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Locals, tourists, and water recreation issues at Claytor Lake, Virginia

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1.0 Introduction

Recreation in the United States continues to increase in popularity and has become a steady high-growth industry in the country. In 2020 the Outdoor Recreation Economy approached 400 billion, leading to larger increases in Real Gross Domestic Product, Real Gross Output, Compensation, and Employment (Bureau of Economic Analysis, 2020). To meet this demand there have been significant pressures put on public lands and waters.

Recently, visitation to public lands and waters have seen dramatic increases. The National Parks saw unprecedented numbers of visitors, largely due to impacts from COVID-19, and most parks recorded the largest numbers ever (National Parks, 2021). This increase in visitation can lead to more visitor to visitor interactions, increases in crowding and conflict, and goal interference which is when a recreationist is unable to attain their recreation goals due to the behaviors of another recreationist (Jacob and Schreyer, 1980). Ibrahim and Cordes (2008) have interpreted Outdoor Recreation as “organized free time activities participated in for their own sake and where there is an interaction between the participant and an element of nature.”

The goal of this paper is to highlight findings from a survey of water recreationists, lakefront homeowners, and other stakeholders at Claytor Lake, Virginia, in order to answer questions to help estimate recreational carrying capacity for the lake and point to issues that may benefit from recreation management action. Issues of crowding, conflict, and perceptions of safety are reported, as well as general lake user characteristics.

1.1 Positive Impacts of Recreation and Nature-Based Tourism

There have been numerous examples of the positive impacts of outdoor recreation and tourism. Participating in outdoor recreation has individual mental benefits, including an increase in attention and cognitive memory, reduction in stress and anxiety levels, better quality of sleep, more emotional stability, and an overall sense of self-perceived welfare (Buckley, Brough, and Westaway, 2018). Engaging in active recreation also has physical benefits such as reducing obesity, diminishing the risk of disease, enhancing the immune system, and increasing life expectancy (Buckley, Brough, and Westaway, 2018).

Aside from physical and mental benefits of recreation participation, there are also positive Impacts to the resource and host sites. Recreation attracts a wide array of people to several nature-based tourism sites because there is a vast selection of activities to enjoy, across a diverse spectrum of recreation opportunities and settings. National and state parks are continually developing ways to increase accessibility for all citizens, in an attempt to create an environment where everyone can participate in outdoor recreation activities. In Virginia State Parks, trails are open to manual and power wheelchairs and personal mobility devices which are designed primarily to assist people with disabilities (Accessibility in your parks, 2022).

Sites that can host diverse recreation activities benefit the communities that surround them in many ways. Parks enhance property values, increase municipal revenue, attract home purchases, and draw in employees and retirees (Bureau of Economic Analysis, 2020). Businesses that cater to these diverse types of outdoor recreation have developed widely across all facets of nature-based tourism locales. Because of this great demand, 7.6 million

Americans rely on jobs created by the outdoor recreation industry (Bureau of Economic Analysis, 2020).

The economic impacts from outdoor recreation and nature-based tourism are also significant. The amount that consumers spend in the recreation and tourism industry totals $887 billion. The amounts being spent on products, gear, equipment, services, and apparel for the outdoor recreation industry totals $184.5 billion. Trip and travel spending generates revenues at $702.3 billion, which includes airfare, fuel, lodging, food, guides, lessons, and passes (Bureau of Economic Analysis, 2020).

1.2 Negative Impacts of Recreation and Nature-Based Tourism

Though there are frequent examples of positive impacts of outdoor recreation and tourism, these can come with associated costs. Each year both state and national parks see an increase in the number of visitors due to an increase in participation in outdoor recreation. Similarly, the increasing popularity of watercraft and water sports has affected most lakes (Kara, 2006). Technology, successful marketing, and international tourism have amplified visitation to recreation facilities such as parks (Canon et al, 2018). People want to see and experience what natural sites have to offer, and this in some cases has led to an issue of crowding. Problems such as traffic and congestion have taken their toll on the experience as some sites see tens of thousands of cars per day. Yosemite National Park displays warnings that waiting in lines to get into their park could take hours, that there is limited parking, busy trails, and rarely availability for camping sites or cabins (National Park Service, 2020).

These numbers of people visiting parks are making it harder for both the environment and the park employees to recover. The former superintendent of one of the busiest parks in Yellowstone, Dan Wenk says, “while visitation has swelled, staffing, because of budget limitations, has remained the same.” With limited time, resources, and funding, issues such as repairs or resource remediation go untreated year after year, causing damage to these conserved federal lands. Cost estimates are around $11 billion to reverse the backlog of upgrades to roads, trails, and buildings that service the national parks in the United States (National Park Service, 2020).

A lack of education and respect in recreation participants also causes negative impacts on the environments that host these visitors. On warm weekends, a popular park in San Francisco holds enough trash to fill 460 trash bags after users leave (Graff, 2017). Visitors to parks who cut switchbacks on trails or ignore paths cause environmental damage such as soil erosion and compaction, vegetation damage, and wildlife disturbance (Buckley, 1991). The Virginia Marine Resources Commission (2021) explains that power boaters who are unaware of their surroundings and produce large wakes cause damage to shallow bay bottoms and erosion on the shorelines due to the wake produced by their boat.

Another issue that arises within outdoor recreation is when different groups tend to interfere with each other’s experience. Some recreationists seek the excitement of speed, while others seek solitude (Jacob and Schreyer, 1980). More poignantly, the thrill of speed activities often negatively impacts the more subtle recreation activity participants. This issue can be exacerbated in water recreation settings because of the dramatic differences in speed of various crafts, soundscape impacts, and different users’ goals in an often-unregulated

recreation setting. Manning (1999) showed that canoeists adequately tolerated other canoeists but showed a disliking for canoes with motors and resentment for motorized boats.

1.3 Carrying Capacity

Measuring crowding issues of recreation users would not be possible without understanding carrying capacity parameters. The notion of carrying capacity centers around how much public use can be accommodated at a recreation area or tourism site (Manning, 2002). Early on, carrying capacity focused on the relationship between visitor use and environmental conditions. Carrying capacity studies later evolved to include elements of social aspects of the quality of the visitor's experience (Manning, 2002). The basic concept is that as more visitors travel to a park or recreation site, not only is the environment negatively affected, but park visitors' general happiness or satisfaction with the experience is also negatively affected.

Carrying capacity has since been split into two categories: *biological carrying capacity* and *psychological carrying capacity*. Biological carrying capacity measures the relationship visitors have on the environment in which they engage in recreation. Psychological carrying capacity focusses on visitors' effects on one another's satisfaction with the experience itself (Martin, Breunig, Wagstaff, and Goldernburg, 2017).

Individual bodies of water can have a carrying capacity. Jacquie Colburn, with New Hampshire Department of Environmental Services, defines carrying capacity as "The amount of development and activity a body of water can handle before it starts to deteriorate" (Doshi, 2006). Factors such as how many boats can be on the water without compromising recreational

use and aesthetic enjoyment need to be incorporated as well in order to ascertain an accurate calculation of carrying capacity.

Doshi (2006) instructs that a carrying capacity estimation won't be accurate without getting to know the lake first, and that specific questions should be answered to better understand the situation. For water recreation, questions such as which recreation activities are more prevalent, how people access the site, and if certain users are causing negative experiences for others are all important. These can be answered by a survey of recreational users and stakeholders (Bosley, 2005). For example, if many boaters mention that most negative experiences come from one particular user type, then this would guide safety and management attention toward that user type to help develop solutions to the issue.

1.4 Claytor Lake

In order to understand how these topics may apply to Claytor Lake, it is important to get a sense of the descriptive characteristics of the waterbody. Claytor lake is a 4,600 acre, dam-impoundment formed by the Claytor Lake dam, built in 1939 for hydroelectric power generation (Claytor Lake Facts, 2015). The lake is a typical steep-walled old riverbed that meanders as it grows in width as it approaches the dam site, with side tributaries forming long coves. The navigable waters are roughly 21 miles long and average about 1 mile in width along the river corridor, providing visitors with over 100 miles of shoreline. The lake sits at 1,846 feet above sea level, providing pleasant weather conditions even in summer months.

Claytor Lake State park is located on the north side of the lake, about three miles from the dam site and roughly 45 miles South of Roanoke, VA (Claytor Lake State Park). The park is

about an hour's drive to the bordering states of Tennessee, North Carolina, and West Virginia. The park is only a few miles off Interstate 81, which makes it a very accessible location for people traveling along this corridor.

Claytor Lake State Park offers one boat ramp with four lanes, and a marina with about 100 slips for boats up to about 28 feet. Boat rentals are available onsite through a private concession. Outside the state park there are two other public boat ramps on the lake, a handful of commercial launches, and several private ramp sites, increasing access to the lake well beyond the state park.

Claytor lake offers other recreation activities aside from boating. There are both paved and natural surface trails for hiking and biking, and a beach with swimming areas, floats, and lifeguards. Accommodations at the park include electric and non-electric campsites, cabins, and yurts. There are structured playgrounds and open spaces to meet a variety of recreation interests.

The attractiveness of Claytor Lake seems to have led to a significant increase in visitation. Though this information has been noted anecdotally by state park and concession employees as well as visitors, there has not yet been a study to directly investigate any recreational issues that may have developed from increased use. Most observations and comments have centered around recreational conflict and crowding issues, though comments have also included safety concerns on the water or along shorelines.

Because of this, this study aims to investigate issues of crowding among lake stakeholders and visitors, as well as potential conflict across user groups. Additionally, this

study investigates people's perceptions of safety on the lake and the general boater characteristics of those visiting Claytor Lake.

2.0 Methods

During the conclusion of the 2020 boating season, an electronic survey was administered to several stakeholder groups in and around Claytor Lake as part of an initial assessment of the recreation experience at the lake, and to help identify any emerging issues. Stakeholder groups included entities such as *Friends of Claytor Lake, Claytor Lake Sailing Association, Claytor Lake Homeowners, Resident of Claytor Lake, Claytor Lake Watersports,* and *Claytor Lake Fishing Group.* Each of these groups represent either private interests that center around the lake, commercial businesses that cater to recreationists and tourists who visit the lake, or waterfront homeowners who live on and use the lake. The electronic survey was developed in Qualtrics and was distributed to these groups via email, social media postings, or both.

Questions were developed and refined among two researchers and consisted of a bank of 17 questions. Internal Review Board (IRB) protocols were followed and approvals obtained. There were several Likert scale questions on general use patterns and perceptions of the recreation experience, and response categories ranged from responses such as 1 "Not at All Crowded" to 5 "Extremely Crowded" or 1 "Not at All Safe" to 5 "Extremely Safe" for example. Through these types of questions, issues of crowding, safety, conflict, and boat use types were identified through the questionnaire.

The survey remained open for three weeks, with two follow-up reminders sent during this timeframe in the second and third weeks. After the survey period, 190 respondents were accumulated. Due to overlap in user groups (i.e., someone could be a member of more than one of the groups to which the survey was distributed) it is unfeasible to calculate an accurate response rate. The survey methods use non-probability, voluntary sampling.

3.0 Results

Thirty percent of respondents traveled a mile or less to visit the lake, while 17% traveled more than 50 miles to visit the lake. The remaining respondents were distributed across the distances traveled to visit the lake of 2-10 miles (16%), 11-20 miles (14%), 21-30 miles (13%), 31-40 miles (6%), and 41-50 miles (4%). Seventy seven percent of respondents visit the lake more than ten times per year, whereas 23% visit the lake ten times or less yearly.

About 35% of respondents access the lake via a private home, and another seven percent use some other form of private ramp or dock. Thirty percent of respondents access the lake from Claytor Lake State Park, and another 28% use one of the other two public launch sites on the lake. This shows that 42% of respondents access the lake via private access points, whereas 58% use public access areas to visit the lake, indicating a dichotomous sample when viewed by lake access.

The largest boat type used were fishing boats at 36% of the sample, followed by pontoon boats at 22%, and speed or ski boats at 17% (Table 1). Sailboats, wake surf boats and non-motorized users each made up 9% segments of the sample. Wake surf boats are defined as

boats specifically designed and weighted to create very large wakes that enable a rider to surf the wake on a short surfboard without a tow rope.

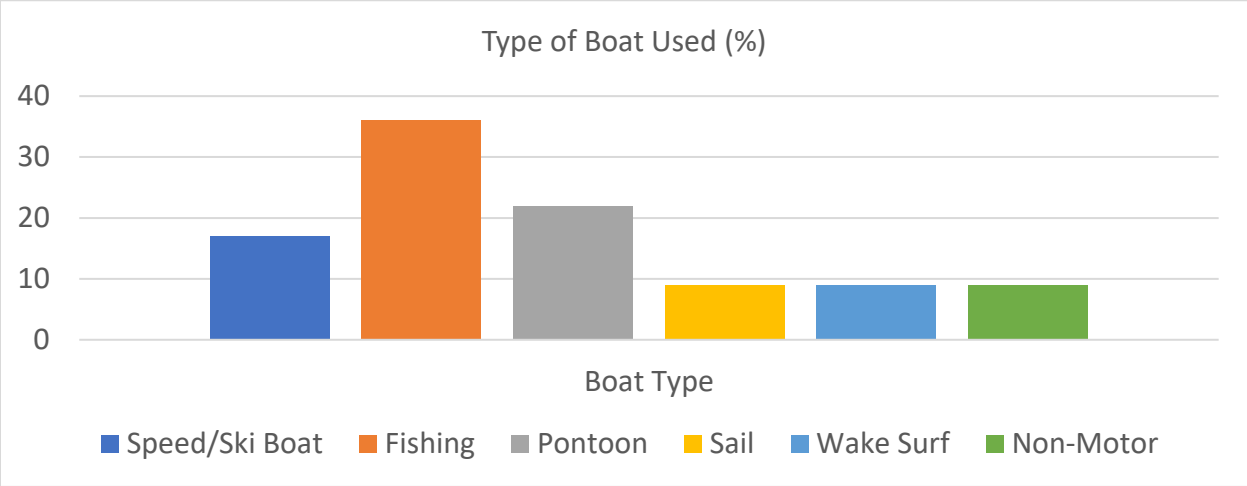

Table 1. Type of boat used on Claytor Lake

Respondents were asked whether they noticed an increase or decrease in recreational use on the lake in the past couple of years. Thirty three percent noticed a “High Increase” and 37% reported a “Low Increase”. Twenty eight percent noticed “neither an increase or decrease”, and two percent noticed a “Low Decrease”. No one reported a “High Decrease”.

Respondents were asked if they had any negative experiences with other boaters on the lake. Respondents had the most negative experiences with jet skis/personal watercraft (PWC) and wake surf boats (Table 2). Results show that 44% of all respondents indicated moderate to extremely negative experiences with PWC and wake surf boats. PWC/Jet Skis are defined as motorized vessels that are propelled by jet pumps (not propellers) where the driver (and any passengers) ride on (not in) the vessel by either sitting on, kneeling, or standing. Respondents reported the largest percentage of “not at all” negative experiences with sailboats at 92%, followed by non-motorized vessels at 85%.

Boat Type	Not all negative (%)	Slightly negative (%)	Moderately negative (%)	Very negative (%)	Extremely negative (%)
Non-motorized	85	9	3	1	1
Sailboat	92	6	2	0	1
Fishing	52	26	15	4	3
Cruiser or ski	48	25	17	3	7
Pontoon	63	23	9	3	2
Wake Surf	41	16	15	11	18
Jet ski or PWC	32	24	22	9	13

Table 3. Percent of negative experiences with various user types

Data were also analyzed to reveal the boat types with which each respondent had particular issues. The highest level of negative issues was reported with wake surf and PWC users. The highest *overall negative* experiences were reported for interactions with wake surf boats, followed closely by negative interactions with PWC's. However, the highest level of "very" or "extremely" negative experiences were reported for interactions with PWC's, followed closely by those negative interactions with wake surf boats (Table 3). Respondents had the least negative issues with sailboats, followed by non-motorized users.

Interestingly, wake surf boats indicated negative experiences with almost all other users, including other wake surf boats. Of the wake surf operators, 66% reported "slightly" to "extremely" negative experiences with fishing boats, 47% reported negative experiences with

ski boats, 47% with pontoon boats, 33% with other wake surfers, and 67% reported negative experiences with PWC's (Table 3).

		Respondent Boat Type					
Boat Type Evaluated	**Negative Issues**	**Ski (%)**	**Fishing (%)**	**Pontoon (%)**	**Sail (%)**	**Wake Surf (%)**	**Non-Motor (%)**
Non-Motor	None	97	70	95	88	87	94
	Slight/Moderate	3	27	2	13	14	0
	Very/ Extreme	0	3	2	0	0	6
Sail	None	97	84	98	100	87	100
	Slight/Moderate	3	16	2	0	7	0
	Very/ Extreme	0	0	0	0	7	0
Fishing	None	50	44	62	71	33	63
	Slight/Moderate	46	54	29	24	46	19
	Very/ Extreme	3	2	9	6	20	19
Ski	None	55	29	68	50	53	56
	Slight/Moderate	44	48	32	38	47	32
	Very/ Extreme	0	24	0	12	0	6
Pontoon	None	62	46	85	71	53	81
	Slight/Moderate	28	48	12	24	33	12
	Very/ Extreme	10	6	2	6	14	6
Wake	None	33	22	59	41	67	63
	Slight/Moderate	47	32	27	24	26	19
	Very/ Extreme	20	46	15	36	7	19
PWC	None	33	22	43	29	33	47
	Slight/Moderate	56	41	43	41	60	36
	Very/ Extreme	10	37	15	30	7	18

Table 3. Percent of negative experiences with other boaters on Claytor Lake reported by boat type

Respondents were also asked to indicate their perceived level of safety on the lake. Twenty five percent of fishing boat users felt "not at all" or only "slightly" safe, and of the non-motorized users, 18% felt "not at all" or only "slightly" safe (Table 4). Wake surf boats felt the

safest on the lake with 81% indicating they felt “safe” or “extremely safe.” Close behind were ski boat operators where 80% felt “safe” or “extremely safe.”

	Speed or Ski boat (%)	Fishing boat (%)	Pontoon boat (%)	Sailboat (%)	Wake Surf boat (%)	Non-Motor (%)
Not at all Safe	0	7	0	0	0	12
Slightly Safe	0	18	2	6	6	6
Moderately Safe	19	31	26	53	12	18
Safe	61	39	57	23	50	47
Extremely Safe	19	4	14	18	31	17

Table 4. Perceived safety on Claytor Lake reported by boater type

Perceived crowding was also measured among users of Claytor Lake. Fishing boat users felt the most crowded where 31% of the sample reported feeling “very” or “extremely” crowded (Table 5). Sailors felt the least crowded where 88% of the sample indicated feeling “not at all” or only “slightly” crowded.

	Speed or Ski boat (%)	Fishing boat (%)	Pontoon boat (%)	Sailboat (%)	Wake Surf boat (%)	Non-Motor (%)
Slightly crowded	23	16	38	53	31	23
Moderately crowded	26	34	17	12	25	35
Very crowded	0	16	2	0	0	6
Extremely crowded	3	15	0	0	0	6

Table 5. Perceived crowding on Claytor Lake reported by boater type

4.0 Conclusions

Overall, the results from this study point to several conclusions. Claytor Lake recreationists seem to be a divergent group of either "locals" who live on or very close to the lake or "tourists" who travel more than 50 miles to visit the lake. The two largest groups of respondents were those traveling more than 50 miles and those who live on the lake or within a mile. Furthermore, the sample is almost split in half where 42% of respondents use private access points, while 58% use public access sites, indicating a local/tourist dichotomy.

Those who use the lake seem to be frequent visitors, visiting more than ten times a year. Of those users, fishing boats make up the largest user type, while non-motorized users made up the smallest user type with less than ten percent of the sample.

Seventy percent of respondents indicated they witnessed some recreational use increase on the lake in the past couple of years. This increase is a significant finding that could indicate an urgency with recreation management on the lake regarding safety. Wake surf boats felt the "most safe" and non-motorized users felt the "least safe", though most of the sample indicated feeling at least "moderately safe". The issue of question is what management and stakeholders are comfortable with regarding visitor safety perceptions. It would be good for future research to look specifically at perceptions of safety during mid-week, weekend, and holiday periods to better understand the safety perception issues at the lake.

Fishing boats felt the "most crowded" and sailboats felt "least crowded". Though the majority of the sample felt moderately or less crowded, when viewed with the fact that 70% of respondents indicated some level of recreational use increase, this implies that stakeholders and managers should take a serious look at the recreational carrying capacity on Claytor Lake. A

logical first step in this direction would be to conduct a simple Water and Lands Recreation Opportunity Spectrum Inventory (WALROS) which would provide a snapshot and classification of recreation conditions at different locations across the lake and during varying use times (Carroll, 2009).

Respondents had the most issues with wake surf and PWC users. Discounting same user type reporting (e.g., wake surf boaters reporting issues with wake surf boaters), the *lowest* percentage of negative experiences with wake surf boats came from non-motorized users at 38% reporting some level of negative experiences with wake surf boats, which is still a considerable amount. The *highest* reported negative experiences with wake surf boats came from fishing boats where 78% of respondents indicated some negative experiences with wake surf boats. On average, about 30% of all other users on the lake reported some negative experiences with wake surf boats, which is a considerable result. The significant impacts of the wakes produced by these boats seem to be an issue in need of further investigation at Claytor Lake.

PWC users were rated equally poorly based on respondent input. Again, non-motorized users reported the *lowest* percentage of negative experiences with PWC, but still 54% of non-motorized users reported negative experiences with PWC/jet skis. The *highest* level of negative experiences with PWC came from fishing boat operators where 78% of these users reported negative experiences with PWC. On average, about 33% of all users on the lake reported some negative experiences with PWC, which again is a considerable result. Similar to wake surf boats, PWC use seems to be another vessel type worthy of further investigation or management action at Claytor Lake. Since PWC are also available for rent on Claytor Lake, future

investigations should attempt to ascertain if particular PWC users are more or less responsible for negative behaviors than others.

Interestingly, wake surf and PWC users reported the highest level overall of negative experiences with other users. Wake surf boaters indicated “very” or “extremely” negative experiences with fishing, ski, and sail boats, whereas PWC indicated “very” or “extremely” negative experiences with fishing, sail, wake surf, ski, and pontoon boats. Because of this, both wake surf boats and PWC appear to be the most sensitive users on the lake because they report the highest level of negative experiences with several other user types, though, surprisingly they also appear to create the most negative experiences on the lake for all other users. Because of this, managing these user groups will prove to be challenging at Claytor Lake.

4.1 Implications

Managing water recreation, especially during high use times, can be challenging because of widely differing interests and perceived experiences. Recreation managers cannot be all things to all groups, and should not strive to do so. Instead, water recreation managers can identify setting characteristics that foster varying experiences and protect those physical, social, and managerial characteristics to ensure that different user groups can seek out diverse recreational opportunities. This is aligned with the highly favorable Water and Lands Recreation Opportunity Spectrum (WALROS) that has been used successfully to manage water recreation opportunities on local, state, and federal waterways, rivers, lakes, bays and reservoirs across the U.S. (Carroll, 2009).

Claytor Lake is in a unique position because of its relatively remote setting and location, and because respondents overall perceive the lake and its setting characteristics favorably, though this can change rapidly. Respondents indicated various negative experiences with other users, however the percentage indicating “extremely” negative experiences was still relatively low. However, this appears to be an area to watch to maintain quality recreation experiences and safety on the lake.

By far, the most reported negative experiences were indicated by interactions with wake surf and PWC users. These two groups should be monitored on Claytor Lake, with an eye for the typical negative impacts found in other recreation studies such as excessive speeds, reckless behaviors, and several safety issues (PWC), shoreline erosion, large waves that create unsafe boating conditions, and damage to docks from excessive wakes (wake surf boats).

Additionally, 85% of wake surf boat users on Claytor Lake indicated that they are waterfront or travel less than a mile to visit the lake. These users appear to be local users and are likely here to stay. This finding is important for recreation management on a water body because more local and frequent users will have significantly different perceptions of the resource, experience, and impacts than less frequent and more tourist-type of visitors (Frick, Degenhardt, and Buchecker, 2007). These local users often feel a sense of ownership and belonging at their home recreation site and can easily justify their actions more so than tourists.

Interestingly, the second largest user group on the lake are those traveling 50 miles or more to visit the lake, comprising more of a “tourist” sector. These users will certainly have

different perceptions and expectations of the experience and harbor different connections to the water resource, leading to additional challenges for water recreation at Claytor Lake.

Additionally, jet ski and wake surf users appear to be the most sensitive groups on the lake because they indicated the highest level of negative experiences with almost all other user groups. These two groups report negative experiences with almost all other boaters, while other boaters seem to evaluate mainly these two groups as negative. This is a unique finding that also warrants further investigation on Claytor Lake.

Claytor Lake offers a unique and valuable recreation setting for the area, offering both recreational outlets and positive economic impacts. This natural resource, its setting, and its recreational opportunities should be protected to ensure its positive benefits last well into the future. Understanding potential user issues and perceptions of the recreation experience offers one more piece to the complex puzzle of effective water recreation management.

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