



# **Jordan Lake: Biography of a Multi-Purpose North Carolina Reservoir**

**1945-2024 and Beyond**

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## **Abstract**

In 1945, the last numbered hurricane in the United States caused significant devastation along the New Hope River in Central North Carolina, flooding and marooning the city of Fayetteville. In response, the decision was made to dam and flood the New Hope Valley, to create a multi-purpose reservoir called Jordan Lake. The project would not be without controversy however, as concerns arose that it would not fulfill its purpose, alongside complaints about the utilization of eminent domain to provide almost 50,000 acres of land needed. This paper tells the story of the lake, beginning with what was planned for it, and the criticisms from the public, with the subsequent responses from the U.S. Army Corps of Engineers. Then it describes the situation since the reservoir pool was filled in 1982, and whether or not it met the expectations set initially, regarding wildlife habitat, flood management, recreational benefits and provision of drinking water. Costs and benefits will be assessed up to the present (2024). Finally, the last chapter forecasts the Lake's future, as a major automotive firm begins to establish its manufacturing plant 10 miles away from Jordan Lake, using eminent domain to construct it and as major housing developments draw water from the lake.

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# *The Past*

# *Chapter One: Needs and Alternatives*

## **1.1: Hurricane No. 9: The Submerged Fate of New Hope Valley**

In 1945, the last numerically named hurricane, Hurricane No. 9, came for North Carolina, and caused significant devastation, which left Fayetteville completely marooned, highways shut down, and even bridges were overwhelmed by the floods. Furthermore, this led to transportation and communication being shut down as well, with “many families made homeless” and additionally “thousands of acres of farmland” also overwhelmed by the flooding (*The Shelby Daily Star*, 1945, pg. 1). What Hurricane No. 9 provided was a gargantuan opportunity to deliver a changed environment for the state. This crisis ultimately allowed local and state officials to begin the transformative process for the environmental augmentation of New Hope Valley, having provided a strong reason for those in charge at the time to take action on the 1933 Water Quality study completed twelve years prior, which revealed how prone the valley was to intense flooding (Leah, 2018).

Three years after the study, as a result of the consistent flooding New Hope Valley endured, along with many other flood-prone parts of the United States, the 1936 Flood Control Act was signed into law, and it cleared the way for The U.S. Army Corps of Engineers to take action, and to recognize that “flood control was an appropriate federal activity. The act authorized hundreds of flood control projects and established policies that endure to this day. Moreover, it dramatically increased the Corps’ work load, forcing the agency to develop new procedures and offices.” And, in addition, acknowledge that “the federal government should take primary responsibility for dealing with the menace of terrifying, huge floods.” (Arnold, 1988, pg. 5,9).

Prior to the impact of the hurricane, this region was populated with towns and farmland, in spite of the valley's frequent flooding. Some of the beaches today are named in memory of the town that existed prior to the lake's existence, such as Seaforth. If one were to dive to the bottom of the lake in present times, one may find old hitching posts, the foundations of farms and houses, and even graveyards (Leah, 2023). Other lakes in the area share similar stories, as they too were man-made. But Jordan Lake's history is perhaps most fascinating, in that despite the lake's short period of existence, its history is quite extensive. And the role it plays in Chatham County is equally as vast. The lake took thirty-seven years to complete, or roughly almost half a century, and it consists of "46,798 acres, of which 13,900 are flooded to form a reservoir 216 feet above mean sea level" (Wallace, 2010, pg.7). The lake today serves multiple purposes beyond flood control, such as drinking water, recreation, and a home for wildlife.

## **1.2: *Impetus*: The Various Visions for Jordan Lake**

The 1971 Final Environmental Report is both an interim report that reflected on the progress made at that point in constructing Jordan Lake, as well as a final report that reflected on what was projected to be created for this lake (how many acres would it take up, costs and benefits, impact on wildlife, etc). Construction of the Lake would not be completed until 1982, as while funding was secured in 1963, (thanks to Sen. B. Everett Jordan) and its development began in 1967, lawsuits, along with an archeological dig for Native American artifacts (as some were found during construction) would delay its completion "off and on through the 1960's and 1970's". Originally known as The New Hope Project, it would be renamed after Sen. B. Everett Jordan (Wallace, 2010, pg.8).

*Why pursue the New Hope Project (Jordan Lake)? Why was this the main vision?*

As per the first volume of the 1971 Final Environmental Report, The U.S. Army Corps of Engineers concluded that “the New Hope Project will enhance the aesthetic value of the region” and that “the lake and the surrounding terrain will provide an outstanding scenic attraction that will be protected from urban pressures and preserved for the enjoyment of generations” and would allow “for the general public seeking outdoor “water-oriented” recreation activities and facilities.” And, in addition, it would “not affect any areas of historic significance” (Final...1971, pg. 26), while simultaneously providing a lake that serves several different purposes as aforementioned. Made possible by the “impoundment of the Haw and New Hope Rivers”, the lake can be utilized “as a sediment trap”, and “improve the bacterial and general mineral content of the influent water” (Final...1971, pg. 31). Lastly, the lake also proves itself to be cost effective, as per their calculations on solely flood control, without other factors, “the annual benefits from flood control only are calculated to be \$1,539,000 vs. annual costs of \$1,431,000.” (Final...1971, pg. 37). In short, the corps realized this lake to be the best outcome for New Hope Valley—but that did not come without criticism (Final...1971, pg. 37-41), lawsuits, and protests, which ultimately delayed the project—hence its long completion time. Later on, in the coming chapters I will explore what came about as a result, the ethics of this specific vision chosen for a significant part of Chatham County, and so much more. But for now, the question arises: *Were there any other possibilities? Were there any other courses of action beyond merely flooding the area and creating a large, multi-purpose lake?* The concerns of the populace were not ignored,

and were instead both heard at length, and contemplated equally as much...



*Downtown Fayetteville Flooded— Courtesy of The Fayetteville Observer, 2017*

Aside from the main impetus of Jordan Lake's creation being the hurricane, there were several others that drove The Corps of Engineers at the time to bring forth the lake. One other impetus was the heavy flooding, as that could be seen as essentially the original impetus—especially when one considers how devastating its effects were. The two together generated a ripple effect, that devastated the valley. Thus, numerous concepts and courses of action as for how best to solve this problem was an inevitability. As such, while a main vision was held in mind by those in charge at the time, numerous other visions took hold—both in those who determined the future of the lake, as well as the general populace. Therefore, to best understand the history of the lake, and to best understand as for *why* it was decided to flood New Hope Valley, one must examine the alternative courses of action—or, as one could also see it, the different *visions* for this project. The U.S. Army Corps of Engineers analyzed each one, and broke down as to why

they were not pursued, and why the New Hope Project was the best answer for the valley. These alternatives individually serve as other impetuses of Jordan Lake's creation.

The main vision for this project was to flood the valley, and much work and progress on that had been made. However, due to objections, concerns, and feedback from others, there were other alternatives, and therefore these could be seen as alternative visions so to speak.

The first of these alternatives was a dry dam, which would "provide flood protection downstream." The dry dam alternative, while useful, withheld a mixed bag of benefits and drawbacks. And ultimately, when compared to just filling the lake, the Corps of Engineers concluded that "the environmental impact would be the same" (Final...1971, pg. 43). And, in addition, the drawbacks that would be seen, were substantial. For instance, the dry dam would allow for the development of a "lush growth", but, "frequent flooding for extended periods and occasional complete submergence for a number of days would rapidly kill off the present forest cover at the lower elevations." Furthermore, this led to a ripple effect that they realized, in which "water-tolerant coppice, annuals, and aquatic plants would rapidly take over at lower elevations."

Meanwhile, "at higher elevations, the less water-tolerant tree varieties would be eliminated."

And due to these effects, the dry-dam <sup>1</sup>then inadvertently "provides ideal mosquito grounds" and "an extended mosquito-breeding period". These ripples, as they also found, bled into recreation.

Despite the fact that there would be an increased presence of wildlife, "the heavy undergrowth at

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<sup>1</sup> Dry-dams capture the excess water produced during floods and similar events. However, when no such weather is occurring, water can move freely. See: <https://albertawater.com/flood-mitigation/dry-dams/#:~:text=Dry%20dams%20are%20catchment%20areas,water%20to%20prevent%20downstream%20flooding.>

the lower elevations would make the area virtually inaccessible to the hunter, fisherman, or naturalist”. Furthermore, usage of a dry-dam would entail the need of the communities that depended on New Hope for water supply, “develop new sources”. Thus, they concluded, “the alternative of a dry dam is not considered to be more favorable than the proposed plan because of the reduced benefits and adverse environmental effects” (Final...1971, pg. 45).

Another option was to “cease all work and abandon project” (Final...1971, pg. 45), and if they were to pursue this alternative, it would prove to be quite costly. They realized that the cost of abandoning the project would result in a loss of annual net project benefits estimated at that time of \$2 million, and they found after factoring in “an interest rate of 3-1/8 percent and a 100-year project life, these project net benefits would have an equivalent present worth value of \$61 million”. Furthermore, while they would have been able to potentially save \$2.5 million of costs “through real estate salvage measures”, in lieu of the \$16.9 million that “had been invested by 30 September 1971 in the project”, unfortunately, this route would see additional costs incurred as a result of bringing all work to a halt. Therefore, abandonment of this project would entail a massive financial loss, to the tune of \$23 million, with a supplementary loss of \$61 million in net benefits (Final...1971, pg. 45).

Cost alone would not have accounted for the environmental consequences of abandonment. In fact, one may even argue the environmental repercussions of this alternative is *far worse* than the financial aspect of it. Firstly, they found that the “environmental quality of the flood plains that would have been protected by the project would continue to degrade”. Meanwhile, “In Fayetteville, the market value of lands subject to natural overflow would drop and the likelihood

of the implementation of an effective flood plain evacuation and recreation program to preclude the spawning of ghetto areas is remote because of the extensive development that has already occurred.” As a result, the communities there would be economically harmed, as they would find that the efforts made “to increase the already low per capita income of the area” would slow down (Final...1971, pg. 45-46).

Ultimately, the corps found that desertion of the project (choosing to flood the lake, the main vision) would also entail a great neglect of the environment. The choice of abandonment “would preclude meeting the water-resource-conservation needs of the basin with a minimum public investment and result in adverse environmental impacts.” And, in addition, they found that, prior to the forced exodus of people who live in the valley, there “would be a period of accelerating economic decline in the standard of living and welfare expenditures” and even those “with a high standard of living provided by effective resource-conservation measures would be forced to seek their livelihoods in other areas” which in turn, would “increase demands on the resources on the resources of other, better managed areas.” Furthermore, aside from the “general degradation of the environment” that would result, they also found that the “land values decline” following this path (Final...1971, pg. 46).

Another option was a “system of small dams”, which would have utilized “232 small and intermediate sized multiple-purpose reservoirs”. The concept, while promising, would have cost “45% more” than the original plan of filling the lake, but would also rake in “33% more annual project benefits.” And while they did find it “economically feasible from a monetary standpoint” they realized that, in order to successfully complete the system, they also found that “more than

twice the amount of land would be required and many more miles of free-flowing stream would be inundated”. Lastly, they also noted that just filling the lake would entail “the least amount of land resources per unit of water resource needed to sustain the growing population” Therefore, this concept was never pursued (Final...1971, pg. 46).

“Flood plain zoning” <sup>2</sup>was another path that was considered. While found to be “a most effective means of reducing the growth of flood damage stemming from new developments in the flood plain” they also realized that this was not entirely sensible for “flood plains where substantial development has already occurred”. And in addition, they also found such zoning in certain areas “such as along the Cape Fear River”, those in charge of “entire farms” would not be able to operate them. But the reason why the Corps of Engineers chose to not pursue this path was due to the massive potential losses, to the tune of “200,000 acres of land, including the 3,000 plus homes and commercial establishments on the 7,000 acres of flood plain land in the Fayetteville area”. And ultimately, they found that they could only really recommend this strategy for the “remaining areas where structural measures do not provide sufficient flood protection to efficiently reduce flood risk” (Final...1971, pg. 46-47).

### ***1.3: Other Possibilities: A Reduced Scale Project, Fayetteville***

#### ***Floodproofing...***

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<sup>2</sup> This term is best defined by Lynn Markham and Rebecca Roberts, of University of Wisconsin, Stevens Point: “The purposes of floodplain zoning are to protect human life, health and to protect property damages and economic losses” (Markham & Roberts, 2006, pg. 150). For reference, see: [https://www3.uwsp.edu/cnr-ap/clue/Documents/Water/Floodplain\\_Zoning\\_Chapter.pdf](https://www3.uwsp.edu/cnr-ap/clue/Documents/Water/Floodplain_Zoning_Chapter.pdf)

Another alternative considered the idea of having the “project reduced in size”, but this was not found to be feasible, as while “the costs of providing similar storage for all purposes in a multiple-purpose project was considerably less” the reduced scale version of the project would not meet the “other water-resource needs in the basin” (Final...1971, pg. 47). Another considered the possibility of having the people of New Hope utilize “flood insurance” in the manner that it serves “as an alternative to the structural flood protection offered by the New Hope project” However, it was found to be “both uneconomical and impractical” and would not cover all the damage caused by flooding. Another suggested the “outright governmental purchase of the flood plain” in which, after the Corps of Engineers did the math, proved itself to not be fruitful. It would cost around “\$158,000,000” and it did not “include many cost items such as resettlement costs, highway, railroad, bridge, and utility relocations costs, etc.” Additionally, they were also aware of the “certain widespread opposition” that would occur as a result (Final...1971, pg. 48). Which, given the amount of opposition the lake was already facing at the time through both protests and lawsuits, avoiding further opposition was both understandable and necessary to keep the peace.

The Army Corps of Engineers also pondered over the “operation of a dry flood control dam at the New Hope site and develop a second reservoir on the Haw River for conservation purposes.” Due to the limits of the reservoirs in terms of “storage capacity”, they chose to not follow through with this plan. Specifically, one site in particular “6000 feet upstream from the New Hope dam-site” was found to not be compatible with this plan due to the fact that its capacity would be “very slightly over the amount required for sedimentation storage and grossly inadequate to meet the water conservation needs of the basin” And while a second reservoir

could be created nearby, the corps ran into the issue of the fact that the one possible site a reservoir could be built was “limited by the steep stream gradient of the Haw River that the total capacity of the reservoir would have to be allocated to sediment storage” (Final...1971, pg. 48).

And the last two alternatives considered the possibility of “local protection works at Fayetteville” which would have utilized “dikes and levees”. They chose not to utilize this plan, due to the fact that the “total flood damages would be less than produced by reservoir storage” and in addition, “the area not protected by the Fayetteville levee system would still sustain annual damages amounting to \$1.4 million”. They once more ran into the issue of storage, and found that the amount of storage needed for this to work would amount to “the same amount of storage as would be needed to protect the Fayetteville area”. Overall, it was not found to be “economically feasible”. The last alternative considered “floodproofing” albeit that it was seen as “not acceptable from aesthetic and practical standpoints”, and therefore, “economic evaluations were not made” (Final...1971, pg. 49).

These different visions serve as a glimpse into the different possibilities that could have altered the future of New Hope Valley in distinctly unique ways, with consequences that also would have been equally unique unto each—permanently affecting the landscape and its people in varying degrees just as equally as deciding to flood the area in the first place. One aspect that remains clear from these different alternative avenues the project could have taken, is that the additional benefits, on top of what the populace today enjoys, (flood control, storage, etc.) would not have been possible if the project were to pivot to any of the aforementioned possibilities.

# ***Chapter Two: Corps of Engineers: Criticisms and Answers Addressed***

At the time of the lake's design, the U.S. Army Corps of Engineers stared down the barrel of intense of criticism, alongside various questions and concerns about the lake. In the 1971 Final Environmental Report, the Corps of Engineers answered each one in detail, (albeit at times with a short yet descriptive answer) providing a rebuttal to the various criticisms with facts and figures, while also acknowledging specific letters that they believed "to be representative of all complaints received on the project" (Final... 1971, pg. 37). Some of these criticisms came from various places— such as professors at Duke University<sup>3</sup>, (Final... 1971, pg. 238-240) as well as the Director of Botany at UNC Chapel Hill<sup>4</sup> (Final... 1971, pg. 194-195). And even the U.S. Forest Service voiced concerns<sup>5</sup>, (Final... 1971, pg. 250-252). Analysis of these claims and the Corps' subsequent rebuttals is crucial to understanding the lake's purported economic and environmental benefits for the people within Chatham County, and elsewhere within North Carolina.

## ***2.1: Flood Control, Damages, Cost vs. Benefits...***

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<sup>3</sup> Several Duke professors signed onto a letter from James E. Wuenschel, Duke University Assistant Professor of Forest Ecology, in opposition to the project. These other professors were: Boyd R. Stain, Associate Professor of Botany. F.M White, Assistant Professor of Forestry. W.D. Bee, James B. Duke Professor of Botany. And Peter Killburn, Instructor of Ecology, (Zoology Department).

<sup>4</sup> The Director of Botany at UNC Chapel Hill was C. Ritchie Bell at that time.

<sup>5</sup> In the letter written by Mr. and Mrs. Fred Choate, and Mr. John C. Stout, they included in their letter an excerpt "from the Chapel Hill Weekly on Sunday, July 25, 1971." Which was "regarding the New Hope Reservoir project". In which they claim to have showed that "in addition to the numerous individuals and groups that have spoken out against the project, the U.S Forest Service has openly condemned it".

In the Final Environmental Statement, it says in one letter, on page 250 from Sam J. Ervin Jr., to Col. Denison, that he had enclosed a copy of the news article from the July 25 1971 issue of *The Chapel Hill Weekly*, that had the U.S. Forest Service's comments opposing the creation of the Lake. However, the article's contents are not present in the Final Environmental Statement itself. The article is called "Forest Service Warns of Major Environmental New Hope Damage". I have looked for the article but it does not appear to be anywhere. At the time of this writing, Digital N.C. (digitized newspaper records) only show issues from 1945-1963.

Some critics believed that the benefits were “exaggerated” and that “the benefit-cost ratio would fall below unity if recreation and water supply benefits are reduced”. Another criticism argued that the occurrences of flooding were “overestimated”, and the damage associated with the flooding was “vastly overestimated”. In response, the Corps made clear that, such flooding, and the consequences that came with it, was quite large. The cost-benefit ratio was claimed to be greater than one, with the annual benefits having been “calculated to be \$1,549,000 vs. annual costs of \$1,431,000”. The Corps argued that their estimation of how common flood events were was correct, and not “overestimated” based on the usage of “the Pearson Type III method” which was “adopted by The Water Resources Council for use in all Federal planning involving water and related land resources” which was used to ascertain “peak discharge frequency”.<sup>6</sup> (Final... 1971, pg. 37-38). The claim that the “flood damages are vastly overestimated” was refuted via “field surveys made immediately after the major flood of 1945 and the lesser floods of 1955, 1956, 1958, and 1960.” The Corps also determined this utilizing “the flood hydrograph damage evaluation method” which was “a standard method” at the time and made clear that “damages were not estimated but were measured”. (Final... 1971, pg. 37-38). One may find the claim of overestimating damage in particular to be rather intriguing when considering the Flood Control Act of 1936, and the language associated with it as aforementioned earlier in this paper, as well as the subsequent acts that would come later in the years after 1936, leading up to the 1971

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<sup>6</sup> The Corps also credited the following source in the report for the Pearson Type III Method and its usage: *A Uniform Technique for Determining Flood Flow Frequencies*, December 1967, Bulletin No. 15, Hydrology Committee, Water Resources Council.

Report.<sup>7</sup> To be more specific, if floods are a “menace” (Arnold, 1988, pg. 5) (again, as aforementioned in this paper and as made clear just in this chapter alone) and the floods themselves (in New Hope Valley and Fayetteville) were indeed likely to be quite damaging, so much so that Fayetteville was “marooned” during Hurricane No.9, (The Shelby Daily Star, 1945, Pg.1) is it justifiable to hold that particular opinion? To that end, I would argue, no, it is not.

## ***2.2: Recreation, Waste, Nutrient Levels, Another Claim of Overestimation...***

Several criticisms of the project concerned issues unrelated to flood control. The first of these, in lockstep with other claims of “overestimation”, was the recreational benefit of the project.<sup>8</sup> In response, the Corps made clear (regarding the amount of visitors it can support each year) that they ensured that the “public recreation demands for the contributing area were computed to be considerably more than what the project can support (2,760,000 annually) so that many more visitors must seek recreation at other projects or sites” (Final... 1971, pg. 38). As to valuation the Corps said its number was a result of the fact that “The Ad Hoc Committee Report sanctions a value anywhere between \$0.50 to \$1.50 per visitor-day. A value of \$0.55 was used to estimate

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<sup>7</sup> There have been many laws specifically regarding flood control that have been passed since 1936. The U.S. Army Corps of Engineers provides an extensive list of these laws on their website. See: *Planning Community Toolbox: Water Resource Development Acts and Other Key Laws*, [planning.ercd.dren.mil/toolbox/index.cfm](http://planning.ercd.dren.mil/toolbox/index.cfm). Accessed 16 Jan. 2024.

<sup>8</sup> This criticism was brought up in seven different letters, two of which were from Roger Wells to Col. Denison, with one letter going to Nick Galifianakis (see pg. 184-193). The other letters that had complained of it were C. Ritchie Bell to Col. Denison, (see pg.194-195), Mr. Greenia to Everett Jordan (See pg. 196-201), Camilla J. Wilson to B. Everett Jordan (See. pg. 202-204) and Dr. Arthur Prange, Jr. to Senator B. Everett Jordan (see pg. 227-237)

benefits; therefore, benefits are conservative” (Final... 1971, pg. 38).<sup>9</sup> Another criticism claimed that “low-flow augmentation will lessen the need for sewage treatment downstream” in which, the Corps simply refuted with the fact that “The Federal Water Pollution Control Act, As Amended (33 U.S.C. 466 et seq.) specifically prohibits the use of storage and water releases as a substitute for adequate treatment or other methods of controlling waste at the source” (Final... 1971, pg. 38). Another criticism concerned nutrients. The concern in particular was the idea that “there would be a loss in productivity in the estuary at the mouth of the Cape Fear River the New Hope Dam “traps” nutrients”. In response, the Corps made clear that a “study and report prepared by Dr. Ruth Patrick shows that the Cape Fear River at Fayetteville already has nutrient levels considerably lower than those at the damsite.” And, as a result, “the effect of New Hope on nutrient levels will be insignificant” (Final... 1971, pg. 38).<sup>10</sup>

### ***2.3: Seizure of Land, Concern for Miles of Free-Flowing Stream, Development of Mud Flats...***

Another criticism claimed that it was “unfair to deprive area residents of their homes, farms, and land”, as this project would not be possible without a significant utilization of eminent domain to acquire land. The Corps responded and made clear that “as of September 1971, approximately 77 families had moved out of the area”, and in addition, “the remaining 73 families” were “eligible

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<sup>9</sup> The Corps also credited the following source in the report for the Ad Hoc Committee Report: *Ad Hoc Committee Report* — Supplement No. 1 to Senate Document 97, June 4, 1964.

<sup>10</sup> The Corps also credited the following source for the nutrient levels: *Cape Fear River Surveys, 1969 and 1970, for the E.I. duPont de Nemours and Company*, Academy of Natural Sciences of Philadelphia, Department of Limnology, February 1971.

for additional benefits from the Uniform Relocation Assistance and Real Property Acquisition Act of 1970” which in turn, led the Corps to be quite confident that this would “result in an improvement over their present situation”. The Corps claimed that despite “the 150 families to be relocated” it was “a small number when compared to the vast number of families that will benefit from the project” (Final... 1971, pg. 39). There were also concerns expressed over the fact that the project would “inundate 17 miles of free-flowing stream”. In response, the Corps argued that this inundation was appropriate, and that its “benefits to the general public” would “far outweigh the value of the stream in its native condition”. Furthermore, this inundation would yield an increase in “fishery” and also “enhance the esthetics, and provide tangible benefits from flood control, water quality control, water supply, and recreation”. (Final... 1971, pg. 39).

In addition, they made clear that, due to the project falling under “public ownership”, it would be “open to all, and yet preserved as green areas” (Final... 1971, pg. 39). Aside from the many miles of free-flowing stream, there was also great concern over the acreage of land that would have to be inundated, including “40,000 acres of prime forest lands” as well as the possibility that the project would result in “a cesspool”. The Corps disputed these two claims, making clear that the actual amount of acreage that would inundated would be at exactly “14,300 acres of cleared and forested lands” and that “the remaining acreage will remain under a forestry management program”. And, that “the quality of water initially impounded in the New Hope Lake project is expected to be of a quality sufficient to guarantee the benefits of which the project was justified, including fish and wildlife, recreation and water supply”. The Corps also argued that, “The State of North Carolina has recently completed a study identifying sources of pollution in tributary streams and has established a plan for removal of nutrients” (Final... 1971,

pg. 39).<sup>11</sup> And that, “Impoundment will improve turbidities and reduce bacterial counts” (Final... 1971, pg. 39).

There was also concern over the development of “vast mud flats”, but the Corps argued that this would not be so, as the “conservation pool level” was set at “elevation 216 feet m.s.l.” which ensured that the “exposure of land has been minimized”. And, “since the project does not include power production, the normal operating range in pool level is not expected to exceed 3 feet”. From this alone, the Corps concluded that the project would “not cause offensive mud flats” and “less than three square miles of land would be exposed by a 3-foot drawdown. The three square miles are spread over 150 miles of shoreline so that little or no offensive mud flats will be exposed” (Final... 1971, pg. 39-40).

## ***2.4: Mosquitos, Fish, More Concern for Recreation, Water Supply, Water Quality...***

Another criticism that the Corps of Engineers faced was the concept that the project would give way to “a mosquito factory”<sup>12</sup> (Final... 1971, pg. 40). The Corps responded that “the

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<sup>11</sup> The Corps of Engineers also credited the following source regarding the nutrients: “*A Study of Nutrients Discharged to the New Hope Reservoir in Wastewater Effluents*, May 1971, N.C. Department of Water and Air Resources.

<sup>12</sup> This complaint came from several letters: Roger Wells’ November 12, 1970 letter to Nick Galifianakis, (See pg.184-188), as well as Mr. Greenia to Everett Jordan (See pg. 196-201) and Dr. Arthur Prange, Jr. to Senator B. Everett Jordan (see pg. 227-237).

methodology for mosquito control is well developed and effective for the control of mosquitoes around impoundments” And in addition, the plan was “evaluated by the Public Health Service (now EPA) and with proper reservoir regulation and shoreline maintenance, mosquitoes and other vectors will not be a problem” (Final... 1971, pg. 40).<sup>13</sup>

Other criticisms of the lake returned to the quality of water of the lake itself—the first of these being the claim that “the lake will not be suitable for primary contact recreation”<sup>14</sup> which, is one of the most critical aspects of the lake, and especially in today’s times as of this writing. The other water quality criticism claimed that the project would “not be desirable as a water supply source.” In response to the first criticism, the Corps argued that the (as of 1971) “recent studies of the Haw and New Hope Rivers indicate that both rivers are presently acceptable using chemical, physical, and bacterial standards.” And that, (again, as of 1971) “it has always been accepted that impoundment improves bacterial quality of water. Many areas of the lake are expected to be suitable for primary contact recreation” (Final... 1971, pg. 40).<sup>15</sup> In response to

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<sup>13</sup> The Corps of Engineers also credited the following source regarding the maintenance of mosquitoes: *Design Memorandum 17*, New Hope Project, Cape Fear River Basin, N.C., *Reservoir Clearing and Mosquito Control*. 12 December 1967.

<sup>14</sup> This was argued by specifically Roger Wells’ November 12, 1970 letter to Nick Galifianakis (See pg.184-188), C. Ritchie Bell to Col. Denison (see pg.194-195), Mr. Greenia to Sen. B. Everett Jordan (See pg. 196-201), Jerry Kendrick to Sen. B. Everett Jordan (see pg. 205-207), Cathe Herman to B. Everett Jordan (see pg. 208-210), J.M. Hester Jr. to Sen. B. Everett Jordan (see pg. 211-213), Wallace Kaufman to Col. Denison, (see pg. 218-219), Dr. Arthur Prange, Jr. to Sen. B. Everett Jordan (see pg. 227-237), and lastly, James E. Wuenscher’s statement to Col. Denison, undersigned by Dr. Boyd R. Stain, Dr. F.M White, Dr. W.D. Bee, and Peter Killburn (See pg. 238-240).

<sup>15</sup> The Corps of Engineers also credited the following source regarding the standards: *Report of Proceedings At Public Hearing Relative to Applications filed by Allied Chemical Corporation and Saralyn, Incorporated, Requesting Reclassification of a Segment of Haw River and Brooks Branch, Cape Fear River Basin, Chatham County*, September 10, 1970, Water and Air Control Committee, North Carolina Board of Water and Air Resources, Raleigh, N.C.

the second criticism, the Corps once again reiterated the standards that they followed, specifically “standards specified in the 1962 edition of the ‘Public Health Service Drinking Water Standards,’” And they made clear that “the State of North Carolina has recently determined that the waters of the Haw River from Bynum to Moncure are presently suitable as a water supply source”. They also once more reiterated the argument that such changes made to “these waters will improve them” (Final... 1971, pg. 40).<sup>16</sup>

Another criticism made was that the project would “not support fish”. In response, the Corps argued that “The U.S. Fish and Wildlife Service, in conjunction with the N.C. Wildlife Resources Commission, has studied the project and concluded that the lake will support the same species as found in the river” (Final... 1971, pg. 40).<sup>17</sup> Furthermore, they also found that as per the aforementioned joint study, “the reservoir will represent a vastly improved habitat for fishes” and additionally, “annual net fishing benefits will be \$320,000” (Final... 1971, pg. 38). The last two statements are in regard to the prospect of “irreversible damage” that the lake’s creation would cause, as well as the perspective that the lake’s “wildlife subimpoundments are 150 miles from nearest wildfowl flyaway and will be useless”. (Final... 1971, pg. 41).

In response, the Corps argued that in regard to the prospect of damages, they argued that, “the lake will impound 14,300 acres for the conservation pool” and that “only the clearing necessary

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<sup>16</sup> The Corps of Engineers also credited the aforementioned source “*Report of Proceedings...*” once more.

<sup>17</sup> The Corps of Engineers also credited the following source: *An Evaluation Report of Fish and Wildlife Resources In Relation To Proposed Development of New Hope Reservoir, Haw River, North Carolina*. U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Region 4, Atlanta, Georgia, December 1961.

for installation of roads and recreational facilities will be accomplished above the conservation pool with the remainder of the land, approximately 23,128 acres, available for wildlife.”

Additionally, the Corps also stated that “approximately 18,000 acres will be leased to the N.C. Wildlife Resources Commission for extensive wildlife management, free forever from pressures or urban development”. Furthermore, they also made clear that “none of the present species are expected to vanish from the area” and also, “five ‘green-tree’ subimpoundments will increase waterfowl use”. It argued that both “the U.S. Fish and Wildlife Service and the N.C. Wildlife Resources Commission state that the lake and its appurtenant wildlife management (the sub impoundments) areas will attract and meet the needs of migratory waterfowl” (Final... 1971, pg. 41).

In the next chapters, we will explore what came about after the development of the lake—the *realizations*, that were made by the Corps of Engineers, and how the lake stands today as a home for various species of wildlife, a water source, a recreation source, and a source of flood control. In the coming chapters, other aspects of the lake in present times will be analyzed, as well as compared and contrasted to its past. The overarching theme for the present is rather simply, *how does the present hold up to the expectation of the past? Was the Corps correct in its predictions? And how did changing circumstances, especially massive population growth in the region, change the costs and benefits of the new lake?*

# *The Present*

# *Chapter Three: Environment*

The importance of many diverse species of wildlife, and the ecosystem that they are a part of at Jordan Lake, was not lost upon the Corps of Engineers. Wildlife is important for their own sake and as a significant part of the lake’s recreational benefits. Understanding what species are here, assists in understanding the positive impact that this lake has made. This chapter will review the Jordan Lake ecosystem, then deal with (1) aquatic wildlife and the lake’s fishing resource, (2) the extensive terrestrial land protected by the Jordan Lake project and its use by hunters, and (3) the avian resource, especially the lake’s eagles.

### ***3.1: So, what exactly are the wildlife at Jordan Lake?***

The NC Division of Parks and Recreation compiled lists of what is found there: plants, fish, reptiles, amphibians, mammals, and birds. For plants, there are 263 taxa,<sup>18</sup> and a few plants that one may find from this list, are plants such as the “Chinese Wisteria” or the “American Strawberry-bush” and even “Marijuana” can be found. (N.C. Division of Parks and Recreation, 2024, Plant Checklist pg. 2-3).

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<sup>18</sup> Encyclopædia Britannica best explains what taxa is, here: “taxon, any unit used in the science of biological classification, or taxonomy. Taxa are arranged in a hierarchy from kingdom to subspecies, a given taxon ordinarily including several taxa of lower rank. In the classification of protists, plants, and animals, certain taxonomic categories are universally recognized; in descending order, these are kingdom, phylum (in plants, division), class, order, family, genus, species, and subspecies, or race. Rules for naming the various taxa are the province of biological nomenclature.” — “Taxon.” *Encyclopædia Britannica*, Encyclopædia Britannica, inc., [www.britannica.com/science/taxon](http://www.britannica.com/science/taxon). Accessed 10 Mar. 2024.

Regarding fish, there are 28 taxa. with specifically ten species of “Centrarchidae” (Sunfish), two species of Clupeidae (Shad), Four species of Cyprinidae (Shiner), One variation of Esocidae (Pike), six species of Ictaluridae (catfish), three species of Moronidae (Temperate Basses), as well as one species of Percidae (Perch) and one species of Poeciliidae (Livebearers) (N.C. Division... 2024, Fish Checklist pg.1)

Twenty-seven taxa of reptiles can be found at the lake, but not at all times of the year. There are specifically five species of Emydidae (Pond Turtles), one species of Kinosternidae (Mud Turtle), one species of Anolidae (Green Anole), two species of Scincidae (Ground Skink, Common Five-lined Skink) one variation of Viperidae (Viper), thirteen species of Colubridae (a family of Snakes), one species of Phrynosomatidae (Eastern Fence Lizard), one species of Teiidae (Eastern Six-lined Racerunner), and one species of Chelydridae (Eastern Snapping Turtle). (N.C. Division... 2024, Reptile Checklist pg.1).

Regarding Amphibians, there are 20 taxa, and there are specifically two species of Ambystomatidae (Spotted & Marbled Salamander), two variations of Plethodontidae (Atlantic Coast Slimy and White-spotted Slimy Salamander), one species of Salamandridae (Red-spotted (Eastern) Newt), eight species of Hylidae (Treefrog), one species of Microhylidae (Eastern Narrow-mouthed Toad) two species of Bufonidae (Eastern American and Fowler’s Toad), and four variations of Ranidae (American Bullfrog, Green, Pickerel, and Southern Leopard) (N.C. Division... 2024, Amphibian. Checklist pg.1).

When it comes to mammals, there are 26 taxa, notably three species of Canidae (Coyote, Common Gray Fox, Red Fox), Castoridae (American Beaver), one species of Cervidae (White-tailed Deer), one species of Didelphidae (Virginia Opossum), two species of Felidae (Feral House Cat, Bobcat), one species of Leporidae (Eastern Cottontail), one species of Molossidae (Mexican Free-tailed Bat), three species of Muridae (Muskrat, White-footed Mouse, Hispid Cotton Rat), one species of Mustelidae (Northern River Otter), one species of Procyonidae (Common Raccoon), four species of Sciuridae (Southern Flying Squirrel, Woodchuck, Eastern Gray Squirrel, Eastern Fox Squirrel). There are also one species of Soricidae (Southern Short-tailed Shrew), one species of Talpidae (Eastern Mole), and lastly, five species of Vespertilionidae (Big Brown Bat, Eastern Red Bat, Hoary Bat, Little Brown Myotis, Evening Bat) (N.C. Division... 2024, Mammal Checklist pg.1).

For birds, unlike the other types of creatures aforementioned, due to their mobility and unrestrained access to the world, and migration, the lake serves as both a permanent— and temporary, home. Many species of birds have been found at the lake, as the Corps' list makes clear that: “of the 473 species known from North Carolina, 316 have been recorded at the state park. Of these 92 species are known to nest within the park. 8 are suspected of nesting”. (N.C. Division... 2024, Birds Checklist, *Cover Page*). Furthermore, while the lake is home to a large, diverse offering of birds, what has most recently captured the attention of many is the recent developments of the eagles that call the lake home.

Jordan Lake is home to two species of eagles (Bald Eagle, Golden Eagle) and their relatives (Mississippi Kite, Northern Harrier, Sharp-shinned Hawk, Cooper's Hawk, Red-shouldered

Hawk, Broad-winged Hawk, Red-tailed Hawk, Rough-legged Hawk). (N.C. Division... 2024, Birds Checklist pg.3).

### ***3.2: Wildlife Recreation***

With the abundance of wildlife, and the large variety of species present, many choose to engage in various activities such as birdwatching, hunting, and fishing. Through these, mankind's interaction with nature, and reassertion of its role in both the food chain, and its presence in the environment is felt once more. The lake was built with recreation in mind as aforementioned, and in present times many enjoy what the lake has to offer in this aspect.

### ***3.3: Birdwatching***

Birdwatching is an activity that is quite popular at the lake—with hundreds of bird species to gaze upon, either through the naked eye or through binoculars, on foot or in a boat, the undertaking is simple, yet requires patience and is enjoyable to many. According to the National Audubon Society, there are “96 Important Bird Areas” (IBAs for short) in our state that they and their constituents have identified, and Jordan Lake happens to be one of them. In one article by the Society, Mary Alice Holley found New Hope Outlook to be of particular interest, as she urged strongly for “birders and nature nuts alike” to stop by it, and claimed that it “is a great place for a bird walk”. Furthermore, she had also noted how, for Double-crested Cormorants, there are only two known nesting sites for them, and Jordan Lake is one of them (Holley, 2014). In a separate article, Maria de Bruyn went looking for eagles, and took advantage of the eagle

platform there, made possible by the U.S. Army Corps of Engineers and the N.C. Wildlife Resources Commission, which was built back in 2012, and as of this writing is temporarily closed.<sup>19</sup> While she did not see any eagles, she gazed upon other birds, such as Prothonotary Warblers, and Carolina Chickadees (Bruyn, 2014).

### **3.4: *Hunting***

Hunting is an activity that is enjoyed here at the lake as well—however, it is well regulated. The Poe’s Ridge Permit Hunting Area Public Hunting Guide provides an overview of how hunting must be conducted. Additionally, the hunting program at the lake is “dynamic” and subject to change contingent on alterations in rules and regulations, both at the state and federal level. Furthermore, it is clarified that given how game animals are natural assets that belong to the state, the rules outlined by the North Carolina Wildlife Resources Commission “apply with regard to deer taken, manner of take, harvest reporting, season, hours, and licensing”. Also, only specific weapons for the taking of deer are allowed. With the exception of weaponry as made clear in the N.C. Wildlife Resources Commission’s Regulation Digest, which are archery equipment, black-powder weapons and shotguns—with certain sizes of buckshot being sanctioned, such as those beyond #2 shot, all other armaments or “manner of take are prohibited”. (Poe’s Ridge..., 2024, pg.ii,iii).

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<sup>19</sup> A google search shows that the observation platform is temporarily closed.

According to the N.C. Wildlife Commission’s 2022-2023 White-tailed Deer Harvest, there were 303 deer taken (N.C. Wild... 2023) What is interesting to also note, is that despite this number of deer, deer density has only increased, as in 2015 there were 15-29 white-tailed deer per square mile in Chatham County, compared to 2020 when this number went up to 31-40.<sup>20</sup>

### **3.5: *Fishing***

An activity that is essentially a given at the lake, fishing is of course, well enjoyed here.

According to the Corps of Engineers’ official website, there are “artificial structures that attract and concentrate fish” which are in place shoreside, (underwater) and within proximity of buoys that are marked. (Corps...2024). The N.C. Wildlife Commission, back in July of 2020, published a ten-year report on the Largemouth Bass fish. In it, they found that from 2006-2016, that not only does the lake provide a respectable amount of this type of fish, but in addition, the fish are significant in quality as “fish larger than 5 pounds are very common”. Furthermore, in that time frame, 5% of the fish surveyed, which is 130 fish out of the 2,595 total, were more than 20 inches long, and were heavier than 5 pounds. In addition, they found that the size of these fish was consistent “over the past 10+ years” (N.C. Wild...2020, An Overview...). They had also

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<sup>20</sup> See the 2020 density:

[https://www.ncwildlife.org/Portals/0/Hunting/Documents/Deer/2020\\_Deer\\_Density\\_Maps.pdf](https://www.ncwildlife.org/Portals/0/Hunting/Documents/Deer/2020_Deer_Density_Maps.pdf) compared to the 2015 density:

[https://www.google.com/search?client=safari&rls=en&q=2015+north+carolina+deer+density&ie=UTF-8&oe=UTF-](https://www.google.com/search?client=safari&rls=en&q=2015+north+carolina+deer+density&ie=UTF-8&oe=UTF-8)

noted how, in the 2008 chart, there was a peak in the length of the fish, as 15% of the fish “were 14-15 inches long”. They later found them in 2014 to have grown to 18-20 inches, and they “remained dominant” while simultaneously making up “almost a quarter of the 2014 captures (24.2%)” (N.C. Wild...2020, An Overview...). That said, the rules are that one may acquire at a daily maximum of five fish, but the fish size cannot be more than 2 inches over a foot. In the beginning of the study, the Commission noted how “The lake’s proximity to the Triangle, diverse fish community, and ample fish holding cover make it a popular destination for anglers”. Overall, this study proves that the lake has much to offer when it comes to fishing (N.C. Wild...2020, An Overview...).

### **3.6: *Eagles***

To understand the strong bond shared between the Lake and the Bald Eagle, the history of Bald Eagles, and its relative, the Golden Eagle, should first be considered. Coming back from the brink of extinction, the Bald Eagle’s survival is both a miracle, and a concentrated effort made by the U.S. government and later in teaming with local and state governments. The U.S. Fish and Wildlife Service provides an excellent, brief history on America’s bird, via their website. Back in 1782, when the eagle was first made into the nation’s national symbol, there could have been roughly one hundred thousand eagles, via anecdotal accounts. It was believed that the first significant depreciation of the eagle population came about in the 1800s, specifically in the middle to later part of it. This decrease of the eagle population also kept pace with the decrease in other species, such as other birds like waterfowl (U.S. Fish... 2024). Despite consuming mainly “fish and carrion”, eagles used to be seen as a serious threat to livestock, such as lambs or

chickens. As a result, they “were shot in an effort to eliminate a perceived threat” which in turn, combined “with the loss of nesting habitat, bald eagle populations declined” (U.S. Fish... 2024).

In the early 1940s, a serious issue began to acquire the attention it deserved...

### ***3.7: Efforts to Protect the Eagles, Dangers of DDT...***

The first of these protective efforts to help save the eagles was the federal 1940 “Bald Eagle Protection Act which prohibited killing, selling, or possessing the species. A 1962 amendment added the golden eagle, and the law became the Bald and Golden Eagle Protection Act” Despite the law and its amendment (unfortunately over twenty years later), the effects were not felt until much later. This was in part due to the chemical DDT—“hailed as a new pesticide to control mosquitoes and other insects”, which came about not long after the Second World War. (U.S. Fish... 2024). It had made its way “into nearby waterways, where aquatic plants and fish absorbed it”. By consuming fish that had been blighted by this chemical, the “bald eagles, in turn, were poisoned with DDT”. As a result, their reproductive capabilities were harmed, which also eliminated their capability “to produce strong eggshells”. Furthermore, “other pesticides related to DDT are suspected to have caused increased mortality”. All of this led to a potentially disastrous situation for the eagles, and by the early 1960s, with just a hair over 400 nesting pairs "of bald eagles known to exist, the species was in danger of extinction” (U.S. Fish... 2024).

### ***3.8: Endangered Species Act, Inspiration by Carson’s Silent Spring...***

Four years later, “In 1967 the Secretary of Interior listed bald eagles south of the 40<sup>th</sup> parallel under the Endangered Species Preservation Act. In 1972 as the dangers of DDT became known – in large part due to Rachel Carson’s book *Silent Spring* – the Environmental Protection Agency took the historic and, at the time, controversial step of banning the use of DDT and some related pesticides in the United States.” Later, “following enactment of the Endangered Species Act” The U.S. Fish and Wildlife Service “listed the species in 1978 as endangered throughout the lower 48 states”. As a result, this designation allowed for the U.S. Fish and Wildlife Service, alongside their allies, to “accelerate the pace of recovery through captive breeding programs, reintroduction efforts, law enforcement and nest site protection for the breeding season” (U.S. Fish... 2024).

### ***3.9: Jordan Lake’s Role in Saving/Protecting Eagles, 1993...***

Published in March of 1993, a K-3<sup>rd</sup> Grade activity book was made to educate young children, specifically to teach them about the food chain, predators in comparison to prey, conservation, etc. (Boswell, Stamm, 1993, pg. 1). But, in the context of eagles, and its relationship to the lake, as well as the rescuing of bald eagles from extinction, the most important aspect of this activity book arrives on its eighth page. In it, there is a clear acknowledgment of and status of, (as of 1993 anyway) how the eagles have taken to this lake. Specifically in this quote here: “Jordan Lake supports the largest summering population of the bald eagle in the eastern United States. The eagle, our national symbol for more than 200 years, used to soar over the nation by the tens of thousands. Now fewer than 5,000 survive, and this magnificent bird of prey is in danger of extinction. The number of eagles in the area has increased dramatically since the flooding of the

reservoir. Vast undisturbed areas provide many of the migrating eagle's basic living requirements, including an abundant supply of fish and a mature of forest for roosting".

(Boswell, Stamm, 1993, pg. 8).

### ***3.10: Bald Eagles at Jordan Lake after 1993...***

The aforementioned quote from the 1993 K-3<sup>rd</sup> grade activity book should be kept in mind when considering the rest of the bird's history. Two years later, in July 1995, the Service "announced that bald eagles in the lower 48 states had recovered to the point where those populations previously considered endangered could be reclassified to the less critical category of threatened". By 2007 the Service noted how there were roughly almost 10,000 nesting pairs of bald eagles in the U.S., which in the eyes of the service, constituted a significant comeback for the Bald Eagle population, so much so "that they no longer needed the protection of the Endangered Species Act" (U.S. Fish... 2024). Later, on June 28, 2007, the service "announced the recovery of our nation's symbol and removal from the list of threatened and endangered species". Two years after that, the bald eagle populations rose to "an estimated population of 72,434 individuals, including 30,548 breeding pairs, in 2009 in the lower 48 states". (U.S. Fish... 2024).

### ***3.11: In the Last Decade—2013...***

Acknowledgement of the lake's positive impact in saving the eagles is seen once more, in a 2013 article. According to Ranger Steve McMurray (who was interviewed for the article) that "the

park is the site of the largest concentration of bald eagles on the East Coast.” The birds are drawn here, McMurray says, because Jordan Lake’s more than 46,000 acres of water and surrounding woods provide plenty of food and room for them to nest high up in the pines, far away from human visitors”. Additionally, it is made clear in the article that from the early 1970s to the early 1980s, there was an absence of active nests. But, as a result of the legislation passed, and by way of establishing multi-purpose basins akin to Jordan Lake, the Bald Eagle was able to make a serious recovery. (Saintsing, 2013).

### ***3.12: In the Last Decade— 2018-2019...***

In a 2019 interview, a veterinarian “*Doc Ellen*” Tinsley, who became a photographer after “a serious vehicle accident”, which made her unable to continue working as a veterinarian, said that she believes “that through photography, she was able to use her vet skills while doing field studies of bald eagles”. Tinsley is a monitor, in which she and seven other monitors keep track of the “16 nests at Jordan Lake”, and are “sworn to secrecy about the location of the nests in order to help keep them safely protected”. One aspect of Tinsley’s job, is to observe the eagle pairs, and ensure their reproduction “is successful”, as well as ensuring that they are still residing in their nests (Mann, 2019). The reason for this being, aside from the lengthy amount of time that it takes to reproduce, which is roughly a decade after birth for successful offspring, is due to the fact that “half of all eaglets die in the first year”. And additionally, of the half that does survive, “only about 40 percent survive the second year”. As an example, in the words of Tinsley, “at Jordan Lake, if the 16 pairs produce two eggs, and if all those eggs hatch, by the first year

typically only 16 will be left. The next year, only about nine or 10 will survive”<sup>21</sup> (Mann, 2019). Another aspect of her job is to help ensure there are no disruptions to the eagle nests. She recounted two instances whereupon humans had disturbed eagle nests, whereupon in one instance “a man was observed walking under an eagle nest with a camera trying to capture a picture. The birds, disturbed that their personal space was violated, flew away from the nest”. In another occasion, “a second intrusion was discovered by a ranger. A man was found using a drone, flying devices that are banned at Jordan Lake. The man was flying his drone over an eagle nest in an attempt to photograph it and its residents” (Mann, 2019). Even in recent times, staunch laws ensure the protection of these birds, as “federal law mandates that humans must stay at least 660 feet away from a bald eagle and its nest. Violations can bring fines from \$5,000 to \$50,000 and even jail time”. (Mann, 2019).

### ***3.13: Eagle Population in 2018-2019, and More Recently...***

It was noted in that same article by Mann, that Jordan Lake is “home to one of the largest breeding population of bald eagles in the state” (Mann, 2019). According to the U.S. Fish and Wildlife Service, “estimates for the bald eagle population in the lower 48 states, based on data from 2018 to 2019, total 316,700 individuals, including 71,467 breeding pairs” (U.S. Fish... 2024). Consider the 2009 figure as aforementioned—of 72,434. And then consider 1993 figure of how there were “fewer than 5,000” during that time, and the lake’s status as having bolstered “the largest summering population of the bald eagle in the United States” (Boswell, Stamm,

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<sup>21</sup> The numerical means of writing “nine”, and then ten as “10” is per Casey Mann’s writing, not mine.

1993, pg. 8). This is not to argue that Jordan Lake *solely saved the eagles*, but it is to say, *that it may have played a major role*, even though so much of its survival was due to the banning of DDT.

### **3.14: In 2023**

The effort to protect the bald eagle continues today, as quite recently there have been renewed calls for the additional safeguarding of these birds. A recent predicament occurred in January 2023 whereupon there were calls to shut down a picnic area, specifically “Picnic Area A, Shelter 8 at Jordan Lake” (Wilson, 2023). The reason being, due to an eagle nest spotted there, and therefore between federal law and the possibility of losing eaglets the cost of not closing that area could be substantial. Dr. Tinsley, this time speaking to ABC 11, (this story covered by ABC 11’s Anthony Wilson) made clear that as a result of “too much attention from people who want pictures of the eagles” this had “frightened the birds, with dire consequences”, which ultimately caused the death of one out of two eaglets, that were occupying that nest (Wilson, 2023).

She also, in the same article, verbally sparred with “John S. Hammond, U.S. Fish and Wildlife Service Biologist” in which Tinsley had claimed that if he “had followed these monitoring guidelines...as he should have, he would have had to tell the park to close the gate to shelter 8, but he didn’t and now the park system is soliciting monitors to be trained by someone who is lacking any kind of bald eagle experience” (Wilson, 2023). Almost ten days later, in a separate article also by ABC 11, the two eagles that have made their nest in shelter 8 “have started

mating”. Overall, it is safe to say that the eagles at Jordan Lake, as well as the bald eagle in general, have a bright future (ABC11, 2023).



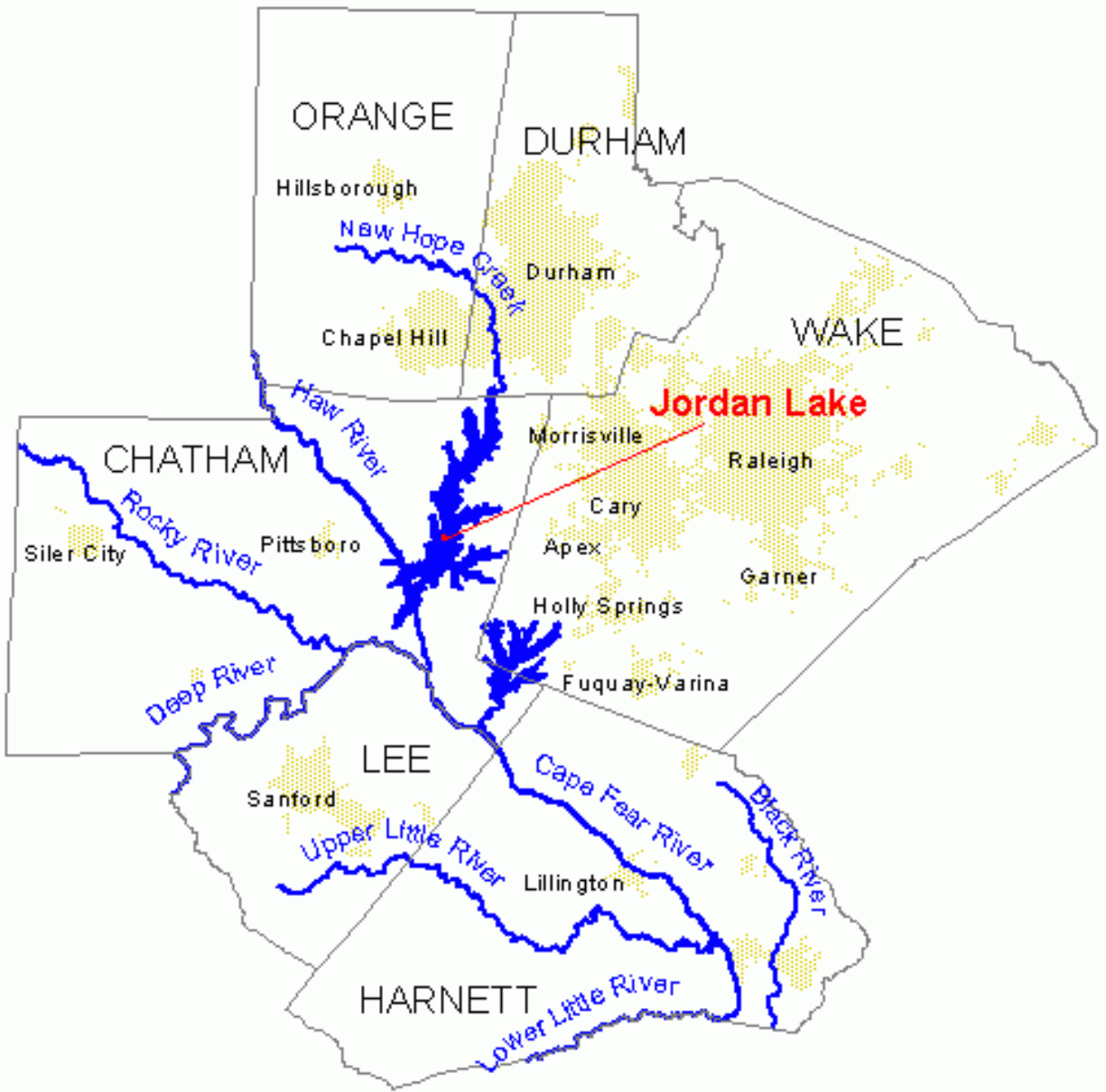
*Eagle, and eaglets in a nest— Image Courtesy of Hank Heusinkveld*

# *Chapter Four: Water Storage and Water Supply*

What is quite possibly the most critical aspect of the lake is its ability to *manage, manipulate and provide, water in a sustainable, positive way that best serves its neighboring communities*. There are several layers to the management of water at Jordan Lake, each requiring a proper dissection to best understand this crucial element of the lake. Utilizing a blend of information from The N.C. Department of Environmental Quality, as well as an information provided from Blake Johnson— an Interpretive & Outreach Ranger for the U.S. Army Corps of Engineers, from his interview with Regency Park Partnership, we can best understand how this lake operates today.

#### ***4.1: Where the Water Comes From/Water Level Control...***

As per the N.C. Dept. of Environmental Quality, the water for Jordan Lake comes from mainly the New Hope and Haw rivers. The dam itself is found on the Haw River, downstream where the two rivers meet, “with most of the Lake’s storage in the New Hope Basin” (N.C. D.E.Q., 2024). They also provided a figure for the sake of clarity:



*Jordan Lake and Surrounding Counties—Figure and Description Courtesy of the N.C.*

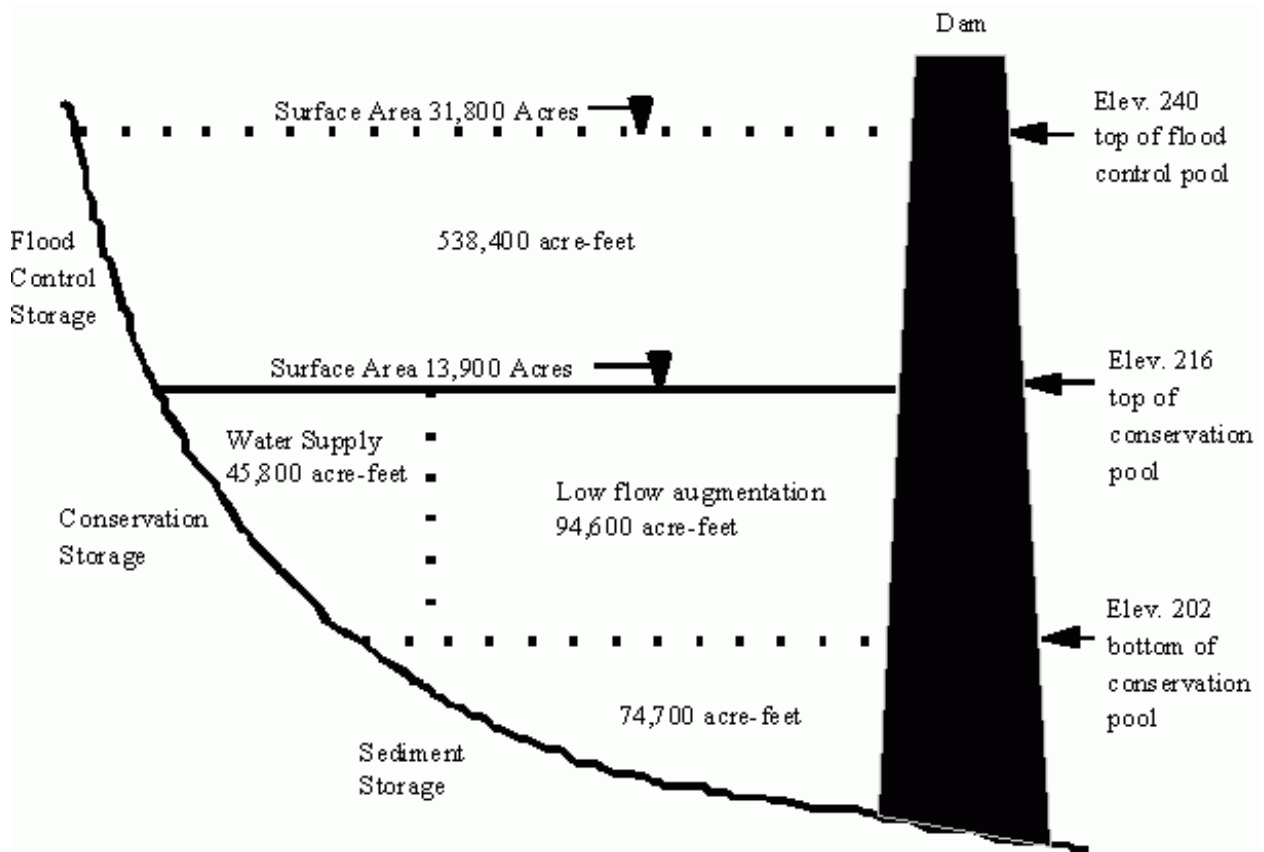
*Department of Environmental Quality*

According to Blake Johnson, the Corps of Engineers directs “the discharge of waters leaving the dam by utilizing a series of gates, which open and close allowing more and less water out accordingly” (Johnson, 2024). Johnson also made clear there exists both a “normal or goal lake level” which is 216ft mean sea level (msl) while the maximum level is 240ft (msl). Should the levels reach the maximum, a spillway routes the excess water around the dam and into the river below. Johnson also said that there is also a minimum discharge in place, of roughly 200 cubic feet per second. This however, can change in instances of significant dry spells. In such circumstances, the aforementioned “minimum level of discharge must be maintained in order to support the minimum river level downstream that companies and towns need to support their daily activities” (Johnson, 2024). In this case, the lake’s water levels will be decreased. Johnson also claims that “the balance of maintaining a satisfactory river level downstream and a sufficient lake level above the dam in order for the towns that rely on lake water can get the water they need is an important goal of water management” (Johnson, 2024).

## ***4.2: Operation and Storage...***

The N.C. Department of Environmental Quality further describes the functionality of the lake. Regarding the storage for the lake, its storage volume is divided vertically into several “pools” which are keyed to lake level elevations. Specifically, there is a “flood pool,” which provides for flood control storage; a conservation pool, which provides for water supply and low flow augmentation; and a “sediment pool,” which provides for the accumulation of sediment. They also make clear that “usable water in the lake at its normal elevation amounts to a total volume of

approximately 140,400 acre-feet and is referred to as the conservation storage. Approximately 45,800 acre-feet in conservation storage, or about 15 billion gallons, is designated to provide water supply. This amount of storage is estimated to be able to furnish approximately 100 million gallons per day (MGD) during most of the severest droughts”. (N.C. D.E.Q., 2024) The figure below shows the various types of pools:



*Image courtesy of N.C. Department of Environmental Quality*

### ***4.3: Anticipation of Severe Weather, Water Level Control Continued...***

***(Blake Johnson)***

Johnson (2024) made clear that the Corps of Engineers tries its best to prepare for intense “special weather events (such as hurricanes)”. While they keep track of forecasts, they also take into account of, and hold in equal importance of, “actual conditions as well”. As an example, the Corps of Engineers adjusted water levels for Hurricane Dorian (which took place in 2019), as forecasts designated the Wilmington area to be receiving a heavy amount of precipitation. In response to that, the Corps ensured that any releases were kept to a minimum, so as to not add onto any further flooding downstream. Johnson recalls that “the lake was at our normal, desired pool stage at that time so we were equipped to hold on to extra waters, preventing them from reaching downstream, if we received plenty of rainfall upstream as well”. And while at times severe instances of precipitation may be forecasted in which prompt others to ask the Corps if they “are draining the lake”, the Corps does not always drain the lake due to the 200-mile journey that waters exiting the dam have, prior to arriving at the ocean waters. Johnson makes clear that lowering the lake waters upon observing projections, “additional waters would be making their way downstream just as those areas are expected to be hit with the hurricane, compounding potential flooding”. (Johnson, 2024)

***4.4: Current Conversations: Jon Bannerman, U.S. Army Corps of Engineers, Feb. 16, 2024***

I recently spoke with Jon Bannerman who is a Natural Resources Specialist with the Corps of Engineers, to acquire some current commentary and clarity regarding the Lake. In the beginning of our conversation, he made clear to me that, from his time here at the lake that it is being influenced a lot from outside influences such as development, and general population centers expanding, such as neighboring towns. He made clear that it is to be seen as for will come of it. From the visitors center to the Poe's Ridge Boat Ramp, is essentially the area managed by the Corps, with the rest of the land being managed by other entities, such as N.C. Wildlife Commission, N.C. Division of Parks Recreation, etc.

*How many times has it held back floods regularly?*

In response to this question, he had made clear that the lake is "pretty consistent" with how often it holds back such floods, and that anytime a hurricane comes through, the lake has dealt with it. It does not always have to be a hurricane for a potential flood to occur, at times all it takes is a bad storm, and these can cause even higher inflows. He recalled a time in January 2021, or 2020, when the lakes waters reached 15-16 feet above normal water level, with the highest ever being 233 feet above mean sea level, but that was back in the 1990's. Beyond that one-off instance in the 1990's, he made clear that there have been exactly *zero* times, that the lake has ever reached maximum capacity. This maximum is specifically 240 ft msl, 245 billion gallons of water. Communication is made by the aforementioned authorities as outlined by Blake Johnson's interview, but also with the N.C. Wildlife Service Commission, as well as town officials. These communications are all then coordinated with hydrologic engineers to determine when to release the waters, flow targets to aim for, etc. (Bannerman, 2024, Personal Communication).

#### ***4.5: Allocation of water supply...***

Regarding the allocation of water supply, the State of North Carolina holds control over “the entire water supply storage in Jordan Lake” (N.C. D.E.Q., 2024). Furthermore, Under G.S. 143-354(a)(11) the state “can assign this storage to local government having a need for water supply storage”. Additionally, there are specific procedures for allocating the Jordan Lake water supply storage via The North Carolina Administrative Code (15A NCAC 2G.0500). There are two levels for distribution of the supply. The first is Level I, in which “allocations are made based on 20-year water need projections *and* when withdrawals are planned to begin within five years of receiving the allocation. Level II allocations are made based on longer term needs of up to 30 years” (N.C. D.E.Q., 2024). Despite the lake’s creation in 1982, the first distributions of water supply from Jordan Lake came about in 1988. In that year, “42 percent of the water supply pool was allocated; however, some original allocation holders have since released their allocations. Currently 44 percent of the water supply pool is allocated” (N.C. D.E.Q., 2024). The N.C. Dept. of Environmental Quality stated that the percentages being allocated are not indicative of withdrawals, but rather are “of the water supply pool”. And that “allocations are frequently expressed in MGD, since 100 percent of water supply storage has an estimated safe yield of 100 MGD”. Furthermore, “existing rules limit water supply allocations that will result in diversions out of the Lake’s watershed to 50 percent of the 100 MGD total water supply yield. The EMC may review and revise this limit based on experience in managing the Lake and on the effects of changes in the Lake’s watershed that affect its yield. Currently, 28 MGD of the 100 MGD yield

is approved to be diverted out of the Lake’s watershed”. It should be noted that 100 MGD is its maximum (N.C. D.E.Q., 2024)

There are multiple municipalities that withdraw from the lake, but at two different levels. Currently, the towns of Cary and Apex receive the lion’s share of the water, at level I, 32 MGD (N.C. D.E.Q., 2024). Coming in at second place is the City of Durham, at level I, 10 MGD. Chatham County itself is third at level I, 6 MGD. Orange Water & Sewer Authority is at level I, 5 MGD. The Town of Morrisville meanwhile, receives 3.5 MGD. The only two users that receive water supply at level II, are the Town of Holly Springs, (2 MGD) and Orange County (1 MGD) (i.e., based on a 30-year population projection) (N.C. D.E.Q., 2024).

Johnson (2024) also described how the various municipalities that acquire water from the lake may communicate with the Corps via calling or emailing “with their total withdrawals daily” Most of the water they withdraw is used as municipal water supply and later treated and discharged or returned into the river below the dam. He also claims that roughly “more than 300,000 people get their water from the lake every day”. The average inflow into the lake is about 450,000 gallons of water per minute and that local towns and counties draw about 40 million gallons of water from the lake, daily. “In the summer months, there is significant evaporation of water from the lake and Johnson estimates “we lose more depth from the lake due to evaporation than our discharges” (Johnson, 2024).

A critical component of water management is communication, and Johnson acknowledges the role that the Corps, and others play in that. He said that there is “a weekly phone conference between the Corps and various stakeholders surrounding the lake as well as upstream and

downstream of the lake” (Johnson 2024). The district he works for, the Wilmington District, comprises most of NC and a small part of VA as well, and five Corps lakes. Conference calls “focus on lake operations – what current lake levels are, plans to increase or decrease releases, etc.”. And, “The National Weather Service (NWS) usually participates in these conference calls to provide weather updates. In critical situations such as severe storms causing heavy rains and flooding (real or potential) there may be phone conferences 2-3 times per week” (Regency Park, Johnson, 2024).

#### ***4.6: Stream Gauge Data***

Johnson also said that, “sensors in different parts of the lake” are not in fact, how the water level is measured. Rather, the Corps chooses to “rely heavily on stream gauge data” to discern “how waters are moving through the Jordan Lake watershed” prior to entering “the lake and also downstream from the dam and into the Cape Fear watershed”. This data originates “from the USGS which maintains gauges in many streams and rivers across the US” The other source they utilize “is the Southeast River Forecast Center (RFC) through the National Weather Service. The Southeast RFC compiles information obtained through USGS and presents prediction models, flood status, and historical data for specific points” (Johnson, 2024).

#### ***4.7: Cape Fear River Water Supply***

It is important to understand the relationship shared between Jordan Lake and the Cape Fear River Basin. The Dept. of Environmental Quality describes on its website the intricate details

surrounding the basin, and its relationship to the lake. Their plan associated with this basin was compiled in September of 2001, by the Environmental Management Commission's (EMC) Water Allocation Committee. The objective of this Cape Fear River Basin plan was to "give the EMC a review of long-range, basinwide water supply issues before making Jordan Lake water supply allocations" (Johnson, 2024).

#### ***4.8: Water Quality Challenges and Concerns—Commentary from Nora Deamer, Harold Brady, N.C. D.E.Q., Feb. 9, 2024***

I reached out to the Dept. of Environmental Quality over email, to see what they had to say regarding the water quality at the lake. When asked about what current challenges they faced, Nora Deamer, a Basin Planner, replied and had said that "there are major water quality concerns and many challenges around address those concerns". She then pointed to a Feb. 22 meeting that will review the rules surrounding nutrient management strategies, and reassess them. The establishment of new rules, according to the website, will occur at the end of 2024, specifically in November. When asked about whether storms may affect the nutrient quality of the lake, Deamer replied in saying that the stormwater "has a very large impact on nutrient loading to the lake". And additionally, "there are some stormwater controls, but these are not sufficient to protect stormwater runoff from reaching streams and rivers that feed Jordan Lake". She then pointed to how the original version of new rules that were "included in the initial set of nutrient management rules were never allowed to go into effect. The legislature put them on hold until additional work was done." And, as a result, they provided funding to the N.C. Collaboratory to

provide further analysis, made possible by UNC-Chapel Hill, NC-State, and UNC-Charlotte. This report was done back in 2019. (Deamer, Brady, 2024, Email Communication).

#### *Two UNC Collaboratory Stories, 2020*

A year after the 2019 report, two stories were published by the Collaboratory, that helped to capture the work they engaged in there, and to bring attention to some of the issues the Lake faces. Unpacking these stories helps to understand the work being done to safeguard the lake.

#### **4.9: *Algae Issues, Land Conservation, Stakeholders, 2020***

Authored by Mary Claire McCarthy, the first of these stories centered around how forests are actually imperative to water quality at Jordan Lake, and how protecting them ultimately protects the drinking water supply. For starters, she describes different aspects of the water supply as well, such as the fact that the drinking water provided by the lake accommodates 700,000 people in the triangle each year. (McCarthy, 2020) Additionally, due to the challenges provided by the recent urban buildup, one issue that is cause for water quality concern is the fact that 88,000 acres of the watershed, or about 8% of all the unprotected land, is secure. Meanwhile, the rest of the unprotected land that fosters agriculture, woodlands, and marsh equates to around 70%. Meanwhile, “developed land increased by almost 13% in the watershed” in the years “2011 to 2016” as originally sourced from the National Land Cover Database (McCarthy, 2020).

#### **4.10: *Algal Issues***

Aside from being the reason for why it gives the lake its coloring, (McCarthy, 2020) the growth of algae is significant issue that affects the lake. Born from pollutants, and “water and sediment in the reservoir” that was over-enriched, via “nitrogen and phosphorus”, algae blooms swiftly overwhelm vegetation deemed imperative, and waterborne creatures as well. Strongly indicative of eutrophication, specific pollution that contributes to this problem stems from effluents and runoff from stormwater, as well as the use of fertilizers in agriculture, which winds up in the water. As originally sourced from the Environmental Protection Agency, aside from the economic and environmental damage such blooms can cause, they can cause illness and even death in humans and animals. Furthermore, they bring strain to “industries that depend on clean water”, negatively impact the aroma and flavor of consumable water, and cause a rise in the price needed to treat water. (McCarthy, 2020)

#### ***4.11: Pollution, Rain-Events, Clean Jordan Lake, 2020***

A non-profit, Clean Jordan Lake, has crusaded against the pollution. The organization has found almost half a million pounds of trash in the lake (340,000 to be exact) as of 2020—a decade after its founding<sup>22</sup>. Some of that trash comprised of the nearly 5,000 tires (4,727) that were found there as well “since 2008” (McCarthy, 2020).

Trash makes its way to the lake after water goes into and out of municipalities and agricultural lands. But, according to Francis DiGiano, who is a co-founder of Clean Jordan Lake and is also

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<sup>22</sup> In the article, the original quote is: Since its founding, volunteers have hauled out more than 170 tons of trash from 20 miles of shoreline. A Ton is equal to 2,000 pounds.” 2,000 multiplied by 170 = 340,000.

Professor Emeritus in the Department of Environmental Sciences and Engineering at UNC Chapel Hill, “80% of the poundage of trash, and that doesn’t include the tires that are removed, comes from the greater watershed” (McCarthy, 2020). And, while recreational trash is a problem at the Lake, it is not the main origin point for it, as it accounts for “a tiny fraction of it” in DiGiano’s words. However, because the State Park’s ownership equates to “less than 30% of the lake’s shoreline” that means that same amount of land withholds restrooms and waste receptacles. (McCarthy, 2020).

#### ***4.12: Stormwater, Development and Flooding to Blame***

The naturally occurring, regular malfeasants for this issue McCarthy says, stems from “land development and high rainfall events”. And, when coupled with how “highly urbanized” The New Hope River watershed is, and the 720,000 people that reside in the New Hope and Haw River watersheds, many people affect, and are affected by, this issue. (McCarthy, 2020).

The developed land McCarthy notes, can act “as speedways for water”, as the water is unhindered by the structures and pavement. Meanwhile, undeveloped land will soak up water into the ground, which will in turn “slow down the speed and intensity of stormwater”. Such stormwater and flooding can send pollution “hundreds of feet into the woods, well above the shoreline” where it remains there after “the water levels return to pre-storm levels” such trash of which, was found by Clean Jordan Lake. As an example McCarthy provided, utilizing records that Clean Jordan Lake maintains on their website, she noted how, back in March 2009, as little as “less than 2 inches of rain caused the water level at Jordan Lake to increase by 3 feet”. She

also noted how the length of time and strength of a storm will have an impact on the quantity of pollution that ends up in the lake (McCarthy, 2020).



*Image Courtesy of Clean Jordan Lake and the UNC Jordan Lake Study Report, 2020*

#### ***4.13: The Role of Climate and its Impact on Jordan Lake***

While stormwater and pollution already produce a harsh impact on the lake, the frequency of storms McCarthy notes, is bound to increase. First noting how, as per the N.C. Climate Science Report, which came out back in March 2020, “that heavy rain is becoming the ‘new normal’”

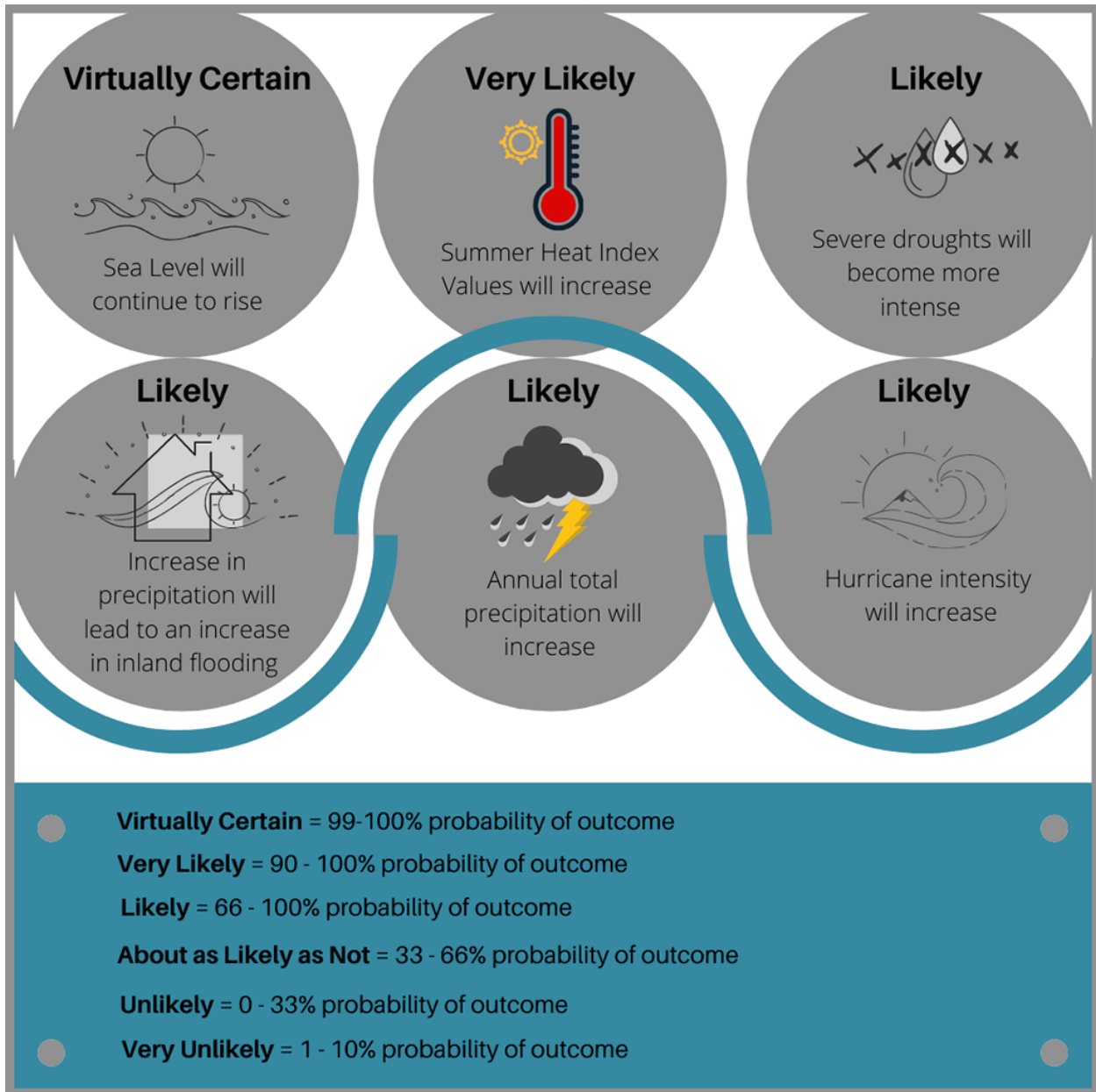
(McCarthy, 2020).<sup>23</sup> And, in addition, that the Carolinas have been hit with some of the most severe floods in the last (as of McCarthy’s writing, in 2020) four years, “since Hurricane Matthew in 2016”, and specifically several of the most powerful hurricanes “in decades”, as well as “two 500-year floods” and “a 1000-year flood” (McCarthy, 2020). McCarthy also noted how, via a study that reviewed over a century of weather data, conducted by Dr. Hans Paerl from UNC Chapel Hill along with other researchers, and with most data originally sourced from NOAA, found that of “the seven wettest storm datasets” they reviewed, six of them had taken place in the last two decades (McCarthy, 2020).<sup>24</sup>

Much of this is to blame on the warming of our planet, made possible by carbon dioxide, McCarthy notes, as once more originally sourced from the N.C. Climate Science Report pointing out how the increased temperature in the seas brings forth significant humidity, which leads to the ripple effect of far more severe storms, heightened sea levels, and more intense droughts and so on. Furthermore, regarding the likelihood of such effects, many of them were designated as, at the very least, “likely” which entails a “66-100% probability of outcome” (McCarthy, 2020). The chart below displays what is in store for our state, and Jordan Lake.

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<sup>23</sup> See the N.C. Climate Science Report McCarthy refers to here: <https://ncics.org/programs/nccsr/>

<sup>24</sup> McCarthy specifically refers to this study: <https://www.nature.com/articles/s41598-019-46928-9>



*Courtesy of Mary Claire McCarthy, UNC Collaboratory, Sept. 3, 2020*

#### **4.14: A Recent Drought, 2023**

As mentioned earlier because of global climate change, droughts will be more likely to occur in the future. But even recently we can see its effects, such as a drought that occurred in November

of 2023 that brought Jordan Lake’s water levels down to what was described as “unusual” (Leah, 2023). This allowed those working at and visiting the Lake to gaze upon the old, previously submerged farm houses and even an old stretch of road, along with other relics and train tracks. (Leah, 2023). Prior to the drought, one would only find such ruins if they were to scuba-dive into the water. But during this drought, one could walk out onto the lake in parts that would be typically covered in water and only navigable via boating, and go up to the remains and inspect them, undisrupted by the water. (Leah, 2023).



*Courtesy of Heather Leah, WRAL News, November 13 2023*



*(Above) House foundations revealed due to the drought— Courtesy of Heather Leah, (Below) A relic found near the foundations—Originally from Katherine Loflin, WRAL News, November 13,*

2023

#### **4.15: *Water Policies***

Whether or not some, all, or none of the recommendations seen in the report are to be utilized, remains to be seen. However, it is worth noting that this report could influence the changes in water management at the lake, and would institute significant change if applied. The first of these recommendations advised the use of a water quality fee. With this new fee, municipalities that draw water from Jordan Lake would be charged this fee (which, would probably cause a ripple effect into an increase in taxes) and revenue acquired from this would be dedicated solely for protecting water quality. This could come in the form of nutrient management, or other projects that focus on managing storm water, land, or “septic tank programs” (UNC Jordan Lake Study, 2019, pg. 9). The report also suggests that the Clean Water Management Trust Fund program could preside over the handling of the revenue generated, with a partial amount allocated for specifically “projects in the Jordan Lake watershed” (UNC Jordan Lake Study, 2019 pg. 9). The report also stressed the need for a consistent focus “for cost effectiveness” and to be mindful with how much capital is invested, not just in “counting pounds of nutrients”. Furthermore, they encouraged the use of continued leadership, and joint efforts made by local governments and organizations, pointing to the Jordan Lake One Water Association, and The Upper Neuse River Basin Association as examples. (UNC Jordan Lake Study, 2019, pg. 9-10).

They also advised that the current standards for water quality in N.C. be “reevaluated” and for the Dept. of Environmental Quality to both stimulate and partake in discourse that would bring forth “new standards with an emphasis on the standards being site-specific and seasonal”. (UNC Jordan Lake Study, 2019, pg.10). In addition, they also called for reform in regard to how storm

and waste water is managed, noting how controls in place for such water has to be accompanied with hygienic “infrastructure upgrades” and consistent service. Lastly, they also encouraged the “conservation of land throughout watersheds with easements and development limits”, flexibility in consideration of “nutrient management and criteria development”, the revamping of “sanitary sewer infrastructure”, as well as the role septic systems withhold “as a source of nutrients”. (UNC Jordan Lake Study, 2019, pg.10).

#### ***4.16: Safeguarding Land as a Solution***

To protect the water from further damage, the defense of “upstream land, streams and rocks” via conservation is ideal. Downward bound water serves as a means of transporting pollution, which brings about the aforementioned harm. But, “forests, wetlands and open fields slow down the water through the soil, trapping pollutants and sediment. Pollution is then kept in the soil instead of flowing into the lakes or reservoirs that are used as drinking water supplies” (McCarthy, 2020). Safeguarding such land will entail strong protection for the water, and is both “inexpensive and effective” (McCarthy, 2020).

#### ***4.17: Efforts by Stakeholders—Jordan Lake One Water***

While there are multiple organizations all working to protect the lake, an organization McCarthy noted in this story specifically is the Jordan Lake One Water Initiative. In short, this organization works with “a diverse set of stakeholders” in an effort “to develop policy, operational and financial recommendations to address the regulatory concerns of the Clean Water Act”, utilizing

a unique strategy that they refer to as “a ‘One Water’ framework”, so as to pursue and achieve “economic, environmental and social” goals (McCarthy, 2020). According to the organization’s website, they are “a partnership of local governments, organizations, businesses and individuals” who are working together “to develop alternative approaches to business-as-usual water management”. (Jordan Lake One Water, 2024).

### *A Plan to Protect Land*

McCarthy made clear that the Jordan Lake One Water Initiative partnered with Triangle Land Conservancy, “an accredited land trust”, (Triangle Land Conservancy, 2024) to develop a strategy that was “modeled after the successful Upper Neuse Clean Water Initiative”. With this, they seek to pin-point land ideal for conservation, with “a goal of protecting 35,000 acres over the next 35 years”, which equates to 5% of viable land “within the watershed” (McCarthy, 2020).

# *Chapter Five: Recreation*

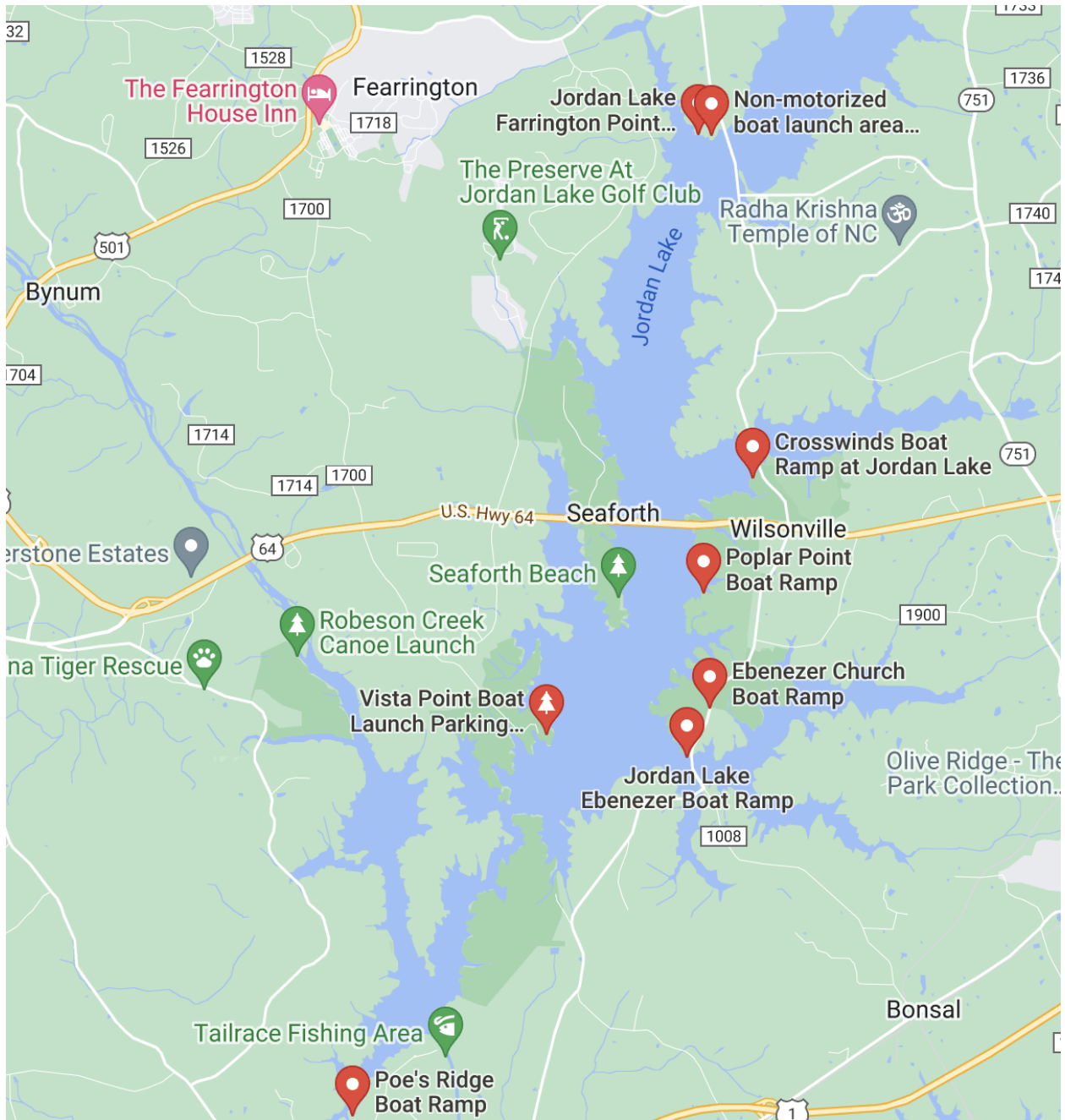
Beyond its water management capabilities, and fostering a diverse trove of wildlife species, one of the hallmarks of this lake is how it motivates people to get outdoors. One may gaze upon the vast lake, and only see its water, and the trees that surround it, perhaps a boat or two—however, there is a much larger story at play. Home to a variety of activities, its recreational capabilities help to anchor the lake’s definition of a *multi-purpose reservoir*.

### ***5.1: Sailing, Swimming, Paddling, Boating (Aquatics)***

Jordan Lake serves as an excellent asset for those looking to engage in aquatic hobbies and ventures. Sailing is quite popular at this lake, with both Carolina Sailing Club, and Carolina Sailing Foundation choosing to call this lake, and (in the instance of the club) Kerr Lake, their primary residencies. The foundation maintains their own boats, whereas with the club you will need to bring your own boat. They both offer youth and adult sailing lessons, although the club is more racing oriented, as they organize and host races (Carolina Sailing Club, 2024) and (Carolina Sailing Foundation, 2023). Non-club boating is also quite popular here, as many may choose to rent a boat from the only marina at Jordan Lake, Crosswinds Boating Center. The center offers several different types of vessels to rent, such as paddle boards, fishing boats, and pontoons (Crosswinds Boating, 2024). Additionally, a franchise of Freedom Boat Club shares this marina, offering ten different boats to choose from, should one choose to sign up. (Freedom Boat Club, 2024).

Tours, conducted via boats and paddling, are also attractive aquatic affairs. Guided tours, such as those provided by *Jordan Lake Journeys*, have the objective of seeing wildlife. Others such as

*Jordan Lake Day* will offer such tours, but will also offer other, non-guided endeavors. For example, *Journeys* has a specific tour for birdwatching, and so too does *Day*, but in the instance of *Day*, other offerings are available, such as wedding proposals, alcohol consumption (such as wine) on the water, or tubing, etc. (Jordan Lake Day, 2024) and (Jordan Lake Journeys, 2024). For paddling, companies such as Frog Hollow Outdoors will provide paddling guided tours (canoe, stand-up paddle boarding (SUP for short), etc.), classes for those who wish to learn how to paddle (kayak, SUP, etc.) as well as camp programs for children. (Frog Hollow Outdoors, 2024). Such sailing, paddling, and boating activities are made possible via the numerous boat ramps throughout the lake, which are found at various access areas, and at the marina. To launch a boat, it will cost a fee—\$5 per vehicle per day for Poe’s Ridge Boat Ramp, as it is a U.S. Fee Area and is managed by the Corps, or by use of an \$80 America the Beautiful Pass, (National Park Service, 2024) or by use of a \$40 Corps Pass (U.S. Army...2024) and, for the part of the park owned by the State, \$7 per vehicle per day, with exceptions made for service members (active or ret.) and seniors, who are charged \$5 per day instead, or \$20 per day for a bus, or by way of a \$60 Seasonal Parking Pass (N.C. Parks... 2024). Boats can also be stored at the marina, although as of this writing they are sold out (Crosswinds Boating...2024).



*Jordan Lake Boat Ramp Locations, Courtesy of Google Maps, 2024.*

### *The Untucked—A Tiny Houseboat*

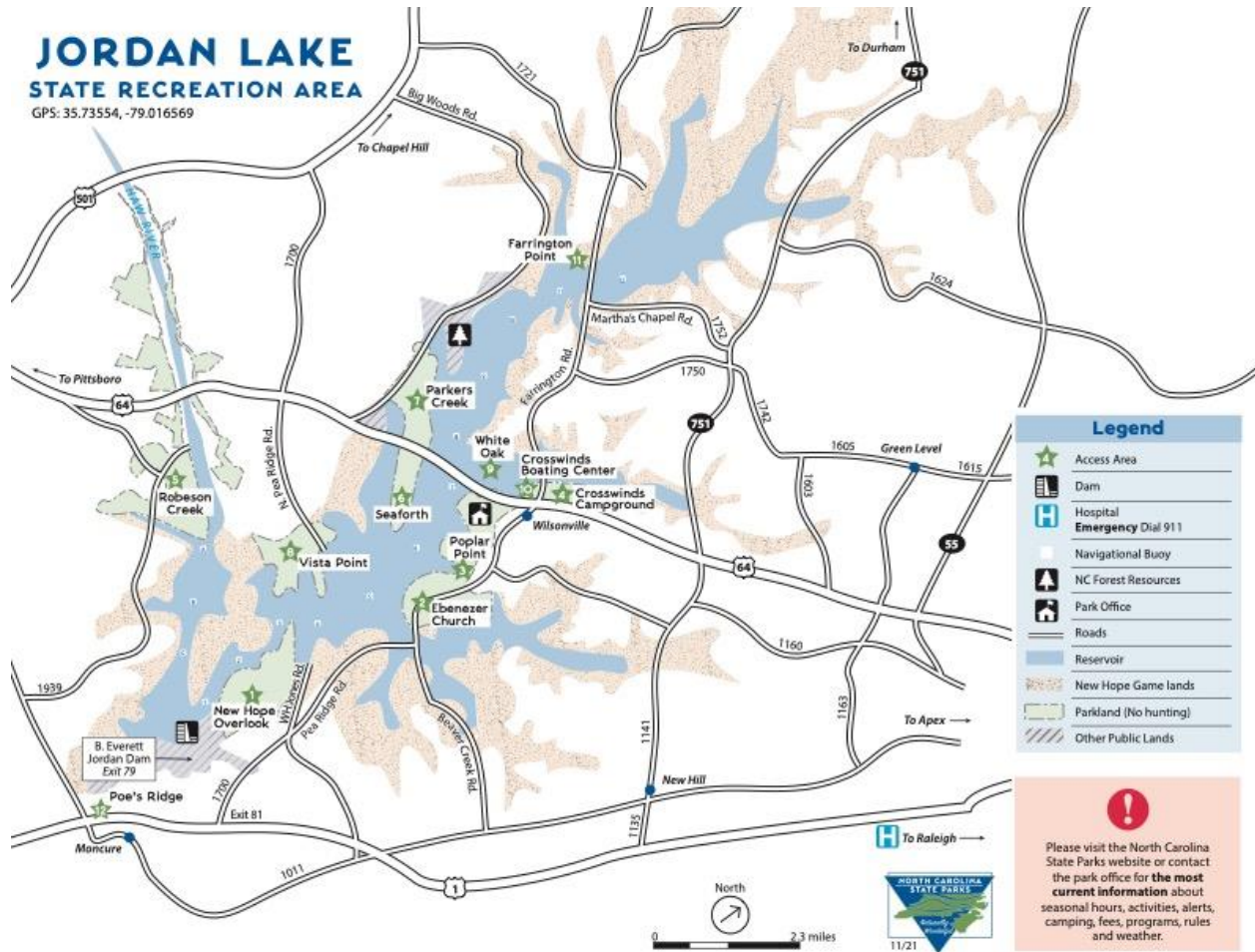
In 2017 television report described how a couple, Gretchen and Darren Eck, who are both local to the lake, decided to create a tiny house boat out of a pontoon boat. Named *Untucked*, the vessel took roughly a year to complete, and “can hold up to six adults and sleeps two on a pullout, queen-sized bed”. With a top speed of just less than twenty miles per hour, operating predominantly with solar power, and coming in at “128 feet squared”, (total size of the vessel) it was originally made purely for leisure. Later, the houseboat was available to be booked on Airbnb. As of this writing, it appears that the houseboat is no longer for rent, and it is unknown if they had to pay to keep the boat in the lake. The Ecks demonstrated the versatility of the lake—taking full advantage of both camping at the lake, and boating on it, essentially at the same time, on a budget (ABC11, 2017).



*“Untucked” the tiny houseboat. Courtesy of Gretchen Eck, ABC 11 News, 2017.*

## 5.2: Camping, Picnicking, Hiking

Managed by N.C. State Parks, there are four different types of camping available at the lake, each with different sites designated specific for that type. The types are: Tent, Trailer, and RV, Backpack, Group, and Group RV Camping. While not all sites are open year-round, numerically, there are 1628 Tent Trailer and RV camp sites, not including walk-up campsites. There are also 24 backpack campsites, 11 group campsites, and 50 group RV campsites. There are also 12 different access areas as well (N.C. State Parks, 2024).



*Park Map Depicting Access Areas, Courtesy of N.C. Division of Parks & Recreation.*

Regarding picnicking, while there are different choices for picnicking, it is made clear on the park website that “Ebenezer Church, Parkers Creek, Seaforth and Vista Point offer picturesque spots for picnicking”. And while all of these points have their own beach, volleyball court, picnic shelter, horseshoe pits and boat ramp, Vista Point is the only one that does not have a playground. The picnic shelters themselves can be reserved, but for gatherings that require a higher capacity, White Oak is more ideal. Additionally, “a large picnic shelter has 60 tables”, and shelters in general are first-come, first-served, unless reserved. (Jordan Lake Activity Fact Sheet, 2024). Furthermore, to reserve a campsite, the fee can vary. A primitive backpack campsite is \$15, a campsite with trailer, tent, and RV non-electric with no hookups will run \$26. An RV campsite with electric and water hookups will cost \$33, and a duplex non-electric with no hookups will cost \$51. The most expensive campsites (Duplex RV campsite with electric hookup, and 35 people max capacity group tent site) will cost \$65 (N.C. State Parks...2024).

The lake also offers those looking to move around with some trails to conquer. While every single campground comes with its own trail exclusive to campers, the longest of these trails can be found at New Hope Overlook, and it is 5.4 miles. With the exception of New Hope Trails, which are rated moderate in difficulty, “all trails are rated easy in difficulty”, and there are 15 miles in total (Jordan Lake Activity...2024).

### ***5.3: Stargazing, Morehead Planetarium, Dark Sky Designation***

The lake’s dark, mostly unpolluted skies allow for a near unobstructed view of the stars at night. Several astronomy clubs, specifically Raleigh Astronomy Club, Morehead Planetarium, and Chapel Hill Astronomical and Observational Society (CHAOS for short), utilize Jordan Lake for

stargazing (NASA Jet...2016), and (Raleigh Astro...2024). Frog Hollow Outdoors also acknowledges this, and offers stargazing tours (Frog Hollow Outdoors, 2024). And, in addition, in the words of Amy Sayle, an educator at the Morehead Planetarium, she had noted how “what’s great about Jordan Lake is it’s the real deal. No, it’s not perfect. No, I can’t control it, but I can show people how to make friends with half of their field of view” (Bieltz, Gardiner, 2016). In an article written by a fundraising campaign for UNC Chapel Hill, it was noted how “In August literally thousands of people have been known to gather at Jordan lake to view the annual Perseid meteor shower” (UNC Chapel Hill, 2017).

The lake is a popular destination for engagement photos. In 2021, one couple decided to make the lake their destination for photos taken at night. When asked why, they responded with: “Jordan Lake is a mainstay in the local astronomy community and provides good views of the heavens” (Shay, 2021). As of this writing, they appear to be the only couple to have had their engagement photos taken at the lake, at night.



*Brian and Christina at Jordan Lake. Courtesy of Dave Shay Photography, 2021.*

# *Chapter Six: Costs and Benefits*

The final aspect of the lake to consider is its costs and benefits. Utilizing conversations I've had recently with the U.S. Army Corps of Engineers, and emails with the N.C. Division of Parks & Recreation, (part of the N.C. Dept. of Natural and Cultural Resources) we can see in a fiscal sense, what this lake looks like today, and when compared to, the past.

### ***6.1: 1971 Costs and Projected Benefits***

As per Volume III of the 1971 report, the Corps of Engineers had summarized the projected costs and benefits of the Lake. The total, "ultimate" cost was \$44,500,000, (Final...Vol.III, 1971, pg.377) which, in current (inflation adjusted dollars) would equate to \$346,102,932.33 (Bureau of Labor Statistics, 2024). The Corps of Engineers had calculated, in its 1971 Final Environmental Statement that assuming a century long project life, and a 3.125 percent interest rate, "a benefit-cost ratio of 1.9 to 1.0" (Final...Vol. I, 1971, pg. 12). Although there are exceptions, such as equity goals, in general Corps projects must attain a 1.1 to 1.0 benefit-cost ratio in order to obtain funding from Congress.

As mentioned in chapter two in Volume I, annual flood control benefits equating to be \$1,549,000 vs. annual costs of \$1,431,000, with a net benefit of \$118,000 (Final... 1971, pg. 37-38). As of this writing, that would entail cumulative benefits of \$12,047,493, and cumulative costs of \$11,129,736. The net benefit would entail, in today's dollars, now \$917,756.09 (Bureau of Labor Statistics, 2024).

Recreational benefits, as per the 1971 report (Volume I), were claimed to be calculated conservatively. Assuming a value of \$0.55 from a range of \$0.50-1.50 a visitor per day, for measuring benefits, alongside the maximum number of visitors the Lake can welcome annually, which was 2,760,000 visits, (Final... 1971, pg.38) even 500,000 visits for an entire year would produce \$275,000 which, in today's dollars, would entail \$2,086,600 (Bureau of Labor Statistics, 2024). The Corps of Engineers, had projected 29.58 miles of roads, and 18.50 miles of railroads to be relocated, and would require 48,151 acres for the project in total (Final...Vol.III, 1971, pg. 378), with 14,300 acres of it being inundated (Final...Vol.1, 1971, pg. 39).

## ***6.2: 2024 Costs and Benefits***

As of this writing, the Lake now comprises of 46,798 acres dedicated to recreation, with 13,900 acres (of the 46,978) having been flooded for the reservoir (Wallace, 2010, pg. 7). The 18.50 miles of railroad was ultimately constructed in 1974, however it was ultimately abandoned in 1979, with the tracks, ties, and gravel having been removed in 1983 (Triangle Rails to Trails Conservancy, 2024). Regarding the road relocation, it is unclear how much of it was carried out, as Bannerman had said that they do not have a master list that they are aware of. However, many of the old roads were submerged— Pea Ridge Road for example, and part of U.S. 64 were amongst the miles of road to be relocated, along with Seaforth, Big Woods, Farrington, Beaver Creek, and Clark Poe Road, as well as Highway 751 (Bannerman, 2024, email). Some of them, such as Pea Ridge Road, the original U.S. 64, are submerged (Leah, 2018). In the aforementioned drought that occurred in 2023, it is quite probable that a part of the original stretch of U.S. 64 was revealed during that time, alongside old train tracks (Leah, 2023). The

completed project's cost ultimately amounted to \$146,300,000 (U.S. Army Corps of Engineers, 2024).

### ***6.3: Current Costs and Benefits—Dana Matics and Fred Watkins (Recreation) 2024***

Dana Matics, an Assistant Operations Manager overseeing Jordan Lake, helps to write up the budget for the lake's operations (Matics, Interview, 2024). She is currently working on the budget for 2026. She believes that it will “decrease over the years, or at best, stay flat lined”. Furthermore, inflation has provided significant challenges, as “any increase” they have observed, “hasn't (so far) kept up with inflation”. She also noted how, even if the amount allocated for the budget stays consistent, “the cost of doing business gets higher every year”, and also noted how their funding specific to recreation, “is being hit the hardest”. She emphasized how it will become far more imperative in the future for the Corps “to rely on partnerships and volunteers” to maintain recreation programs throughout the country, as she noted how the Corps of Engineers is “one of the leading providers of federal outdoor recreational opportunities in the US” (Bannerman, Matics, email, 2024).

Fred Watkins is one of the park superintendents for Jordan Lake (Watkins, email, 2024).

Regarding the costs and benefits of the lake, he made clear that, for two years now, the State Recreation Area (the recreational land owned by the State, not the land owned by the Corps of Engineers) at Jordan Lake has been the most visited in the entire state, as it saw 2.3-2.5 million visitors in 2022 and 2023. During the last fiscal year, they had seen revenue generated to the tune

of \$3 million, while the operational budget was roughly \$1.3 million, which is also factoring in income for interim staff (Watkins, 2024, Personal Communication).

## ***6.5: Current Costs and Benefits—Jon Bannerman and Tony Young (Flood Control) 2024***

When asked if Jordan Lake has met expectations, Jon Bannerman, a Natural Resources Specialist, believes \$1.5 billion dollars have been saved as a result of flood damage reduction here at the lake, and that overall, it has achieved its expectations, most especially in the last 10 years, and with regard to water piling up downstream. He said that during Hurricane No. 9, 50% of Fayetteville was underwater. Between the lake and Kernersville, there are no major dams, and so for the most part there isn't a major reservoir that would be holding back waters like Jordan Dam, with the only close second being Randleman Lake. It is quite "nuanced" how the waters are released, after significant water events they still have to hold back water even as other places are flooding, to let the Deep River discharge excess waters before Jordan Lake can release its own (Bannerman, 2024, Personal Communication).

Tony Young, who is the Water Management Chief of the Wilmington District of the U.S. Army Corps of Engineers (which, oversees Jordan Lake) had sent me an email regarding financials of the lake as well. Yearly benefits are calculated from "estimated annual flood damages prevented" as a result of the Lake's flood risk management operations. He claimed that the annual benefits, as a result of preventing flood damage, *equate to 33 million dollars on average*, albeit this number can "vary significantly" each year due to the changing climate that can result in higher

amounts (of damage prevented, which results in benefits) prevented in wetter years, compared to drier years that don't entail as much in the way of flooding. (Personal Communication with Tony Young, 2024). That is *extremely significant*, as the average annual benefits has *far* exceeded what was expected back in 1971— (\$917,756.09 in today's times as aforementioned). He also pointed me to the costs section of the Round 4 Jordan Lake Water Supply Allocations Recommendations...

## ***6.6: Water Supply Costs and Benefits seen in Round 4: Jordan Lake Water Supply Allocation Recommendations (Section V) N.C. Dept. of Environmental Quality***

The following text describes the payment responsibilities of allocation holders, and what costs they are subject to, as seen in Section V of the Round 4 Recommendations. Allocation holders are municipalities, such as The Town of Apex, Holly Springs, etc. as described in chapter four, who draw water from the lake. Such holders are subject to various costs, and are of the following classifications: “capital costs including interest, operating costs, and administrative costs” (D.E.Q., 2016, pg. 71).

Under North Carolina General Statute 143-215.38, the State assumes responsibility for repayment for water supply storage costs in Jordan Lake, through the Environmental Management Commission (EMC) (D.E.Q., 2016, pg. 71). Out of the entire conservation pool, 33 percent of it (45,800-acre feet) is dedicated to water supply storage (D.E.Q., 2016, pg. 71).

Regarding the Capital and Interest Costs, the nearly \$100 million of construction costs are what the capital and interest costs are derived from. However, recreational areas are budgeted separately— they are not seen as part of the aforementioned construction costs. Due to the shared nature of the project, as it serves multiple purposes, “the Corps estimated that 4.6% of the construction cost is attributable to water supply” (D.E.Q., 2016, pg. 71). The original investment of capital, while factoring in interest during its construction, equates to \$4.388 million. As a result, “the initial capital cost is \$43,880 for each one percent of water supply storage” (D.E.Q., 2016, pg. 71). Interest payments on unallocated water supply at a rate of 3.225% begun in the early 1990’s (1992 specifically). And additionally, such interest payments “will be passed on to the eventual holders of the water supply storage” (D.E.Q., 2016, pg. 72) Level I and II allocations see similar, yet slightly different costs. For instance, “the estimated cost for a new Level 1 allocation made in 2015 is \$91,041 per percent of water supply storage”<sup>25</sup>, and, pertinent to Round 4, municipalities can expect to be “billed for operation and maintenance expenses based on the percentage of storage in the allocation” in the future (D.E.Q., 2016, pg. 72). Meanwhile, Level II holders will also face similar charges, “until their allocation is converted to Level I” (D.E.Q., 2016, pg. 72).

Operating expenses are required to be paid by holders, and are continuous. This is pertinent to both “current and future allocation holders” (D.E.Q., 2016, pg. 72). And, in addition, the State is

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<sup>25</sup> One percent=458 acre-feet. As noted on page 71 of the Round 4 allocations, “Jordan Lake dedicates 33 percent of the conservation pool, or 45,800 acre-feet, for water supply storage” (D.E.Q., 2016, pg. 71).

charged 5.4% of all expenses related to operation and maintenance—a percentage of expenditures estimated by the Corps, which has been the case since 1992 (D.E.Q., 2016, pg. 72).

Replacement costs however, are attributed a different percentage, and do not occur on a consistent basis. The Corps estimated the percentage to be “2.8% of the total expense” (D.E.Q., 2016, pg. 72). And while the Corps has not subjected itself to such costs since 2011, which would make the State obligated to repay such expenses, a part of the yearly replacement costs (estimated to be roughly \$66,000) “charged against water supply storage is approximately \$1,800 in total, or \$18 per percent of storage” (D.E.Q., 2016, pg. 72-73). Furthermore, the cost for replacement does not entail supplementary reimbursement costs for allocation holders (D.E.Q., 2016, pg. 73).

Rehabilitation costs are the same percentage as replacement costs, and the State has not been billed by the Corps for such expenditures since 1996 (D.E.Q., 2016, pg. 73) a part of the yearly rehabilitation costs (estimated to be roughly \$30,092.86) is “charged against water supply storage amounts to approximately \$843 or \$8.43 per percent of storage”. These costs were sourced from those seen in 1995-1996 (D.E.Q., 2016, pg. 73). The following chart and notes capture the financials more specifically:

Estimates for Year	2015		2015
	New 1% Level I		New 1% Level II
	I	I	II
	1st Year	Subsequent Years	1 st Year
Capital Cost <sup>1</sup>	\$ 43,880.00	\$ -	\$ -
Accrued Interest on Capital <sup>2</sup>	\$ 32,547.99	\$ -	\$ -
Total Capital Cost <sup>3</sup>	\$ 76,427.99	\$ -	\$ -
Interest Portion of Capital Payments <sup>4</sup>	\$ -	\$ 1,415.13	\$ 1,415.13
Annual O&M Cost <sup>5</sup>	\$ 777.30	\$ 777.30	\$ 777.30
Accrued O&M Costs <sup>6</sup>	\$ 13,775.07	\$ -	
Annual Rehabilitation Cost <sup>7</sup>	\$ 8.43	\$ 8.43	\$ 8.43
Accrued Rehabilitation Costs <sup>8</sup>	\$ 33.98		
Replacement Cost <sup>9</sup>	\$ 18.00	\$ 18.00	\$ 18.00
Total Cost per PERCENT <sup>10</sup>	\$ 91,040.76	\$ 2,218.85	\$ 2,218.85
Additional Fixed Cost per Acct. <sup>11</sup>	\$ 250.00	\$ 250.00	\$ 250.00

*Example of Payment Responsibilities for Allocation Holders (per percent of storage allocated.)*

*Figure and Description Courtesy of the Round 4: Jordan Lake Water Supply Allocation*

*Recommendations, December, 2016, pg. 74<sup>26</sup>.*

<sup>26</sup> The following notes were also provided for this chart, for the footnotes directly next to the estimate names as follows:

1. \$4,388,000 for 45,800 acre-feet of storage.
2. 3.225% interest paid annually on the original capital cost for the years 1992-2014, compounded annually.
3. Total Capital Cost=Capital Cost + Accrued Interest on Capital.
4. The interest on \$43,880 at 3.225% interest rate.
5. The estimated annual O&M (operation and maintenance) cost, based on an average of actual O&M costs for the years 2007-2011.
6. The total of actual O&M costs for the years 1992-2011 and estimates for 2012, 2013 and 2014.
7. The estimated annual rehabilitation cost, based on an average of actual rehabilitation costs for the years 1995-1996.
8. The total of actual rehabilitation costs for the years 1992-1999. Payback assumes either a lump sum, or 20 equal annual payments at a 3.225% interest rate.
9. Replacement cost is based on the Corps estimate of the average annual replacement cost. Note that there is no accrued replacement cost, as the State has not been billed for such as of year 2011.
10. Total Cost per percent of storage= (Total Capital Cost or Interest Portion of Capital Payments) + Annual O&M Cost + Accrued O&M Cost + Annual Rehabilitation Cost + Accrued Rehabilitation Costs + Replacement Cost.
11. An additional administrative charge of \$250 is added to each allocation holder's bill. (Round 4... 2016, pg. 74).

# *Chapter Seven: The Future*



The future of Jordan Lake is one of which that consists of several layers, each unique unto their own. There cannot be an overall understanding of the future of this lake—rather breaking it down through these layers allows us to best understand its destiny, as it is not guided by nor captured through any one particular area.

### ***7.1: Future of Water Supply, Western Intake Partnership***

The future of water supply at Jordan Lake is certain in some aspects, and uncertain in others. For instance, as aforementioned, revisions to the Jordan Lake rules are being made, and by the end of 2024, there will be a new plan in place. However, what is certain, is that a new coalition, founded in 2014, known as Western Intake Partnership, seeks to make some changes. It consists of the Town of Pittsboro, Chatham County, the City of Durham, and Orange Water and Sewer Authority (OWASA for short). This coalition has the specific goal of creating of “A second intake”, as well as “untreated water pumps and pipelines”, and an all-new regional water treatment facility for drinking water, and finally, for transporting water after treatment, “Treated water pipelines” (Western Intake Partnership, 2024). Furthermore, the Partnership claims that, once completed, it will “provide 27,000,000 gallons of drinking water a day”. There are three key phases to this project. The first phase, which is almost complete, involves the initial planning of it, as well as acquiring permits. This takes place from 2020-2024. The second, due to begin 2024-2027, involves the bidding and design. The last phase will entail the construction and completion, starting in 2027 and ending in 2031. (Western... 2024).

*As of This Writing... (Western Intake Partnership)*

The Partnership began geotechnical subsurface investigations on February 16, 2024. The process is “expected to last for three weeks, weather permitting” and will analyze rock and soil samples. The goal of this testing, is to discern the quality of the ground where pipelines will be installed, with a specific focus on “stability, load-bearing capabilities, and drainage characteristics”. (Western... 2024). They also made clear in their March 1, 2024 newsletter that they are attempting to gain rezoning approval, with an anticipated completion date of Spring 2024 (Western... 2024). Furthermore, in the same newsletter, they made clear that they plan to award four contracts, in which case the “contracts will use one of two methods to plan, design, and build each part of the project” (Western... 2024). More specifically, they are the progressive design-build, and the design-bid-build methods. However, the first method (progressive) will be “for the water intake system and the water treatment facility” (Western... 2024). Decision for what company/companies will construct these will arrive in 2025. Meanwhile, for the latter method, that is “for the treated water transmission pipeline and for the water storage tanks”, with the decision for what company/companies will construct those arriving in 2027. (Western... 2024).

## ***7.2: Chatham Park Development, Population Growth...***

On the road to becoming the population center for the U.S., the south has exploded in growth—so much so it was recently noted by Mike Schneider of the Associated Press that North Carolina was one of ten states that was seen with the most significant population growth, as of January of 2023 (Schneider, 2023, Associated Press). This has, of course, real estate investors licking their chops. And so, in Chatham County, the recent Chatham Park Development, in lockstep with

other apartment complexes, housing developments, and ambitious multi-use residential and retail developments found in the Triangle, is being made. However, what makes this project significant, *is how large it is*, as well as its closeness to Jordan Lake. According to the Chatham County Economic Development Corporation, this project is going to be almost 10,000 acres, and located “adjacent to Jordan Lake and Pittsboro”. Fully completed, this project “is expected to add 60,000 residents and will house 22 million square feet of office, research, retail and community space”. (Chatham County Eco... 2023). For reference, the Town of Pittsboro’s *population is not even at 5,000 people*. To better understand the gravity of this, World Population Review compiled a list of all the N.C. municipalities ranked by population. As of 2024, Pittsboro stands at #172, with a whopping 4,860 people — compare that to the 2020 census amount of 4,564, or their 2010 number of 3,800. Meanwhile, Chapel Hill comes in at #16, at 67,572 people, and Town of Apex, at #14 with 76,775 (World Pop... 2024).

#### *Road to Completion... (Chatham Park)*

First projected to be completed in four decades, it is now slated to be done *in less than three—25* years to be exact, via their official website. Ground for this project was broken back in 2014, so if the 25-year projection holds true, this entails a completion year of roughly 2039, instead of the original 50-year completion date of 2064. This is intriguing, since the difference of Pittsboro’s population now, vs. fourteen years ago, is only a matter of 1,000 people. So, fifteen years from now, should the construction timeline hold true, that same town will see 65-70,000<sup>27</sup> people, perhaps even more, just by way of this massive development alone. (Chatham Park, 2024).

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<sup>27</sup> 60,000 residents, plus the 5,000 right now, but also factoring in additional growth conservatively.

### *A Sustainable Neighborhood (Chatham Park)*

Sustainability, according to the website, is kept in mind as construction of this super development continues. According to their recent community and resident energy savings report brochure on their website, dated January 1, 2020- December 31, 2023, as originally sourced from Southern Energy Management, they lay claim to various figures as a result of how their homes have been built. In regards to community energy savings, they boast of how they have had “1 million pounds of emissions avoided, \$264.3K of combined cumulative energy savings of community” with “equivalent savings of the carbon sequestered by 12.6K trees planted” or “the carbon from 55.4k gallons of gasoline” (Chatham Park, 2024). They also boast of how they have an average HERS score<sup>28</sup> of 59. In which, they also boast, (now on the resident energy savings part of this brochure) that a home from them is “26% more efficient” when compared to a new home built to NC Code. (Chatham Park, 2024). Furthermore, they claim that the difference in annual energy costs is \$2,662 for N.C. Code homes, while such costs are \$1,883 for Chatham Park homes (Chatham Park, 2024). In that same section pertinent to resident energy savings, they also lay claim to “3K pounds of carbon emissions avoided” with \$546 of annual energy savings when compared to NC Code Standards. They also make clear that such savings are equivalent to “the carbon form of 3.1K vehicle miles not driven” (Chatham Park, 2024).

### *Efficiency, Green Space, Solar Power...(Chatham Park)*

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<sup>28</sup> HERS= Home Energy Rating System. For reference, a HERS score of zero would be indicative of the home generating an amount of energy that is equivalent to the amount consumed, as per its website. See more:<https://www.hersindex.com/hers-index/interactive-hersindex/interactive-hersindex-inside/#57>

Other aspects of this super-development include the fact that nearly 50 acres are dedicated for the solar farm there, that brings power to nearly 1,000 homes. They also claim that “12 acres of native grasses and wildflowers have been planted” to support the local ecosystem. They are also LEED certified, and are building homes that are ecoSelect Plus certified, which they claim their homes are more efficient than other, nearby homes, to the tune of 30%. Green space appears to not be lost on them either, as they claim that one third of, Chatham Park (precisely 2,000 acres) have been reserved for such space. This will take the form of community parks and open space. (Chatham Park, 2024).

*Water Management, A Home for Honeybees... (Chatham Park)*

A fascinating aspect of this place, is how it handles greywater and stormwater. Known as the Water Recovery Center, it is “only one of two such onsite systems in the entire country” as per Chatham Park. This system is quite unique, and according to McKim & Creed, the engineering firm that designed it, this facility can be developed further beyond how it already is, to support up to 1.0 mgd. For now, it remains a 250,000-gpd facility, which uses “two parallel 150,000-gpd trains”. Furthermore, this facility utilizes a variety of pump stations, “a UV disinfection system” as well as “a membrane biological reactor (MBR) system” and “a waste activated sludge aerobic digester, chemical feed systems and odor control”. And, down the road, should the demand for reclaim water increase, “a chlorination disinfection system will be activated to meet Type 2 reclaimed water standards”. (McKim & Creed, 2024). Reclaimed water, according to Chatham Park, will be used for “watering lawns” or “to flush toilets” or even be “used as a cooling agent

for commercial HVAC systems”. Lastly in regard to water management at Chatham Park, they have made clear that there is a buffer around the Haw River, of which they claim to have gone beyond Chatham County’s requirement of a 100ft buffer, by “up to 1,000 ft.” (Chatham Park, 2024). The Water Recovery Center is also where one will find the dedicated pollinator garden for honeybees. Roughly a quarter million of these bees reside there in eight beehives, with plans for more “as Chatham Park development continues”. (Chatham Park, 2024).

### *Pricing...(Chatham Park)*

Chatham Park’s housing is divided into three sections. They are: *Vineyards at Chatham Park*, *MOSAIC*, and *Encore at Chatham Park*. While they claim that *Vineyards* has offerings that range “from the high \$300s” with “custom homes from the \$900s”, the cheapest home as of this writing is \$398,717 (1904 sq. ft. townhome) while the most expensive is \$1.1 million even (4196 sq. ft. single family home) (Chatham Park, 2024).

Chatham Park it seems, is going to slingshot the Town of Pittsboro from a small, rural town, to a much larger one in the future, essentially establishing what we currently understand the likes of Apex, or Chapel Hill to be, in the near future. But this of course, does not yet factor in the other major development coming to Pittsboro, which will be situated *within* Chatham Park itself.

## ***7.3: Asteria, A Residential Neighborhood by Disney***

The Walt Disney Company plans to establish their second ever *Storyliving* community, known as *Asteria*, within Chatham Park itself. The first one, known as *Cotino*, was built in Rancho Mirage, California, as per Disney Connect’s website (Disney Connect, 2023). Announcements for *Asteria* came about in December of 2023, as per the Disney Parks Blog website (Dutton, 2023, Disney Parks Blog). According to Chatham Park’s *MOSAIC* specific website, this community will be 1500 acres in size, with over 4,000 “residential units including single family and multi-family homes”. This community will also have amenities specific to them, such as a restaurant, clubhouse, and other such amenities similar to what is found elsewhere in Chatham Park. (Mosaic Chat... 2024). However, cast members<sup>29</sup> will work to heighten the experience, in an effort to deliver a similar experience one may find when walking around Walt Disney World, such as engaging in activities with residents, as per the Storyliving by Disney website (Disney, 2024).

#### *Pricing... (Disney’s Asteria)*

All details have not been unveiled regarding this neighborhood; however, its slightly older sibling *Cotino* can help provide a glimpse into the price tag one may expect. According to Heidi Reid, of *Raleigh Magazine*, the homes that could be purchased in the *Cotino* neighborhood are in the “upper \$1 million to lower \$2 million range” (Reid, 2023, *Raleigh Magazine*). However, the Disney specific perks and benefits come at a steep price. For *Cotino*, there is an eye-watering \$20,000 fee *just to sign up*. Then, one must spend \$1,000 at minimum on food and drinks,

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<sup>29</sup> A “cast member” is a Disney employee that typically works in retail stores and Disney Parks, such as Disney World. It is akin to the term “team member” or “crew member” typically used in other retail and food service outlets. A cast member shares her experience here: <https://disneyconnect.com/dpep/disney-cast-member-finds-joy/>

alongside \$11,000, annually. Should one choose, they may share such perks and benefits to their relatives for \$9,000 (So, for clarity's sake, in total, for the first year of club membership, one would spend \$41,000, *on top of* their home purchase price.) Then, a recurring fee of \$12,000, each year, unless one chooses to shell out the extra \$9,000, which would be \$21,000 a year, each year. Which, (and this is speculative but rational) is more than likely *subject to increase* based on costs and benefits, inflation, crime, and a variety of other factors (Reid, 2023, Raleigh Magazine).

#### *The Fine Print/No Guarantees... (Disney's Asteria)*

It should be noted that *Asteria* and to include *Cotino*, is virtually *not guaranteed*. This sounds preposterous, but it is clearly written in the fine print on their website. They make clear that, “plans are subject to change or cancellation at any time without notice”. And, that club membership is “mandatory”— yes(!), at minimum, one will be required to spend *at least* \$12,000 a year, and be subject to the initial \$20,000 fee. So, one's first year *is guaranteed* to be spending \$41,000, on top of the home purchase, a detail Raleigh Magazine and other publications as of this writing seemed to have missed. Furthermore, Disney itself is not building nor selling these homes. Instead, the “residential community is Disney branded and managed, developed by DMB Development with homes built and sold by third-party builders” (Disney, 2024). And, in addition, it is these third parties that are in charge of such development, *not* Disney. To make things worse, “no guarantee is made that the communities, the Club or any facilities or improvements therein will continue to be managed by Disney, use the name “Disney” or otherwise be associated with Disney” (Disney, 2024). So, on top of the steep

pricing, and the eye-watering fees, Disney’s presence can disappear at any time, thus defeating the main selling point of purchasing a home in such a neighborhood. Such business practice is quite concerning, as Disney’s presence, and absence, can affect home prices and value drastically, and cause significant, localized economic turbulence on a whim.

#### **7.4: *VinFast***

13.5 miles away from Jordan Lake, a Vietnamese car company has recently begun construction on its car manufacturing plant. Known as VinFast, they are producing fully electric cars, and are “strongly committed to the mission for a sustainable future for everyone” and claim to be “ready to lead the EV revolution” (VinFast, 2024). They also have won multiple awards, and are part of the larger, conglomerate company, known as Vingroup. Upon opening the parent company page, the first thing that appears (as of this writing) are the words “to create a better life for people” and are involved in many industries, from A.I. and healthcare, to K-12 education, to real estate ventures, such as hotels and malls, and among others, they have multiple subsidiaries to address each one, akin to how they have addressed electric cars with VinFast (Vingroup, 2024).

According to their March 29, 2022 press release, they plan to produce two models there—the VF9, and the VF8 (VinFast, 2022). According to their website, the VF9 starts at \$79,800, while the VF8 starts at \$46,000 (VinFast, 2024).

*The State Government Involvement/Eminent Domain Utilized for the VinFast Plant*

A March 29, 2022 news release from N.C. Governor Roy Cooper announced VinFast’s decision to establish the plant at the Triangle Innovation Point (located in Moncure, Chatham County). Touting how North Carolina is becoming a focal point in terms of green energy, he claims that not only will it boost employment but also to help reduce emissions (Monaghan, 2022, N.C. Gov...). The size of the plant will be almost 2,000 acres (precisely 1,977 acres), and after phase one of the project is completed, roughly 150,000 vehicles will be built each year, with production of these vehicles beginning in July 2024 (Monaghan, 2022, N.C. Gov...). Furthermore, they claim that the establishment of this plant will “grow the state’s economy by at least \$71.59 billion over 32 years”. The building of this plant will also be made possible thanks to a “Transformative Job Development Investment Grant (JDIG)” which will allow for a “potential reimbursement to the company” for nearly half a billion dollars, (\$316.1 million) specifically, over the duration of that same 32-year time frame (Monaghan, 2022, N.C. Gov...). The state is also going to cover the tab apropos of infrastructure, specifically to preparing the site, water and sewers, and roads, utilizing \$450 million. And, as part of the JDIG agreement with VinFast, almost \$50 million (\$36.6 million) will be moved to the “the state’s Industrial Development Fund – Utility Account”, which will allow for other communities in agrarian areas within North Carolina to improve their infrastructure (Monaghan, 2022, N.C. Gov...). It should also be noted that the JDIG is performance based—the Department of Commerce, and the Department of Revenue will confirm if VinFast is meeting their “incremental job creation and investment targets” (Monaghan, 2022, N.C. Gov...). However, the development of this plant is not without controversy.



*Site of where VinFast's plant will be built. Courtesy of Brian Gordon, News & Observer, January 17, 2024.*

Theresa Opeka, of *The Carolina Journal*, back on April 26, 2023, covered how eminent domain is being used to construct the plant, as well as the different hurdles and hiccups that VinFast still had to clear. For starters, several sales executives departed VinFast, the company had eliminated 80 jobs and had also cut their CFO. On top of that, N.C. Dept. of Transportation will be utilizing eminent domain to seize 27 homes, Merry Grove Baptist Church, along with five businesses (Opeka, 2023, *The Carolina Journal*). Furthermore, while the first phase of the project will focus on relocating the church, eleven homes, and three businesses, the second phase will “impact an additional two. Businesses and 16 homes” And, it should also be noted that the church has, until recently with this development, remained in one place since 1888 (Opeka, 2023).

Opeka also called attention to the since abandoned Durham-Orange Light Rail project, as an example of when eminent domain can go wrong, whereupon “23 acres were taken by eminent domain”. This project would have allowed people to go back and forth between Durham and Chapel Hill, and as a result, people lost their homes, and \$3.8 million (of GoTriangle’s money, which is taxpayer dollars) were essentially wasted (Opeka, 2023, The Carolina Journal). The abandonment of the project came as a result of Duke University’s refusal to allocate a part of their land for it, and GoTriangle dropping the ball in acquiring agreements and funding (Opeka, 2023, The Carolina Journal).

However, despite seeing great exposure to a variety of industries, and the amount of capital VinFast has, made possible by its founder, Pham Nhat Vuong, who recently gave the company \$1 billion of his own money (Burgos, 2023, Forbes) VinFast, put simply, is struggling. The factory is not even open and operational, and yet the VF8 has received terrible press. Multiple notable publications have given the car scorching reviews. Scott Evans from *MotorTrend*, as an example, claimed to have driven pre-production vehicles that “that were far closer to production ready than the in-production VF8” and recalled how many functions of the vehicle were not working properly, such as air conditioning, or a turn signal, which did not work during the vehicle’s launch (Evans, 2023). Meanwhile, *Car and Driver* gave it a 6/10 score, and claimed that the car, as part of its lows (out of its highs and lows) is that it had “mediocre fit and finish” (Miller, 2024, Car and Driver). *Road & Track* claimed that the car “is unacceptable” (Hogan, 2023, Road & Track).

Jalopnik's Kevin Williams, along with other journalists and online influencers, were invited to check out the car in 2023. After talking with representatives from VinFast and frustrated with the lack of feedback, Williams claimed that the VF8 "isn't ready" and went further as to claim that it "is a terrible deal" and, additionally, that "it feels like an underdeveloped, unfinished product that, quite frankly, would be an embarrassment in any market". He claimed that over all, he had flown nearly 10,000 miles, did not learn anything, and "drove a car that was not ready for the United States" (Williams, 2023, Jalopnik). Lastly, the reviews on this vehicle are so abysmal, that even the YouTube channel Donut had got involved. With (as of this writing) nearly ten million subscribers, their jocular video covering this car was titled "We Drove the Worst Reviewed Car in America" amassed over five million views, and appeared to concur with others who had voiced their frustrations on this vehicle (Pumphery, Sykes, 2023, Donut Media).

## ***7.5: Concluding Remarks and Concerns***

Gazing upon all the development being made local to the lake, Mary Claire McCarthy's words come to mind in regard to how developed land challenges the water quality of Jordan Lake. And yet, four years after her remarks, Chatham Park is going to tee up a *drastic* population growth that, to the best of my knowledge and research, the Triangle has not seen before, or at the very least, quite some time. I also think of how, given our current, challenging times, the developments being made local to Jordan Lake are walking the knife's edge between serious prosperity, and serious turbulence. While yes, Chatham Park seems to be a significant development, it will also bring many challenges. The nice, small town of Pittsboro, that as of this writing does not know what it is like to have a population exceeding 5,000, should construction not be hindered and adhere to the development timeline, will have to get used to being a

significantly much larger town, in as little as fifteen years. *Is it actually ready for all of that change?* That is not to say that it is impossible, other towns nearby have been able to embrace such change.

### *My Hometown and Experience in a Town That Doubled in Size, as an Example*

As an example, my hometown of Holly Springs experienced a lot of change. According to the World Population Review website, when I first moved to this town, it had 25,000 people, back in 2010 (World Pop... 2024). As of this writing, fourteen years later, it has since doubled. In 2000, Holly Springs had 9,200 people. The growth it made over twenty-four years has now led to the town's population consisting of 50,141 people. Anecdotally speaking, when I first moved here, the local Wal-Mart, and Chick-Fil-A were still being constructed, along with a nearby shopping plaza. Other than that, in the way of attractions and business, Holly Springs did not have much to offer. Fourteen years later, the population change is extremely noticeable, and the town is completely different (in a great way) compared to how it was in the past. My town is one of the few in the entire nation that sees drones buzz overhead, delivering food and occasionally groceries to my neighborhood and others, on a regular basis. The change I have experienced, is equally quite drastic. Business, primarily in restaurants and retail, is booming through here. However, I cannot afford a home in the town I grew up in. All home prices have since doubled, and in some cases tripled. Apartments border on affordable, and yet are being built right and left. New homes and developments that are constructed start at \$50,000+ higher than what we purchased our home for fourteen years ago, at half the size, sometimes less. Pittsboro might embrace a similar fate.

### *Other Towns as Examples*

Apex did not see any serious growth until after the 1990s. From 1940-1980, the town did not see a population of 3,000+ until 1990. A similar story can be seen in Fuquay-Varina as well. But for Pittsboro, they are going to see a level of population increase that puts to shame Apex, Holly Springs, and Fuquay-Varina in terms of growth if Chatham Park comes through in the next fourteen years. But again, it is not impossible. Cary could be a solid case study for Pittsboro to study, as their growth over the years has led to the town accommodating nearly 200,000 people (World Population Review, 2024). However, in the case of Pittsboro, such a massive jump in a possibly short amount of time is bound to lead to growing pains.

### *Climate Change and Jordan Lake*

The role of climate change in Jordan Lake's future, will be nothing short of significant. According to The Fifth National Climate Assessment, the American Southeast is poised to be hammered by climate change. In its four key messages, the percentage of likelihood for its predictions is, at minimum, *likely*, or 66%, with most of their predictions amounting to *very likely*, or 90-100% (McNulty, et al. 2023, Chapter 22). Most predictions are of *high confidence*, with some being of *very high confidence*, while only one prediction was of *medium confidence* (McNulty, et al. 2023, Chapter 22).

In the first of its four key messages, the Assessment found that agrarian areas are facing population decline, with an increasing proportion of elderly residents, which will render such

areas more prone to the effects of climate change. Meanwhile, more heavily populated areas, such as cities and coastal municipalities, will see their populaces and resources face increased “risks related to climate and land-use changes” (McNulty, et al. 2023, Chapter 22). Furthermore, data that is available “on climate-related risks to inform adaptation plans” used by “decision-makers” is sparse and or out of date, which, consequently, can lead them to overlook declining climate conditions in the future. (McNulty, et al. 2023, Chapter 22). Lastly, while historically marginalized groups are at risk, those that are “concentrated in wealthier communities” tend to see a greater concentration of climate adaptation efforts (McNulty, et al. 2023, Chapter 22).

In the second of the four key messages, the Assessment found that various individual factors, such as age, representation (racial or ethnic), class, and the prevalence of chronic disease can worsen the effects felt from climate change, as it is currently damaging the health of those in the Southeast (McNulty, et al. 2023, Chapter 22). They also found that there are strategies to help manage the negative health effects felt from climate change, “that have multiple benefits across social and environmental contexts”. Lastly, they ultimately concluded that climate change and human well-being are “intimately linked in the Southeast” (McNulty, et al. 2023, Chapter 22).

In the third of the four key messages, the Assessment acknowledges the disparities between urban and rural areas, as while urban areas have seen far more economic prosperity, and require “climate-sensitive infrastructure and regional connections to thrive” rural areas see significant risk from climate change. In the Southeast, it is projected that global warming will negatively impact supply chains, economies, and labor, while producing “disproportionate effects on frontline communities” (McNulty, et al. 2023, Chapter 22). Therefore, the Assessment

recommends for collaboration between rural and urban areas to safeguard their economies (McNulty, et al. 2023, Chapter 22).

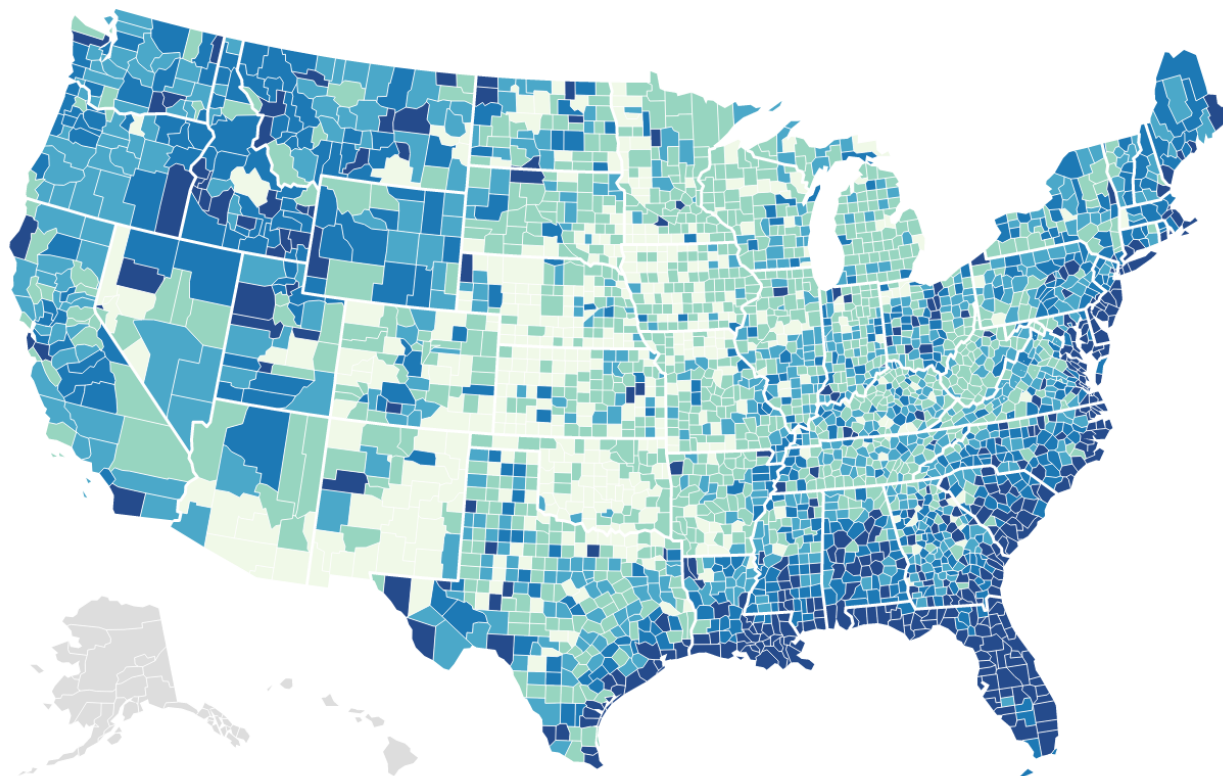
In the fourth of the four key messages, the Assessment makes clear that while significant precipitation, and sea level increases, alongside temperature changes and drought impact food supply and agriculture are already occurring in the Southeast, such issues are bound to intensify via global warming. However, the Assessment also claims that such warming will increase the demand for resources (such as water or land), putting urban and rural populaces at odds with one another. That said, agricultural innovation may provide some saving grace, as the Assessment points to “precision farming” as one way the effects felt from warming can be reduced (McNulty, et al. 2023, Chapter 22).

Furthermore, according to another study, the United States is poised to see a 26% increase in the cost of flood damage, *solely* from climate change in the coming decades. The authors of this study created their own maps, to show where flood risk will be most significant, by county. These “maps account for flooding from rivers, rainfall, and the oceans – both now and into the future – across the entire contiguous United States” (Wing, et al. 2022). Furthermore, their model projections also take into account “how and where” increasing populations of people will reside, to calculate future flood risk (Wing, et al. 2022). Chatham county is one of the many that was listed, and the authors noted a 13% increase in flood risk for it (Wing, et al. 2022). The monetary value of Jordan Lake, and its dam, is increased as a result of the heightened risk of flooding downstream. However, this is contingent on whether or not the dam can hold back flood waters. The amount of non-flooded land owned by the Corps of Engineers above the dam allows for presumptively enough excess capacity in the flood pool to hold back a 13% increase in runoff.

## Where flood risk is projected to rise fastest in the US

A new analysis projects changes in flood risk between 2020 and 2050 by zooming in on every neighborhood across the U.S.

Percentage rise, 2020-2050



Flood damage measured in 2020 U.S. dollars.

Map: The Conversation/CC-BY-ND • Source: Wing, et al. 2022 • Created with Datawrapper

*Flood Risk Map, Courtesy of Oliver Wing, Carolyn Kousky, Jeremy Porter, and Paul Bates, The Conversation, January 31, 2022.*

*An Eye on Our Environment, and Business*

I feel, quite strongly, that if storms and severe weather is on the horizon, as per McCarthy's article, alongside the challenges posed by climate change, rapid urbanization and straining our water quality is the last thing we should do. While it is a business and it is being built with sustainability in mind, Chatham Park should slow construction to allow for sustainable adjustments to be made to the lake. Furthermore, I encourage VinFast to slow down (no pun intended) as well. If they cannot manufacture a car properly, how much faith can we allocate to them, both in general but also in terms of constructing the plant? Cars are a recent invention, historically speaking. They've only been around almost a hundred and fifty years.<sup>30</sup> But, for VinFast, considering their resources, as well as the ample amount of information that is out there and the various car manufacturers in the game, it is ridiculous that they are struggling this badly to produce automobiles. Furthermore, if they fail as a business, it is *highly likely* they will also abandon the plant altogether. One can find examples of such abandonment in K-Mart's World Headquarters, the Lisa Frank factory, and many other abandoned establishments of business throughout the country<sup>31</sup>. It would be of no surprise to me that even VinFast, as committed as they say they are to sustainability, would also choose to walk that same path, should failure arise.

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<sup>30</sup> Carl Benz (namesake of Mercedes-Benz) invented the first car, and applied for a patent for it back in 1886. For reference, see their website that covers it here: <https://group.mercedes-benz.com/company/tradition/company-history/1885-1886.html#:~:text=On%20January%2029%2C%201886%2C%20Carl,1>. But, it would not be until Henry Ford's Model T, that the world would see the first *affordable* automobile, in 1908. See: <https://corporate.ford.com/articles/history/the-model-t.html>

<sup>31</sup> The Lisa Frank factory was abandoned in 2013, however as of November of 2023, it may be reopening. See: <https://www.12news.com/article/news/local/arizona/arizona-lisa-frank-factory-appears-to-be-reopening/75-b5ea9687-bbed-4a3a-b777-c455d49c50dd>  
K-Mart's world headquarters (nearly 1 million square feet!) has remained abandoned since 2006. As of November 2023, the building is now being torn down. See: <https://www.freep.com/story/money/business/michigan/2023/11/15/demolition-underway-old-kmart-hq/71596173007>  
<https://www.freep.com/story/money/business/michigan/2023/11/15/demolition-underway-old-kmart-hq/71596173007/#>

I'm all for both sustainability, and business, and I believe there can be a winning balance between the two, that fosters respect for our environment and nets a profit.

However, I fear that, as of this writing, that balance just isn't there with large corporations, both in general but also specific to the area around Jordan Lake. There isn't anything sustainable about (figuratively speaking) constantly hovering your finger over the eject button (Disney's *Asteria*) nor is there anything sustainable about promoting the creation of a plant (VinFast) for an expensive, at times laughable car that is a failure, of which, when combined with the massive super development (Chatham Park), and its new Disney component, could amount to staggering home shortages, or at the very least, significantly high housing costs. However, it should be said that, if all is executed properly—the car is improved and sells, the plant is built properly, Chatham Park is built properly, Disney does not remove itself from the development, wages accommodate costs and inflation, and Jordan Lake is kept secure, economic growth will be nothing short of massive. However, I can only ever hold such optimism in strong caution, given the current circumstances. I think what is somewhat lost on VinFast and Chatham Park's part, is the need to hit the brake pedal at times. Jordan Lake's development was by no means perfect—it was mired in lawsuits and scrutiny, and was *also* made possible via eminent domain. However, the benefits outweigh the costs, it consistently generates significant benefits each year, helps to reduce and or eliminate flooding, and serves an (overall speaking) solid example of how public works can also function as a business, and where everyone wins.

Jordan Lake was built *specifically to serve people, and to also generate benefits*. However, VinFast, and Chatham Park, along with Disney, are building homes and cars *specifically for*

business, and to make a profit, it is not to serve people. And while the distinction may be obvious that indeed, the recent developments are in no way non-profits, they should take a hard look at Jordan Lake. To be put even more bluntly, they should take inspiration from Jordan Lake, and work to ensure that whatever business is conducted reflects and echoes the success of, and care given to the Lake and its respective populace that it serves. There is already a myriad of challenges that Jordan Lake faces—the last thing anyone should do, is add onto them, in the name of profit. I’m reminded of the quote seen in the 1993 K-3 *Predators and Prey* Jordan Lake activity book, as we (as a society) seem to forget lately how interconnected everything is:

*In the web of life, all things are connected. The bobcat and the rabbit are but opposite ends of the same strand. — Henry Boswell III and Daniel K. Stamm*

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