

ANGLER PERCEPTIONS OF CHANGES IN
LATERAL CONNECTIVITY: THE CASE
OF THE BLACK WARRIOR RIVER

by

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ABSTRACT

Due to current river management priorities for aging, altered, and sedimented river systems, access to off-channel areas on the Black Warrior River system in West Alabama has diminished. As a result, satisfaction of river recreation stakeholders is lowered, ecological services provided by these areas are reduced, and the interests of recreationists, such as anglers, are neglected by dominant main river channel management practices. An understanding of the extent to which anglers perceive changes and the importance they place on off-channel area access is under-researched. The objectives of this study are to determine the extent to which anglers perceive changes in access to off-channel resources, the influence of off-channel areas on river recreation activities and behaviors, and management and policy implications. A two survey strategy, one delivered in-person and another via the Internet, assessed how anglers observe and experience changes in lateral connectivity. Angler perceptions of changes resulting from decreased lateral connectivity in altered waterways were documented, using the Black Warrior River in Alabama as a case study. The research reveals the recreational impacts of diminishing lateral connectivity, develops a framework for understanding perceptions of lateral connectivity changes, and aids in informing and influencing future river management plans and policy.

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INTRODUCTION

Declining lateral connectivity on river systems results in loss of access to off-channel areas. This is happening on rivers throughout the nation, particularly on systems that have been altered by lock and dam construction. The study area for this research is the Black Warrior River system in West Alabama. Due to current management priorities, access to off-channel areas on the Black Warrior River has diminished. The interests of certain stakeholders, most notably recreationists, such as anglers, boaters, and hunters, are neglected by dominant main river channel management practices. The loss of access to off-channel areas results in the disappearance and underutilization of public resources. As a result of this loss, the satisfaction of certain river stakeholders is lowered.

The objective of this research was to determine the extent to which anglers perceive changes in access to off-channel resources and the influence of these changes on river recreation activities and behaviors. From the recreationist stakeholder group, anglers were selected as the subject for this research because they comprise a high portion of river recreationists and interact with the river closely and frequently. Understanding how this group perceives changes in access is valuable for understanding the policy implications of declining lateral connectivity. Additionally, the degree of angling specialization reflected by participation in bass tournament anglers was explored as a potentially intervening variable affecting the perceptions of anglers.

The extent tournament anglers perceive changes in access to off-channel areas is under-researched, if researched at all. This investigator was unable to identify any studies regarding the perceptions of river changes by anglers. For this study, a two survey strategy was utilized to

assess how specialized and general anglers observe and experience changes in lateral connectivity. The research methodology and analysis of survey responses developed a framework for establishing and interpreting the variables that influence angler perceptions of changes in lateral connectivity.

Lateral Connectivity

Lateral connectivity is the lateral hydrological exchange between the main river channel and off-channel areas. Examples of off-channel areas include backwaters, sloughs, oxbow lakes, floodplain ponds, marshes, side-arms, and cut-off braided channels. These areas are associated with a high degree of resiliency and the ecological integrity of a river system (Sparks, 1995). Lateral connectivity is of concern to river recreationists, particularly anglers, because access to off-channel areas is crucial to the viability and success of their pursuits. When considering the influence of lateral connectivity on human activities, it is often discussed in relation to accessibility of small boats to off-channel areas (Nielson, 1999). When lateral connectivity declines in a river system, accessibility to off-channel areas subsequently declines. Research suggests that lateral connectivity is an important issue for river management officials to address because of the ecological services and benefits it provides (Jungwirth, Muhar, & Schmutz, 2002).

Environmental Dimension

Lateral connectivity is important for natural river hydrological processes and to the well-being and survival of fish populations. Environmental benefits provided by lateral connectivity include reduced nutrient-loading through natural filtration and flood control (Sparks, 1995). Connectivity to off-channel areas offers key habitats for fish throughout their lifecycle, from the larval stage to adulthood (Sparks, 1995; Bayley, 1995). Off-channel areas also provide shallow

hard bottom areas protected from main channel currents that are suitable spawning and nursing habitats (Bayley, 1995; Sparks, 1995). Fish migrate throughout river channels and rely on off-channel areas for nutrients and shelter from main channel conditions and disturbances (Junk, Bayley, & Sparks, 1989; Amoros & Bornette, 2002). Fish inhabit off-channel areas during winter months (Sparks, 1995). For example, largemouth bass in the Upper Mississippi River retreat to off-channel areas during winter to avoid the lower temperatures and swift currents found in the main river channel (Gent, Pitlo, Jr., & Boland, 1995).

Sedimentation is the main cause of reduced access to off-channel areas (Adams, Bhowmik, Bogner, & Dillion, 1987; Marlin, 1999). Sedimentation is the suspension of solid matter, including fine sand and soil particles, in water and is considered a pollutant generated by navigation, urban development, liquid waste discharge, and agricultural runoff (Ward, Harris, & Ward, 2005). Sediment builds up at entrances to off-channel areas obstructing access. Studies on the lateral connectivity of the Illinois and Missouri Rivers conclude that fish populations decline as sedimentation increases and off-channel areas diminish (Jackson & Starret, 1959; Funk & Robinson, 1974). Declining lateral connectivity results in limiting the movement of fish species and the detachment and reduction of fish populations. For regions dependent upon fisheries, diminishing lateral connectivity and loss of shallow backwaters threaten fish populations (Schramm, Jr., Minnis, Spencer, & Theel, 2008).

Human Dimension

The human dimension of lateral connectivity is assessed through impacts experienced by river stakeholders. Access to off-channel areas from the main river channel provide recreational opportunities for humans and subsequently social, cultural, and economic benefits (Marmulla, 2001). Elimination of backwater access because of declining lateral connectivity reduces

recreational opportunities and societal benefits to stakeholders. The likelihood of the participation of anglers in their sport is positively related to the amount of freshwater available (Arlinghaus, 2006). Anglers desire diverse recreational experiences, in terms of the size and number of fish and fishing opportunities. This is especially true for largemouth bass anglers (Chen, Hunt, & Dittion, 2003).

River systems with access to off-channel areas have larger, more diverse fish populations than systems with reduced backwater access. Lateral connectivity is considered a key variable in maintaining fish populations in river systems (Slipke & Macina, 2005). The ability to meet the needs of stakeholders depends in part on the overall health of a river ecosystem, including its fisheries (Marmulla, 2001). As lateral connectivity diminishes, fish populations decline and the participation and satisfaction of anglers decrease. Backwaters have cabins and other structures along their shorelines, adding significance to the human dimension. Loss of access to the main river channel from these structures reduces fishing, boating, and other activities. This can result in devaluing ownership satisfaction and property.

Channelization, levees, and impoundments increase river sedimentation and alter the path, morphology, and floodplains of rivers (Sparks, 1995). Impoundment greatly influences the Black Warrior River Basin in terms of navigation, utilities, and recreation. While the presence of dams offer environments conducive for fishing, they also reduce species populations and increase sedimentation. Since the 1960s, dams have impeded the migration of native species, including striped bass on the Black Warrior River (Alabama Department of Environmental Management, 2003).

Additionally, the health of a river system and satisfaction of anglers has economic impact. Sport fishing in the United States has a significant economic footprint. According to a

2011 report, \$48 billion annually is contributed to the United States economy through sport fishing, with the average angler spending over \$1,400 a year in support of their angling activities. The sport supports 828,133 jobs nationally, including 10,489 jobs in Alabama. Alabama hosted 682,625 anglers in 2011 and generated \$1.1 billion through the retail sales, salaries, wages, and federal, state, and local tax revenues (Southwick Associates, 2013). Undeniably, sport fishing contributes significantly to national and local economies.

Management and Policy

Under the River and Harbor Act of 1899 and the Clean Water Act of 1972, navigable waters and adjacent wetlands, including non-navigable tributaries, are under the jurisdiction of the U.S. Army Corps of Engineers (U.S. Environmental Protection Agency and the Department of the Army, 2008). Waterway projects managed by the U.S. Army Corps of Engineers are funded through taxpayer dollars and are public resources (Nielson, 1999). In a 2013 statement, the Alabama Attorney General stated that off-channel areas are public resources, reinforcing the position that even unnavigable backwaters remain public. (Att'y Gen., 2013). Management plans and policies instated by the U.S. Army Corps of Engineers recognize the importance of maintaining public access to waterways for the purpose of outdoor recreation by enhancing banks and shorelines and by preventing physical intrusions along project areas, yet access to off-channel areas continue to diminish (U.S. Army Corp of Engineers, 1985). Therefore, loss of access to off-channel areas is a loss of public resources.

The importance of managing for lateral connectivity was established in the early 1900s. The concept and its ecological significance were more thoroughly developed in the late 1970s and 1980s, but management plans remained focused on the main river channel (Sparks, 1995). Over forty years later, dominant practices in regulated river management still do not provide

enough attention to natural environmental flows and instead remain focused on main channel management (Grantham, Viers, & Moyle, 2014). On the Black Warrior River, main channel dredging and channelization efforts continue (Alabama Department of Environmental Management, 2003). This historically one-dimensional approach to river management allows for the degradation of off-channel areas. Both the availability and priority of funding to remediate backwater access issues are insufficient (Wells, Jr., 2011).

River management plans that fail to acknowledge the recreational desires of stakeholders undervalue the importance of lateral connectivity and do not allow for suitable off-channel management. An interdisciplinary, multiple use approach is required for developing management plans and policies for environmental issues, including lateral connectivity (Cairns, Jr., 1972). Management plans and policies should consider all stakeholder groups. Identifying the preferences and behaviors of stakeholders is key to developing management plans and policies that meet the needs of stakeholders and reduce management-stakeholder conflicts. Identification of the stakeholders and their unique values can be challenging but it is critical to developing comprehensive environmental policy (Bryan & Hendee, 1982).

The incorporation of physical, social, and political sciences is necessary to develop a comprehensive, interdisciplinary approach to environmental management (Caldwell, 1985). The social and political complexities associated with environmental management must be adequately addressed in order to reduce potential management failures related to the maintenance of off-channel areas and the stabilization of fish populations (Young, Charles, & Hjort, 2008). Developing river management plans and policies has ecological, social, political, and economic complexities that must be accounted for in order for management to conserve natural resources while simultaneously meeting the needs and expectations of stakeholder groups.

Specialization

Of particular interest to this research is the concept of “recreational specialization,” which serves as an intervening or control variable for perception. This theoretical construct posits that recreationists become specialized in their activity or sport over time and their attitudes and perceptions differ from general or non-specialized recreationists (Bryan, 1977; Bryan, 1979; Bryan, 2008). Recreational specialization is a "continuum of behavior from the general to the particular" (Bryan, 1979). Specifically, recreational specialization is “reflected by equipment and skill used in the sport and activity setting preferences” (Bryan, 2008). The scale of specialization on the Black Warrior River varies from casual, recreational anglers to tournament bass anglers.

Tournament bass anglers are specialized users with unique perspectives on the environment in which their sport takes place (Bryan, 2008). For purposes of this research, specialization was operationalized as those who fish in bass tournaments. In other words, angler specialization is exemplified in bass tournament fishing. Tournament anglers are at the high end of the specialization continuum, since they participate frequently in their activity, have the specific purpose of participating in tournaments, and possess a high skill level. The concept of recreational specialization is applicable to perceptions of changes in lateral connectivity on the Black Warrior River because anglers comprise a large portion of recreational stakeholders and possess a vested interest in the health of the river system. Furthermore, the preferences and attitudes of these specialized users are capable of influencing other anglers and river management, which is demonstrated in this study (Bryan, 2008).

Research Site

The environmental and human impacts of declining lateral connectivity on the Black Warrior River were established through previous research by Wells, Jr. (2011). The Black

Warrior River was selected as the research site for this study in an effort to build upon the work of Wells, Jr. (2011). The Black Warrior River is part of the Mobile River Basin located in the Southeastern United States. The Mobile River Basin spans portions of Alabama, Georgia, Tennessee, and Mississippi. The headwaters of the Mobile River are in north Alabama, north Georgia, and northeast Mississippi. The system empties in the Gulf of Mexico. The Mobile River has seven main tributaries: the Black Warrior, Tombigbee, Sipse, Cahaba, Coosa, Tallapoosa, and Alabama Rivers. Of the seven Mobile River tributaries, only the Sipse and Cahaba Rivers are unregulated (Ward, Harris, & Ward, 2005). The Black Warrior River has four locks prior to its confluence with the Tombigbee River near Demopolis, Alabama (U.S. Army Corp of Engineers Mobile District, 2007). Figure 1, Black Warrior River and research site, illustrates the spatial scale of the Black Warrior River and its basin in the state of Alabama as well as the research location for this study.

Like other Mobile River tributaries, the Black Warrior River is a popular destination for anglers, who specifically travel to the Black Warrior River for bass fishing and to participate in bass tournaments. Sedimentation is a major issue in the Mobile River system, as is the case among other altered river systems around the country, and a main cause of diminishing access to off-channel areas on the Black Warrior River. Sedimentation, along with other environmental and human factors, influences the connectivity of the river. Between 1965 and 2006, open off-channel areas on the Black Warrior River decreased by 26%. Entrances to off-channel areas decreased from 251 to 119, and the average size of off-channel areas also decreased (Wells, Jr., 2011).

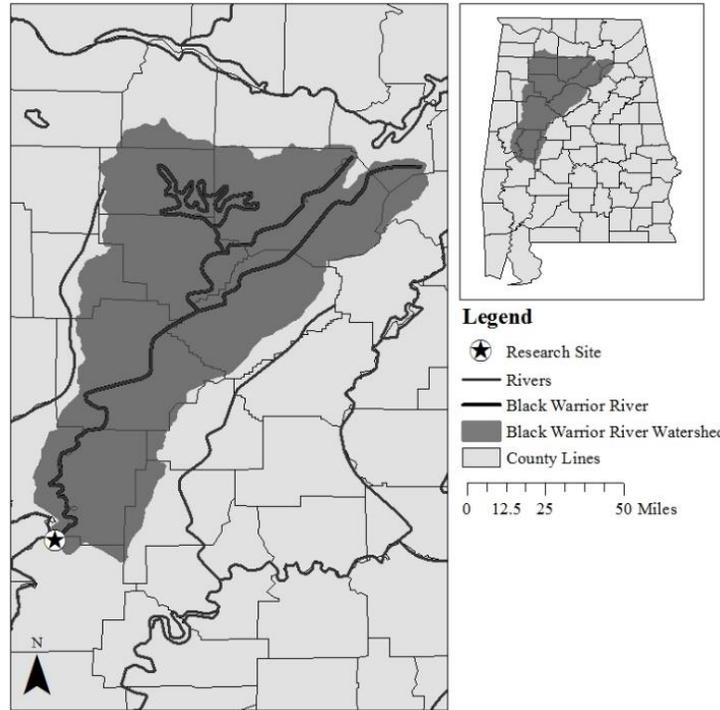


Figure 1. Black Warrior River and research site

METHODOLOGY

A two survey strategy was employed to assess angler perceptions of reduced access to off-channel areas on the Black Warrior River. An in-person survey was administered to non-tournament and tournament anglers at the Demopolis City Landing on the Demopolis pool of the Black Warrior River, and an online survey was delivered to members of the Alabama Bass Anglers Sportsman Society (B.A.S.S.) Nation via the Internet survey platform Qualtrics. In-person survey responses provided observations and perceptions by anglers who had recent contact with the Black Warrior River. These responses were valuable because they documented the most current experiences of the anglers, providing the latest insight into river issues. The online survey reached bass tournament anglers throughout Alabama. While online participants may not have fished the Black Warrior River recently, their observations were valuable for determining the scale of diminishing lateral connectivity. Together the surveys compiled data

representing local and statewide opinions regarding lateral connectivity on the Black Warrior River. The surveys were approved by the University of Alabama Institutional Review Board and adhered to the guidelines and requirements set forth by the Board. Documentation of approval is located in Appendix A: IRB Approval and Appendix B: IRB Revision Approval.

The Surveys

Quota sampling was employed for both surveys. For the in-person survey, a sample of 100 responses was sought from anglers fishing out of Demopolis City Landing. The online survey was distributed to 1,296 Alabama B.A.S.S. Nation members, not all of which were eligible to participate since they may not have experience fishing the Black Warrior River. The Alabama B.A.S.S. Nation is a chapter of the B.A.S.S. Nation, an organization for affiliated bass clubs. The Alabama B.A.S.S. Nation provides bass tournament fishing opportunities for its members throughout Alabama, including an annual tournament on the Black Warrior River. The B.A.S.S. Nation is also involved in water conservation initiatives. Alabama's chapter is one of the largest chapters nationally and internationally (Nation, n.d.).

Demopolis City Landing was selected as the research site because it is a popular boat launch for both tournament and non-tournament anglers. The landing is located in Demopolis, Alabama, at the confluence of the Black Warrior and Tombigbee Rivers. The boat ramps at Demopolis City Landing provide direct access to both rivers. Figure 2, Demopolis City Landing east boat ramp, and Figure 3, Demopolis City Landing north boat ramps, show the four boat ramps at the Demopolis City Landing survey site. Survey responses were collected during the spring and fall of 2014, specifically April, May, September, and October, typical high-use months.



Figure 3. Demopolis City Landing north boat ramps



Figure 2. Demopolis City Landing east boat ramp

For the in-person survey, anglers were approached as their fishing activities concluded and asked to participate in a survey about fishing. The objective of the study was explained and consent requested. Since both the Black Warrior and Tombigbee Rivers are easily accessible

from the research site, participants were asked specifically to talk about their experiences on the Black Warrior River. The anglers were asked about their observations, behaviors, and opinions relating to river access and management. The survey concluded with demographic questions. Open-ended and fixed response questions were utilized to determine the degree of angler specialization that influences the observations, behaviors, and preferences of anglers on the Black Warrior River. Appendix C: Observational and Behavioral Questions and Appendix D: Demographic Questions detail the survey questions.

For the online survey, a link to the Qualtrics survey was distributed to Alabama B.A.S.S. Nation members via email. In effort to avoid redundancy, members were asked not to participate if they previously participated in a survey about fishing at Demopolis City Landing. The online survey consisted of the same questions as the in-person survey (see Appendixes D and E) with one modification. One question was removed from the online survey because of irrelevancy. Participants were not asked their main reason for being at the river because that did not apply to online participants. The survey concluded with demographic questions. The collection period for survey responses was limited to one week.

RESULTS

For the in-person survey strategy, 100 anglers participated at Demopolis City Landing. Of the 1,296 Alabama B.A.S.S. Nation members to whom the online survey was distributed, 100 anglers participated. The response rate for the online survey was 7.7%. The low response rate was anticipated since the list of member email addresses provided by Alabama B.A.S.S. Nation was dated and contained inaccuracies. In total, 200 survey responses were collected. Organizing responses by tournament and non-tournament anglers allowed the in-person and online survey

responses to be combined, creating a set of results that represented local and statewide perceptions of changes in lateral connectivity, organized recreational specialization. Additionally, the open-ended responses offered further insight on variables anglers observed relating to lateral connectivity and on resulting behavioral changes.

Since the focus of this research is on perceptions of lateral connectivity, potential indicator variables were compared to angler identification of access to backwater areas as an important river issue. Participation in bass tournaments, years of fishing experience, and fishing frequency were the potential indicator variables tested. Use of the chi-square independence test and the Mann-Whitney *U*-test determined which association between variables was significant and which variable was the best indicator of recreational specialization in this study. A significance level of 0.05 was set for all statistical tests.

To determine statistical significance between categorical variables, the chi-square independence test was performed. Table 3, Access to backwaters and tournament participation contingency table, features the chi-square test contingency table. Results indicated a significant association between identification of access to backwaters as an important river issue and angler participation in bass tournaments, $X^2 (1, n = 200) = 4.8, p = 0.0284$. To determine statistical significance between discrete variables, the Mann-Whitney *U*-test was performed. Results indicated there is not a significant difference in experience fishing in years between anglers that identified access to creeks and sloughs as an important river issue (Mdn = 30) and anglers who did not (Mdn=5), $U = 4218, p = 0.1285$. There was also not a significant difference in the frequency of fishing between anglers that identified access to creeks and sloughs as an important river issue (Mdn = 50) and anglers who did not (Mdn = 50), $U = 4287, p = 0.2225$.

Table 1. Access to backwaters and tournament participation contingency table

	Access to backwaters		
	Important	Not important	Total
Tournament	70 (83.3%)	81 (69.8%)	151
Non-tournament	14 (16.67%)	35 (30.1%)	49
Total	84	116	200
Chi-square	4.8, $p = 0.0284$		

Testing variables that indicate specialization for statistical significance revealed that participation in bass tournaments, not years of fishing experience or frequency of fishing, was the indicator of recreational specialization for anglers who participated in this study. The chi-square independence test results supported the hypothesis that bass tournament anglers (specialized anglers) have a relationship with angler perceptions of river changes in lateral connectivity. The insignificant results from the Mann-Whitney *U*-tests reveal that neither years of fishing experience nor frequency of fishing are indicators of degree of recreational specialization. However, in specialization theory, experience and frequency of fishing are two common measures of the concept. The small sample size of non-tournament anglers (24.5%, $n = 49$) used in this study may account for the lack of statistical significance for these variables.

Fishing Experience and Frequency

Of the 200 anglers who participated in the study, 151 (74.5%) participated in bass tournaments and 49 (25.5%) did not participate in bass tournaments. On average, tournament anglers participated in 21 bass tournaments a year (range = 1-100, $SD = 14.68$, $\sigma^2 = 215.5$). Years of fishing experience, times fishing anywhere yearly, and times fishing the Black Warrior River yearly are highlighted in Table 4, Experience and frequency of fishing. For tournament anglers, 96% preferred to catch bass. For non-tournament anglers, 59% preferred to catch bass.

Table 2. Experience and frequency of fishing

	Tournament				Non-tournament			
	<i>n</i>	<i>range</i>	<i>M ± SD</i>	σ^2	<i>n</i>	<i>range</i>	<i>M ± SD</i>	σ^2
Years fishing	150	2-60	27.7 ± 14.6	213.14	49	5-63	28.5 ± 15.1	228.9
Times fishing anywhere yearly	149	3-365	81.7 ± 59.2	3502.7	49	3-365	63.1 ± 70.5	4968.9
Times fishing Black Warrior River yearly	151	1-183	27.9 ± 35.2	1242.5	49	1-365	45.5 ± 64.9	4206.3

Experience and frequency of fishing illustrated differences between tournament and non-tournament anglers. When comparing the two groups, years of fishing experience, times fishing anywhere yearly, and times fishing the Black Warrior River yearly for non-tournament anglers were more dispersed than tournament anglers. Tournament anglers fished more often than non-tournament anglers, but non-tournament anglers fished the Black Warrior River more often. Non-tournament anglers on average had more years of fishing experience. Non-tournament anglers had more frequent experiences fishing the Black Warrior River, but the fishing experiences of tournament anglers provided them with unique perceptions and preferences.

Important River Issues

Figure 4, Important river issues, compares issues tournament and non-tournament anglers listed as important on the Black Warrior River. Access to backwater areas was not the most important river issue for either group of anglers. The most frequent response for tournament anglers was the condition and number of boat ramps. Seventy-six tournament anglers (50.3%) considered the condition and number of boat ramps an important river issue, while 70 (46.4%) considered access to creeks and sloughs an important river issue. The most frequent response for non-tournament anglers was decline in fish numbers with 15 responses (30.6%). Access to backwaters was the second most reported issue with 14 responses (28.6%) for non-tournament anglers.

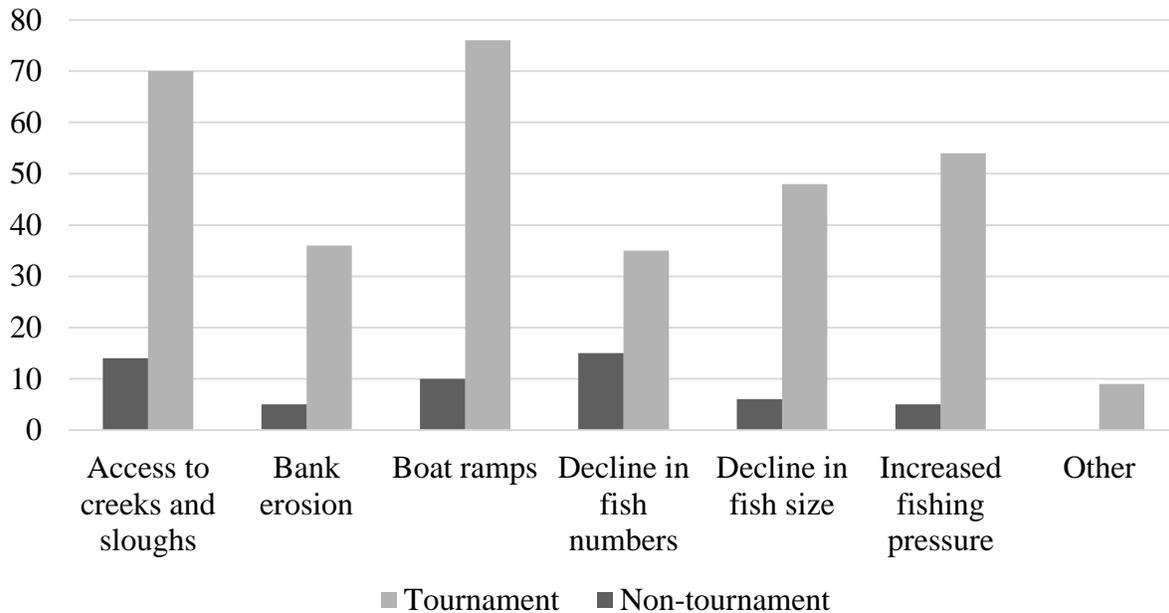


Figure 4. Important river issues

Because more tournament anglers listed boat ramp conditions than backwater access as an important river issue, the boat ramp issue and participation in bass tournaments variables were tested for association using the chi-square independence test. Table 3, Boat ramps and tournament participation contingency table, features the chi-square test contingency table. Results indicate a significant association between the number and condition of boat ramps responses and participation in bass tournaments, $X^2(1, n = 200) = 13.5, p = 0.0002$.

Table 3. Boat ramps and tournament participation contingency table

	Boat ramps		Total
	Important	Not important	
Tournament	76 (88.3%)	75 (65.8%)	151
Non-tournament	10 (11.6%)	39 (34.2%)	49
Total	86	114	200
Chi-square	13.5, $p = 0.0002$		

Observed Changes

When asked if anglers observed changes to the Black Warrior River, 106 (70.2%) of tournament anglers and 32 (65.3%) of non-tournament anglers stated they observed changes. Of those who observed changes, 58.2% of tournament anglers and 36.7% of non-tournament anglers altered their behavior as a result of their perceived changes to the Black Warrior River, demonstrating that changes to the river impact the activities of river recreationists. When the anglers described the changes they perceived, the differences between tournament and non-tournament anglers were apparent.

Tournament and non-tournament anglers alike noted increased erosion and sedimentation, more use by anglers, and additional fishing pressure. The changes observed by tournament anglers were wide-ranging and included changes non-tournament anglers did not perceive. Tournament anglers alone commented on reduction in fish size and reduced water depth. The most common impact of changes to the river for tournament anglers was the need to find new areas to fish because of reduced off-channel area access. Of the anglers affected by changes to the river, reduced access to off-channel areas directly impacted 34 tournament anglers (32.1%) and four non-tournament anglers (12.5%). Tournament anglers specifically sought out alternative fishing locations as a result of degraded fish habitats and reduced backwater on the Black Warrior River. Several tournament anglers indicated they choose to fish other bodies of water instead of the Black Warrior River because of reduced access. Differing from the tournament anglers, the most common impact on non-tournament anglers was fewer fish catches. Non-tournament anglers lamented the reduction in number of catches on the Black Warrior River but did not express efforts to fish other locations in lieu of the Black Warrior River.

Backwater Accessibility

Keeping backwater areas accessible should be a river management priority according to 91.3% of tournament anglers and 93.9% of non-tournament anglers. While the majority of anglers surveyed supported keeping backwater areas accessible from the main river channel through management initiatives, there was general confusion over backwater ownership. Figure 5, Angler understandings of off-channel water law, shows the differences in understanding of water law between specialized and non-tournament anglers.

Tournament anglers possessed a better understanding of ownership with 65.6% identifying inaccessible waters as public resources. Still, over a quarter of tournament anglers were unable to correctly identify the owner of backwater areas. Under half of the non-tournament anglers knew that previously accessible backwater areas remained public. More non-tournament anglers misidentified inaccessible backwaters areas as private property than correctly identified the areas as public. Moreover, the majority (63.3%) of non-tournament anglers either

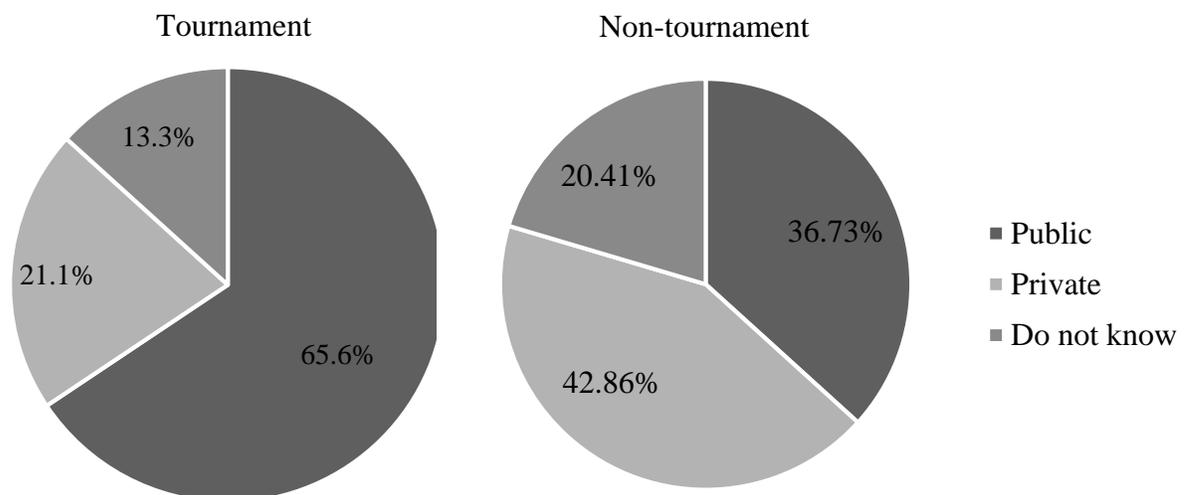


Figure 5. Angler understandings of off-channel water law

misinterpreted water law or did not know to whom the areas belonged. Specialized anglers better understood water law than non-tournament anglers, yet both groups demonstrated confusion and misinterpretation of water law pertaining to inaccessible backwater areas.

Demographics

Table 6, Demographic information, summarizes the demographic information of survey participants. The majority of participants was white males with varying ages. Participant education level and employment status were not related to perceptions of anglers. Difference in employment status was not considered as a variable because only two tournament anglers and one non-tournament angler were unemployed. For difference in education level, the chi-square test of independence was performed. Table 5, Education and tournament participation contingency table, features the chi-square test contingency table. Results indicated there was not a significant relationship between angler participation in bass tournaments and education level, $X^2(1, n = 200) = 2.0, p = 0.1526$. In traditional specialization theory, socioeconomic factors influence level of specialization on the specialization continuum (Bryan, 1979). In this study, however, neither employment nor level of education were distinct between tournament and non-tournament anglers. This may have resulted from socioeconomic conditions present in the Demopolis-area, or as with the case of participation in bass tournaments and fishing experience and frequency, this may have resulted for the small sample size for non-tournament anglers.

Locality of anglers also did not influence perceptions. The hometowns of anglers varied throughout the state of Alabama and 16 participants were from outside the state. Of the 151 tournament anglers, 14 were non-residents, and of the 49 non-tournament anglers, two were non-residents. Arkansas (two), Florida (one), Mississippi (12), and Tennessee (one) were the states of residency of the non-Alabamian participants. Locality of anglers was not assumed to influence

Table 4. Demographic information

	Tournament		Non-tournament	
	<i>n</i>	%	<i>n</i>	%
Gender				
Male	148	98.0	42	85.7
Female	2	1.3	7	14.3
Decline to answer	1	0.7	--	--
Race/ethnicity				
White	141	93.4	45	91.8
Hispanic or Latino	1	0.7	--	--
Black or African American	5	3.3	4	8.2
Asian/Pacific Islander	2	1.3	--	--
Decline to answer	2	1.3	--	--
Age				
19-29 years	46	30.5	18	36.7
30-49 years	63	41.7	13	26.5
50-64 years	25	16.6	16	32.7
> 65 years	15	9.9	2	4.1
Decline to answer	2	1.3	--	--
Employment status				
Employed	97	64.2	36	73.5
Self-employed	15	9.9	6	12.2
Unemployed	2	1.3	1	2.0
Military	2	1.3	--	--
Student	16	10.6	3	6.1
Retired	18	11.9	3	6.1
Unable to work	1	0.7	--	--
Level of education				
Some high school	6	4.0	2	4.1
High school diploma/GED	39	25.8	18	36.7
Some college	58	38.4	13	26.5
Bachelor's degree	28	18.5	11	22.4
Graduate degree	20	13.2	5	10.2

Table 5. Education and tournament participation contingency table

	Education		
	No college	College	Total
Tournament	45 (69.2%)	106 (78.5%)	151
Non-tournament	20 (30.8%)	29 (21.5%)	49
Total	65	135	200
Chi-square	2.0, $p = 0.1526$		

perceptions because diminishing lateral connectivity is not limited to the Black Warrior River. The issue of access to backwaters exists on other rivers that tournament anglers fish, and therefore, the issue was relevant to anglers no matter where their hometown was located.

DISCUSSION

Angler Perceptions

Tests of significance validated operationalizing tournament anglers as specialized recreationists. The statistical significance between identification of access to creeks and sloughs as an important river issue and participation in bass tournaments supports the argument that specialized anglers possess heightened insight and meaningful perceptions of the rivers they fish. Bass tournament anglers expressed a higher level of awareness regarding changes to the river than non-tournament anglers. Tournament and non-tournament anglers shared concerns regarding access to creeks and sloughs on the Black Warrior River. However, specialized anglers perceived changes in lateral connectivity more often than general anglers, and the impacts of the changes influenced specialized anglers more than non-tournament anglers. The perceptions of tournament anglers offered insight into the extent specialized anglers perceived changes and the variables specialized anglers used to assess the fishing conditions. Non-tournament anglers did not share the level of insight or awareness of ecological changes as tournament anglers. Furthermore, differences in perceptions between the two groups developed from diverse types of specialization. That is, specialization lies within the variety of fishing. The activities of non-tournament anglers did not lend them to a high degree of specialization. Other activities than bass fishing, such as catfish and crappie fishing, that non-tournament anglers participate in do not allow for the same level of specialization as bass tournament fishing.

Tournament anglers were aware of river conditions that adversely impacted fishing. Tournament anglers perceived reduced access to backwaters as a problem, as demonstrated by the anglers listing backwater access as an important river issue and by identification of reduced backwater access as an impediment to fishing activities. Although neither group of anglers prioritized the importance of this issue, tournament anglers were acutely aware of changes to the Black Warrior River ecosystem as a result of reduced lateral connectivity. The majority of changes perceived by tournament anglers were issues related to lateral connectivity.

The significant statistical association between the number and condition of boat ramps issue (the foremost concern of anglers) and participation in bass tournaments warrants explanation. Ramps are an immediate concern for tournament anglers. When competing anglers arrive at a tournament site, ramps are in high demand as participants attempt to launch boats simultaneously. The number and condition of boat ramps determine the efficiency of launch and simplicity of the process. Non-tournament anglers experience issues with the number and condition of boat ramps, too, but the peak demand for ramps experienced in a tournament setting does not match the demand for ramps experienced during times of non-tournament. For tournament anglers, the rush at the boat ramp is their first, immediate consideration when fishing, taking priority over issues such as those included in the survey.

Optimal river conditions for tournament anglers include healthy fish populations (in terms of size and number) and access to fish habitats. Many of the open-end responses for changes perceived on the river were related to diminishing lateral connectivity. Decreasing number of catches and increasing sedimentation perceived by non-tournament anglers were issues connected to lateral connectivity, since lateral connectivity has a significant influence on the health of the river and its ecosystem. Similarly, tournament angler responses documented

changes resulting from diminishing lateral connectivity, but their responses were more specific, pinpointing the issue.

When tournament anglers perceived habitat loss, changes in flora, increased flooding events, and the declining health of fish in the Black Warrior River, anglers were aware of conditions that were detrimental for their sport. The changes in conditions that anglers perceived were not independent of changes in lateral connectivity. The variables that influenced the success of their fishing activities were the same variables that influenced tournament angler perceptions of lateral connectivity. These perceptions of specialized anglers were an indication that management of the Black Warrior River failed to meet the needs of this stakeholder group.

Management and Policy Recommendations

A strong case can be made that current management practices by the U.S. Army Corps of Engineers do not provide sufficient priority to the needs and preferences of recreational stakeholders, specifically anglers. Analysis of the perceptions of specialized anglers produced two recommendations for river management: off-channel entrance dredging should occur more frequently and public awareness of public water rights ought to be improved. Off-channel areas are valued resources for recreationists and are ecologically important to the health of the river. By adapting management plans to consider the needs and preferences of anglers, healthier, more resilient ecosystems result and recreational stakeholders satisfaction improves.

The U.S. Army Corps of Engineers should budget for an ongoing program for dredging backwater access points on the Black Warrior River. Managing the main river channel is important for navigation and commerce, but this single-focus management approach reduces the benefits received by other river stakeholders. Results of the research reported here support the conclusion that maintenance for the purpose of promoting lateral connectivity should receive

higher priority by river management agencies because increased lateral connectivity improves the experiences of a significant segment of recreationist stakeholders. Incorporating dredging off-channel areas into the river management plan preserves public resources, supports a healthy and diverse ecosystem, and facilitates robust fishing experiences.

In addition river management revisions, improved clarity and communication about water law would aid in informing the public of their rights as well as the benefits best river management practices offer. Water law varies by state, and in Alabama the law is controversial and commonly misinterpreted. In response to an inquiry about public water use by Commissioner Guy of the Alabama Department of Conservation and Natural Resources, the Attorney General of Alabama, Luther Strange, issued an opinion statement on June 28, 2013, clarifying the distinction between public and private waters. The Attorney General determined that “if a dam, lock, or impoundment device is placed across a navigable waterway, the impounded waters are public waters that may be used by the public for hunting and fishing” (Att’y Gen., 2013). According to the Alabama Supreme Court, water is public, to the extent of flooding or flowage easements, if a lock or dam is placed across a navigable waterway (Ala. Code 9-11-80(a) cited in Att’y Gen., 2013). Public waters that are not navigable, such as backwaters that lose connectivity from the main channel, remain public resources, and the public retains the right to use the waters for recreation (Att’y Gen., 2013). The Attorney General’s statement is included in Appendix E: Attorney General Water Law Opinion.

The Attorney General’s opinion on water law is relevant to this research because state departments as well as river stakeholders are confused about rightful access to backwater areas. The survey results documented a lack of understanding of Alabama water law among anglers. The majority of anglers in both groups wanted better management of the backwater areas, yet

there was confusion over water law as it pertains to off-channel areas, especially among non-tournament anglers. Tournament anglers had a higher rate of correctly identifying inaccessible backwater as public resources, whereas over 60% of non-tournament anglers thought the backwaters reverted to private ownership or did not know to whom the areas belonged. The lack of understanding and knowledge among anglers regarding water rights is disconcerting because it means a significant stakeholder group is not aware of policy that directly impact their interests and river experiences.

By informing anglers about water law, particularly the distinction between public and private resources, the importance of lateral connectivity and dynamic river management in relation to the activities of angler becomes more apparent. Perpetuation of public resources are essential for the sport. Furthermore, off-channel areas have a better chance of remaining accessible if the U.S. Army Corps of Engineers managed for recreationist priorities. Without revisions to current river management, public resources are lost to river recreationists. Changes to river management policy would benefit the overall health of the river system and improve the experiences of recreational stakeholders.

CONCLUSION

This research reveals the recreational impacts of diminishing lateral connectivity on anglers, develops a framework for understanding perceptions of lateral connectivity changes, and aids in influencing future river management plans. Understanding how changes in lateral connectivity impact the activities of anglers is important in managing river systems for this segment of recreationist stakeholders. Best river management practices need to afford more

attention to lateral connectivity management and include considerations for the unique desires and perspectives of recreationists, specifically anglers.

The research findings offer insight into the extent anglers perceive changes to the river and how river managers can better meet the needs of this group of recreationists. The results demonstrate that anglers are aware of changes in the lateral connectivity on the Black Warrior River and their recreational experiences are negatively altered by declining lateral connectivity. Analysis of angler perceptions revealed that the majority of anglers were aware of changes in lateral connectivity on the Black Warrior River, and the behaviors and experiences of anglers were impacted based on their level of recreational specialization. Recreational specialization offered a framework for interpreting the perceptions of recreationist stakeholders. The theoretical concept provided a context for interpreting why specialized and general recreationists have differing perceptions.

Along with identifying the perceptions of changes in lateral connectivity on the Black Warrior River by anglers, the results of this study are beneficial for informing river management and generating policy recommendations. Based on the research results, it is recommended that the needs of specialized anglers be incorporated into future management plans. Poor management of rivers results in diminishing lateral connectivity which is relevant to all river recreational stakeholders. The majority of anglers believe keeping off-channel areas and backwaters accessible should be a river management priority, since their sport depends upon access to these resources. If rivers like the Black Warrior River continue to be managed for only main channel activities, valuable public resources and critical habitats will be lost. Incorporating off-channel dredging into a dynamic river management plan would improve the ability of the Black Warrior River to support the diverse needs of stakeholders, continue contributing to

Alabama's sport fishing economy, maintain accessibility of public areas, and improve the health of the ecosystem.

Following analysis of the research results, potential improvements to the study became apparent. For future similar studies, this researcher recommends a more complete collection of sociodemographic information in an effort to provide a better explanation of the relationship between participation in bass tournaments and socioeconomic standing. Collection of a larger non-tournament sample is also recommended. The small non-tournament sample size and single locale of non-tournament survey collection limited the scale of perspectives of non-tournament anglers. Non-tournament anglers in different communities may have alternative perceptions influenced by their fishing experience, fishing frequency, and sociodemographics. Collection of non-tournament angler perspectives and perceptions in communities beyond Demopolis would provide a more thorough representation of this segment of the recreationist stakeholder group. Opportunities for future studies on the human dimension of diminishing lateral connectivity include exploring how anglers interpret water law and learning how other groups of specialized recreationists perceive and experience changes.

Declining lateral connectivity is happening on waterways throughout the nation. This study targeted a single river, but the findings are applicable to other rivers since the environmental conditions and the management challenges resulting from declining lateral connectivity on the Black Warrior River are similar in other regions. The research findings demonstrate that changes in lateral connectivity on the Black Warrior River are perceived by anglers and provide a framework for interpreting the needs and preferences of anglers through the theoretical concept of recreational specialization. Unless the needs and preferences of this important recreational stakeholder group are incorporated into river management plans,

stakeholder satisfaction, economic revenue, and ecosystem health will continue to be at risk of decline.

REFERENCES

- Adams, R. J., Bhowmik, N. G., Bogner, W. C., & Dillion, F. S. (1987). *Sedimentation in Quincy Bay and Potential Remedial Measures*. Champaign: Illinois State Water Survey Division.
- Alabama Department of Environmental Management. (2003). Black Warrior River Watershed Management Plan. Montgomery, Alabama. Retrieved from <http://adem.alabama.gov/programs/water/nps/files/BlackWarriorBMP.pdf>
- Amoros, C., & Bornette, G. (2002). Connectivity and biocomplexity in waterbodies of riverine floodplains. *Freshwater Biology*, 47(4), 761-776.
- Arlinghaus, R. (2006). Understanding Recreational Angling Participation in Germany: Preparing for Demographic Change. *Human Dimensions of Wildlife*, 11, 229-240.
- Att'y Gen. (2013, June 28). *Real Property - Water and Waterways - Recreation - Conservation Department, Op*, 1-5. Montgomery, Alabama: Office of the Attorney General.
- Bayley, P. B. (1995). Understanding Large River-Floodplain Ecosystems. *Bioscience*, 45(3), 153-158.
- Bryan, C. H., & Hendee, J. C. (1982). *Social Impact Assessment: A Guide to Principles and Procedures for Implementing National Policy*. Washington, D.C.: U.S. Government Printing Office.
- Bryan, H. (1977). Leisure value-systems and recreational specialization-Case of trout fishermen. *Journal of Leisure Research*, 9(3), 174-187.
- Bryan, H. (1979). Conflict in the Great Outdoors: Toward Understanding and Managing for Diverse Sportsmen Preferences. In *Sociological Studies No. 4* (p. 101). Tuscaloosa: University of Alabama Bureau of Public Administration.
- Bryan, H. (2008). *Conflict in the Great Outdoors: Towards Understanding and Managing Diverse Sportsmen Preferences*. Tuscaloosa: University of Alabama Press.
- Cairns, Jr., J. (1972). Rationalization of Multiple Use Rivers. In R. T. Oglesby, C. A. Carlson, & J. A. McCann (Ed.), *River Ecology and Man* (pp. 421-430). Amherst: Academic Press.
- Caldwell, L. K. (1985). *Science and the National Environmental Policy Act: Redirecting Policy through Procedural Reform*. Tuscaloosa: University of Alabama Press.

- Chen, R. J., Hunt, K. M., & Dittion, R. B. (2003). Estimating the Economic Impact of a Trophy Largemouth Bass Fishery: Issues and Applications. *North American Journal of Fisheries Management*, 23, 835-844.
- Funk, J. L., & Robinson, J. W. (1974). *Changes in the Channel of the Lower Missouri River and Effects of Fish and Wildlife*. Jefferson City: Missouri Department of Conservation.
- Gent, R., Pitlo, Jr., J., & Boland, T. (1995). Largemouth Bass Response to Habitat and Water Quality Rehabilitation in a Backwater of the Upper Mississippi River. *North American Journal of Fisheries Management*, 15(4), 784-793.
- Grantham, T. E., Viers, J. H., & Moyle, P. B. (2014, November). Systematic Screening of Dams for Environmental Flow Assessment and Implementation. *BioScience*, 64(11), 1106-1018.
- Jackson, H. O., & Starret, W. C. (1959). Turbidity and Sedimentation on Lake Chautauqua, Illinois. *Journal of Wildlife Management*, 23, 157-168.
- Jungwirth, M., Muhar, S., & Schmutz, S. (2002). Re-establishing and Assessing Ecological Integrity in Riverine Landscapes. *Freshwater Biology*, 47, 867-887.
- Junk, W. J., Bayley, P. B., & Sparks, R. E. (1989). The Flood-Plain Pulse Concept in River-Floodplain Systems. *Canadian Special Publication of Fisheries Aquatic Sciences*, 106, 110-127.
- Marlin, J. (1999). Potential Use of Innovation Dredge Technology and Beneficial Use of Sediment for River Restoration. *Seventh Governor's Conference on the Management of the Illinois River System* (pp. 137-148). Champaign: University of Illinois at Urbana-Champaign.
- Marmulla, G. (Ed.). (2001). *Dams, Fish, and Fisheries: Opportunities, Challenges, and Conflict Resolution*. *FAO Fisheries Technical Paper 419*. Rome: Food and Agriculture Organization of the United Nations.
- Nation. (n.d.). Retrieved February 25, 2015, from Alabama B.A.S.S. Nation: <http://www.albassnation.com/nation.htm>
- Nielson, L. A. (1999). Histories of Inland Fisheries Management in North America. In C. C. Kohler, & W. A. Hubert (Eds.), *Inland Fisheries Management in North America* (2nd ed., pp. 3-30). Bethesda: American Fisheries Society.
- Schramm, Jr., H. L., Minnis, R. B., Spencer, A. B., & Theel, R. T. (2008). Aquatic Habitat Change in the Arkansas River after the Development of a Lock and Dam Commercial Navigation System. *River Research and Applications*, 24(3), 237-248.

- Slipke, J. W., & Macina, M. J. (2005). The Influence of River Connectivity on Fish Community and Sport Fishing Abundance in Demopolis Reservoir, Alabama. *Annual Conference of the Southeastern Association of Fish and Wildlife Agencies*, (pp. 282-291).
- Southwick Associates. (2013). *Sportfishing in America: An Economic Force for Conservation*. Fernandina Beach: American Sportfishing Association.
- Sparks, R. E. (1995). Need for Ecosystem Management of Large Rivers and Their Floodplains. *Bioscience*, 45(3), 168-182.
- U.S. Army Corp of Engineers. (1985, August 9). Water Resources Policies and Authorities Recreational, Planning, Development, and Management Policies.
- U.S. Army Corps of Engineers Mobile District. (2007, September 27). Joint Public Notice USACE and ADEM Recertification of the Proposed Long Range Maintenance Dredging and Disposal Plan Black Warrior-Tombigbee Waterway.
- U.S. Environmental Protection Agency and the Department of the Army. (2008, December 2). Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States & Carabell v. United States*.
- Ward, M. G., Harris, P. M., & Ward, A. K. (2005). Gulf Coast Rivers of the Southeastern United States. In A. C. Benke, & C. E. Cushing (Eds.), *Rivers of North America* (pp. 124-178). Burlington: Elsevier Academic Press.
- Wells, Jr., T. L. (2011). Policy Implications of Aging and Manipulated River Systems Case Study: Black Warrior River. Tuscaloosa: University of Alabama.
- Young, C. D., Charles, A., & Hjort, A. (2008). Human dimensions of the ecosystem approach to fisheries: an overview of context, concepts, tools and methods. *FAO Fisheries Technical Paper 489*. Rome: Food and Agriculture of the United States.

APPENDIX A: IRB APPROVAL

March 20, 2014

Office for Research
Institutional Review Board for the
Protection of Human Subjects

Shivon Van Allen
Department of Geography
College of Arts & Sciences
University of Alabama



Re: IRB # EX-14-CM-039 "Perceived Changes in Lateral Connectivity on the Black Warrior River by Recreationists"

Dear Ms. Van Allen:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your protocol has been given exempt approval according to 45 CFR part 46.101(b)(2) as outlined below:

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:

- (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and
- (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Your application will expire on March 19, 2015. If your research will continue beyond this date, complete the relevant portions of Continuing Review and Closure Form. If you wish to modify the application, complete the Modification of an Approved Protocol Form. When the study closes, complete the appropriate portions of FORM: Continuing Review and Closure.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number.

Good luck with your research.

Sincerely,



555 Van Allen Instruction Building
Box 876137
tamu.com / phone: 35487-5177
(205) 498-5461
fax: (205) 498-5189
TOLL FREE: (877) 829-3066

Carpalitato T. Myles, MSM, CIM, CIP
Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama

AAHRPP Document # 139

THE UNIVERSITY OF ALABAMA
HUMAN RESEARCH PROTECTIONS PROGRAM

Shivon Van Allen, Principal Investigator from the University of Alabama, is conducting a study called Perceived Changes in Lateral Connectivity on the Black Warrior River by Recreationists. The Principle Investigator wishes to learn about activities on the Black Warrior River and the experience of recreational users. This study involved research on the activities and opinions of recreational users on the Black Warrior River.

Taking part in this study involves participating in a survey that will take about five (5) minutes. This survey contains questions about the activities, observations and opinions of recreationists.

We will protect your confidentiality by securely storing and managing survey responses. Only the Principle Investigator and overseeing faculty member will have access to the data. The data will be password protected. Only summarized data will be presented at meetings or in publications. Name or personal identifiers will not be included in study results.

There will be no direct benefits to you for participation. The findings of the study will be useful to Black Warrior River stakeholders (including but not limited to anglers and boaters) and management officials. Future river management recommendations geared towards recreationists may result from the study.

The chief risk to you is that some of the questions may make you uncomfortable. You may skip any questions you do not want to answer. YOUR PARTICIPATION IS COMPLETELY VOLUNTARY. You are free not to participate or stop participating any time before you submit your answers.

If you have questions about this study, please contact Shivon Van Allen at (360) 903-0696 or by email at svanallen@crimson.ua.edu. If you have questions about your rights as a research participant contact Ms. Tanta Myles (the University Compliance Officer) at (205) 348-8461 or toll-free at 1-877-820-3066. If you have complaints or concerns about this study, file them through the UA IRB outreach website at http://osp.ua.edu/site/PRCO_Welcome.html. Also, if you participate, you are encouraged to complete the short Survey for Research Participants online at this website. This helps UA improve its protection of human research participants.

By beginning the survey, you acknowledge that you understand the statements above, are at least 18 years old, and freely consent to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty. **Proceeding to respond to the survey questions asked by the investigator constitutes your consent to participate. Please keep a copy of this informed consent form for your records.**

UA IRB Approved Document
Approval date: 3-20-14
Expiration date: 3-19-15

APPENDIX B: IRB REVISION APPROVAL

Office for Research
Institutional Review Board for the
Protection of Human Subjects



May 22, 2014

Shivon Van Allen
Department of Geography
College of Arts & Sciences
University of Alabama

Re: IRB # EX-14-CM-039 "Perceived Changes in Lateral Connectivity on the Black Warrior River by Recreationists"

Dear Ms. Van Allen:

The University of Alabama Institutional Review Board has reviewed the revision to your previously approved exempt protocol. The board has determined that the change does not affect the exempt status of your protocol.

Please remember that your approval period expires one year from the date of your original approval, March 20, 2014, not the date of this revision approval.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants.

Good luck with your research.

Sincerely,

Carpatho T. Myles, MSM, CCM, CIP
Director of Research Compliance & Research Compliance Officer
Office of Research Compliance
The University of Alabama



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AAHRPP Document # 139

**THE UNIVERSITY OF ALABAMA
HUMAN RESEARCH PROTECTIONS PROGRAM**

The Principal Investigator, Shivan Van Allen, from the University of Alabama, is conducting a study called Perceived Changes in Lateral Connectivity on the Black Warrior River by Anglers. The Principle Investigator wishes to learn about activities on the Black Warrior River and the experience of fishermen. The study involves research on the activities and opinions of fishermen on the Black Warrior River.

Taking part in this study involves participating in a survey that will take about five (5) minutes. This survey contains questions about the activities, observations and opinions of fishermen.

Your confidentiality is protected by securely storing and managing survey responses. Only the Principle Investigator and overseeing faculty member have access to the data. The data will be password protected. Only summarized data will be presented at meetings and/or in publications. Names or personal identifiers will not be included in study results.

There will be no direct benefits to you for participation. The findings of the study will be useful to Black Warrior River stakeholders and management officials. Future river management recommendations geared towards fishermen may result from the study.

The chief risk to you is that some of the questions may make you uncomfortable. You may skip any questions you do not want to answer. **YOUR PARTICIPATION IS COMPLETELY VOLUNTARY.** You are free not to participate or stop participating any time before you submit your answers.

If you have questions about this study, please contact Shivan Van Allen at (360) 903-0696 or by email at svanallen@crimson.ua.edu. If you have questions about your rights as a research participant contact Ms. Tanta Myles (the University Compliance Officer) at (205) 348-8461 or toll-free at 1-877-820-3066. If you have complaints or concerns about this study, file them through the UA IRB outreach website at http://osp.ua.edu/site/PRCO_Welcome.htm. Also, if you participate, you are encouraged to complete the short Survey for Research Participants online at this website. This helps UA improve its protection of human research participants.

By beginning the survey, you acknowledge that you understand the statements above, are at least 19 years old, and freely consent to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty. **Selecting "I agree to participate" constitutes your consent to participate in the study. Please keep a copy of this Informed consent form for your records.**

UA IRB Approved Document
Approval date: 5-22-14
Expiration date: 3-19-15

APPENDIX C: OBSERVATIONAL AND BEHAVIORAL QUESTIONS

Question	Response Options
What is your main reason for being here today?	Open-ended
What species do you most like to catch?	Bream Bass Crappie Catfish Other
About how many times a year do you guess you go fishing on the Black Warrior River?	Open-ended
About how many times a year do you guess you go fishing anywhere?	Open-ended
How many years have you been fishing?	Open-ended
Check the issues you think are important based on your fishing of the river.	Increased fishing pressure Bank erosion Decline in fish numbers Decline in fish size Access to creeks and sloughs Boat ramps (number and condition) Other
Have you noticed changes to the river since you've been fishing it?	Yes No
If yes, what kind of changes?	Open-ended
Have these change had any effects on fishing?	Yes No
If yes, how so?	Open-ended
Do you think keeping backwater areas accessible should be a river management priority?	Yes No
Who do the areas that have been closed-off belong to?	Open-ended
Do you fish in bass tournaments?	Yes No
If yes, about how many do you fish in a typical year?	Open-ended

APPENDIX D: DEMOGRAPHIC QUESTIONS

Question	Response Options
What is your gender?	Male Female Prefer not to answer
What is your race/ethnicity?	White Hispanic or Latino Black or African American Native American/American Indian Asian/Pacific Islander Other
What is your age?	19-29 years old 30-49 years old 50-64 years old 65 years and over
What is your employment status?	Employed Self-employed Unemployed Military Student Retired Unable to work
What is the highest level of education you've completed?	Some high school High school diploma/GED Some college Bachelor's degree Graduate degree
What is your hometown?	Open-ended

APPENDIX E: ATTORNEY GENERAL WATER LAW OPINION



2013-057

**STATE OF ALABAMA
OFFICE OF THE ATTORNEY GENERAL**

**LUTHER STRANGE
ATTORNEY GENERAL**

**501 WASHINGTON AVENUE
5TH FLOOR, ROOM 501
MONTGOMERY, AL 36130-0152
PHONE 742-7357
WWW.AG.OF.ALABAMA.GOV**

June 28, 2013

Honorable N. Gunter Guy, Jr.
Commissioner, Department of
Conservation and Natural Resources
64 North Union Street
Suite 468
Montgomery, Alabama 36130-1450

Real Property - Water and Waterways -
Recreation - Conservation Department

Pursuant to section 9-11-80 of the Code of Alabama, if a dam, lock, or impoundment device is placed across a navigable waterway, the impounded waters are public waters that may be used by the public for hunting and fishing.

Dear Commissioner Guy:

This opinion of the Attorney General is issued in response to your request.

QUESTION

Pursuant to section 9-11-80 of the Code of Alabama, are waters that are impounded by the construction of a lock or dam, or other impounding device placed across the channel of a navigable stream, public waters that can be utilized by the public for hunting and fishing?

FACTS AND ANALYSIS

According to your request, the Department of Conservation and Natural Resources ("Department") has been given jurisdiction and control over all unseced lands of the State of Alabama pursuant to section 9-15-2 of the Code of

Honorable N. Gunter Guy, Jr.

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Alabama, and further has the authority, through its Commissioner, to lease the oil, gas, and minerals under any navigable stream or navigable waterway and manage such lands as set forth in section 9-17-62 of the Code. Pursuant to these provisions, the Department is frequently called upon to make determinations as to whether particular stretches of Alabama waterways are navigable so as to determine whether the State will assert ownership in the beds of such streams.

Under the equal-footing doctrine, the State of Alabama was vested with title to the beds of all navigable waterways when the State was admitted to the Union on December 14, 1819. *See PPL Montana, LLC v. Montana*, 132 S. Ct. 1215 (2012). Thus, when reviewing a request for determination of ownership, the Department assesses whether the waterway was navigable as it existed on December 14, 1819.

The Department asserts, however, under the laws of the State of Alabama, the public has the right to use all public waters within the State for hunting and fishing, regardless of the ownership of the waterbed. Thus, even if the Department determines that certain waters are not navigable for title purposes under the federal test for navigability, the Department further asserts that this does not preclude the conclusion that those waters are public waters under State law or that the public has a right to use the waters.

The question of whether waters are public is a matter of state law as explained by the Alabama Supreme Court as follows:

"A federal determination of 'navigability' may serve many different purposes, the three most typical being: to confer admiralty jurisdiction, to define Congress' reach under the commerce power, and to grant title under the equal footing doctrine. *See State of Alaska v. United States*, 563 F.Supp. 1223, 1225 n. 3 (D.Alaska 1983). *In addition to the federal tests, states have also adopted a variety of navigability definitions to satisfy different policies regarding resource conservation, apportionment of waterways between private and public uses, and protection of public access to waterways.* No aspect of the federal test of navigability used to determine title under the equal footing doctrine precludes the various states from adapting more liberal tests in order to advance other important interests or public uses. *See Hitchings v. Del Rio Woods Recreation and Pack Dist.*, 53 Cal.App.3d 560, 127 Cal.Rptr. 830, 834 (1976) ('for purposes of public use of waters, the state may adopt different and less stringent tests of navigability').

Honorable N. Gunter Guy, Jr.
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City of Irondale v. City of Leeds, No. 1111347, 2013 WL 563410, at *5 (Ala. Feb. 15, 2013) (emphasis added).

Section 9-11-80 of the Code of Alabama defines “public and private waters” as follows:

(a) All waters of this state are hereby declared to be public waters if such waters are natural bodies of water such as rivers, creeks, brooks, lakes, bayous, bays, channels, canals or lagoons or are dug, dredged or blasted canals and if these waters traverse, bound, flow upon or through or touch lands title to which is held by more than one person, firm or corporation. *Any water impounded by the construction of any lock or dam or other impounding device placed across the channel of a navigable stream is declared a public water.* All waters caused to be impounded or owned or leased by any municipality, county or other governmental unit are also declared to be public waters; likewise, all impoundments owned or operated by public utilities when such impoundments touch or bound lands title to which is held by more than one person, firm or corporation are declared to be public waters, provided, that before any person may go or be upon the posted lands of another for the purpose of fishing he shall procure the consent of the landowner or his agent.

(b) Private waters are defined as any body of water wholly on lands held in fee or in trust or under lease by any one person, firm, corporation or club and include impoundments that are wholly on lands held in fee or in trust, or under lease by any one person, firm, corporation or club, and regardless of the extent of the impounded stream, provided such stream is nonnavigable.

ALA. CODE § 9-11-80 (2001) (emphasis added).

The Alabama Supreme Court has emphasized that the determining factor for determining whether impounded water is public water under section 9-11-80(a) of the Code is whether the lock or dam is placed across a waterway that is navigable. *Webb v. Turpin*, 110 So. 2d 1243 (Ala. 1998). In *Webb*, the Court held that individual property owners owning part of a lake bed only had the

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right to use the surface waters covering their property rather than the entire man-made lake because the stream that was dammed to form the lake was nonnavigable. The Court stated as follows:

The Wehbys also contend that Yellowleaf Creek is navigable at the point where the dam is located. They rely on Ala. Code 1975, § 9-11-80, for the proposition that Yellowleaf Creek, being a natural waterway flowing through lands belonging to more than one person, is a public waterway. The Wehbys assert that the lake is public and, therefore, that the common law rule would have no field of operation because the lake's source is capable of being traversed by fishing boats and canoes during some parts of the year. The Wehbys do acknowledge, however, that *impounded waters are not within the definition of "public waters" in § 9-11-80 and, therefore, that the lake is not a public lake, within the meaning of the statute, unless Yellowleaf Creek was navigable where the dam was placed.*

Id. at 1249-1250 (emphases added).

Based upon the above, the Department must make a factual determination as to whether the dam, lock, or impoundment device is placed across a navigable waterway. The Attorney General does not make factual determinations. Opinion to Honorable Cassandra Forsley, Winston County Judge of Probate, dated April 19, 1986, A.G. No. 96-00189 at 1. If the dam, lock, or impoundment is placed across a navigable waterway, the impounded waters are public waters, at least to the extent of the flood/flowage easements. See *City of Trussdale*, 1111347, 2013 WL 563410, at *4.

The plain language of section 9-11-80 of the Code leads to the conclusion that the impoundment of a navigable waterway creates a public servitude to the impounded waters. Further, the Alabama Supreme Court has held that the public's right in a right-of-way or easement across certain surface waters is superior to the rights of the owner of the waterbed. See *Walker v. Allen*, 72 Ala. 456, 459 (1882) (noting that a public right-of-way or easement upon certain waters is "superior to the right of the riparian proprietor, though he may own the soil of the bed"). Thus, the public may utilize the impounded waters for hunting and fishing, but the right to use the waters extends over and across the public waters only, and does not extend to the submerged lands or any upland areas.

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CONCLUSION

Pursuant to section 9-11-80 of the Code of Alabama, if a dam, lock, or impoundment device is placed across a navigable waterway, the impounded waters are public waters that may be used by the public for hunting and fishing.

I hope this opinion answers your question. If this Office can be of further assistance, please contact Ward Reeson of my staff.

Sincerely,

FUTHER STRANGE
Attorney General
By: _____

BRENDA F. SMITH
Chief, Opinions Division

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