ballast tanks of ships transporting goods from Eastern Europe (California Department of Fish and Wildlife, n.d.b). Quagga mussels are prolific breeders; a female Quagga mussel may spawn up to 1,000,000 offspring annually (San Luis Obispo County Water Resources Division of Public Works, 2008a). Such rapid reproduction negatively impacts aquatic ecosystems by causing hundreds of thousands of dollars worth of damage yearly and by disrupting natural food chains. Quagga mussels colonize pipes, docks, ship hulls, clog waterways, impair boat engines, damage water treatment facilities and consume so much plant life that water begins to clear up (San Luis Obispo County Water Resources Division of Public Works, 2008b). Clearer water means that many small aquatic animals no longer have sufficient nutrients, and sunlight can penetrate deeper into the water,

stimulating the growth of bluegreen algae, and causing taste and odor problems in drinking water (San Luis Obispo County Water Resources Division of Public Works, 2008b). In an effort to slow the spread of this species and other invasives in California, the California Department of Fish and Wildlife created a plan of action to manage aquatic invasive species threats to the state (California Department of Fish and Wildlife, n.d.a). Preventative action is best because once Quagga mussels have established a home in a waterway, there is no way to fully eradicate the species.

Many local bass fishermen are members of bass fishing organizations. Local divisions of these organizations frequently hold bass fishing tournaments at Central Coast lakes. Motivations of bass fishermen to participate in tournaments vary, but may include reasons such as personal enjoyment, monetary incentives, the lake is close proximity to home, or other motivations. Of great concern to the Central Coast is the possibility of a Quagga mussel infestation. As a component of aquatic invasive species preventative measures, Central Coast lake personnel must inspect all boats before vessels are permitted to enter the water. Inspections prevent not only aquatic invasive species from entering a lake, but also protect human health because Santa Margarita Lake and Lopez Lake provide drinking water to San Luis Obispo County residents. According to one local bass fisherman, there is limited consistency in boat inspection procedures among Central Coast lakes, and boat inspections vary in length of time and intensity depending on the lake county (G. Gray, personal communication, January 20, 2013). A lack of consistency may be a constraint to bass fishermen and lead to recreation displacement. Whereas Nacimiento Lake and Santa Margarita Lake accept security boat tags from other counties to validate boat inspections, Cachuma Lake does not. This forces fishermen to either

make a special trip to Santa Barbara County to have their boat inspected prior to a tournament, or give up valuable hours on tournament day because inspection procedures in this county do not take place until mid-morning. Motivations and constraints experienced by bass fishermen in regards to participation at a specific lake will ultimately impact the overall usage of a lake. Fishermen may choose or are forced into recreation displacement if constraints of participation outweigh motivations.

Lake managers will be able to use information gathered in this study to determine how boat inspection procedures impact recreation. Managers may learn how aquatic invasive species preventative measures provided at certain Central Coast lakes could influence recreation displacement. Additionally, managers may consider developing inspection procedures that are consistent throughout the three counties. Uniform inspection procedures would make the inspection process more time-efficient and cost-effective for both bass fishermen and lake staff. The more satisfied participants are with a location and its procedures, the more likely they will be motivated to recreate at that location and return. Implementing cohesive inspection procedures could prove to be advantageous.

Review of Literature

Research for this review of literature was found using California Polytechnic State University campus resources, including the Robert E. Kennedy Library and online databases. Databases utilized were the Academic Search Premier, Hospitality & Tourism Complete, and Proquest. This review of literature is organized as three topic areas: recreation displacement from recreational fishing, place attachment with water-based

recreation areas, and impacts of aquatic invasive species.

Recreation displacement from recreational fishing. Constraints have a powerful impact on an individual's motivation to participate in a recreational experience. An individual must navigate through, negotiate, and cope with constraints to find the comfort level suitable for participation. Other factors, such as crowding, fees, and place attachment, largely affect participation as well. This section discusses the influence of various factors that can cause recreation displacement from recreational fishing lakes.

Public recreation areas play a significant role in the facilitation of leisure time activity (Wilhem Stanis, Schneider, & Anderson, 2009). Having a family, getting vacation time, time away from work, or obtaining a permit for recreation access are common constraints to recreation participation (Schneider, Schroeder, & Schwaller, 2011). These constraints cause a participant to shorten the experience, adjust the experience to conform to the present situation, or substitute the experience for another. Fedler and Ditton (2000) reported that the most common constraints participants experienced with recreational fishing included perceived lack of time or money; lack of access to and knowledge of facilities; negative images of water quality, fish contamination, and boater safety; inconsistent delivery of satisfactory boating and fishing products, services, and facilities; and lack of consistent positive images of boating and angling. These constraints to recreational fishing can be grouped into three larger categories of leisure constraints: structural, interpersonal, and intrapersonal (Crawford & Godbey, 1987). Recreation area managers can then analyze these three categories to determine which category impacts recreation participation at their facility.

Structural constraints are external factors such as lack of time, money, or transportation to the activity location. Structural constraints interfere with recreation participation and take place once a decision to participate is made, but before the actual participation in the activity occurs (Crawford & Godbey, 1987). Intrapersonal constraints are unique to an individual and are psychological qualities, such as anxiety or perceived skill level (Crawford & Godbey). Intrapersonal constraints affect an individual's ability to create and determine leisure preferences. Similar to intrapersonal constraints, interpersonal constraints affect social influences to participate, such as family or friends also participating (Crawford & Godbey). Overall, constraints can impact visitor behavior, participant visitation to a destination, and the overall recreational experience. Strategies of coping may be used as a way to manage recreational constraints.

Coping is a strategy to manage constraints to recreation participation and other potentially stressful situations. Lazarus and Folkman (1984) defined coping as "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (p. 141). Two types of coping are emotion-focused and problem-focused (Lazarus & Folkman). Often occurring concurrently, emotion-focused and problem-focused coping have the ability to assist and hinder each other. Emotion-focused coping strategies regulate emotions or help psychologically avoid stressful situations (Iwasaki & Schneider, 2003). When problem-focused coping strategies are used, an individual takes action to alter a situation by managing the environment through rationalization and reasoning, substituting one activity or resource for another, or using displacement strategies.

Displacement is a form of behavioral coping (Manning, 1999). If individuals are dissatisfied with a recreation experience or want to avoid crowding, they may displace themselves from the unpleasant location or situation. Displacement may involve intersite displacement, from one recreation area to a different recreation area; intrasite displacement, shifts within a recreation area; or temporal displacement, shifts from one time period to another (Manning). Results of a study by Robertson and Regula (1994) indicated that a decline in the number of participants who engaged in recreational boating at lakes served as an attraction for boaters who desired less crowding. Some boaters interviewed in the study chose to continue recreating at these lakes because there were fewer boaters and they had more room to recreate. Other boaters chose to displace from these lakes, discontinued, or reduced their lake use as opposed to dealing with crowding. In addition, these individuals also reported being less satisfied with their recreation experience in comparison to continuing users who tolerated the crowding or continued recreating at the lakes. The desire to avoid crowding or external effects, such as the price of user fees, can greatly influence displacement and recreation use of a location.

In a study by Richer and Christensen (1999), many lake users said they would consider paying higher prices for entrance fees to reduce crowding at a recreation area. The occurrence of crowding in a recreation area may reduce recreation participation or cause recreation displacement; higher entrance fees could eliminate the potential for crowding because only users who are able to pay the user fees can recreate there. Richer and Christensen also noted that although fees for recreation generated significant revenue, they had the potential to change the behavior of those who recreated. Even if a

location is crowded or if a recreation area charged fees, people may still continue to use recreation areas for more personal reasons, such as place attachment.

Many influences affect an individual's decision to participate in recreational fishing. In order to attain the most satisfaction that this form of leisure offers, individuals must navigate through perceived or personal constraints and develop coping strategies. For some individuals, constraints or crowding in a recreation area will not influence recreation displacement. These individuals have most likely developed place attachment with a location, and this strong emotional bond could contribute to a participant's satisfaction with the recreation experience. How an individual manages the various influences that affect recreational fishing participation will directly influence their potential for displacement and their overall satisfaction with the activity.

Place attachment with water-based recreation areas. Recreational fishing is a sport enjoyed by people of all ages, backgrounds, and abilities. This outdoor, water-based form of recreation tends to take place in scenic, natural, or protected areas. Place attachment is an emotional bond people develop over time with a location or recreation area. When an individual develops place attachment with a protected area, a sense of personal identity becomes connected with the location. Special meanings or spiritual beliefs may also be associated with the location. This section discusses place attachment with water-based recreation areas.

The U.S. Army Corps of Engineers (USACE) manages two percent of all federal lands and waters, and supports over 20% of all federal land recreation. Within these recreation categories supported by USACE, recreational fishing is the most popular activity (Budruk, Wilhem Stanis, Schneider, & Heisey, 2008). Fedler and Ditton (2001)

found that overall, people agreed that fishing was a good use of their time and money, and people were satisfied with the economic and social returns fishing provided. Fedler and Ditton noted that "fishing programs, activities, and services should…facilitate access and easier participation" (p. 291). Because of the popularity of recreational fishing combined with fairly easy access to participation, repeat visitation and use of a recreation area is likely to occur. As a result, people may develop place attachment with the location (Budruk et al.).

People with strong place attachment tend to be more sensitive to management decisions regarding alterations in laws, procedures, policies, or changes in the physical landscape of a location (Williams & Stewart, 1998). Because place attachment is an emotional bond people develop, place attachment has the potential to become a barrier for managers in charge of making resource management decisions (Budruk et al., 2008; Williams & Stewart). Budruk et al. reported the following:

> One of the outcomes associated with water recreation is that visitors often develop special emotional relationships to the places they visit through a process referred to as place bonding or place attachment. Repeated place exposure, among other things, enables visitors to identify with and depend on these places to fulfill emotional needs…repeat visitation will lead to increasing site impacts and territoriality...as deeper bonds develop, visitors may become stewards and guard against negative impacts (pp. 528-529).

Repeat visitation to a recreation area can be positive; it shows that participants enjoy a recreation area or are somehow emotionally connected to a location. Over time place

attachment can grow stronger, or even so strong that potentially no influence will cause individuals to displace from recreating at a location.

It is important for recreation area managers to pay close attention to the actions of participants. Managers can use the knowledge they gain by observing and communicating with participants, and note why these recreation locations attract people. Potential reasons include significant meanings, values associated with the location, history, or emotional or spiritual bonds expressed (Williams & Stewart, 1998). In a study conducted by Provencher, Baerenklau, and Bishop (2002) the influence of seasonality, the outside temperature, and the occurrence of fishing tournaments at a location were huge motivating factors that participants expressed for why they did or did not recreate at certain lakes. Only after careful analysis of a variety of factors necessary management decisions should be made (Williams & Stewart). Place attachment is a valuable phenomenon for recreation area managers to study.

Outdoor recreation areas are vital to the preservation of natural and scenic settings, and to the continuing enjoyment of outdoor recreational activities, including recreational fishing. Overall, an individual with strong place attachment may be capable of overcoming the influences of recreation displacement and management decisions, and will be able to continue recreating at an area long after others displace.

Impacts of aquatic invasive species. Parks are essential to the protection and survival of plants, animals, and natural resources. When non-native species are introduced to a park system, dramatic changes in the natural flow of life often occur (Hickey, 2010). This section will explore issues related to the importance of non-native species management at parks and recreation facilities.

The three areas most affected by aquatic invasive species are environmental, economic, and public health ("Why should we care about ANS," 2012; Rosaen, Grover, & Spencer, 2012). Within these three areas the industries most disturbed by aquatic invasive species include sport and commercial fishing, water treatment, power generation, industrial facilities using surface water, and tourism (Rosaen et al.). Leung, Bossenbroek, and Lodge (2006) suggested studying the pathways through which aquatic invasive species can be dispersed into these areas and industries.

Natural barriers such as oceans, mountains, and deserts keep species confined to their natural habitats. This confinement has enabled species and their ecosystems to evolve without complications from non-native species. However, according to McNeely (2004), technology has helped break natural barriers of species confinement and natural isolation.

By harnessing the power of technology, a variety of modes of transportation have been developed to accommodate travel by air, water, and land. Transportation not only allows people to travel from destination to destination, but also enables aquatic invasive species to hitchhike on vehicles to new environments (Bax, Williamson, Aguero, Gonzales, & Geeves, 2003). The movement of recreational boaters traveling from lake to lake is considered the most significant pathway aquatic invasive species are transported (Leung et al., 2006). When transported by recreational boaters, either on purpose or accidently, aquatic invasive species are commonly found on ship fouling, in ballast water (Bax et al., 2003), in live wells, bilges, engines, boat trailers, and anchors (Johnson, Ricciardi, & Carlton, 2001, p. 1789). McNeely (2004) acknowledged that although every species is native to a particular geographic area, and while territorial expansion and shifts

in living environment do occur, there is a question as to whether human travel facilitates or speeds up this natural process too quickly. Because of the capabilities and speed of human travel, global as well as isolated locations are now more accessible than ever.

Any location, including an extremely protected area, is susceptible to an aquatic invasive species infestation (McNeely, 2004). If an infestation does occur, park managers have four main choices to consider: do nothing about the infestation, close the park, restrict movement from other areas within the park, or educate park visitors and enforce park policies (Hickey, 2010). Park managers have no way of knowing how an aquatic invasive species will impact the park or park ecosystem. The type of aquatic invasive species, breeding and reproduction time of a species, average lifespan of an individual in a species, and resources an aquatic invasive species needs for survival in an ecosystem are extremely important factors to consider when determining the most appropriate choice for action that should be taken (McNeely).

If park managers choose to keep the park open by educating visitors and enforcing policies, biological control is one of the most powerful and effective complementary actions that can be taken (McNeely, 2004). Biological control is the purposeful application of natural enemies to control invasive species populations. As stated by Richer and Christensen (1999), "ecological damage…has a monetary value" (p. 9), so many times, biological control is the most cost-efficient method and least harmful to the environment (McNeely). Biological control may not be a suitable control method for all aquatic invasive species, especially if a species has established a home in an ecosystem or has gone unnoticed for some time.

If an aquatic invasive species has intruded into an ecosystem and the population is vigorous in this new environment, the population can quickly become challenging to manage if the corrective steps are not taken. The problem of aquatic invasive species in an ecosystem rapidly gets worse with time, so successful management and abatement of aquatic invasive species is only possible if preventative action is taken quickly and administered at the global and regional levels (Bax et al., 2003). Next, it is necessary and essential that all possible vectors of the aquatic invasive species are identified, treated, or prevented from spreading to new areas. Multiple aquatic invasive species are often dispersed through the same vectors (Leung et al., 2006). Knowing that species invasions are unavoidable, park managers can reduce the risk of impacts by addressing, and having an action plan for, these six topics in park policy: prevention, detection, quarantine, eradication, control, and mitigation (Bax et al.). Identifying how aquatic invasive species enter new ecosystems and applying management techniques to control the population play important roles in analyzing overall costs of a species.

Costs imposed by aquatic invasive species range from measurable to immeasurable (Rosaen et al., 2012). Monetary costs may include direct operating costs such as maintenance actions or fixing damaged infrastructure; decreased productivity, decreased revenue, and profits because time repairing damages takes away from regular business operations; and reduced demand from participants, customers, or tourists because of the unsightly or highly infested areas (Rosaen et al.). Damage costs caused to ecosystems by aquatic invasive species are numerous. In addition to the impacts mentioned previously, native species can become threatened or destroyed when in competition with invasive species for food sources; most often, they consume so much

food and oxygen from lakes that water clarity increases and native species begin to perish (Bax et al. 2003; McNeely, 2004). Drinking water may also be affected if species infest and clog water intake pipes or invade water treatment plants. Human health and well-being are threatened by aquatic invasive species when these scenarios occur because there is increased risk of the spread of disease (Pejchar & Mooney, 2009). Human culture, in terms of recreation and tourism, may experience a shift because of physical and visual transformations in landscape, or because of recreation areas becoming undesirable or unsafe to use (Pejchar & Mooney). Aquatic invasive species are harmful nuisances to non-native waterways and must be carefully monitored so that the natural balance of life in an ecosystem does not become critically endangered.

Summary. The review of literature provided information about influences that cause recreation displacement from recreational fishing, place attachment to water-based recreation areas, and impacts of aquatic invasive species.

Recreation displacement can be influenced or caused by a variety of factors. Common reasons include constraints, external sources such as fees, and the desire to avoid crowding. If an individual does not have the tolerance to manage these reasons, they are more likely to displace from a recreation area to a more comfortable or desirable location.

Place attachment is an occurrence that tends to be unaffected by influences of recreation displacement. People with strong place attachment tend to overlook these influences that may affect a number of others who recreate at the same location, and will continue to recreate even after the others displace.

Aquatic invasive species infestations are serious problems. Careful and effective management strategies are essential in attempt to prevent infestations because of the degree of harm these species cause to native ecosystems, their adverse affects on multiple industries, and the potential to impact human health.

There is a void in research that makes this study significant. Little research has been conducted in the Central Coast area of California on how aquatic invasive species preventative measures occurring at Central Coast lakes influence recreation displacement of bass fishermen from these lakes. This study will lead to a better understanding of this topic area as well as discover if Central Coast lakes in San Luis Obispo, Monterey, and Santa Barbara counties would benefit from having uniform aquatic invasive species inspection procedures.

Purpose of the Study

The purpose of this study was to assess the impacts of aquatic invasive species preventative measures on recreation displacement of bass fishermen from Central Coast lakes.

Research Questions

This study attempted to answer the following research questions:

1. What lake is perceived as the least favorite among bass fishermen?
2. Do aquatic invasive species preventative measures cause recreation displacement?

3. What factors influence recreation displacement of bass fishermen from Central Coast lakes?
4. What is the relationship between displacement and perceived place attachment due to removal of barriers?

Delimitations

This study was delimited to the following parameters:

1. Information on the impact of the aquatic invasive species preventative measures on recreation displacement was gathered from members of a local bass fishing organization, 101 Bass.
2. Influences that cause recreation displacement from recreational fishing, place attachment with water-based recreation areas, and impacts of aquatic invasive species were analyzed.
3. The data were collected during the spring of 2013.
4. Information for this study was gathered using a pencil and paper survey.

Limitations

This study was limited by the following factors:

1. This study used a combination of convenience and expert sampling because subjects may have considerable prior knowledge of the topic area. Only participants conveniently available for the researcher during data collection have the opportunity to participate in the study.
2. The instrument used in this study was not tested for validity or reliability.

3. Only subjects present at the Lopez Lake bass fishing tournament hosted by the 101 Bass organization were asked to participate in this study.

Assumptions

This study was based on the following assumptions:

1. It was assumed that the subjects would respond honestly to the questionnaire.
2. It was assumed that subjects had prior experience with aquatic invasive species preventative measures.
3. It was assumed that subjects were members of the 101 Bass organization.

Definition of Terms

The following terms are defined as used in this study:

Aquatic invasive species. Non-native aquatic species; pose significant ecological and economic threats to aquatic ecosystems

Constraint. Structural, interpersonal, intrapersonal; a limitation or restriction

Coping. Problem-focused or emotion-focused; a way of dealing with stress

Crowding. Too many people sharing the same space at the same time

Eradication. To exterminate or wipeout

Motivation. The reason or reasons for behaving in a certain way

Place attachment. An emotional bond or connection developed over time with a location

Recreation displacement. A method of behavioral coping; can be caused by crowding or undesirable situations; decision to change behavior to something more pleasing

Chapter 2

METHODS AND PROCEDURES

The purpose of this study was to assess the impacts of aquatic invasive species preventative measures on recreation displacement of bass fishermen from Central Coast lakes. This chapter is organized by the following sections: description of subjects, description of instrument, description of procedure, and method of data analysis.

Description of Subjects

Central Coast bass fishermen who were members of the 101 Bass organization for the 2012-2013 season were the subjects for this study. Of 86 members, the primary demographic was 97% male (101 Bass, 2013). Central Coast lakes hosted 101 Bass fishing tournaments in a rotational fashion from November through September during the year. Using convenience sampling, the researcher selected one Central Coast lake tournament to attend and distribute questionnaires; the sample was drawn from attendees at the tournament. All 86 members may or may not have been present at the tournament; however, the researcher attempted to collect data from all participants present. Subjects in the 101 Bass organization were chosen for this study because the 101 Bass organization had a high number of participants compared to other local organizations; subjects had a high level of familiarity and experience with aquatic invasive species preventative measures at each of the Central Coast lakes; and they were very knowledgeable about boating procedures and policies at each of the Central Coast lakes.

Description of Instrument

The self-administered questionnaire was distributed in spring 2013. The researcher designed the seven-item questionnaire using both independent and dependent variables to assess if recreation displacement was influenced by aquatic invasive species preventative measures conducted at local lakes. Independent variables included least favorite lake, aquatic invasive species, tournament non-participation, barriers to participation, lake counties, and county of current residence. Dependent variables were tournaments, reasons for non-participation, potential barriers to participation, enhanced recreation experience, and uniform boat inspection procedures. Independent and dependent variables were organized into discrete and continuous data.

Discrete data included participant least favorite lake, participant opinion about uniform boat inspection procedures, and participant's county of current residence. Data were formatted as forced choice "circle one" or "check one" questions with the options of "yes," "no," and "undecided," with one partially closed-ended choice of "other: please specify" pertaining to participant county of current residence.

Continuous data measured included reasons to avoid Central Coast lakes due to aquatic invasive species preventative measures; reasons to not participate in a tournament at a participant's least favorite lake; level of agreement with the idea that if barriers to participation at a participant's least favorite lake were removed the participant may be more attached to the lake; and participant opinion about which lake counties could improve existing boating policies. Data were formatted using forced choice, questions with options of "always," "sometimes," and "never," and 4-point Likert scales with choices of "strongly disagree" to "strongly agree" (see Appendix A). The Cal Poly

Human Subjects Committee reviewed and approved the questionnaire and Informed Consent form before the researcher proceeded with data collection for this study (see Appendix B). A pilot study was conducted and the questionnaire was distributed to 10 people. These individuals were chosen at random through convenience sampling, and all were members of the 101 Bass organization. Subjects gave feedback to the researcher after pilot testing the questionnaire and recommended adjusting two questions. Subjects suggested that the researcher adjust the wording of one question so it would be easier to understand, and more categories should be added to the second question. Changes as a result of the pilot study were made before data collection occurred.

Description of Procedures

Prior to the pilot test on March 15, 2013 at San Antonio Lake, the researcher made arrangements with the 101 Bass tournament director to collect data on March 30, 2013 at the organization's Lopez Lake tournament. On March 30, the researcher arrived at the tournament location and set up a table at the tournament awards ceremony site. At the start of the awards ceremony, an announcement was made by the tournament director to encourage subjects to participate in a voluntary research study. Convenience sampling was used to distribute the pencil and paper questionnaire to subjects; each received one writing utensil, questionnaire, and Informed Consent form. The researcher remained stationed at the table for questions until the tournament awards ceremony ended, and completed questionnaires were submitted to a covered questionnaire box located next to the researcher's table. Participants were thanked for their time.

Method of Data Analysis

Research questions were addressed through the questions used in the instrument. Data from the questionnaire were collected and entered into Microsoft Excel for analysis.

Perceived least favorite lake among bass fishermen was measured using discrete data. Data were analyzed with frequency and percentage. Recreation displacement caused by aquatic invasive species preventative measures was measured with continuous data. Possible reasons to avoiding recreating at certain lakes were analyzed though means and standard deviations. Factors that influenced recreation displacement of bass fishermen were measured were using continuous data in a Likert scale regarding level of agreement with a list of potential non-participation reasons. Data were analyzed using mean and standard deviation.

To determine if a relationship existed between displacement and perceived attachment to a lake, level of agreement with potential constraints to participation were measured with a Likert-type scale. Continuous data were analyzed using mean and standard deviation.

Chapter 3

PRESENTATION OF THE RESULTS

The purpose of this study was to assess the impacts of aquatic invasive species preventative measures on recreation displacement of bass fishermen from Central Coast lakes. Questionnaires were distributed to 101 Bass members at the Lopez Lake bass fishing tournament on March 30, 2013. Of 62 possible subjects present at the tournament, 36 participated in the study (58.10% response rate).

Perceived Least Favorite Central Coast Lake

In order to answer the research question, "What lake is perceived as least favorite among bass fishermen," participants were asked to indicate their least favorite Central Coast lake for bass fishing tournaments. Cachuma Lake was the least favorite (n = 23, 63.90%). For a complete display of these findings see Table 1.

Table 1
Least Favorite Central Coast Tournament Lake According to Frequency and Percentage

Lake Name	*f*	%
Cachuma Lake	23	63.90
Lopez Lake	2	5.60
Nacimiento Lake	5	13.90
San Antonio Lake	4	11.10
Santa Margarita Lake	2	5.60
Total	36	100.10

Note. Due to rounding of numbers, percentages are more than 100%.

Results for Recreation Displacement

To answer the research question, "Do aquatic invasive species preventative measures cause recreation displacement," participants were asked to identify the frequency that they avoid fishing practice and tournaments at Central Coast lakes due to boat inspection procedures. Of the 36 participants in the study, many participants agreed they sometimes (n = 17, 48.60%) avoid fishing practice and never (n = 18, 54.50%) avoid bass fishing tournaments. See Table 2 for a complete description of frequency of participant fishing practice avoidance.

Results for Recreation Displacement Factors

In order to answer the research question, "What factors influence recreation displacement of bass fishermen from Central Coast lakes," participants were asked to indicate their level of agreement with a list of reasons for not participating in bass fishing tournaments at their least favorite lake. As illustrated in Table 3, participants agreed that they do not participate in bass fishing tournaments at their least favorite lake because the boat inspection process takes too long (n = 35). Results indicated that most participants are likely to not participate in tournaments at their least favorite lake if the lake is perceived as too crowded at certain times of year (mean score 2.44, standard deviation 1.02) or if fishing conditions were perceived as poor (mean score 2.41, standard deviation 1.05). Fishermen are not necessarily displaced because of the cost of tournament entry fees (mean score 1.62, standard deviation 0.74) or the potential of aquatic invasive species (mean score 1.82, standard deviation 0.97). A detailed breakdown of non-participation in tournaments is shown in Table 4.

Table 2
Avoidance of Fishing Practice Due to Boat Inspection Procedures According to Frequency and Percentage

Avoid Fishing Practice	*f*	%
Always	3	8.60
Sometimes	17	48.60
Never	15	42.90
Total	35	100.10

Note. Due to rounding of numbers, percentages are more than 100%.

Table 3
Avoidance of Tournaments Due to Boat Inspection Procedures According to Frequency and Percentage

Avoid Tournaments	*f*	%
Always	3	9.10
Sometimes	12	36.40
Never	18	54.50
Total	33	100.00

Results for Relationship Between Displacement and Perceived Place Attachment

In order to answer the research question, "What is the relationship between displacement and perceived place attachment due to removal of barriers," participants were asked to identify their level of agreement with a list of potential barriers to participation. Thirty-two participants agreed that if perceived barriers to participation were removed from their least favorite lake, they would get more satisfaction out of fishing there (mean score 2.78, standard deviation 1.01). As shown in Table 5, results indicated that participants would not consider the lake more special (mean score 2.00,

standard deviation 0.80) or find fishing at their least favorite lake more important than fishing at another lake (mean score 2.00, standard deviation 0.79).

Table 4
Reasons for Non-participation in Tournaments at Least Favorite Lake According to Mean Score and Standard Deviation

Reasons	Mean	SD
Do not enjoy the lake location	2.29	1.17
Avoid fishing practice at this lake	2.35	1.20
Think fishing conditions are poor	2.41	1.05
Think water conditions are poor (water level, clarity)	1.91	0.84
Choose not to attend	2.21	1.08
Am not able to attend	1.90	0.94
Think the boat inspection process takes too long	2.89	1.26
Think the tournament entry fee is too costly	1.62	0.74
Think there is potential for aquatic invasive species	1.82	0.97
Think the lake is too far from home	2.35	1.20
Think the lake is too crowded at certain times of year	2.44	1.02
Overall Mean	2.12	1.04

Participants were asked to indicate the county of current residence, and the majority of participants answered San Luis Obispo County (n = 28, 82.4%). For a complete presentation of these findings, see Table 6.

Table 5
Perception of Least Favorite Lake Barriers to Participate Removed According to Mean Score and Standard Deviation

With Removed Barriers	Mean	SD
This lake would be the best place for tournament fishing	2.06	0.88
This lake would be very special to me	2.00	0.80
I would strongly identify with this lake	2.09	0.86
I would get more satisfaction out of fishing here	2.78	1.01
I would be very attached to this lake	2.28	0.85
I would fish here more often	2.76	1.03
Fishing here would be more important to me than fishing at another lake	2.00	0.79
I would not substitute another lake for the things I could do at this lake	2.03	0.85
Overall Mean	2.25	0.88

Table 6
Participant County of Residence According to Frequency and Percentage

County of Residence	*f*	%
Monterey County	4	11.80
San Luis Obispo County	28	82.40
Santa Barbara County	2	5.90
Other	0	0.00
Total	34	100.10

Note. Due to rounding of numbers, percentages are more than 100%.

The results presented in this chapter indicate that boat inspection procedures do cause some recreation displacement of bass fishermen. Results also indicate that most

fishermen agree Central Coast lake counties would benefit from universal boat inspection procedures at Central Coast lakes. Participants indicated that they would get more satisfaction out of fishing and fish at their least favorite lake more often if barriers to participation at their least favorite lake, most notably, the boat inspection process taking too long, were removed. A detailed summary and a discussion of the findings will follow in Chapter 4.

Chapter 4

DISCUSSION AND CONCLUSIONS

This study was developed to assess if aquatic invasive species preventative measures caused recreation displacement of bass fishermen. This concluding chapter will include the following: a summary of the study, a discussion of the findings, limitations, conclusions based on research questions, implications of the findings, and recommendations for future research.

Summary

The purpose of this study was to assess the impacts of aquatic invasive species preventative measures on recreation displacement of bass fishermen from Central Coast lakes. This study was delimited to members of the 101 Bass organization.

Research shows that constraints to recreational fishing can cause displacement of participants. Individuals who navigate though perceived constraints to participate have most likely developed place attachment with a recreation area. This strong emotional bond can be a potential barrier for recreation area managers in addition to managing impacts of aquatic invasive species.

The researcher distributed a self-administered pencil and paper questionnaire using convenience sampling at the 101 Bass Lopez Lake tournament on March 30, 2013. A total of 36 questionnaires were collected from participants at the tournament; data were analyzed using Microsoft Excel. Frequency and percentage were tabulated for five questions, and mean and standard deviation were utilized for two questions. The results

indicated that aquatic invasive species preventative measures do not necessarily cause recreation displacement of bass fishermen from Central Coast lakes.

Discussion

This study answers five research questions. The first research question, regarding perceived least favorite lake among bass fishermen, indicates that Cachuma Lake is the least favorite for bass fishing tournaments.

Research question two assesses if aquatic invasive species preventative measures cause fishermen to displace from their least favorite tournament lake. Results suggest that nearly half of participants in the study sometimes avoid fishing practice, and over half of the participants never avoid tournaments at their least favorite lake. This shows that aquatic invasive species preventative measures do not cause significant displacement, especially for tournament conditions.

Research question three analyzes factors that influence recreation displacement of bass fishermen. Participants indicate the most significant reason they do not attend bass fishing tournaments at their least favorite lake is because the boat inspection process takes too long.

The relationship between displacement and perceived place attachment due to the removal of barriers is evaluated in research question four. Results show that the vast majority of participants are from San Luis Obispo County, and if perceived barriers to participation are removed from a participant's least favorite lake, they will get more satisfaction out of fishing there.

Major findings of this study indicate that aquatic invasive species preventative measures do cause some recreation displacement. Most fishermen are more likely to avoid their least favorite Central Coast lake during fishing practice conditions, and will avoid participating in tournaments if the boat inspection process is perceived to take too long. The majority of fishermen would be more satisfied with fishing at Cachuma Lake if perceived barriers to fishing at this lake were removed.

The findings of this study support previous research on recreation displacement. Participants in this study confirm this research by suggesting that the boat inspection process acts as both a structural and intrapersonal constraint. Commonly, participants deal with these types constraints by displacing to avoid certain situations or locations. Many participants in this study indicate that they sometimes avoid fishing practice at their least favorite lake because of boat inspection procedures, specifically because the inspection process takes too long.

Findings and conclusions as a result of this study show that the aquatic invasive species preventative measures do affect bass fishermen, but not to the extent that fishermen avoid their least favorite lake in all instances. Although the boat inspection procedure is a necessary component for admittance to a Central Coast lake, the variability in inspection duration leads to participants being unsatisfied with their experience before they can even begin their recreational activity. If this occurs enough to be viewed as unpleasant, many fishermen may choose to displace from an unsatisfactory lake during practice conditions; fishermen rarely displace during tournament conditions. It is recommended that lake counties should assess why the boat inspection procedure varies in duration at each lake. Central Coast lake counties should also consider implementing

uniform boat inspection procedures to standardize the process throughout the Central Coast region. This would make the inspection process more efficient for participants to experience as well as lake staff to conduct. Uniformity could lead to less lake avoidance by fishermen, which could potentially increase revenue for a recreation area.

Limitations of this study include the small population size of the 101 Bass organization, which resulted in a small sample size for data collection. Of the population, only participants who attended the 101 Bass Lopez Lake tournament had the opportunity to participate in the study. Members of the population who did not attend the tournament were displaced for some reason, and were not accessible to the researcher. Of the population sampled in this study, over half (57.20%) sometimes or always avoid fishing practice at Central Coast lakes and nearly half (45.50%) sometimes or always avoid tournaments because of boat inspection procedures. These results should alarm aquatic recreation managers.

Because of the potential for considerable prior knowledge of the topic area, the use of convenience and expert sampling with local bass fishermen was appropriate for this study. However, with such a small sample size, the findings may not be generalized to the larger population of members of the 101 Bass organization.

Managers of aquatic recreation areas need to be aware of and understand user perceptions in order to manage an area that facilitates optimum use. This study assesses how aquatic invasive species preventative measures at Central Coast lakes affect bass fishermen. The significance of the study shows that outside influences, such as bass fishing tournaments, provide enough motivation for participants to tolerate non-standardized boat inspection procedures. Conclusions made in this study are especially

applicable to outdoor aquatic recreation areas, and may be applied to other California lakes.

Conclusions

Based on the results of this study, the following conclusions are drawn:

1. Participants in the 101 Bass Lopez Lake tournament said Cachuma Lake is their least favorite lake for tournament fishing.
2. Bass fishermen are more likely to displace from their least favorite Central Coast lake in practice conditions over tournament conditions.
3. Bass fishermen are likely to not participate in tournaments at their least favorite Central Coast lake if the boat inspection process is perceived to take too long.
4. If perceived barriers to fishing participation were ideally removed from the participants' least favorite lake, they would be more satisfied with fishing there.

Recommendations

Based on the conclusions of this study, the following recommendations are made:

1. Cachuma Lake should determine why participants consider this lake to be their least favorite for bass fishing tournaments.
2. Lake counties should assess why bass fishermen are more likely to displace from a lake in practice conditions to attract these participants not just in tournament conditions.

3. Central Coast lake counties should assess why the boat inspection process varies in duration and thoroughness at each lake, and should consider implementing uniform boat inspection procedures.
4. Lake counties should assess what barriers bass fishermen may perceive when recreating at a certain lake.

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APPENDIXES

Appendix A

Questionnaire

Recreation Displacement of Bass Fishermen from Central Coast Lakes

Please take a few moments to complete this questionnaire. Your responses are strictly anonymous and your participation is completely voluntary. Responses will help determine if aquatic invasive species boat inspection procedures influence recreation displacement of bass fishermen from Central Coast lakes. Thank you for your participation.

1. **Which of the following Central Coast lakes is your *least favorite* when participating in a tournament? (Circle one)**

Cachuma Lopez Nacimiento San Antonio Santa Margarita

2. **Do you avoid recreating at certain Central Coast lakes because of aquatic invasive species boat inspection procedures? Please circle your answer for each item.**

I avoid fishing practice because of boat inspections	Always	Sometimes	Never
I avoid tournaments because of boat inspections	Always	Sometimes	Never

3. **For the statements below, please circle your level of agreement with each item.**

	Strongly Disagree	Disagree	Agree	Strongly Agree
I don't participate in tournaments at my least favorite lake because I...				
Do not enjoy the lake location	1	2	3	4
Avoid fishing practice at this lake	1	2	3	4
Think fishing conditions are poor	1	2	3	4
Think water conditions are poor (water level, clarity)	1	2	3	4
Choose not to attend	1	2	3	4
Am not able to attend	1	2	3	4
Think the boat inspection process takes too long	1	2	3	4
Think the tournament entry fee is too costly	1	2	3	4
Think there is potential for aquatic invasive species	1	2	3	4
Think the lake is too far from home	1	2	3	4
Think the lake is too crowded at certain times of year	1	2	3	4

Please continue on back

4. **If all the barriers to participation were removed from your *least favorite* lake, would your perceptions about this lake change? For example, if your least favorite lake had better fishing conditions, would you enjoy it more? Please circle your level of agreement with the following statements.**

If all barriers to participation were removed from my least favorite lake...	Strongly Disagree	Disagree	Agree	Strongly Agree
This lake would be the best place for tournament fishing	1	2	3	4
This lake would be very special to me	1	2	3	4
I would strongly identify with this lake	1	2	3	4
I would get more satisfaction out of fishing here	1	2	3	4
I would be very attached to this lake	1	2	3	4
I would fish here more often	1	2	3	4
Fishing here would be more important to me than fishing at another lake	1	2	3	4
I would not substitute another lake for the things I could do at this lake	1	2	3	4

5. **In your opinion, do you think the lake counties listed below could improve their current boating policies to enhance your recreation experience? (Circle one)**

Monterey County (Nacimiento Lake, San Antonio Lake)	Yes	No	Uncertain
San Luis Obispo County (Lopez Lake, Santa Margarita Lake)	Yes	No	Uncertain
Santa Barbara County (Cachuma Lake)	Yes	No	Uncertain

6. **In your opinion, do you think that the lakes in the Central Coast counties listed in question 5 would benefit from having uniform boat inspection procedures allowing for a universal boat tagging system? (Check one)**

_____ Yes, I feel that counties would benefit from uniform procedures
_____ No, I do not feel that counties would benefit from uniform procedures
_____ Undecided

7. **In what county do you currently live? (Check one)**

_____ Monterey County
_____ San Luis Obispo County
_____ Santa Barbara County
_____ Other, please specify _____

Thank you for your participation!

Appendix B

Informed Consent Letter

Informed Consent Form

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT ABOUT RECREATION DISPLACEMENT OF BASS FISHERMEN FROM CENTRAL COAST LAKES.

A senior project on aquatic invasive species and recreation displacement is being conducted by Erin Gray in the Department of Recreation, Parks, and Tourism Administration at Cal Poly, San Luis Obispo under the direct supervision of Dr. Bill Hendricks. The purpose of the study is to assess the impact of aquatic invasive species preventative measures on recreation displacement of bass fishermen from Central Coast lakes.

You are being asked to take part in this study by completing the attached questionnaire. Your participation will take approximately five minutes. Please be aware that you are not required to participate in this research and you may discontinue your participation at any time without penalty. You may also omit any items on the questionnaire you prefer not to answer.

There are no risks anticipated in the participation in this study. Your responses will be provided anonymously to protect your privacy. No personal information will be collected from participants. Potential benefits associated with the study include learning more about possible impacts of aquatic invasive species preventative measures on causes of recreation displacement of bass fishermen from Central Coast lakes.

If you have questions regarding this study or would like to be informed of the results when the study is completed, please feel free to contact Erin Gray at engray@calpoly.edu or Dr. Bill Hendricks at whendric@calpoly.edu. If you have questions or concerns regarding the manner in which the study is conducted, you may contact Dr. Steve Davis, Chair of the Cal Poly Human Subjects Committee, at (805) 756-2754, sdavis@calpoly.edu, or Dr. Dean Wendt, Interim Dean of Research, at (805) 756-1508, dwendt@calpoly.edu.

If you agree to voluntarily participate in this senior project as described, please indicate your agreement by completing the attached questionnaire. Please retain this consent cover form for your reference, and thank you for your participation in this research.