



**US Army Corps of
Engineers**

Wilmington District

**CAPE FEAR RIVER LOCKS AND DAMS
BLADEN COUNTY, NORTH CAROLINA
SECTION 216 DISPOSITION STUDY
DRAFT INTEGRATED REPORT
AND ENVIRONMENTAL ASSESSMENT**



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Prepared by U.S. Army Corps of Engineers Wilmington District

Table of Contents

1.0	INTRODUCTION	1
1.1	Executive Summary.....	1
1.2	Initial Appraisal	1
1.3	Feasibility Study	1
2.0	STUDY OVERVIEW AND PURPOSE (Purpose and Need).....	2
2.1	Overall Purpose.....	2
2.2	Overall Scope.....	2
3.0	AUTHORITY.....	2
3.1	Project Authorization.	2
3.2	Study Authorization.	3
4.0	PROJECT LOCATION AND BACKGROUND	3
4.1	Construction.	3
4.2	Lock and Dam Number One.....	5
4.3	Lock and Dam Number Two.....	5
4.4	Lock and Dam Number Three (William O. Huske Lock and Dam).	5
5.0	HISTORY OF THE PROJECT.....	5
5.1	Operations and Maintenance.	5
5.2	Dam Safety Action Classification (DSAC) & Safety Evaluation.	5
5.2.1	Structural Condition.....	6
6.0	RECREATION.....	11
6.1	Information on Easements, Agreements, and Other.....	12
6.2	Related Studies	13
6.3	Project Modifications and Fish Passage	15
7.0	PROJECT FEASIBILITY, FEDERAL INTEREST, AND EVALUATION OF ALTERNATIVES.....	16
7.1	Introduction to Plan Formulation and Evaluation of Alternatives	16
7.2	Problems and Opportunities (Need for Action).....	17
7.3	Goals and Objectives	17
7.3.1	Goal.....	17
7.3.2	Objective	18
7.3.3	Constraints	18
7.3.4	Formulation and Evaluation Criteria	18
7.4	Inventory of Existing and Future Without Project Conditions	19

- 7.4.1 The Study Area19
- 7.4.2 Hydrology and the Watershed19
- 7.4.3 Drinking Water Quality.....25
- 7.4.4 Socio-Economics.....26
- 7.4.5 Physiography.....26
- 7.4.6 Fish and Wildlife Resources26
- 7.4.7 Threatened or Endangered Species.....27
- 7.4.8 Cultural Resources27
- 7.4.9 Navigation27
- 8.0 ANALYSIS OF ALTERNATIVES: IDENTIFICATION, EXAMINATION, AND SCREENING OF MEASURES (FORMULATION, EVALUATION, COMPARISON, AND SELECTION OF A PLAN)28
 - 8.1 Alternative 1: No Action Plan28
 - 8.2 Alternative 2: (Removal)29
 - 8.3 Alternative 3: (Recommended Plan, Transfer)29
- 9.0 ECONOMIC BENEFITS ANALYSIS.....29
 - 9.1 Real Estate Analysis.....33
 - 9.2 Selection of the Recommended Plan33
 - 9.3 Risks and Uncertainties.....33
- 10.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS.....53
 - 10.1 Physical Resources53
 - 10.1.1 Sediments.....53
 - 10.1.2 Geology and Aquifers55
 - 10.1.3 Water Quality58
 - 10.1.4 Water Supply63
 - 10.2 Biological Resources66
 - 10.2.1 Wetlands and Floodplains66
 - 10.2.2 Vegetation.....67
 - 10.2.3 Fish and Wildlife68
 - 10.2.4 Threatened and Endangered Species71
 - 10.3 Cultural and Operational Environment.....76
 - 10.3.1 Cultural Resources and Tribal Interests.....76
 - 10.3.2 Socio-Economics80
 - 10.3.3 Demographics and Environmental Justice.....81
 - 10.3.4 Agriculture and Silviculture83

10.3.5 Recreation83

10.3.6 Air Quality and Noise84

10.3.7 Climate Change and Sea Level Rise87

10.3.8 Hazardous, Toxic and Radioactive Waste (HTRW).....87

10.3.9 Aesthetics88

10.3.10 Lock and Dam Operations88

10.4 Cumulative Impacts89

11.0 PUBLIC AND AGENCY INVOLVEMENT AND ENVIRONMENTAL COMPLIANCE92

12.0 CONCLUSIONS93

13.0 RECOMMENDATIONS93

14.0 POINT OF CONTACT94

15.0 REFERENCES95

LIST OF FIGURES

Figure 1: Location of Cape Fear River Locks and Dams	4
Figure 2: Cape Fear River Lock and Dam Number One	8
Figure 3: Cape Fear River Lock and Dam Number Two	9
Figure 4: William O. Huske Lock and Dam on the Cape Fear River	10
Figure 5: Cape Fear River Watershed	21
Figure 6: Water Supply Intake Locations in Cape Fear River Basin	23
Figure 7: Hydrogeologic cross-section from west-northwest to east-southeast through Bladen County (includes study area)	57
Figure 8: NCDWR Water Quality Classifications at Lock and Dam Number One	60
Figure 9: NCDWR Water Quality Classifications at Lock and Dam Number Two	61
Figure 10: NCDWR Water Quality Classifications at Lock and Dam Number Three	62
Figure 11: Jordan Lake Water Sharing Agreement and Interconnections	64
Figure 12: Atlantic Sturgeon Critical Habitat in the Cape Fear River	75
Figure 13: Lock and Dam Number One, Circa 1915.....	80

LIST OF TABLES

Table 1: Lock and Dam Visitation	12
Table 2: The land available for recreation activities (excludes operational lands) at each lock and dam is as follows:	12
Table 3: Recreation Valuation, Cape Fear River Locks and Dams.....	31
Table 4: Regional Economic Impact, Cape Fear River Locks and Dams, Indexed to 2018 Dollars	32
Table 5: System of Accounts Analysis.....	35
Table 6: Water Supply Demand in Million Gallons Per Day (MGD) by the Surface Water Supply Users from Lock and Dam Number One through Headwaters of Lock and Dam Number Three.....	65
Table 7: Threatened and Endangered Species Potentially Present in the Study area	74
Table 8: Bladen County, NC Demographic Profile (2010 and 2017).....	82
Table 9: Agriculture Profile, Bladen County, NC (2007 and 2012).....	83
Table 10: 2018 Air Quality Index Report for Fayetteville, NC	86

ATTACHMENTS

- Attachment 1 – NC Session Law 2008-186
- Attachment 2 – Economic Guidance Memorandum EGM 18-03
- Attachment 3 – Draft Finding of No Significant Impact (FONSI)

APPENDICES

- Appendix A - Real Estate
- Appendix B - Hydraulic Analysis
- Appendix C - USFWS IPaC
- Appendix D - Climate Change Analysis

**CAPE FEAR RIVER LOCKS & DAMS
CAPE FEAR RIVER
BLADEN COUNTY, NORTH CAROLINA
SECTION 216 - DISPOSITION STUDY
INTEGRATED DRAFT MAIN REPORT
AND DRAFT ENVIRONMENTAL ASSESSMENT**

1.0 INTRODUCTION

1.1 Executive Summary

The Cape Fear River Locks and Dams (CFRLD) are a series of three locks and dams constructed between 1910 and 1935 on the Cape Fear River in southeastern North Carolina, for the purpose of commercial navigation. Over many years, their use for commercial navigation has declined, with the last known commercial lockage occurring in 1995. The projects continue to require substantial historic operations and maintenance (O&M) funding, totaling approximately \$800,000 annually. Average annual funding provided in recent years has been approximately \$450,000, for operations/labor, routine repairs, electricity, and facility maintenance. The purpose of this Section 216 feasibility disposition study, is to evaluate the current and future usage of the projects, to compare a “No- Action” alternative in which the project continues to be owned by the Federal government (but perhaps not fully maintained due to lack of funds), an alternative consisting of de-authorization, followed by deconstruction of all project improvements and disposal of associated real estate, and an alternative that includes de-authorization and transfer of the projects to a willing non- federal governmental entity. The period of analysis for this study is 50 years, so assumptions made for all alternatives consider conditions up to and including 50 years from the date of this document. The study is being conducted under “Interim Guidance on the Conduct of Disposition Studies”, issued 22 August 2016, by the Director of Civil Works, U.S. Army Corps of Engineers (USACE).

1.2 Initial Appraisal

In May 2009, the USACE completed an initial appraisal under the authority of the 1970 Flood Control Act using Operation and Maintenance (O&M) funds. The Initial Appraisal found a Federal Interest in conducting further study to determine the ultimate disposition of the projects.

1.3 Feasibility Study

The Feasibility Study is being conducted under the General Investigations Program, and is being performed at full Federal expense since it involves evaluating alternatives for reducing Federal expenses and has no willing sponsor at the time of study.

2.0 STUDY OVERVIEW AND PURPOSE (Purpose and Need)

2.1 Overall Purpose.

The primary purpose of the CFRLD was to allow commercial navigation between Wilmington and Fayetteville, North Carolina. Since 1995, commercial barge traffic using the Locks and Dams has ceased, while the Wilmington District has incurred average annual operations & maintenance expenditures. Historically, annual funding to address operations & maintenance has totaled approximately \$800,000. In recent years, approximately \$450,000 in annual funding has been provided. The purpose of the study is to determine the future disposition of the CFRLD, and evaluate the opportunity to reduce Federal expenses.

2.2 Overall Scope.

This study of the CFRLD will address multiple resources including: passage of diadromous (anadromous and catadromous) fishes, water supply, recreation, reduction of Federal expense, commercial navigation, small boat navigation concerns, and potential disposal strategies. Alternatives investigated include leaving the structures in their current state (i.e., “caretaker status”), potentially rendering the projects “safe” by modifying the structures through partial or total removal, and potentially deauthorizing the projects and transferring all real estate and operations and maintenance of the structures to another non-federal government entity.

The same recommendations contained herein, made for one of the locks and dams, would hold true for all three. They currently function as a single system, and piecemeal disposal, for reasons of impacts to many different assets, precludes such recommendations.

3.0 AUTHORITY

3.1 Project Authorization.

USACE submitted its recommendation for Locks and Dams Numbers One and Two for the Cape Fear River above the Wilmington navigation project, along with an eight-foot deep channel, in House Document 890, 60th Congress, 1st Session. Congress appropriated funds for the improvements in the River and Harbor Act of 1910, 36 Stat. 630, Pub. L. No. 61-264. The authorization for the third and final lock and dam, later renamed the William O. Huske Lock and Dam, followed on August 30, 1935 alongside authorization for an eight-foot deep navigation channel to Fayetteville, North Carolina, 115 miles above Wilmington. (River and Harbor Act of 1935, 49 Stat. 1028, Pub. L. No. 74-409, referencing House Document 786, 71st Congress, Third Session). The River and Harbor Act of 1937, 50 Stat. 844, Pub. L. No. 75-392 via reference to Rivers and Harbors Committee Document 17, 75th Congress, First Session authorized a 25- foot deep channel to a basin at Navassa, North Carolina (2.9 miles up the Cape Fear River above Wilmington). Recreation facilities at each lock were authorized by Section 4 of the Flood Control Act of 1944, 58 Stat. 887, Pub L. No. 78-534. Finally, the River and Harbor Act of 1965, 59 Stat. 844, Pub. L. No. 89-298 via reference to House Document 252, 89th Congress, First Session authorized deepening the navigation channel from 8 to 12 feet between Navassa and Mileboard 30, just downstream of Lock and Dam Number One.

3.2 Study Authorization.

The authority to study the divestiture of these Federal projects is Section 216 of the 1970 Flood Control Act, which authorizes the Secretary of the Army to review the operation of USACE projects when found advisable due to significantly changed economic, physical, or environmental conditions. The study is a 100% Federally-funded effort that will be reviewed and evaluated for policy compliance, and with recommendations due to the Congress, for potential deauthorization and disposal.

4.0 PROJECT LOCATION AND BACKGROUND

4.1 Construction.

The CFRLD are located 39, 71, and 95 miles, respectively, above Wilmington, North Carolina. The City of Fayetteville, North Carolina is approximately 111 miles upstream of Wilmington (see Figure 1). The CFRLD are designed to aid navigation, but all three include recreational facilities as well. On the west side at each lock and dam is a park area with picnic tables, shelter, toilet facilities, boat ramps, locks and associated facilities. There are also houses where the lockmasters lived when commercial traffic was frequent on the river. In-water components at each lock and dam consist of a dam that abuts the eastern bank of the Cape Fear River, and is joined to the western bank by a lock that consists of a lock chamber, two upstream lock gates, and two downstream lock gates. No CFRLD-associated infrastructure exists on the east side of the river. A short discussion on each lock and dam follows.

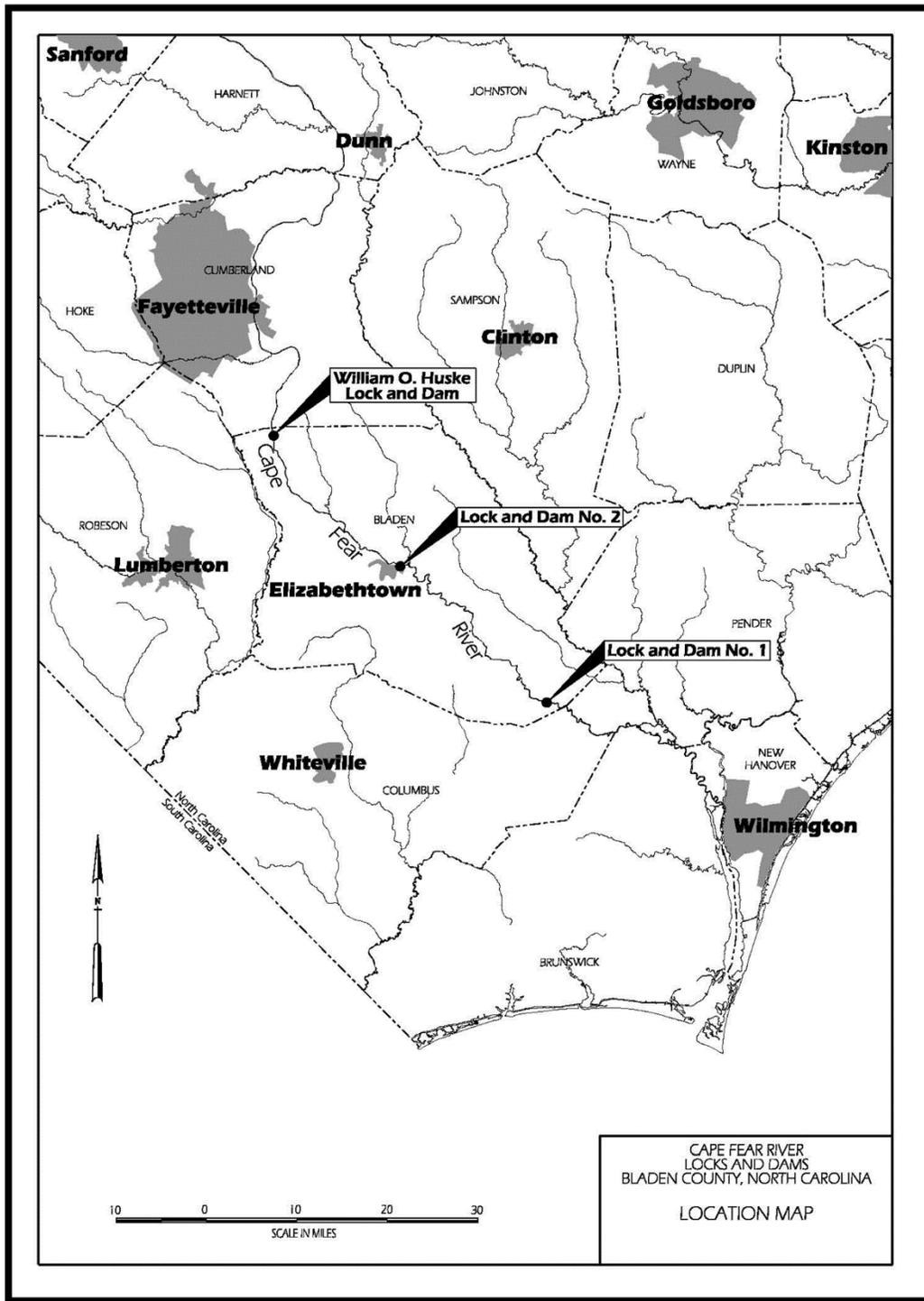


Figure 1: Location of Cape Fear River Locks and Dams

4.2 Lock and Dam Number One.

As shown in Figure 2, the project reservation associated with Lock and Dam Number One encompasses about 17 acres. The lock and dam was constructed in 1915 and raised three feet in 1935. The lock is made of concrete on wood pilings with a chamber 40 feet wide by 200 feet long. The vertical lift is 11 feet. The dam is a rock fill, timber crib structure with steel pilings, clay fill, and a concrete spillway. The dam is 275 feet long at a crest elevation of approximately 10 feet (NAVD 1988). The lock chamber wall is at approximate elevation 20 feet (NAVD 1988). A fish passage structure was added to the project in 2012, as mitigation for deepening of Wilmington Harbor, and coordinated with all applicable Federal and state resource agencies. Stabilization of the toe of the structure was carried out at that time. Ten upstream timber dikes (added upstream of the dam in 1940 and 1987) help maintain the pool for navigation purposes and prevent the river from escaping around the left abutment during normal flows.

4.3 Lock and Dam Number Two.

Lock and Dam Number Two, which is shown in Figure 3, was constructed in 1917. Alterations to add height in were constructed 1935. The project reservation encompasses about 30 acres. The lock is made of concrete on wood pilings with a chamber 40 feet wide by 200 feet long. The vertical lift is nine feet. The dam is a rock fill structure with steel pilings and a clay fill. The dam is 228.8 feet long with a crest elevation of approximately 19 feet (NAVD 1988). The lock chamber wall is at a crest elevation of approximately 33 feet (NAVD 1988).

4.4 Lock and Dam Number Three (William O. Huske Lock and Dam).

This structure, shown in Figure 4, was constructed in 1935. Both the lock and dam are concrete. The project reservation associated with the Lock and Dam Number Three encompasses about 20 acres. Both the lock and dam are constructed of concrete on steel pilings. At 40 feet wide by 300 feet long, the lock chamber is the largest of the three locks. The vertical lift of the lock chamber is 9 feet and the lock chamber wall is at approximate elevation 38 feet (NAVD 1988). The dam is a concrete spillway structure 220 feet long with a crest elevation of approximately 28 feet (NAVD).

5.0 HISTORY OF THE PROJECT

5.1 Operations and Maintenance.

The staffing and routine maintenance of the three locks and dams averaged about \$310,000 annually (at-the-time FY dollars), between 1992 and 1995. Clearing and snagging, debris removal, and maintaining aids to navigation averaged about \$340,000 over the same time period. In 1997 an \$180,000 improvement to the recreation area at Lock and Dam Number Two was constructed. Currently, Wilmington District is incurring average operations and maintenance expenditures of approximately \$450,000 per year.

5.2 Dam Safety Action Classification (DSAC) & Safety Evaluation.

Dam Safety Action Classification (DSAC) ratings range from 1 to 5. As of November 2019,

all three Cape Fear Locks and Dams are rated DSAC 5, which is the lowest urgency DSAC rating assigned by the USACE. By contrast, a DSAC 1 rating would indicate a dam at extremely high risk of failure with high risk of significant negative consequences to life and economic interests. The classification is determined by evaluating a combination of likelihood of failure and incremental consequences should the dam fail. The driving factor in the DSAC determination for these dams is the lack of significant consequences. Risks posed by the CFRLD are considered tolerable when compared to a list of tolerable risk guidelines (annual probability of failure, life safety risk, economic risk, and environment and other non-monetary consequences). The CFRLD meet criteria of ER 1110-2-1156 as “dams found to have insignificant or no consequences should they fail” and have potential to serve a state, local, or tribe purpose (USACE 2014). Because they satisfy this criteria, they are exempt from routine dam safety management under current USACE guidance.

5.2.1 Structural Condition.

Inspections, conditions surveys, recreation facility repairs, and other miscellaneous expenditures averaged about \$150,000 from 1992 to 1995. In 1993 and 1994, all three locks were refurbished at a cost of more than \$1.3 million in total. All of the mechanical parts and seals were refurbished and the lock gates were sand blasted and repainted. As a result of this rehabilitation, these locks are currently in fair structural condition. The USACE conducted Screening Portfolio Risk Analysis (SPRA) in 2008 and 2009 to assess dam safety. At Lock and Dam Number One, several items in the SPRA were considered inadequate for the normal, unusual, and extreme Load Cases, including seepage and piping under the esplanade, stability of the downstream sheet pile wall, and stability of the upstream timber dikes. Following the SPRA, major rehabilitations were conducted at Lock and Dam Number One in 2012. The rehabilitations included filling the downstream scour hole, placement of the Rock Arch Rapids Fish Passage, repairs of the riverside and landside lock walls, and repairs to the esplanade. With these rehabilitations, it is believed that the seepage and piping under the esplanade has been remedied. It is also believed that the scour hole has been repaired and scour is no longer progressing. The upstream timber dikes have not yet been repaired as recommended during the SPRA.

At Lock and Dam Number Two, several items in the SPRA were considered inadequate for the normal, unusual, extreme, and maximum design earthquake (MDE) Load Cases, including the stability of the lock walls and stability of the dam due to the downstream scour hole. In 2017, construction began to armor the scour hole to prevent additional erosion and increase stability of the dam. This construction project was completed in the fall of 2019.

At Lock and Dam Number Three (also known as William O. Huske Lock and Dam), the SPRA concluded that stability of the lock walls was probably inadequate for the MDE Load Case as well as during normal operating conditions. No major rehabilitations have been conducted at Lock and Dam Number Three since the SPRA.

A dam safety inspection was last conducted in February 2019. Condition of the locks and dams has continued to deteriorate in the years since the SPRAs. Additional deficiencies that have not been corrected exist such as damaged gate mechanisms, missing personnel railings, damaged mooring cells, and others. Taking into account available information, with emphasis on considerations regarding likelihood of failure and

Cape Fear River Locks & Dams
Section 216 - Disposition Study

incremental consequences should the dams fail, DSAC 5 ratings were approved in November 2019.

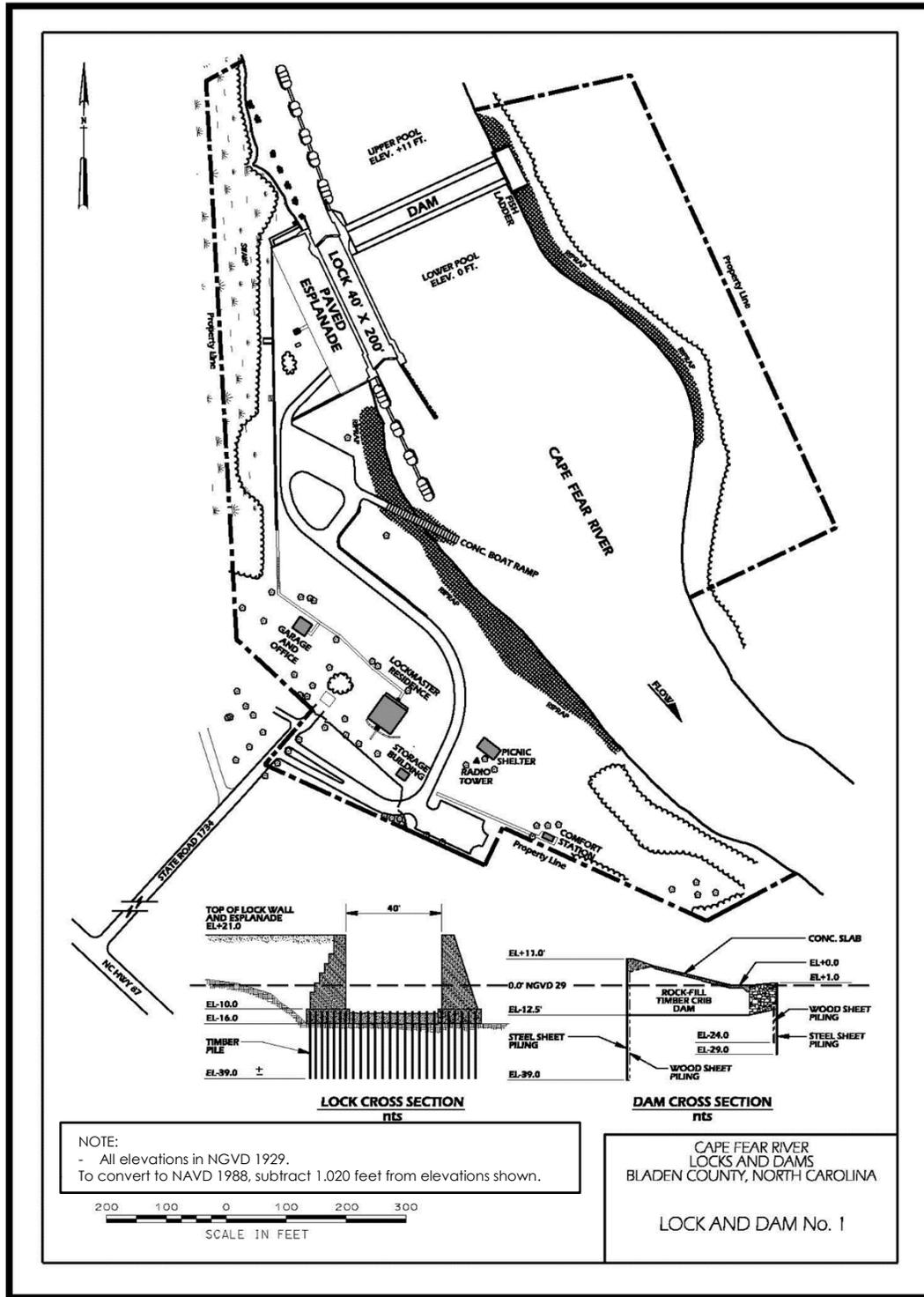


Figure 2: Cape Fear River Lock and Dam Number One

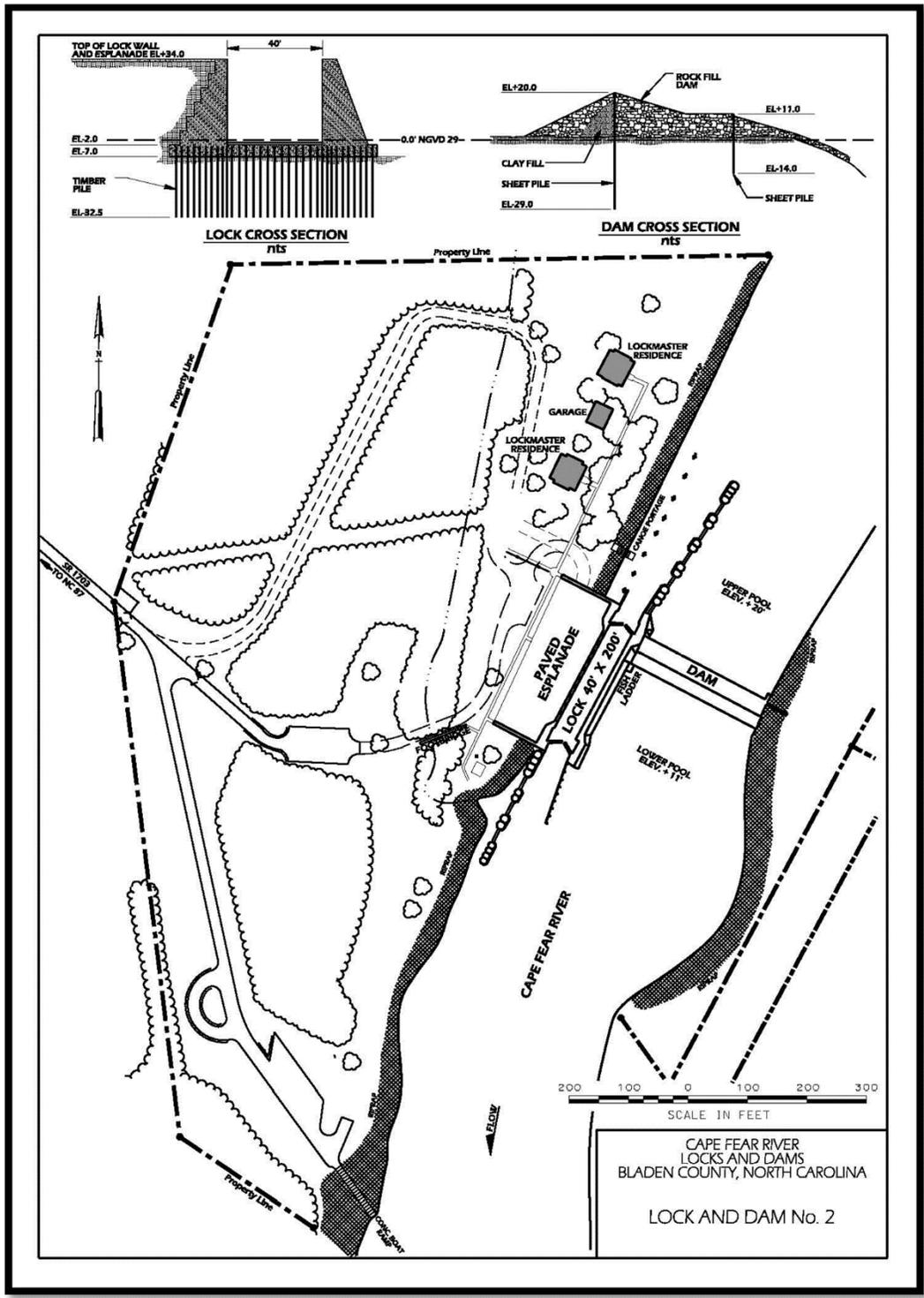


Figure 3: Cape Fear River Lock and Dam Number Two

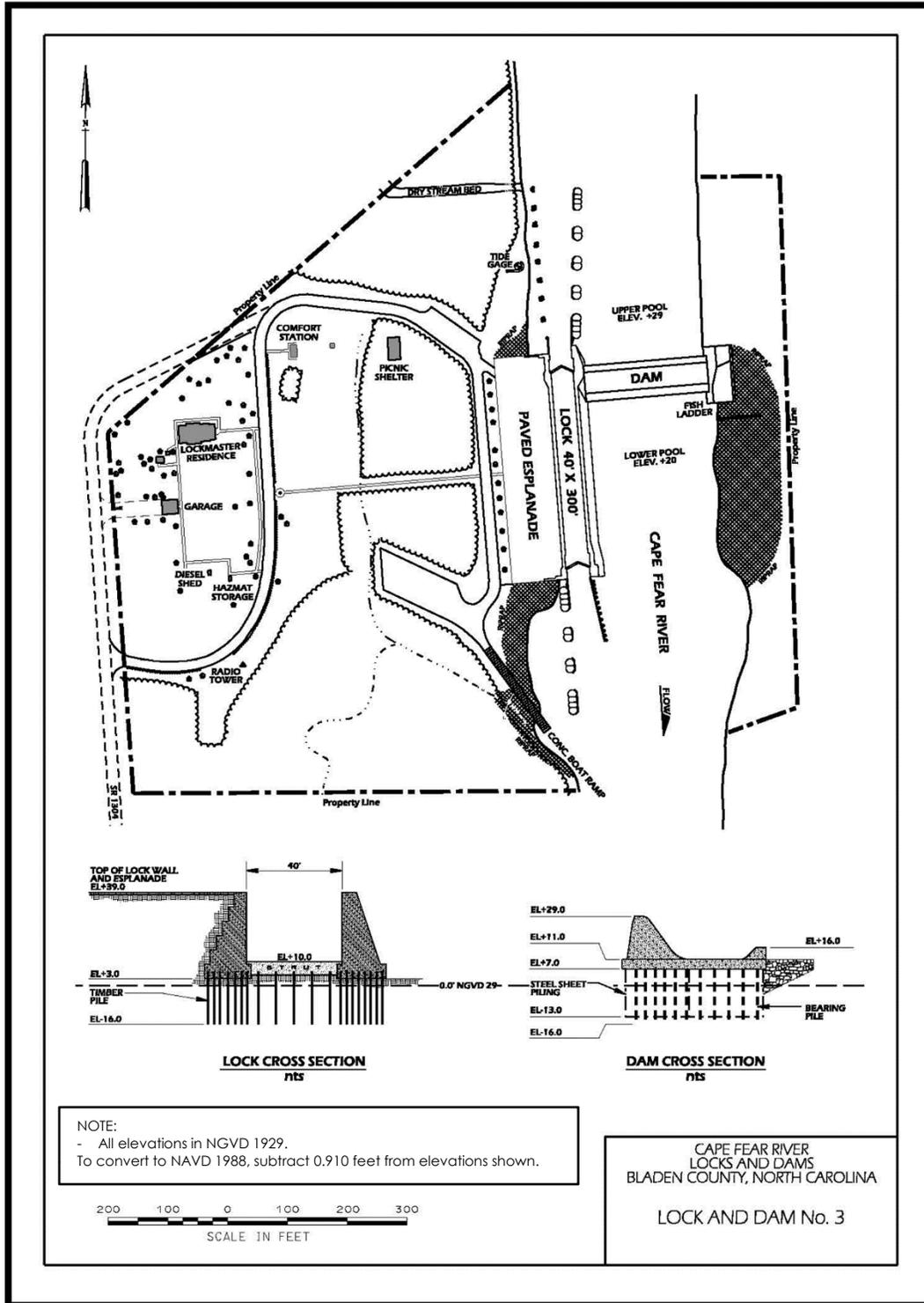


Figure 4: William O. Huske Lock and Dam on the Cape Fear River
 (Cape Fear River Lock and Dam Number Three)

6.0 RECREATION

Recreation areas have been available at the three locks and dams since 1965. In addition, recreational boaters enjoy fishing in the Cape Fear River in the vicinity of the locks and dams. The maintenance of sufficient depth for these recreational uses is dependent on the proper function and operations upstream of Lock and Dam Number One, especially during drought and low flow conditions.

Since 1965, USACE has maintained and upgraded many of the recreational facilities at the CFRLD to provide safe and sanitary accommodations for boaters, fishermen, picnickers, and sightseers. These facilities include picnic areas, restrooms, parking areas, fishing areas, boat ramps, and open lawn areas. Since 2000, the annual visitation for the three locks and dams has averaged about 70,000 visitors, with variation attributed to drought or unusually high water years.

In 2016, USACE entered into a lease agreement with the Town of Elizabethtown for a term of 25 years. This lease includes the operation and maintenance of all the recreation lands and facilities at Lock and Dam Number Two. The lease does not include the lock structure or the dam.

In 2017, USACE and the Town of Elizabethtown entered into a Memorandum of Agreement (MOA) with North Carolina Wildlife Resources Commission (NCWRC) for incorporation of the three locks and dams' boating access areas into their Public Boating Access Area program. This MOA allows an increased presence of NCWRC Enforcement Officers and bolsters their ability to enforce State regulations at the entire CFRLD project.

Table 1: Lock and Dam Visitation

Fiscal Year (FY)	Number of Visitors
FY 2000	11,266
FY 2001	51,495
FY 2002	47,134
FY 2003	37,788
FY 2004	86,590
FY 2005	94,076
FY 2006	77,928
FY 2007	87,589
FY 2008	74,043
FY 2009 – FY 2011	Unavailable
FY 2012	31,855
FY 2013	49,689
FY 2014	61,216
FY 2015	78,527
FY 2016	72,852
FY 2017	144,107*

*Note: * Also accounts for dispersed visitation not accounted for above. Dispersed use recreation is visitation that occurs on U.S. Army Corps of Engineers (USACE) owned land and water that is located outside of designated recreation areas and that is not captured via any type of traffic counting device. The data used were recorded and reported by USACE project staff. It is assumed that the increase in visitation totals is the result of a survey to capture the dispersed recreation instances in that year, but not in the previous years.*

Table 2: The land available for recreation activities (excludes operational lands) at each lock and dam is as follows:

Locks & Dam	Available Land
Lock and Dam Number One	6 acres
Lock and Dam Number Two	21 Acres
Lock and Dam Number Three	12 Acres
Total	39 Acres

6.1 Information on Easements, Agreements, and Other.

The lands required to construct the CFRLD were acquired between 1910 and 1934. Lock and Dam Number One consists of 16.61 acres acquired in fee and 1,073.34 acres in Flowage Easement (a flowage easement allows property to be flooded to support the project purposes). The site is improved with an office, multiple out buildings, five picnic sites, two picnic shelters, a comfort station, and a paved boat ramp with parking for ten trailers. The recently constructed rock arch rapids fish passage structure does not contribute to the appraised value of the site.

Lock and Dam Number Two consists of 28.5 acres acquired in fee and 1.39 in revetment easement. The site is improved with an office, multiple out buildings, five picnic sites, one

picnic shelter, a comfort station, a wooden deck with surrounding benches used as an overlook, and a paved boat ramp with parking. There is a current lease to the Town of Elizabethtown for all the recreation lands and facilities at Lock and Dam Number Two.

Lock and Dam Number Three, (also known as William O. Huske Lock and Dam) consists of 20.50 acres acquired in fee. The site is improved with an office, multiple out buildings, seven picnic sites, one picnic shelter, and a paved boat ramp with parking. See Real Estate Appendix (Appendix A) for more details.

6.2 Related Studies

The studies and reports below speak specifically to actions and assessments at the CFRLD.

In May of 2010, an Environmental Assessment (EA) for *Rock Arch Rapids Fish Passage, Cape Fear River Above Wilmington, NC, Lock and Dam No. 1, Bladen County, North Carolina* was completed. A Finding of No Significant Impact (FONSI) was signed in May 2010. The EA identifies and evaluates the environmental impacts associated with the proposed construction of a rock arch rapids fish passage structure at Lock and Dam Number One, with the intent to improve fish passage to spawning grounds above Lock and Dam Number One on the Cape Fear River. Construction of the rock arch rapids fish passage structure was completed in 2012 and required monitoring that concluded in 2014.

In May 2008, the State of North Carolina expressed interest in acquiring the three Cape Fear River locks and dams. Senate bill 2157 and House bill 2785 were ratified in July 2008 and signed by the Governor in August 2008 as Session Law 2008-186 (Attachment 1). These bills indicate that the State would take over operation of all three locks and dams if the facilities were adequately rehabilitated and a rock ramp fish passage was constructed at all three locks and dams. While funds have been appropriated and construction completed to address rehabilitation of several items at Lock and Dams Numbers One and Two to improve stability, it remains unlikely that Federal funding to construct additional fish passage facilities will be received. The State is aware of this Federal funding constraint, as well as interest from non-federal entities to construct additional and improved fish passage at the CFRLD.

In March of 2007, the USACE, Mobile District, produced the *Wilmington Harbor General Re-evaluation Report GRR Lock and Dam Study Intake Evaluation Final Report*. This report was conducted to evaluate impacts of fish passage alternatives on the water supply intakes on the Cape Fear River that could potentially be impacted by modifications to Lock and Dam Numbers One, Two, or Three. Specifically discussed were effects to the City of Fayetteville's Glenville and Hoffer pump stations, the lower Cape Fear Water and Sewer Authority's pump station, the City of Wilmington's pump station, and the DuPont pump station. Additionally, this report provided alteration recommendations that would allow for adequate function of water intake structures should Cape Fear River elevations fall behind the locks and dams.

In 2005 the USACE, Wilmington District began developing a *Wilmington Harbor General Re-evaluation Report (GRR)*; however, the report was not finalized and this effort was halted in 2009. Included in this GRR was discussion of the potential effects of alteration of the three Cape Fear River locks and dams. Potential alterations included implementing

fish passage measures, lowering the dams and pools behind the dams, and removing the dams.

In 2003, an EA/FONSI for *Fish Bypass at Lock and Dam No. 1, Cape Fear River, Bladen County, North Carolina* was completed by the USACE, Wilmington District. This document identified and evaluated the environmental impacts associated with the proposed construction fish bypass measures at Lock and Dam Number One with the intent to improve fish passage to spawning grounds above Lock and Dam Number One on the Cape Fear River.

In the August 2000 EA/FONSI for *Preconstruction Modifications of Authorized Improvements for Wilmington Harbor*, a commitment was made by USACE, Wilmington District, and the Wilmington Harbor 1996 Act project sponsor, the State of North Carolina, to construct a fish passage structure at Lock and Dam Number One on the Cape Fear River. This was also a requirement of Term and Condition Number 8 of the August 3, 2000 National Marine Fisheries Service *Biological Opinion (BO) on Wilmington Harbor*. This fish passage structure was required to mitigate for the potential impacts of in-water blasting on the Federally-endangered shortnose sturgeon. Blasting in the Wilmington Harbor navigation channel was required to remove rock. The type of fish passage structure was not specified in the BO, and was decided following further investigation and coordination with resource agencies. Ultimately, mitigation for blasting impacts took the form of the rock arch rapids, currently in place, downstream of and abutting Lock and Dam Number One.

In 1997, an appraisal was conducted by the USACE, Wilmington District for the three Cape Fear River locks and dams for the purpose of initiating a feasibility study that would determine the future disposition of the lock and dams. This Section 216 Disposition Study is the feasibility study proposed to be initiated in 1997. Funding to conduct this 2016 Disposition Study was not received until 2018.

In 1996, the USACE, Wilmington District completed a study under the authority of Section 1135 of the Water Resources and Development Act of 1986 to include an *Environmental Assessment and Finding of No Significant Impact for the Interim Fish Passage at Lock and Dam Number 1*. This Environmental Assessment and Finding of No Significant Impact cleared the way for the installation of a fish ladder to provide upstream passage for shad and river herring, and to restore access by these species to 33 miles of spawning habitat above Lock and Dam Number One. That structure was removed in approximately 2011 during construction of the rock arch rapids structure.

In 1980, the USACE, Wilmington District, conducted a study to evaluate adding hydropower at all three locks and dams on the Cape Fear River. The study was entitled *Lock and Dam Nos. 1, 2, and 3, Cape Fear River, North Carolina Reconnaissance Study*. In this study, various alternatives were evaluated, including adding conventional power to the dams at their existing heights and after raising them several feet. In all cases, the value of the energy that could be generated fell short for economically justifying the addition of hydropower.

Additionally, a number of fish passage-related studies in the Cape Fear River have been performed by entities other than the USACE. A non-exhaustive list of these studies is included below:

Flowers, H.J. and J.E. Hightower. 2015. Estimating Sturgeon Abundance in the Carolinas Using Side-Scan Sonar. *Marine and Coastal Fisheries*, 7:1, 1-9, DOI: 10.1080/19425120.2014.982334

Raabe, J.K., A.E. Ellis, J.E. Hightower, and C. Collier. 2014. Evaluation of Fish Passage Following Installation of a Rock Arch Rapids at Lock and Dam #1, Cape Fear River, North Carolina. North Carolina State University, U.S. Geological Survey, and North Carolina Division of Marine Fisheries.

Smith, J. and J.E. Hightower. 2009. Spawning Activity and Migratory Characteristics of American Shad and Striped Bass in the Cape Fear River, North Carolina. U.S. Geological Survey, North Carolina Cooperative Fish and Wildlife Research Unit, North Carolina State University.

Dial Cordy and Associates. 2006. Cape Fear River Anadromous Fish Larvae and Egg Survey. Prepared for the Wilmington District Corps of Engineers.

CZR. 2004. Preconstruction monitoring of American Shad, Atlantic Sturgeon and Striped Bass Passage at Lock and Dam # 1 on the Cape Fear River, NC. Year 3. Prepared for the Wilmington District Corps of Engineers.

CZR. 2003. Preconstruction monitoring of American Shad, Atlantic Sturgeon and Striped Bass Passage at Lock and Dam # 1 on the Cape Fear River, NC. Year 2. Prepared for the Wilmington District Corps of Engineers.

CZR. 2002. Preconstruction monitoring of American Shad, Atlantic Sturgeon and Striped Bass Passage at Lock and Dam # 1 on the Cape Fear River, NC. Year 1. Prepared for the Wilmington District Corps of Engineers.

Moser, M. L., A. M. Darazsdi, and J. R. Hall. 2000. Improving passage efficiency of adult American shad at low-elevation dams with navigation locks. *North American Journal of Fisheries Management* 20:376-385.

Hall, J. R., Moser, M. L., A. M. Darazsdi. 1998. Improving passage efficiency of adult American shad at low-elevation dams with navigation locks. Completion report to the NC Sea Grant Fisheries Resource Grant Program.

Nichols, P.R. and E.D. Louder. 1970. Upstream passage of anadromous fish through navigation locks and use of the stream for spawning and nursery habitat, Cape Fear River, North Carolina, 1962-66., U.S. Fish and Wildlife Service, Circ. 352.

6.3 Fish Passage

In the 1960s, the U.S. Fish and Wildlife Service (USFWS) determined that fish locking was adequate to pass diadromous fishes in the Cape Fear River. This method of fish passage continued for decades to follow, and still occurs at Lock and Dam Numbers Two and Three. Under the National Marine Fisheries Service (NMFS) Biological Opinion (BO) dated August 2000; the USACE was required to construct improved fish passage at Lock and Dam Number One, and study fish passage options at Locks and Dams Two and Three (NMFS 2000). This requirement was born out of the potential to negatively impact endangered

shortnose sturgeons during rock blasting, as described in the *Finding of No Significant Impact for Preconstruction Modifications of Authorized Improvements, Wilmington Harbor, North Carolina* dated August 2000 (USACE 2000). Beginning in June 2011 and reaching completion in November 2012, a rock arch rapids fish passage structure at Lock and Dam Number One was constructed across the entire downstream face of the dam. The environmental impacts of the rock arch rapids were addressed in the *Finding of No Significant Impact for Rock Arch Rapids Fish Passage, Cape Fear River above Wilmington, NC, Lock and Dam No. 1, Bladen County, North Carolina*, dated May 2010 (USACE 2010). Total cost was approximately \$13 million. This fish passage method has been used on several dams in the upper Midwestern United States, although the rock arch rapids at Lock and Dam Number One was and remains the first of its kind designed to accommodate shortnose sturgeon passage. Prior to construction of the rock arch rapids at Lock and Dam Number One, fish were locked upstream via the lock chamber near the southern bank of the Cape Fear River. Fish locking was also performed at Lock and Dam Number Two and Lock and Dam Number Three and is still conducted at these two Locks and Dams in coordination with the NCWRC and as USACE resources allow. Since completion of the rock arch rapids at Lock and Dam Number One in 2012, fish locking has ceased at Lock and Dam Number One. Multiple academic studies have been undertaken to address the rock arch rapids efficacy. In general terms, the rock arch rapids at Lock and Dam Number One has proven relatively successful in passing sturgeons and shad, but less so in terms of striped bass passage. Fish passage improvement efforts are currently in development by several non-federal at all three locks and dams, and are being evaluated under Section 408 (33 U.S.C. §USC 408).

Concrete fish ladder structures exists at Lock and Dam Number Two and Lock and Dam Number Three, but both are considered non-functional. They are located between the lock wall and the dam.

7.0 PROJECT FEASIBILITY, FEDERAL INTEREST, AND EVALUATION OF ALTERNATIVES

7.1 Introduction to Plan Formulation and Evaluation of Alternatives

The planning process used for this study and detailed in this section was conducted in accordance with detailed guidance contained in the Planning Guidance Notebook (Engineer Regulation 1105-2-100). This guidance is based on the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies that were developed pursuant to Section 103 of the Water Resources Planning Act (P.L. 89-80) and Executive Order 11747, which was approved by the U.S. Water Resources Council in 1982, and by the President in 1983. A defined six-step process is used to identify and respond to problems and opportunities associated with the Federal objective, and specific state and local concerns.

The six steps defined in the process are as follows:

- Step 1: Identify Problems and Opportunities
- Step 2: Inventory and Forecast Conditions
- Step 3: Formulate Alternative Plans
- Step 4: Evaluate Alternative Plans

Step 5: Compare Alternative Plans Step 6: Select Recommended Plan

The process involves an orderly and systematic approach to making evaluations and decisions at each step so the public and the decision makers can be informed of basic assumptions made, the data and information analyzed, risk and uncertainty, the reasons and rationale used, and the significant implications of each alternative plan. Alternatives were formulated and then screened, evaluated, and compared in an iterative process with increasing levels of detail at each sequence to finally identify the Recommended Plan. Although various analysis parameters may change at each sequence, within each sequence, the parameters used to compare alternatives are kept identical. The process concludes with the selection of a Recommended Plan. The period of analysis for this study is 50 years, so assumptions made for all alternatives consider conditions up to and including 50 years from the date of this document. Specific applications of the process are described in following sections of this document.

7.2 Problems and Opportunities (Need for Action)

The Cape Fear River Locks and Dams no longer serve their Federally-authorized project purpose of commercial navigation. They are a burden to the taxpayer to operate and maintain for a purpose that no longer exists. Funding for operations, maintenance, repair, rehabilitation and replacement (OMRR&R) continues to decline year after year, and will result in eventual failure of one or more structures.

The dams and their associated pools serve many communities and commercial enterprises as a water storage and intake location for water supply; however, this is not an authorized project purpose. This means that the CFRLD do not receive funding to be maintained for water supply. Water supply is a secondary benefit of the dams' existence. Nevertheless, the loss of this water storage would constitute a significant negative impact to communities that rely on that storage and access.

The CFRLD also provide public access to the Cape Fear River and facilities for recreational activities to tens of thousands of visitors each year at no cost to the visitors.

7.3 Goals and Objectives

As outlined in the 1983 *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, the Federal objective in water resources planning is to contribute to national economic development (NED) consistent with protecting the Nation's environment. The Federal objective leads to the general overall goal of this study:

7.3.1 Goal

Provide a National Economic Development (NED) Plan for the Cape Fear Locks and Dams, based on an evaluation of alternatives, and provide those recommendations to the Congress for action.

Identifying and considering the problems, needs, and opportunities of the study area in the context of federal authorities, policies, and guidelines resulted in the establishment of the following specific objectives, which are all to be considered over the resulting period of analysis:

7.3.2 Objective

Identify the best action plan for the Federal government to divest itself from a project that no longer has a Federal interest, in a manner that also causes the fewest impacts to stakeholders and the environment.

7.3.3 Constraints

The planning process is subject to the following general constraints:

- Conformance to USACE policies for the project purpose.
- All applicable Federal laws, regulations, and Executive Orders.
- Current limits of knowledge, information, and predictive ability.
- No structural modifications or major operational changes.

No other specific planning constraints have been identified for this study that would further limit the planning process. Although there are many factors that may ultimately affect the ability to implement a particular alternative and be used throughout the screening process, these factors do not necessarily qualify as planning constraints

7.3.4 Formulation and Evaluation Criteria

Alternative plans are evaluated by applying numerous, rigorous criteria. Four general criteria are considered during alternative plan screening: completeness, effectiveness, efficiency, and acceptability.

Completeness: Completeness is the extent that an alternative provides and accounts for all investments and actions required to ensure the planned output is achieved. These criteria may require that an alternative consider the relationship of the plan to other public and private plans if those plans affect the outcome of the project. Completeness also includes consideration of real estate issues, O&M, monitoring, and sponsorship factors. Adaptive management plans formulated to address project uncertainties also have to be considered.

Effectiveness: Effectiveness is defined as the degree to which the plan will achieve the planning objective. The plan must make a significant contribution to the problem or opportunity being addressed.

Efficiency: The project must be a cost-effective means of addressing the problem or opportunity. The plan outputs cannot be produced more cost-effectively by another institution or agency.

Acceptability: A plan must be acceptable to Federal, state, and local government in terms of applicable laws, regulation, and public policy. The project should have evidence of broad-based public support and be acceptable to the non-Federal cost sharing partner.

It should be noted that these criteria may not be fully evaluated at the initial stages of plan formulation in regards to evaluation of measures and preliminary alternatives, but are fully evaluated for the final array of alternatives. Additional criteria are used in the System of Accounts analysis, which evaluates alternatives for their National Economic

Development, Regional Economic Development, Environmental Quality, and Other Social Effects outcomes.

There are also specific technical criteria related to engineering, economics, and the environment, which also are considered in evaluating alternatives. These are:

7.3.4.1 Engineering Criteria:

The recommendation, if appropriate, of a safe, efficient, and reliable project option that incorporates best engineering principles/practices in support of an NED plan.

7.3.4.2 Economic Criteria:

The plan must contribute benefits to National Economic Development. Tangible benefits of a plan must exceed economic costs. Each separable unit of improvement must provide benefits at least equal to costs.

7.3.4.3 Environmental Criteria:

The plan must fully comply with all relevant environmental laws, regulations, policies, and Executive Orders.

The plan should be developed in a manner that is consistent with the USACE's Environmental Operating Principles (EOPs). See:

<http://www.usace.army.mil/Missions/Environmental/EnvironmentalOperatingPrinciples.aspx>

Adverse impacts to the environment should be avoided. In cases where adverse effects cannot be avoided, then mitigation must be provided to minimize impacts to at least a level of insignificance.

7.4 Inventory of Existing Conditions and Future Without Project Conditions

7.4.1 The Study Area

The locks and dams are located on the Cape Fear River, which is formed in central North Carolina by the confluence of the Deep and Haw Rivers. The Cape Fear River flows generally southeast 198 miles from that confluence and empties into the Atlantic Ocean just west of Cape Fear, 28 miles south of Wilmington. All three of the Cape Fear River Lock & Dams (CFRLD) are located in Bladen County, which is in the southeastern section of North Carolina.

7.4.2 Hydrology and the Watershed

As previously stated, the Cape Fear River is formed in central North Carolina by the confluence of the Deep and Haw Rivers (Figure 5). The USACE-owned and operated B. Everett Jordan Dam and Lake, situated three miles upstream from the confluence of the Haw and Deep Rivers, is the most important regulating component in the Cape Fear River basin; however, the USACE's ability to regulate flows does not mean that B. Everett Jordan Dam and Lake has significant control over flow rates and volumes in the entirety of the Cape Fear River basin downstream of the dam. The drainage area of B. Everett Jordan Lake is 1,690 square miles, which constitutes a small portion of the total 8,750 square miles that drains into the entire Cape Fear River. The drainage areas at Lock and Dam Numbers One, Two, and Three are 5,220, 4,980, and 4,810 square miles,

respectively.

The primary hydrologic benefit from the CFRLD system was to ensure a dependable controlling depth for commercial barge traffic. In addition to the structures being authorized for the purpose of aiding commercial navigation, the pool above Lock and Dam Number One contains water supply intake structures serving 400,000 people in Brunswick, New Hanover, and Pender Counties. The pool above Lock and Dam Number Two contains a water supply intake structure currently serving the Smithfield Food's Tar Heel facility, with capacity to serve additional municipal and industrial customers. The pool above Lock and Dam Number Three contains water supply intake structures serving about 200,000 people in Cumberland County.

The Cape Fear River was a free flowing river until 1915 when the USACE built Lock and Dam Number One followed by Lock and Dam Number Two in 1917. Lock and Dam Number Three, near Fayetteville, was built in 1935. The Cape Fear River at this time was used to transport products from the Port of Wilmington to Fayetteville and inland North Carolina.

The Cape Fear River watershed is undergoing rapid growth, especially at its upstream and downstream terminal areas, to include areas surrounding B. Everett Jordan Dam and Lake and near the mouth of the river. These areas are hubs for economic growth, education, and healthcare, and are among the fastest growing areas in North Carolina. With this growth comes increased water usage and wastewater treatment. Additionally, increases in residential and commercial construction have increased percentages of cleared land and impervious surfaces, which increases sheet flow of storm water runoff.

Although the three Cape Fear River locks and dams are authorized for the purpose of aiding commercial navigation, the pools of convenience behind each lock and dam have become closely linked to the operations and water supply needs of several municipal and commercial entities (Figure 6). No agreements exist between the U.S Army Corps of Engineers and these entities regarding water supplies.

Decades ago, the raw water intake for the City of Wilmington was moved upstream on the Cape Fear River behind Lock and Dam Number One in Bladen County. This was done to support industrial, tourism, and residential growth in its service area, and to allay concerns of salt water intrusion in source water. This intake is now operated by the Cape Fear Public Utility Authority (CFPUA), which serves approximately 400,000 people across Brunswick, New Hanover, and Pender counties in southeastern North Carolina. The CFPUA's Sweeney Water Treatment Plant uses water taken from the Cape Fear River behind Lock and Dam Number One to create safe drinking water on the order of approximately 15 million gallons per day. The CFPUA is not able to meet this demand using groundwater resources alone, and considers its raw water intake in the Cape Fear River behind Lock and Dam Number One critical to its operations. Additionally, the Sweeney plant is not designed to treat groundwater. Should the three Cape Fear River locks and dams be removed, the water level in the Cape Fear River may not be compatible with the CFPUA's existing infrastructure. Furthermore, the cost to the CFPUA of identifying and implementing alternate raw water sources may be tremendous and burdensome on its customer base.

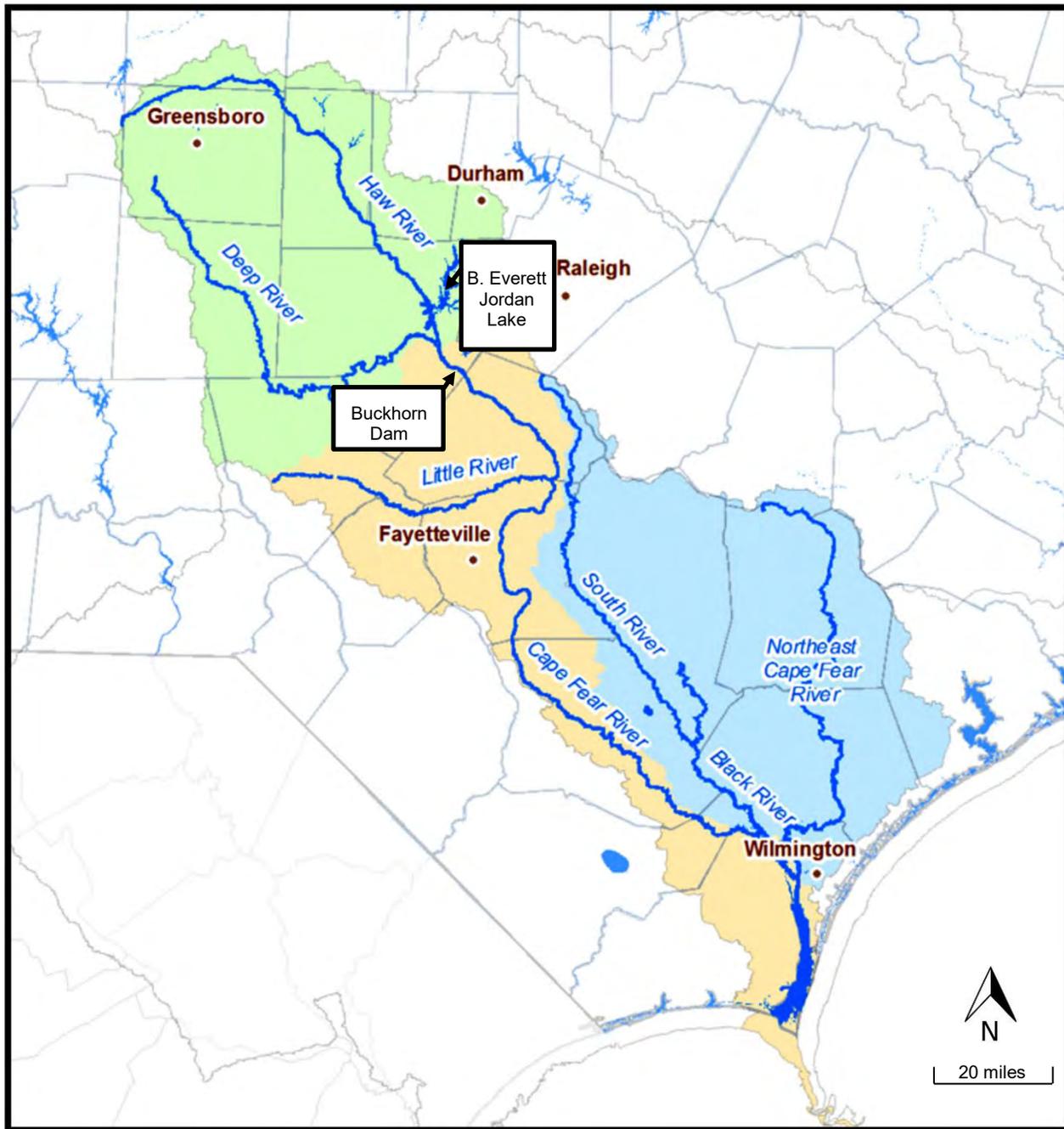


Figure 5: Cape Fear River Watershed

<http://cfra-nc.org/cape-fear-river/>

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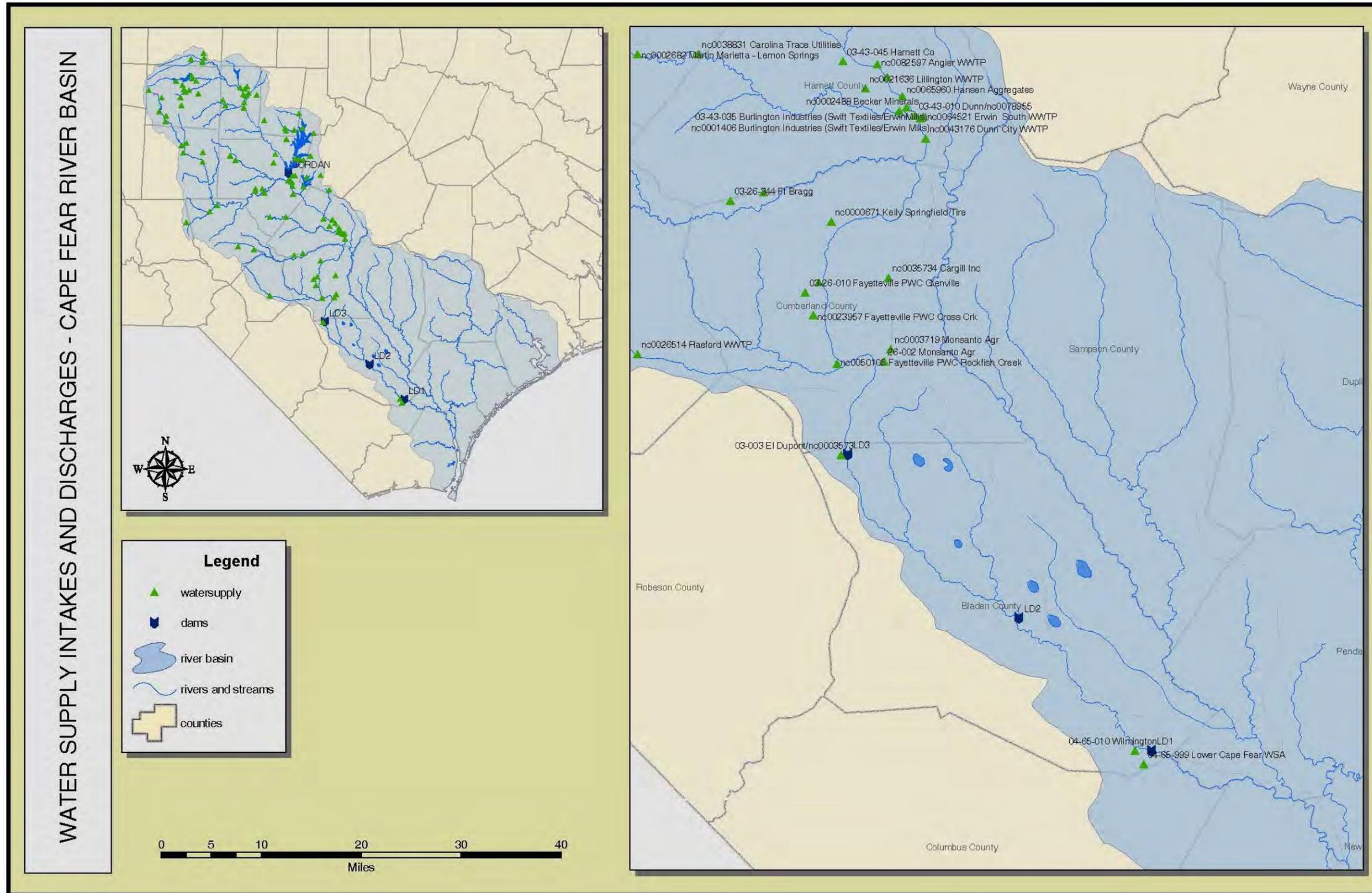


Figure 6: Water Supply Intake Locations in Cape Fear River Basin

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The Lower Cape Fear Water and Sewer Authority (LCFWASA) owns and operates two water supply facilities along the Cape Fear River—Kings Bluff, a raw water intake system located above Lock and Dam Number One, and Bladen Bluffs, a raw water intake and water treatment plant above Lock and Dam Number Two. LCFWASA is a regional organization with sponsoring members representing Bladen, Brunswick, Columbus, New Hanover, and Pender Counties, and the City of Wilmington. The Kings Bluff Raw Water Pump Station obtains water from the Cape Fear River via two raw water intake pipes located just above Lock and Dam Number One in Bladen County. The 100 million gallons per day (MGD) capacity at Kings Bluff station conveys raw water by various raw water transmission mains to several governmental and industrial users in southeastern NC, including Brunswick and Pender Counties and has an interconnection with the CFPWA water system, and would be severely impacted similarly to CFPWA if Lock And Dam Number One were to be removed. LCFWASA also owns and operates the Bladen Bluffs Regional Surface Water System, which is comprised of a raw water intake and water treatment plant located upstream of Lock and Dam Number Two that currently provides treated water to the Smithfield Packing facility near Tarheel in Bladen County. The Bladen Bluffs system includes a 30 MGD raw water intake and a 12 MGD raw water pump station leading to the 6 MGD water treatment plant, and is scalable for future industrial, commercial, and municipal demand. Having been recently constructed in 2014, the Bladen Bluffs facility was designed such that it is not reliant on the pools created by the Locks and Dams to function, unlike the Kings Bluff intake.

The Fayetteville Public Works Commission (FPWC) owns and operates a raw water intake upstream of Lock and Dam Number Three, also in Bladen County, which currently provides water and sewer service to about 250,000 residents of Fayetteville, NC and other residents of Cumberland County. Currently, approximately 60% of Cumberland county residents are served by the FPWC. Service to 90% of Cumberland County residents, or 384,000 customers is expected by 2040. In addition, Spring Lake, Stedman, Hope Mills and portions of Hoke County and Fort Bragg are also served by the FPWC via its existing infrastructure. Expiring in 2050, the FWPC has been contracted by the Department of Defense to supply up to 16 million gallons of potable water for use at Fort Bragg. The FPWC's Glenville Lake Water Treatment Facility (WTF) has a permitted treatment capacity of 57.5 million gallons per day (MGD). The Little Cross Creek watershed supplies an estimated 4.5 MGD of raw water is available to the Glenville Lake WTF and is supplemented by pumping water from the Cape Fear River. The Cape Fear River is the only available raw water source for the P. O. Hoffer WTF. These two FPWC raw water pump stations on the Cape Fear River have a combined design capacity of 92 MGD and a combined firm capacity of 58 MGD, and withdraw water from the pool of convenience located behind Lock and Dam Number Three, which acts as a reservoir from the dam to a point approximately 29 miles upstream. Chemours, formerly owned by DuPont Fayetteville, operates an intake upstream of Lock and Dam Number Three. This intake is located about a mile upstream of the dam, but is situated low enough in the river such that it would not be adversely affected if the dam was lowered or removed.

7.4.3 Drinking Water Quality

The North Carolina Department of Environmental Quality, Division of Water Resources, formerly known as the North Carolina Department of Environment and Natural

Resources, Division of Water Quality, performs sampling on a systematic and scheduled basis to assess water quality conditions in the Cape Fear River using metrics such as turbidity, fecal coliform bacteria concentrations, pH, and dissolved oxygen. Available reports can be viewed here:

<https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/reports-publications-data#cape-fear-river-basin>

Water quality in the project vicinity ranges from poor to excellent. The water intake for the City of Wilmington and part of Brunswick County is located upstream of Lock and Dam Number One to ensure the exclusion of ocean derived salts.

For the Cape Fear River in the vicinity of the locks and dams the water quality classification is "SW", although waters downstream of Lock and Dam Number One and upstream of Lock and Dam Number Three are classified as "WS-IV". All "WS-IV" waters are protected as water supplies which are generally in moderately to highly developed watersheds.

When waters recede following heavy rainfall and storm events during which the Cape Fear River overtops its banks, the river may be expected to acquire an elevated nutrient load due to increased agricultural and runoff input. This nutrient load may lead to algal blooms, especially during warmer months and in relatively stagnant portions of the river. Algal blooms may ultimately contribute to lower available dissolved oxygen levels, associated fish kills, and increased costs associated with water treatment and water supply infrastructure maintenance.

7.4.4 Socio-economics

Bladen County is primarily rural and agricultural. Easily developed land, accessible water supply, abundant natural resources, and the aesthetic beauty of the region are the fundamental building blocks of the local economy. More detailed descriptions of the local economy and demographics of the study area are found in Section 10.3.2. This descriptive information provides insight into the study area's socio-economic characteristics, and provides part of the basis for different facets of the economic impact evaluation. <https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/reports-publications-data#cape-fear-river-basin>

7.4.5 Physiography

The Cape Fear River Locks and Dams are located in the Upper Coastal Plain with the Lower Piedmont region about 30 miles to the north. The soils are derived from underlying sediment deposits, which are dipping and thickening to the southeast. The area is characterized by broad ridge tops and numerous swamps and marshes. The drainage pattern is generally sub-parallel and is mainly developed to the north of the river. The river has been migrating southward for thousands of years and presently has captured only a few tributaries in this direction. The Cape Fear River at the CFRLD has a broad flat floodplain of nearly level soils.

7.4.6 Natural Resources

The Cape Fear River and its adjacent riparian zones, and nearby wooded areas provide habitat for a variety of wildlife including reptiles, amphibians, birds, mammals, fishes, mussels, and other classes of wildlife. Fishes, in particular, are susceptible to the influence of the CFRLD in terms of habitat continuity. Please refer to section 10.2.3 for more detailed information regarding fish and wildlife resources.

7.4.7 Threatened or Endangered Species

Multiple species Federally-listed as threatened or endangered may occur in the study area. These species include mammals, birds, reptiles, clams, flowering plants, and fish. Please refer to section 10.2.4 for more detailed information regarding threatened or endangered species. The existing rock arch rapids at Lock and Dam Number One was specifically constructed to fulfill a mitigation requirement associated with impacts to shortnose sturgeon due to in-water blasting related to improvements at Wilmington Harbor. Please refer to section 6.3 for additional information.....

7.4.8 Cultural Resources

The CFRLD are unique partly because of the river itself. In North Carolina, only the Cape Fear River could offer transportation from the Piedmont to a seaport without intervening shallow sounds. It was also the only river that could accommodate “slack water” navigation in eastern North Carolina. Lock and Dam Number One, Lock and Dam Number Two, and Lock and Dam Number Three have been documented and evaluated as eligible for listing in the National Register of Historic Places (NRHP). Please refer to Section 10.3.1 for additional information regarding the CFRLD with regard to cultural resources.

7.4.9 Navigation

Currently, recreational boats comprise the largest category of boats being locked on the Cape Fear River, albeit in very small numbers. The Cape Fear River above Wilmington has tonnage barged from terminals in Wilmington to Progress Energy at Mt. Misery and International Paper at Riegelwood, which are downstream of Lock and Dam Number One. Through the mid-nineties, recreational boats averaged 45, 20, and 16 lockages each year at Lock and Dam Numbers One, Two, and Three, respectively. Most of these lockages were for small recreational fishing craft. In recent years, this has declined dramatically, with fewer than one dozen lockages a year. Lockages will not be possible when mechanical failure of the lock gates occurs.

Commercial Cargo Trends. Traffic on the Cape Fear River between Wilmington and Fayetteville was brisk from the turn of the century to the early 1970s, when barging of wood to the lumber and paper mills in the region ended. This reduced the amount of traffic through the locks and dams and reduced the scale of the remaining barge operations. For example, as barge traffic decreased, logs were no longer available for backhaul, increasing the costs of barging on the river. Barge traffic continued through the locks and dams on a lesser scale until the 1990s, when rehabilitation of the locks and dams occurred. At that time, three river terminals in Fayetteville received barged commodities that had been locked through the Cape Fear River Locks and Dams. Liquid nitrogen was the primary product being barged up the river, while logs were barged down the river. In the early 1990s, more than 100 barges carrying a total of over

60,000 tons of products were locked through the CFRLD annually. By 1994, with the closing of International Paper's operations in Elizabethtown, North Carolina (near Lock and Dam Number Two), commercial lockages were cut in half. In 1995, only one commercial barge was locked going both up and down river at Lock and Dam Numbers One and Two, after which International Paper ceased operations. No commercial lockages have occurred since 1995.

Alternative Commercial Transportation. During rehabilitation of the locks and dams in 1994, railroads transported the liquid nitrogen shipments between Wilmington and Fayetteville. The operation of the locks was interrupted for about four months while new seals and other work were accomplished. When the locks were reopened in the fall of 1994, the railroad had absorbed the liquid nitrogen business and it did not return to the river.

8.0 ANALYSIS OF ALTERNATIVES: IDENTIFICATION, EXAMINATION, AND SCREENING OF MEASURES (FORMULATION, EVALUATION, COMPARISON, AND SELECTION OF A PLAN)

8.1 Alternative 1: No Action Plan

The existing and future condition consists of no additional Federal action on the projects (project operations would continue with no additional Federal action) operations, maintenance (O&M), repair, rehabilitation and replacement (RR&R) for the existing project. Federal O&M would continue at a declining level. RR&R would likely cease.

The dam structures and all associated amenities such as boat ramps, picnic shelters, and any other improvements as well as the acreage would remain under the ownership and maintenance of the USACE regarding future operation and management. While the funding to maintain these projects is expected to decrease due to the caretaker status (minimal amount of maintenance required for ownership), funding needs are expected to increase due to deterioration of lock and dam components. At all three Locks and Dams, deterioration of valves and miter gates would be expected. The likely future scenario, realized within 50 years, would involve a combination of gates and valves being inoperable with one or more gates and valves stuck in an open position. The No Action assumption is that upstream miter gates at all three CFRLD would be permanently closed due to damage, but upstream valves would be stuck open. Downstream miter gates would be stuck open, allowing water flow through the lock chamber. In this scenario, a few diadromous fishes may pass, but not many will pass due to the sediment and debris blocking the channel. This scenario would result in lowering of the upstream pools, with the greatest potential effects during low water periods.

Under Alternative 1, it can be expected that maintenance of recreational amenities including boat ramps, picnic shelters, and other improvements will decline and conditions would be expected to deteriorate.

In summary, significant deterioration would result in one or more of the locks failing and pools may no longer be held at levels adequate for navigation (authorized purpose) or water supply (non-authorized purpose).

Deterioration of fencing, signage, and reduction or elimination of Federal workforce presence may make trespassing more likely and increase the likelihood of injury to those trespassers and/or vandalism to the property. In addition, deterioration of warning signage and buoys could result in the public being given inadequate warning regarding the dangers of boating near the dams. A specific hazard being the hydraulic jumps, a strong circular current below the dam that can trap boats and paddle craft, at Lock and Dam Number Three and Lock and Dam Number Two.

8.2 Alternative 2: (Removal)

Deauthorize the project and dispose of real property and improvements, including removal of improvements.

This alternative would include the deauthorization of the project with disposal of all real property and all improvements at the three locks and dams. Removal of all improvements would include the deconstruction of the lock guide-walls, dams, dolphins, lock timber guides, esplanades and other in-water structures including the rock arch rapids at Lock and Dam Number One. However, the rock used to fill the scour holes at Locks and Dams One and Two would not be removed. Leaving the scour hole fill material would be less damaging to the environment than removing the material. A cofferdam would be used to ensure that the removal of all water structures would be done in the “dry” while allowing continuous flow of the Cape Fear River. All recreation features, including roads, parking lots, boat ramps, restrooms, picnic shelters, lockmaster buildings, and fishing piers, would be removed as well. Construction access would use existing roadways, and material/equipment staging would in previously-disturbed upland areas.

Following deconstruction, the dams would be removed from the USACE Dam Safety Program and all costs associated with routine inspections and maintenance would cease as these would no longer occur. This alternative would result in the loss of all three pools above the dams. All hazards to trespassers associated with the structures would be eliminated once the improvements were removed.

8.3 Alternative 3: (Recommended Plan, Transfer)

Deauthorize the project and dispose of real property and improvements, to willing non-Federal governmental entity, at no additional cost to the Federal government:

The lock and dam structures and all associated improvements such as boat ramps, picnic shelters, and any other amenities as well as the acreage would be turned over to a willing non-Federal governmental entity for future operation and management.

Once deauthorized, the dams would be removed from the USACE Dam Safety Program. All Government costs associated with routine inspections, operations, and maintenance would cease as the Government would no longer execute these functions. It is assumed that the entity assuming ownership and management will operate transferred infrastructure, improvements, amenities, etc. in a manner similar to that of the USACE.

9.0 ECONOMIC BENEFITS ANALYSIS

Recreation Facilities provide community citizens with social opportunities, physical activities, educational programs, and community pride. Access to recreational facilities is a crucial component to community health. It is important to residents to provide future generations with natural resources that are minimally impacted and recreationally enjoyable. Natural areas can facilitate multiple uses outside of flood risk management, including: outdoor recreation, environmental education, tourism, community and cultural activities, and fish and wildlife habitat preservation. Recreation features provide opportunities for various age groups and abilities to engage in physical activity, education, and social interaction.

It is frequently not possible to estimate demand directly from observed price-consumption data for publicly provided recreation. Thus, three alternate methods can be used to estimate use and willingness to pay. They are the travel cost method (TCM), contingent valuation method (CVM) and the unit day value method (UDV). Criteria to select the method to use include availability of a regional demand model, type of recreation activities affected (general or specialized), estimated annual visits and cost of proposed facilities.

From the above methods, the Unit Day Value methodology was chosen for this study, which relies on expert or informed opinion and judgment to estimate the average willingness to pay of recreational users. By applying a carefully thought-out and adjusted unit day value to estimated use, an approximation is obtained that may be used as an estimate of project recreation benefits.

Visitation numbers have been provided by on-site personnel at the CFRLD, and were interpolated to compensate for voids within any data collection. Because the recreation value rating system is point driven, USACE Wilmington District personnel employed the current Economic Guidance Memorandum (EGM) 18-03, which provides rating criteria and the associated point totals. EGM 18-03 is provided as a reference in Attachment 2. The results are listed in Table 3 below.

Table 3: Recreation Valuation, Cape Fear River Locks and Dams

Criteria	Maximum Total Number of Points Allowed	Points Assigned	Rating Logic
Recreation Experience	30	10	<i>Activities include fishing, visitation to the fish passage (LD1), wildlife/bird viewing, and boat launching</i>
Availability of Opportunity	18	3	<i>There are several similar activities within 30 minutes to 1 hour travel time that offer equivalent experiences</i>
Carrying Capacity	14	8	<i>There is well maintained parking and a boat launch , perhaps the best public facility within the travel area (per Availability of Activity criteria)</i>
Accessibility	18	11	<i>There are good signage and well-maintained roads to the site</i>
Environmental Quality	20	9	<i>Given it's rural location, the aesthetics can be seen as 'above average', with very few limiting factors, beyond project specific functionality</i>
Sum	100	41	
Unit Day Value Per Visit*	\$12.15	\$7.70	
Average Visitation**	81,280	81,280	
2018 \$ Value of Recreation	\$987,552.00	\$625,856.00	

**UDV and NED Determined independent of Regional Multiplier Model, Based On District Employee Elicitation ** Mean visitation determined from available data for years 2000-2017 (18 years)*

In addition to analysis conducted by Wilmington District staff, USACE performs an economic analysis employing an Economic Impacts model that measures theoretical Regional Economic growth as a function of multiplied impacts. The main theory behind these multiplier effects is that dollars spent during an activity will multiply as they are transferred from sector to sector. For example: a person on a fishing trip would potentially spend money to purchase fuel, which theoretically contributes to the salary of the gas station employee, who would then use that salary to purchase goods and services, perpetuating the same cycle. As this cycle continues, the direct benefits/impacts lessen. These impacts are typically direct or indirect/induced.

While the Regional Economic benefits aren't prescribed as a variable in quantification of any benefit cost ratio, per USACE guidance, it's important to understand that monies generated by quantifiable activities have a rippling impact throughout the adjacent areas. The results from the latest (2016) Regional Economic model are listed in Table 4 below.

Table 4: Regional Economic Impact, Cape Fear River Locks and Dams, Indexed to 2018 Dollars

Category	2016 Dollars	2018 Dollars
Visitation Per Year Results (Estimated)		
Visitor Spending Within 30 Miles of Project	\$1,400,000	\$1,465,000
Sales Within 30 Miles of Project	\$843,000	\$882,000
Jobs Created Within 30 Miles of Project	14	14
Labor Income Created Within 30 Miles of Project	\$368,000	\$385,000
Net Increase in National Economic Development as a result of visitation	\$393,000	\$411,000
Regional Impacts With Multiplier Effects (Estimated)		
Total Spending	\$1,846,000	\$1,931,000
Total Sales	\$1,306,000	\$1,366,000
Total Jobs Created	18	18
Total Labor Income	\$493,000	\$516,000
Total Increase of Value Added	\$690,000	\$722,000

<http://www.corpsresults.us/recreation/fastfacts/lake.cfm?LakeID=67>

Regional Results are produced independently of the Wilmington District personnel UDV analysis, and would theoretically decrease or increase as the Unit Day Value changes. In the case of the Cape Fear River Lock and Dam project, Wilmington District personnel calculated a higher value for individual visitation, so the result would most likely result in higher spending and multiplier effects.

Aside from visitation and recreation facilities, economic benefits to surrounding municipalities may have ties to the pools behind the CFRLD. For example, future

economic growth in the Fayetteville, NC area depends on water supply to attract new industries which may require large quantities of water to conduct operations. These new industries may offer gainful employment to residents of the greater Fayetteville area.

9.1 Real Estate Analysis

The CFRLD are suitable for uses such as municipal and industrial water supply, public recreation, and other uses. The CFRLD have commercial value, but it is not likely to be substantial. The lack of commercial traffic in the Upper Cape Fear River eliminates a significant portion of income potential from use of the lock system. Real estate valuation studies are complete and contained in the Real Estate Appendix (Appendix A). The State of North Carolina has passed a statute to take over the locks from USACE, if the disposal is approved by Congress. It is anticipated that no other military, federal, local governmental or private entities will have an interest the properties. Given the remote nature of the facilities, it is unlikely that the McKinney Homeless Act will be invoked. See Real Estate Appendix (Appendix A) for more details.

9.2 Selection of the Recommended Plan

The selection of the Recommended Plan was based on the collection and analysis of data and information on potential positive and negative outcomes, and its evaluation and comparison in the document, and as summarized in Table 5, the “System of Accounts”. Those accounts are National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE). Life-Safety is covered under OSE. The System of Accounts analysis also requires an assessment of an alternative’s acceptability, completeness, effectiveness, and efficiency (cost-effectiveness).

Selection of the Recommended Plan rationale follows the System of Accounts matrix and analysis thereof.

9.3 Risks and Uncertainties

Risks and uncertainties associated with Alternative 1, the No Action Plan, are primarily related to the availability of sufficient future Federal funding for the projects, particularly for operations, maintenance, repair, rehabilitation and replacement (OMRR&R), and the role of OMRR&R in keeping the projects fully functional, and as resistant to failure as is possible. In the absence of sufficient Federal funding, there is some chance that one or more structures may fail in a No Action scenario, with subsequent effects that may include: impacts to the channel’s wetted perimeter, flow from the channel into adjacent floodplains, potential effects on neighboring wells, effects on riparian vegetation and species, and potential effects on groundwater behavior. The effects on water supply in the event of failure are more certain: the loss of storage and intake reliability, to approximately 600,000 persons in the region, supplied by public utilities providers. The effects on recreation are uncertain, but maintenance of recreation facilities would decline and/or cease entirely. Amenities such as picnic shelters, restrooms, etc. are likely to fall into disrepair, be rendered unsafe and unusable.

Risks and uncertainties associated with Alternative 2 (Removal) deauthorize and dispose of project improvements, are many. The removal of the locks and dams will result in the

loss of their pools, with subsequent impacts to the channel's wetted perimeter, flow from the channel into adjacent floodplains, potential effects on neighboring wells, effects on riparian vegetation and species, and potential effects on groundwater behavior. The effects on water supply are more certain: the loss of storage and intake reliability, to approximately 600,000 persons in the region, supplied by public utilities providers. Impacts to the recreational facilities would be relatively certain: demolition and removal of all improvements such as picnic shelters, restrooms, fishing piers, etc. is likely.

Risks and uncertainties associated with Alternative 3, (Recommended Plan, Transfer) deauthorize and dispose of the projects to a willing governmental entity, are fewer, and potentially much less impactful than either Alternative 1 or Alternative 2. The System of Accounts analysis indicates much more certain outcomes for the many stakeholders utilizing the assets the projects provide. The greatest uncertainty associated with Alternative 3 is the ability of the State of North Carolina to staff and fund the projects sufficiently to ensure the project assets provide the current level of positive outcome for the many stakeholders the projects serve.

Uncertainties associated with climate change were found to have little impact on Alternative 3, but greater uncertainty with Alternative 2, due to loss of the pools, and hence, potential effects on water supply, particularly during drought.

The System of Accounts analysis is summarized in Table 5. This table presents the analysis of each factor that might be affected by Alternative 1, No Action; Alternative 2, the deauthorization removal of improvements (Removal) alternative; and Alternative 3, the Disposal (Transfer) to a willing non-federal governmental entity.

Table 5: System of Accounts Analysis

Item	Alternative 1 – No Action (For purposes of this table, assumption is that future funding will decline resulting in mechanical failure of lock gates.)	Alternative 2 – Disposal (Removal; Removal of all improvements except for scour hole fill material.)	Alternative 3 – Disposal (Transfer; For purposes of this table, assumption is that the Cape Fear River Locks and Dams will be managed by new owner in a manner similar to current USACE operations.)
Regional Economic Development			
Impact on Sales Volume	Status quo maintained No effect to sales volume.	Local businesses offering equipment, food, or conveniences near the study areas may be negatively affected.	No effect as compared to current conditions.
Impact on Income	Status quo maintained. No effect to income.	Local businesses offering equipment, food, or conveniences near the study areas may be negatively affected.	No effect as compared to current conditions.
Impact on Employment	Status quo maintained. No effect to employment.	Businesses inextricably tied to the CFRLD would be negatively affected.	No effect as compared to current conditions.
Tax Changes	Status Quo maintained. No effect to taxes.	No effect to taxes.	No effect as compared to current conditions.
PLAN	No additional Federal Action taken.	Deauthorization, Demolition of Improvements, and Disposal of Real Property.	Deauthorization, Disposal of Property to Willing non-federal Governmental Party.

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 – No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
National Economic Development Account			
Average Annual Damages Prevented	\$0	\$0	\$0
Emergency Costs Avoided	\$0	\$0	\$0
Recreation	Direct recreation provides an estimated \$625,856 per year to NED.	This alternative would continue to provide some benefit, but not at level of existing projects. Would render downstream fishing piers useless. Fishing near dams would be impacted.	Direct recreation provide an estimated \$625,856 per year to NED, although this may change under new ownership and management.
Total Beneficial Impacts	\$722,000	\$ unknown at this time.	\$722,000
Initial Project Cost, Including Real Estate	\$0, with continuing project costs of an estimated \$450,000 for O&M.	\$36,583,000 (ROM) for de-construction with no later cost for O&M of projects.	Reduction in Federal expenditure of an estimated \$450,000 per year for O&M.
Interest During Construction	N/A	N/A	N/A
Economic Costs for BCR	N/A	N/A	N/A
Average Annual First Cost	N/A	N/A	N/A
Annual O&M	Estimated \$450,000 per year	No O&M costs	Estimated \$450,000 per year
Total Avg. Annual Costs	N/A	N/A	N/A
Benefit-Cost Ratio	N/A	N/A	N/A
Average Annual Net Benefits	N/A	N/A	Estimated \$175,856 per year

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
National Economic Development Account			
Effects on Commercial Navigation	May allow for continued commercial navigation; however, no future commercial navigation is likely. Decreases in future funding may result in no lockage	Alternative would result in complete loss of commercial navigation	May allow for continued commercial navigation; however, no future commercial navigation is likely.
Effects on Small Boat Navigation	May allow for continued small boats; however, no future commercial navigation is likely. Decreases in future funding may result in no lockage	Alternative would result in complete loss of commercial navigation lockage, but would allow for unimpeded passage for very small boats	May allow for continued small boat navigation; however, no future commercial navigation is likely.
Environmental Quality Account			
Physical Environment			
Sediments	Upstream miter gates at the CFRLD would be permanently closed due to damage, but upstream valves would be stuck open. Downstream miter gates would be stuck open, allowing water flow through the lock chamber. This would result in resuspension of some sediments held behind the dam and carried through the lock chamber, along with some areas downstream having increased shoreline erosion and other areas downstream experiencing greater sediment deposition.	Would result in release of sediment from behind each of the CFRLD structures. Since it is expected that each of the dam features would be removed incrementally over many years, the effects from any suspended sediment within the water column would be minor. Removal would be conducted using condition-appropriate turbidity barriers. After removal, some sediment may be expected to migrate downstream during high flow events, settling out in lower velocity areas downstream.	No effect as compared to current conditions. Accreted sediments behind the CFRLD would continue to remain in place and would not be reintroduced into the water column.

Cape Fear River Locks & Dams
 Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Physical Environment			
Geology and Aquifers	<p>With failure of the locks in the future some drawdown of the pool behind the dam would occur. As a result of this pool drawdown there could also become an increased reliance on groundwater and area aquifers.</p>	<p>Would result in the lowering of the pools that currently exist behind the existing Locks and Dams which could be more dramatic especially during times of drought conditions. This lowering of the pools could affect upstream water intake structures and may result in increased reliance on groundwater and area aquifers. Aquifer over pumping, which leads to lowering of the water level below the top of the aquifer, may initiate aquifer dewatering. Dewatering induces compaction of the aquifer with the resulting loss of pore space. Dewatering also introduces air into the aquifer and may cause a permanent loss of yield. Dewatering causes other problems for water wells relating to lowering water levels. As the water level declines, pump intakes must be lowered and additional wells may have to be drilled to supply the same amount of water to municipalities and commercial interests.</p>	<p>No effect as compared to current conditions.</p>

Cape Fear River Locks & Dams
 Section 216 - Disposition Study

Item	Alternative 1 – No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Physical Environment			
Water Quality	<p>Upstream miter gates at the CFRLD would be permanently closed due to damage, but upstream valves would be stuck open. Downstream miter gates would be stuck open, allowing water flow through the lock chamber. This open gate scenario would result in resuspension of sediments held behind the dams once the gates are open. The sediment being held behind the dams will begin to be washed downstream causing temporary increases in turbidity followed by new sediment deposition areas within the Cape Fear River as settling occurs. These impacts are expected to be considered minor and temporary. Algal blooms may occur in areas of low water velocity, especially during drought conditions, which may contribute to relatively low dissolved oxygen levels.</p>	<p>May result in temporary and minor impacts to water quality. Turbidity may increase during lock and dam removal operations, but impacts would be expected to be very minor and temporary. During the removal process proper turbidity curtains would be used to minimize impacts. No violations of State water quality standards would occur. Living aquatic resources dependent upon good water quality should not experience significant adverse impacts due to water quality changes from lock and dam removal. All required water quality permits and analyses would be executed prior to the commencement of any removal activities, pursuant to the requirements of the Clean Water Act. Additionally, algal bloom effects to water quality would be reduced due to decreased water residence time, which may also reduce low dissolved oxygen events.</p>	<p>No effect as compared to current conditions. Algal blooms may occur in areas of low water velocity, especially during drought conditions, which may contribute to relatively low dissolved oxygen levels.</p>

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Physical Environment			
Water Supply	<p>Failure of locks, which would result in reduction of the pools behind the CFRLD. Pool reduction, especially during flow periods, would significantly affect the ability of water systems utilizing the pools behind the locks and dams to withdraw water.</p>	<p>The loss of pools, would negatively affect water supply and the ability of current water supply infrastructure to function properly. Of the six water supply intakes, only the LCFWASA Bladen Bluffs intake behind Lock and Dam Number Two and the Chemours (DuPont) intake behind Lock and Dam Number Three would remain operational. The remaining four existing water supply structures would not be able to withdraw water under low-flow/ drought conditions, and modifications to maintain operations could become costly for each water supply entity. The removal of locks and dams would adversely affect hundreds of thousands of water users in the Lower Cape Fear Region. In the case of the Fayetteville Public Works Commission (FPWC), public health for approximately 250,000 people in FPWC’s service area depends on the pool behind Lock and Dam Number Three. In addition to physical limitations of FPWC’s water intake to accommodate the loss of the pool, quantitative assessments of water availability behind Lock and Dam Number Three by the N.C. Division of Water Resources (NCDWR) are greatly enhanced due to consideration of that storage pool (compared to a free-flowing stream assessment). Without NCDWR’s consideration of this pool, FPWC’s 2060 future water needs would greatly exceed its available supply. Additionally, there is no water supply allocation from Jordan Lake available to the FPWC. Therefore, FPWC is nearly entirely dependent on the maintenance of the water supply pool maintained by Lock and Dam Number Three for its current and future water supply needs. Additionally, should Lock and Dam Number One be removed, the Cape Fear Public Utility Authority (CFPUA) risks losing access to its Sweeney Water Treatment Plant surface water allocation, and the Lower Cape Fear Water and Sewer Authority’s Kings Bluff intake would be impacted. Additionally, the removal of Lock and Dam Number One could potentially allow salt water to migrate farther upstream in the Cape Fear River during more severe droughts and could compromise CFPUA’s raw water supply.</p>	<p>No effect as compared to current conditions.</p>

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Physical Environment			
Air Quality and Noise	No effect on air quality and noise as compared to current conditions; however, if cultural festivals and gatherings chose to relocate, noise would be reduced.	Would temporarily affect air quality and noise as the locks and dams and associated infrastructure are mechanically removed. The direct and indirect emissions associated with Alternative 2 would be below prescribed de minimus levels and noise will only be elevated during construction. Additionally, the project areas are located in relatively remote areas with few residences nearby and construction activities would have little overall effect on quality of life for Bladen County residents.	No effect as compared to current conditions.
Climate Change and Sea Level Rise	No effect from climate change within the project areas, as compared to current conditions. However, saltwater intrusion into groundwater and aquifers may occur.	May alter flooding regimes and frequency of waters overbanking the Cape Fear River to a small degree. Sea level rise may affect river water elevation and force brackish water to reach locations in the Cape Fear River upstream of the current brackish water extent.	No effect as compared to current conditions; however, salt water intrusion into groundwater and aquifers may occur in the future should sea level rise. Sea level rise may affect river water elevation and force brackish water to reach locations in the Cape Fear River upstream of the current brackish water extent.
Hazardous, Toxic, and Radioactive Wastes (HTRW)	No effect regarding HTRW concerns in the project areas as compared to current conditions.	May introduce HTRW substances into the water column that have accreted behind dams; however, additional information is needed to fully understand the effects of sediment mobilization.	No effect as compared to current conditions.

Cape Fear River Locks & Dams
 Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Biological Environment			
Wetlands and Floodplains	<p>Failure of the locks would have no effect on flooding in the immediate surrounding areas since the CFRLD are not designed for flood control, but wetlands may be affected due to changes in the water table. A review of the FEMA flood map for all three CFRLD indicates they are located in the FEMA designated Flood Zone AE, which means that they are within the 100-year flood plain. Surrounding wetlands that are directly abutting the lock and dam features would be impacted by the lowering of the pool level behind the locks and dams. This impact would be expected to be minor and contained to areas located adjacent to the CFRLD. The effect could be a negative impact to area floodplain wetlands that may no longer have the same hydrologic connectivity which could possibly change the wetland dynamic and the overall function of the wetland.</p>	<p>Would alter the flooding regime of wetlands in the immediate vicinity of the study areas. The flooding of these wetlands could be altered as compared to current conditions due to lowering of the river elevation in the study areas. There may be a minor adverse effect to wetlands and floodplains in terms of reduced wetlands surface area/acreage.</p>	<p>No effect as compared to current conditions.</p>
Vegetation	<p>Minor negative impacts to vegetation may be caused by changes in the hydrology of the area directly adjacent to the lock and dam experiencing a mechanical failure due to the lowering of the pool behind the dam and a decrease in wetted perimeter around the area.</p>	<p>May be expected to gradually change the vegetation in the immediate vicinity of the study areas to accommodate new hydrologic conditions associated with lowering of the water level in the river. It is unknown if hydrologic conditions presented by locks and dams removal would favor invasive flora species.</p>	<p>No effect as compared to current conditions.</p>

Cape Fear River Locks & Dams
 Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Biological Environment			
Fish and Wildlife	<p>Lock failures will result in negative effects on fish resources. Locking of fish would be impossible with inoperable lock gates. The effect on invasive aquatic species in the area is unknown. There would be no effect on benthic resources terrestrial wildlife.</p>	<p>Would remove three barriers to diadromous fish passage in the Cape Fear River and may make available additional benthic habitat upstream until reaching Buckhorn Dam (Figure 5). The former pools behind the structures would be lowered and river levels would fall. It is possible that lower water levels, as compared to current conditions, would be more susceptible to summer heating and dissolved oxygen depletion, which may negatively affect aquatic species; however, increased water flow velocity in the absence of pools behind the three locks and dams may likely dissipate these potential negative effects. Although not expected, salt water intrusion upstream of the current location of Lock and Dam Number One may occur with future sea level rise, changingf the habitable ranges of particular fish species in terms of salinity tolerance. This alternative would have no effect on terrestrial wildlife.</p>	<p>No effect as compared to current conditions. Diadromous fish passage would continue to prove challenging and inefficient for diadromous fishes with the CFRLD in place. Fish passage measures only exist at Lock and Dam Number One. Diadromous fishes would remain dependent on locking at Lock and Dam Number Two and Lock and Dam Number Three. There would be no effect on terrestrial wildlife.</p>

Cape Fear River Locks & Dams
 Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Biological Environment			
Threatened and Endangered Species	<p>With lock failures, the CFRDL would no longer be able to lock fish and facilitate with diadromous fish passage. This could have a direct negative effect on both Atlantic and shortnose sturgeon. There would be no effect on other threatened or endangered species in the project area.</p>	<p>Would remove barriers to endangered sturgeons and other diadromous fish in the Cape Fear River and may make additional benthic habitat available. The former pools behind the structures would be lowered and river levels would fall. Sturgeons typically require at least 4-feet of water depth to adequately function. It is possible that lower water levels, as compared to current conditions, would be more susceptible to summer heating and dissolved oxygen depletion, which may negatively affect aquatic species; however, increased water flow velocity in the absence of pools behind the three locks and dams may likely dissipate these negative effects. Additionally, the increased flow velocities resulting from the removal of the locks and dams may uncover historic sturgeon spawning habitat by removing sediments that have accumulated over the past century or so. There will be no effect on the Northern long-eared bat, the Red-cockaded woodpecker, the Wood stork, the American alligator, the Atlantic pigtoe, the American chaffseed, Pondberry, and Rough-leaved loosestrife as the habitat types used by these species, specifically, would not be altered.</p>	<p>No effect as compared to current conditions. Diadromous fish passage would continue to prove challenging and inefficient for Atlantic and Shortnose sturgeons at Lock and Dams Two and Three.</p>

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Cultural and Operational Environment			
Cultural Resources and Tribal Interests	No effect on tribal interests in the project areas as compared to current conditions; however, properties eligible for listing on the National Register of Historic Places may be negatively affected.	Would remove elements of the locks and dams, currently deemed eligible for inclusion on the National Register of Historic Places under criteria A and C. Close coordination with the North Carolina State Historic Preservation office and Office of State Archaeology would be completed prior to removal. There would be no effect to tribal interests.	No effect as compared to current conditions.
Socio-Economics	There could be negative effects to the socioeconomics of surrounding areas in terms of potential job loss and increased utility costs if the water intakes for any dependent commercial/municipal entities were negatively affected by the lowered pool levels.	There would be negative impacts to employment opportunities for lock masters and recreational facility maintenance workers where the infrastructure supporting these professions would be eliminated. Additionally, utility costs would increase as new water supply sources/infrastructure are explored/modified.	No effect as compared to current conditions.
Demographics and Environmental Justice	There could be negative effects on demographics or environmental justice in the study area with lock failure. Numerous low or no cost recreation and water access opportunities could be eliminated or changed for local residents. Loss of these opportunities may disproportionately affect minority communities and those of lower economic status. Utility costs may increase due to the need to modify water supply infrastructure or seek new water sources should pools be lowered.	There would be negative effects on demographics or environmental justice in the study area with removal. Numerous low or no cost recreation and water access opportunities would be eliminated for local residents. Loss of these opportunities may disproportionately affect minority communities and those of lower economic status. Utility costs would increase due to the need to modify water supply infrastructure or seek new water sources should pools be eliminated.	No effect as compared to current conditions.

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Cultural and Operational Environment			
Agriculture and Silviculture	Could have a negative effect on agriculture or silviculture in the project areas as compared to current conditions, during times of severe drought and should pool levels fall. Water scarcity would stress crops/timber.	Could have a negative effect on agriculture or silviculture in the project areas as compared to current conditions, during times of severe drought and should pools be eliminated. Water scarcity would stress crops/timber.	No effect as compared to current conditions.
Recreation	May have a negative effect on recreation in the project areas. As funding is expected to continue to decline, the recreation facilities such as boat ramps, restrooms, picnic shelters and fishing piers may fall into disrepair due to lack of funding and may have to be closed, or otherwise rendered unusable due to public safety concerns. Annual community and cultural events held at the locks and dams, such as the 'East Arcadia Blue Monday Shad Fry' would be forced to cease or find other suitable venues. Access to free public recreation and water access at the CFRLD would be altered or eliminated.	Would include removal of fishing areas, piers, picnic facilities, boat ramps, and other public recreation opportunities in the project area. The recreating public, especially in terms of fishing, boating, sightseeing, and picnicking, would lose free recreation opportunities. Removal of the recreational facilities would reduce free public access to the river for boat launching or bank fishing by half in Bladen County and one-third along the Cape Fear. Recreational businesses relying on existing infrastructure would be negatively affected as well. Annual community and cultural events held at the locks and dams, such as the 'East Arcadia Blue Monday Shad Fry' would be forced to cease or find other suitable venues.	No effect as compared to current conditions.
Aesthetics	Negative effect to aesthetics as facilities deteriorate. Provided funding will decrease which will reduce the ability to perform maintenance.	Would impact aesthetics by removing large in-water structures and other amenities associated with the CRFLD. Riverbanks in the study area would also become exposed. Exposed riverbanks may become colonized by natural or invasive vegetation where the maintained lock and dam areas once existed.	No effect as compared to current conditions.

Cape Fear River Locks & Dams
 Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 -Disposal (Transfer)
Cultural and Operational Environment			
Lock and Dam Operations	<p>Would result in reduction or suspension of OMRR&R and loss of public recreational opportunities. Reduction in OMRR&R will contribute to deterioration of lock gates to include loss of function.</p>	<p>Would deauthorize and remove all improvements from the Cape Fear River and associated lands and terminate all operations. Removal of all improvements would include the deconstruction of the lock guide-walls, dams, dolphins, lock timber guides, esplanades and other in-water structures including the rock arch rapids at Lock and Dam Number One. However, the rock used to fill the scour holes at Locks and Dams One and Two would not be removed.</p>	<p>No effect as compared to current conditions. Operations are assumed to continue in a manner similar to the current USACE operations.</p>

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Other Social Effects Account			
Security of Life, Health, and Safety	Failure of locks and decreased maintenance for recreational facilities may result in negative impacts such as loss of life due infrastructure failure (different water levels and flow rates near shoreline), or the creation of unsafe conditions for the recreating public.	Drowning and other life-safety risks would be reduced with removal of in-water structures.	No effect as compared to current conditions.
Preserves Historic Importance	Properties eligible for listing on the National Register of Historic Places may be negatively affected as provided operations and maintenance funding decreases.	Would remove elements of the locks and dams, currently deemed eligible for inclusion on the National Register of Historic Places. Close coordination with the North Carolina State Historic Preservation office and Office of State Archaeology would be completed prior to removal. There would be no effect to tribal interests.	No effect as compared to current conditions.
Maintains Social Bonds/Connections	Social recreation areas and opportunities may be lost as funding declines in the future.	May impact some degree of social bonds/connections should loss of pools and recreation areas not draw as many local residents. Additionally, free social recreation areas and opportunities would be lost.	No effect as compared to current conditions.
Community Cohesion	Community cohesion may be negatively affected as funding declines in the future.	This alternative would negatively affect day-to-day recreation and cultural/social festivals, such as the annual “Blue Monday Shad Fry”	No effect as compared to current conditions.
Minimizes Risks to Life and Safety	Failure may result in negative impacts, such as loss of life, due to infrastructure deterioration/failure or the creation of unsafe conditions for the recreating public.	Removal would reduce risks of drowning and falls from structures.	No effect as compared to current conditions.

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Other Social Effects Account			
Minimizes Excessive Flood Depths	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.
Promotes resiliency	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.
Tax Values	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.
Community Growth/Economic Vitality	Alternative will have negative effect due to reduction in water supply availability (pool lowering) and degradation of recreational facilities.	Alternative will have negative effect due to reduction in water supply availability (pool elimination) and employment opportunities, and degradation of recreational facilities.	Alternative is not anticipated to have any positive or negative effect.
Property Values	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.
Public Facilities	Alternative will have negative effect due to degradation of recreational facilities.	Low cost recreational opportunities (picnicking, fishing pier use) would be lost.	Alternative is not anticipated to have any positive or negative effect.
Public Services	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.	Alternative is not anticipated to have any positive or negative effect.

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Other Social Effects Account			
Required Criteria (ER 1105-2-100):			
a. Acceptability	Plan is acceptable in regard to current laws and policies	Plan is acceptable in regard to current laws and policies	Plan is acceptable in regard to current laws and policies
b. Completeness	Alternative is not a complete solution to identified problem set, as it would affect water supply through pool level reduction.	Alternative is not a complete solution to identified problem set, as it would cause immediate impacts to water supply through pool elimination.	Alternative is a fairly complete solution to the problem set
c. Effectiveness	No Action is an ineffective solution to identified problem set, due to long-term deterioration of the projects with substantial effects to regional water supply	Alternative is not an effective solution to identified problem set, only a solution from a Federal funding standpoint, after deconstruction	Alternative is an effective solution to identified problem set
d. Efficiency (Cost-Effectiveness; i.e., most efficient use of Federal and non- Federal Funds)	No Action is an inefficient solution to identified problems, which include continued investment of Federal funds at a project for which there is no longer a Federal purpose. Funding needs of approximately \$400,000 per year would continue to be required, for O,M,R,R&R.	Removal of the projects would require an estimated \$36,583,000, after which Federal OMRR&R would be \$0 per year. Loss of assets to local government would be substantial, due to their use as a source of water supply.	Disposal to State and local governments are an efficient way to reduce Federal expenditures, although this passes responsibility to State or local governments. Due to CFRLD use as water supply features, this is a highly efficient option to State and local government, due to the cost of alternative water supply sources.

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Other Social Effects Account			
Risk of Failure	There are risks associated with the continued presence of these projects on the Cape Fear River. Risk of failure of locks, resulting in drawdown of the pool and, is considered to be low. It is not anticipated that much life safety risk exists in that event, but it is acknowledged that the possibility exists for loss of life due to changes in flow rates. Ability to utilize water supply intakes may be affected. Risks from falls, or drowning, will always exist.	No risk of failure would remain in the event of project de- construction and de-watering of the pools, but flood risk would remain within the Cape Fear River floodplain – Dams do not affect flood risk, and do not affect flood heights or volumes. Risks from falls, or drowning, will always exist, but would be reduced under this alternative.	There are risks associated with the continued presence of these projects on the Cape Fear River. Risk of failure of one or more dams or locks, resulting in rapid drawdown of the pool, or a flood wave, is considered to be low. It is not anticipated that much life safety risk exists in that event, due to the low head and small pool, but acknowledge that the possibility exists. Risks from falls, or drowning, will always exist.
Residual Risk	There are risks associated with the continued presence of these projects on the Cape Fear River. Residual risks include potential failure of one or more dams or locks, resulting in rapid drawdown of the pool, or a flood wave. It is not anticipated that much life safety risk exists in that event, due to the low head and small pool, but acknowledge that the possibility exists. Residual risks from falls, or drowning, will always exist.	Little residual risk would remain in the event of project de- construction and de-watering of the pools, but flood risk would remain within the Cape Fear River floodplain – Dams do not affect flood risk, and do not affect flood heights or volumes. Residual risks from falls, or drowning, will always exist.	There are risks associated with the continued presence of these projects on the Cape Fear River. Residual risks include potential failure of one or more dams or locks, resulting in rapid drawdown of the pool, or a flood wave. It is not anticipated that much life safety risk exists in that event, due to the low head and small pool, but acknowledge that the possibility exists. Residual risks from falls, or drowning, will always exist.
Climate Change	No effect from climate change within the project areas, as compared to current conditions. However, saltwater intrusion into groundwater and aquifers may occur.	May alter flooding regimes and frequency of waters overbanking the Cape Fear River to a small degree. Saltwater intrusion into groundwater and aquifers may occur.	No effect; however, salt water intrusion into groundwater and aquifers may occur in the future should sea level rise.
Sea Level Rise	No effect; however sea level rise may affect river water elevation and force brackish water to reach locations in the Cape Fear River upstream of the current brackish water extent.	Sea level rise may affect river water elevation and force brackish water to reach locations in the Cape Fear River upstream of the current brackish water extent.	No effect; however, sea level rise may affect river water elevation and force brackish water to reach locations in the Cape Fear River upstream of the current brackish water extent.

Cape Fear River Locks & Dams
 Section 216 - Disposition Study

Item	Alternative 1 - No Action	Alternative 2 – Disposal (Removal)	Alternative 3 – Disposal (Transfer)
Other Social Effects Account			
Risk of Ecosystem Damage	With lock failures, the CFRLD would no longer be able to lock fish and facilitate with diadromous fish passage. Hydrology may be altered with lowered pool levels, leading to long-term vegetation changes in riparian zone and floodplain.	May result in changes in aquatic habitat and riparian habitat due to water drawdown. This may benefit diadromous fish species, but negatively affect others as wetted perimeter, aquatic acreage and volume are drawn down.	No effect.
Risk to Life and Safety.	Failure of locks and decreased maintenance for recreational facilities may result in negative impacts such as loss of life due infrastructure failure (different water levels and flow rates near shoreline), or the creation of unsafe conditions for the recreating public.	Drowning and other life-safety risks would be reduced with removal of in-water structures.	No effect as compared to current conditions.
Risk to Mental and Physical Health	There are no anticipated risks to mental and physical health associated with this alternative.	There are no anticipated risks to mental and physical health associated with this alternative.	There are no anticipated risks to mental and physical health associated with this alternative.

10.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

This section is written in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. §§ 4321–4347), as amended, the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 C.F.R. §§ 1500–1508), and the USACE Planning Regulations (Engineering Regulation (ER) 200-2-2).

The affected environment and environmental effects described below will address all three alternatives (Alternative 1: No Action; Alternative 2: deauthorization and disposal of real property and improvements, including removal of improvements (Removal); Alternative 3: deauthorization and disposal of real property and improvements to willing stakeholders (Transfer)). The recommended plan is Alternative 3 (Transfer). The affected environment includes USACE-owned real property, including all physical structures, associated with three Cape Fear River Locks and Dams (CFRLD). Moreover, resources in the areas of Bladen County and the Cape Fear River ecosystem surrounding the three CFRLD has also been taken into consideration.

10.1 Physical Resources

10.1.1 Sediments

Sediments in rivers and waterways often contain contaminants from sources within the watershed they drain. The Cape Fear River system drains a large area entirely within the State of North Carolina. The river flows from the north central piedmont region near Greensboro southeast to the Atlantic Ocean. There are more than 100 municipalities and all or portions of 27 counties contained within the basin. The most densely populated areas are near the cities Greensboro, Durham, Chapel Hill, Fayetteville, and Wilmington. Major industries in the basin include chemical manufacturing, paper and fiber, agriculture, and silviculture. The basin includes concentrated hog and turkey producing regions in Sampson and Duplin Counties. The Cape Fear River contains a concentration of industries along the lower portion of the Cape Fear River and the Cape Fear River estuary. Thus, the watershed drains rural, urban, and industrial areas. Sediments are a sink for contaminants from various sources including controlled and uncontrolled releases. Sediments sequester point and non-point pollutants or contaminants contributed by activities in the watershed. Organic and inorganic contaminants have a strong affinity for silt (fine-grained sediment) and the organic fraction of sediments. Sediments accumulate in areas where environmental conditions allow deposition, such as a quiescent areas, manmade channels and basins, and impounded reaches behind structures such as the locks and dams.

There are no regulations or sediment standards that dictate the approach used in evaluating potential sediment contamination at dam sites. However, there are well-established procedures for evaluating contaminant-related impacts from sediments proposed for dredging. These effects-based procedures are useful in evaluating potential sediment contaminant pathways and impacts. Three USACE and the U.S. Environmental Protection Agency (EPA) guidance documents are commonly utilized for this purpose:

“Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual” (EPA/USACE 1998), commonly referred to as the Inland Testing Manual.

“Environmental Effects of Dredged Material Management Alternatives – A Technical Framework” (Technical Framework – EPA/USACE 2004)

“Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual” (EPA/USACE 1991), commonly referred to as the Ocean Testing Manual.

A Tier I (EPA/USACE 1998) assessment using readily available existing information to assess the potential sediment contaminant concerns was conducted and reported in USFWS (2006). The Tier 1 reviewed databases and files maintained by State and Federal natural resource agencies. A geographic information systems (GIS) map was made which notes the proximity of pollutant sources to areas that would accumulate sediment, including impoundments behind the dams. Environmental studies for this portion of the Cape Fear River prepared by others, with an emphasis on water and sediment chemistry, were reviewed. A site reconnaissance on August 21, 2006 was conducted to determine general composition and to identify depositional areas where pollutants may accumulate. People with knowledge of the dams, the river, and local pollution sources were interviewed.

The Tier I data indicate no known significant organic or inorganic pollutant problems in an one-mile assessment area surrounding the impounded reaches of the CFRLD. Because of identified contaminant sources, the potential of the dams to trap sediments in the low gradient inner coastal plain and the overall paucity of sediment data for the assessment area, additional physical, chemical and toxicity testing of sediments from depositional areas was recommended.

A Tier II and III (EPA/USACE 1998) assessment of sediments from within the impounded reaches of three locks and dams on the Cape Fear River was conducted and reported in USFWS (2007). Sediment sampling and analyses were conducted to obtain data on the physical and chemical characteristics of the sediments behind the locks and dams to compare to sediment screening values and assess the toxicity of sediments and sediment elutriates to sensitive aquatic organisms. Twelve sediment samples from within impounded reaches of the three Cape Fear River Locks and Dams were sampled. Whole sediment toxicity tests with midges and amphipods showed no adverse effects of the sediments on test organism survival and growth. Sediment elutriate toxicity tests with sensitive aquatic organisms (cladocerans) resulted in statistically significant reductions in survival in samples from four sites. Manganese had among the strongest correlation and the most plausible biological association with the reduced survival observed.

Based on the results of sediment chemistry and toxicity tests, contamination in surface sediments behind the Cape Fear River Locks and Dams is unlikely to be a concern, should accumulated sediments remain in-place. Mobilization of sediments due to an event such as dredging or dam removal may affect water quality and turbidity.

Over nearly a century of sediment movement and accretion behind the three CFRLD, there is the possibility that sediment containing hazardous substances and compounds

have adsorbed into sediment particles and accumulated behind the three Cape Fear River locks and dams. Should the structures be removed, accumulated sediments behind them would be released and may potentially reintroduce a number of hazardous substances into the downstream water column.

Additionally, the banks of the Cape Fear River, including riparian vegetation, have become accustomed to relatively high water levels upstream of the three locks and dams due to pool formation. If the locks and dams were to be removed, or have their lock gates fixed into open positions, the pool would disappear or be significantly lowered. River banks in previously pooled river reaches would become exposed and subject to increased erosion given the exposed riverbed devoid of vegetation. Over time, vegetation would be expected to colonize these areas. Additionally, accumulated sediment behind each of the three locks and dams would be released downstream in large, one-time quantities should the locks and dams be removed. This would result in short-term increases in turbidity and the potential alteration of benthic habitat in areas where hard bottom would be covered with sediment.

Alternative 1 (No Action) does not include removal of the locks and dams, but assumes failure of locks. Upstream miter gates at the CFRLD would be permanently closed due to damage, but upstream valves would be stuck open. Downstream miter gates would be stuck open, allowing water flow through the lock chamber. This would result in resuspension of some sediments held behind the dam and carried through the lock chamber, along with some areas downstream having increased shoreline erosion and other areas downstream experiencing greater sediment deposition.

Alternative 2 (Removal) would result in release of sediment from behind each of the CFRLD structures. Since it is expected that each of the dam features would be removed incrementally over many years, the effects from any suspended sediment within the water column would be minor. Removal would be conducted using condition-appropriate turbidity barriers. After removal, some sediment may be expected to migrate downstream during high flow events, settling out in lower velocity areas downstream.

Alternative 3 (Recommended Plan, Transfer) would have no effect as compared to current conditions. Accreted sediments behind the CFRLD would continue to remain in place and would not be reintroduced into the water column.

10.1.2 Geology and Aquifers

For a general description of the local geology of the study area refer to Physiography Section 7.4.5.

The composition of the Surficial or Water Table Aquifer varies widely depending on local subsurface conditions. In general it consists of the veneer of Holocene sands and the underlying permeable materials down to the uppermost confining unit. In the study area this can range from the Peedee Confining Unit in the south down to the Upper Cape Fear Confining Unit in the north. The total thickness of the Surficial Aquifer can be as much as 150 feet. This aquifer is directly recharged by rainfall.

The Cape Fear Formation is the oldest outcropping sedimentary rock unit in the North

Carolina Coastal Plain, and the only visible outcrop in the river valleys separating the Cape Fear and Tar River. The Upper Cape Fear Aquifer underlies the entire study area and consists of essentially the same type of alternating lithological units as are present in the Lower Cape Fear Aquifer, but from the upper part of the Cape Fear Formation. The clays and silts are generally red, pink, and yellowish gray. The sands are feldspathic and are subrounded to the subangular. Accessory minerals include pyrite, marcasite, and siderite. The Upper Cape Fear Aquifer is about 40 feet thick from a few miles northwest of Elizabethtown north into southern Cumberland County. The aquifer increases to approximately 160 feet thick towards the southeast of the study area.

The Peedee Aquifer is also present in the study area, stretching southward from its northern extent near Elizabethtown. It ends just south of the center of Elizabethtown. It has a gentle southeast dip of about five feet per mile. The top surface of the aquifer is somewhat hummocky in the central part of the study area, apparently due to an erosional cut-and-fill between Quaternary and Peedee age deposits. The aquifer is generally wedge-shaped in profile, oriented northwest-southwest, and thickens towards the southeast to a maximum of approximately 160 feet. The Peedee Aquifer is often semi-confined to confined in the study area due to a lack of confining unit continuity. Recharge of the aquifer is substantial in areas where its confining layer is discontinuous. Like the Black Creek Aquifer, the Peedee Aquifer contains only fresh water in the study area. Water quality is acceptable but is not as good as in the underlying confined aquifers due to dissolved minerals. In Bladen County, the Peedee is used by the towns of Bladenboro and Clarkton for water supply. The Peedee Aquifer confining unit is present in the study area from Lock and Dam Number One to near the center of Elizabethtown. It has a maximum thickness of 20 feet in one well in Bladen County. It may reach a maximum thickness of approximately 30 feet in the study area. It thins northwestward and dies out near the center of Elizabethtown.

The Black Creek Aquifer is also present under the entire study area and consists of alternating sands and clays of the Black Creek Group. The sands are generally fine- to medium-grained, gray to olive gray, and poorly-sorted. The clays are generally gray to black and lignitic. Individual sand and clay beds are typically 10 to 20 feet thick. Beds of the Middendorf Formation may be included in this aquifer where they exist, especially in Cumberland County. The aquifer is generally confined in the uplands adjacent to the river valley. It becomes semi- confined to unconfined where the confining unit has been eroded in the river valleys, especially near Lock and Dam Number Three in northwest Bladen County and southern Cumberland County. The aquifer is approximately 150 feet thick at each of the three Cape Fear River locks and dams, and thins to less than 100 feet in Cumberland County. The aquifer is used for municipal water supply by White Lake and Elizabethtown, and is used commercially by Smithfield Foods. Recharge of the aquifer occurs from the downward movement of groundwater from overlying aquifers, especially from the Surficial Sands Aquifer where the confining unit is not continuous.

The lowest aquifer in the study area is the Lower Cape Fear Aquifer (Figure 7), which consists of hydraulically-connected alternating layers of fine- to coarse-grained poorly-sorted sand, silt, and clay from the lower part of the previously discussed Cape Fear Formation. The Lower Cape Fear Aquifer is thickest, approximately 80 feet thick, at the southeast end of the study area. This aquifer thins progressively northwestward and pinches out at depth against the basement rock several miles northwest of

Elizabethtown. Because of this pinchout and the occurrence of the Lower Cape Fear Aquifer only in the deep subsurface (approximate elevation 349 to 699 feet NAVD 1988 in the study area), it has the lowest recharge rate of the five aquifers in the study area. Outside the project study area, most of the Lower Cape Fear Aquifer contains salt water. Both fresh and salt water occur inside the study area, depending on location. The salt water occurs in the southeastern part of the study area near the Columbus/Pender County line and extends up the Cape Fear River Valley to a point several miles above Lock and Dam Number One. Here, the fresh water/salt water transition zone begins at the top of the aquifer. The amount of fresh water in the aquifer increases with distance up the valley to the end of the transition zone just south of Elizabethtown. From here northwest to where the aquifer pinches out, the aquifer contains only fresh water. The fresh water occurs in a northeast-southwest trending zone from the transition zone to the aquifer pinchout at depth several miles northwest of Elizabethtown, about midway between Lock and Dam Numbers Two and Three.

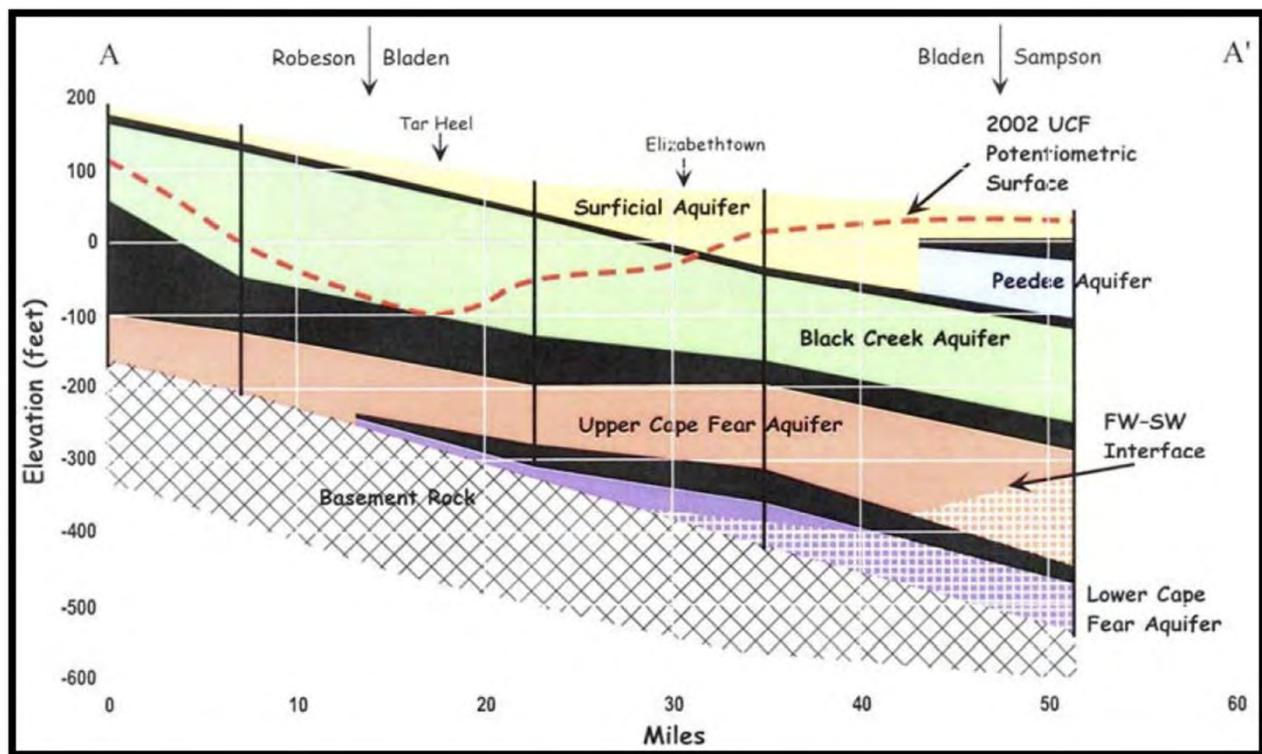


Figure 7: Hydrogeologic cross-section from west-northwest to east-southeast through Bladen County (includes study area)

Alternative 1 (No Action) does not include removal of the locks and dams, but assumes failure of locks. Upstream miter gates at the CFRLD would be permanently closed due to damage, but upstream valves would be stuck open. Downstream miter gates would be stuck open, allowing water flow through the lock chamber. With failure of the locks in the future some drawdown of the pool behind the dam would occur. As a result of this pool drawdown there could also become an increased reliance on groundwater and area aquifers.

Alternative 2 (Removal) would result in the lowering of the pools that currently exist behind the existing Locks and Dams which could be more dramatic especially during times of drought conditions. This lowering of the pools could affect upstream water intake structures and may result in increased reliance on groundwater and area aquifers. Aquifer over pumping, which leads to lowering of the water level below the top of the aquifer, may initiate aquifer dewatering. Dewatering induces compaction of the aquifer with the resulting loss of pore space. Dewatering also introduces air into the aquifer and may cause a permanent loss of yield. Dewatering causes other problems for water wells relating to lowering water levels. As the water level declines, pump intakes must be lowered and additional wells may have to be drilled to supply the same amount of water to municipalities and commercial interests.

Alternative 3 (Recommended Plan, Transfer) would have no effect on geology and aquifers as compared to current conditions.

10.1.3 Water Quality

The waters in the study area are classified by the North Carolina Division of Water Resources as SW and WS-IV downstream of Lock and Dam Number One (NCDWR 2019b; Figures 8-10).

Upstream of Lock and Dam Number One, waters are classified as WS-IV, as indicated in Figures 8-10. Upstream of Lock and Dam Number Three, waters are classified as WS-IV. Additionally, the areas surrounding Lock and Dam Number One and Lock and Dam Number Three are classified as water supply watersheds. All other waters in the study area, including those immediately in the vicinity of Lock and Dam Number Two, are classified as C. Descriptions of applicable surface water classifications are below.

Class C – Water protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.

Swamp Waters (SW) – Supplemental classification intended to recognize those waters which have low velocities and other natural characteristics which are different from adjacent streams. Water Supply IV (WS-IV) – Waters used as sources of water supply for drinking, culinary, or food processing purposes where a WS-I, II or III classification is not feasible. These waters are also protected for Class C uses. WS-IV waters are generally in moderately to highly developed watersheds or Protected Areas.

Storm water runoff reaching the Cape Fear River may contain nutrients such as nitrogen and phosphorus that serve to accelerate growth of algal species, some of which may produce toxins harmful to human health. Algal blooms are most common in relatively warm, nutrient-rich, low-velocity water bodies. The pools created upstream of the CFRD provide these conditions, especially in warmer months. In general, conditions favorable to algal growth are most common during times of drought when water levels in the river are relatively low. Algal blooms may present challenges to municipal and commercial water treatment in terms of additional treatment costs and existing

infrastructure treatment capability.

Additionally, algal blooms may alter pH and decrease available dissolved oxygen in the river. During photosynthesis, algal blooms raise water pH by increasing hydroxide levels. In this way, high pH can be a non-visual indicator of algal bloom presence and activity. During respiration, algal blooms remove dissolved oxygen from the water column, which may result in fish kills. Low dissolved oxygen conditions may also occur when a large number of algae die and are decomposed (NCDEQ 2019a).

Using molecular gene markers, recent research has demonstrated that Jordan Lake, which serves as the headwaters of the Cape Fear River, is unlikely to significantly contribute to downstream harmful algal blooms. Additionally, there is no indication that the ecology of the Cape Fear River has changed in a manner to support growth of harmful algal blooms (Polera et al., 2017).

Alternative 1 (No Action) does not include removal of the locks and dams, but assumes failure of locks. Upstream miter gates at the CFRLD would be permanently closed due to damage, but upstream valves would be stuck open. Downstream miter gates would be stuck open, allowing water flow through the lock chamber. This open gate scenario would result in resuspension of sediments held behind the dams once the gates are open. The sediment being held behind the dams will begin to be washed downstream causing temporary increases in turbidity followed by new sediment deposition areas within the Cape Fear River as settling occurs. These impacts are expected to be considered minor and temporary. Algal blooms may occur in areas of low water velocity, especially during drought conditions, which may contribute to relatively low dissolved oxygen levels.

Alternative 2 (Removal) may result in temporary and minor impacts to water quality. Turbidity may increase during lock and dam removal operations, but impacts would be expected to be very minor and temporary. During the removal process proper turbidity curtains would be used to minimize impacts. No violations of State water quality standards would occur. Living aquatic resources dependent upon good water quality should not experience significant adverse impacts due to water quality changes from lock and dam removal. All required water quality permits and analyses would be executed prior to the commencement of any removal activities, pursuant to the requirements of the Clean Water Act. Additionally, algal bloom effects to water quality would be reduced due to decreased water residence time, which may also reduce low dissolved oxygen events.

Alternative 3 (Recommended Plan, Transfer) would have no effect on water quality as compared to current conditions. Algal blooms may occur in areas of low water velocity, especially during drought conditions, which may contribute to relatively low dissolved oxygen levels.

NC Surface Water Classification

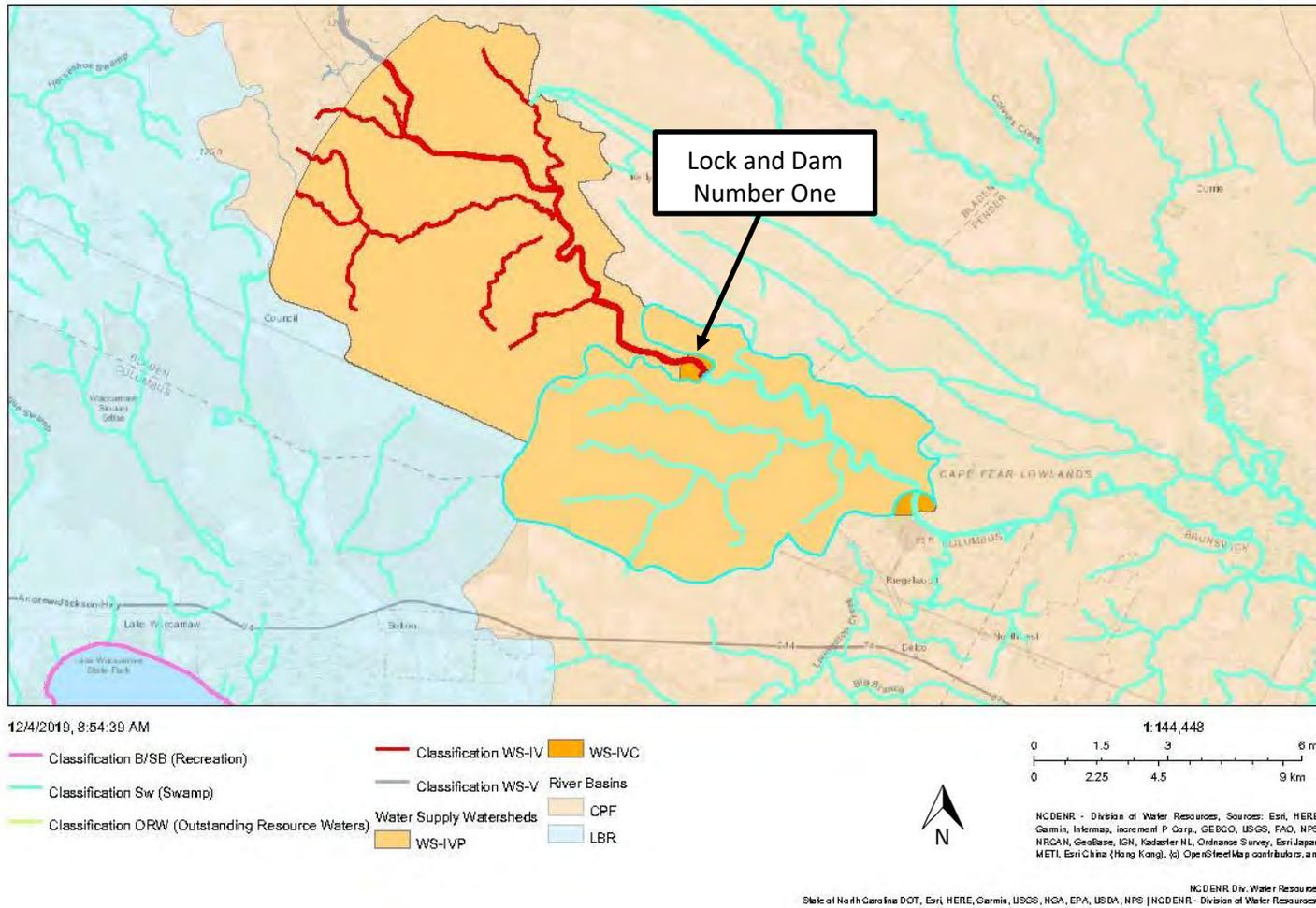


Figure 8: NCDWR Water Quality Classifications at Lock and Dam Number One

NC Surface Water Classification

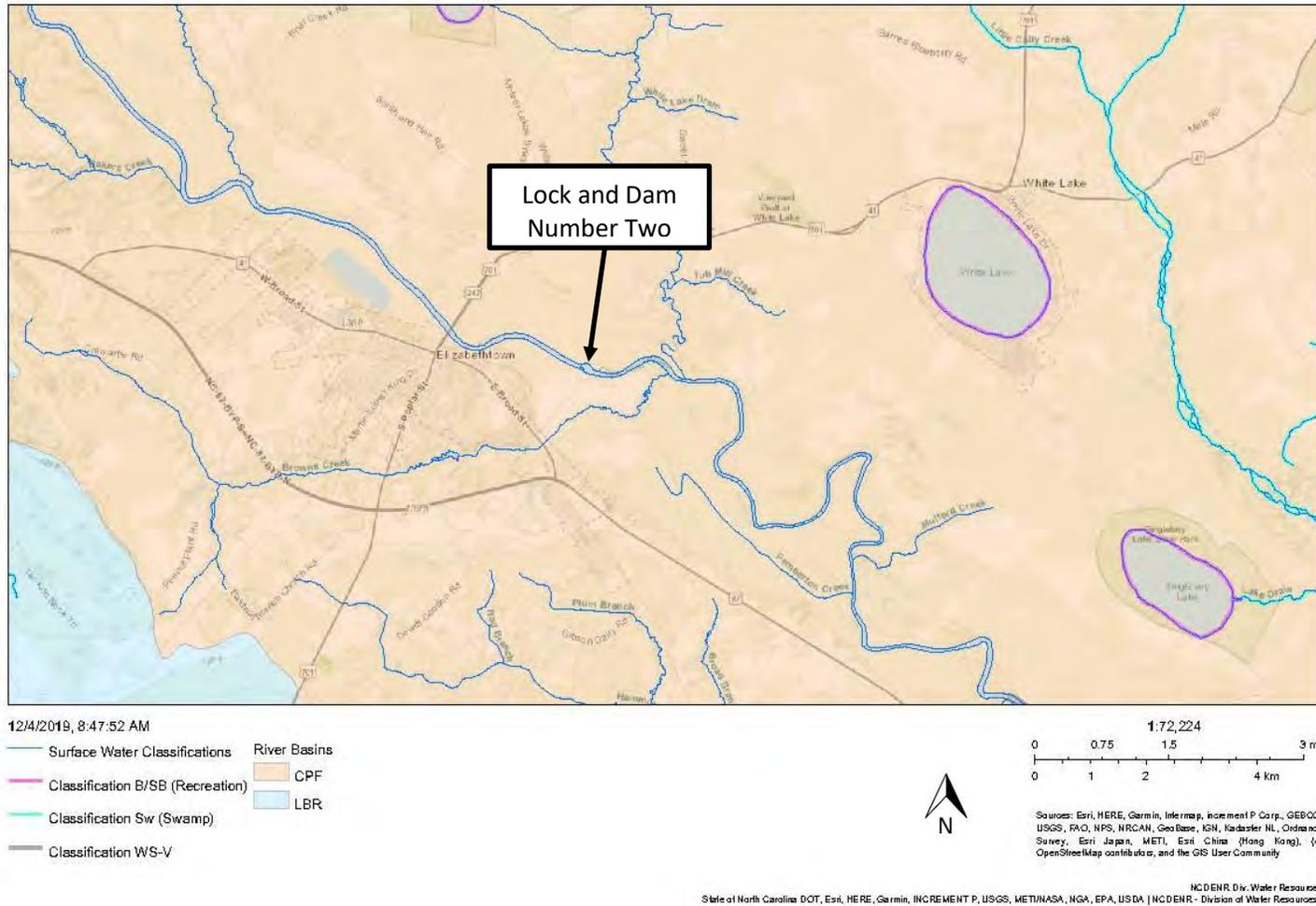


Figure 9: NCDWR Water Quality Classifications at Lock and Dam Number Two

NC Surface Water Classification

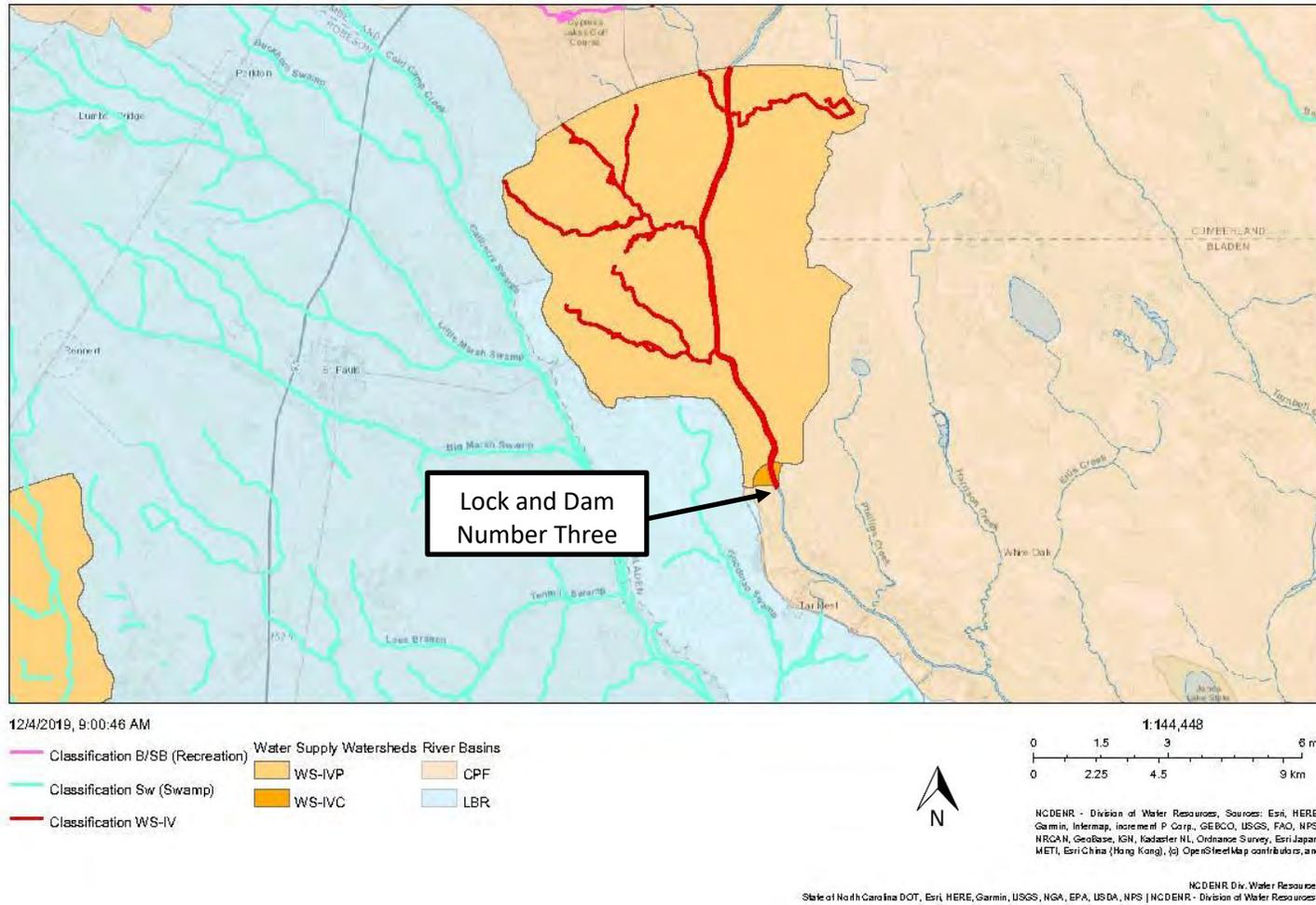


Figure 10: NCDWR Water Quality Classifications at Lock and Dam Number Three

10.1.4 Water Supply

There are six existing water supply intakes on the Cape Fear River upstream of the CFRLD that use the dam-formed pools for water supply. Those are described previously in Section 7.4.2, and those that would be affected by the loss of these pools are included in Figure 6. There are two intakes upstream of Lock and Dam Number One, one upstream of Lock and Dam Number Two, and three upstream of Lock and Dam Number Three. Ownership and operation of these water supply intakes are also further described in Section 3.6.2. Of note, The Fayetteville Public Works Commission (FPWC) is under contract to Fort Bragg to supply the military installation with potable water through the year 2050 using the FPWC's existing in-river water intake infrastructure. Additionally, there is no water supply allocation from Jordan Lake available to the FPWC (Figure 11).

As described earlier in Section 10.1.2 Geology and Aquifers, increased aquifer use in the study area, if required, may necessitate over pumping which may lead to lowering of the water level below the top of the aquifer. This, in turn, may initiate aquifer dewatering. Dewatering induces compaction of the aquifer with the resulting loss of pore space. Dewatering also introduces air into the aquifer and causes a permanent loss of yield. Dewatering may also create problems for water wells. As the water level declines, pump intakes must be lowered. Well yield drops and additional wells must be drilled to supply the same amount of water.

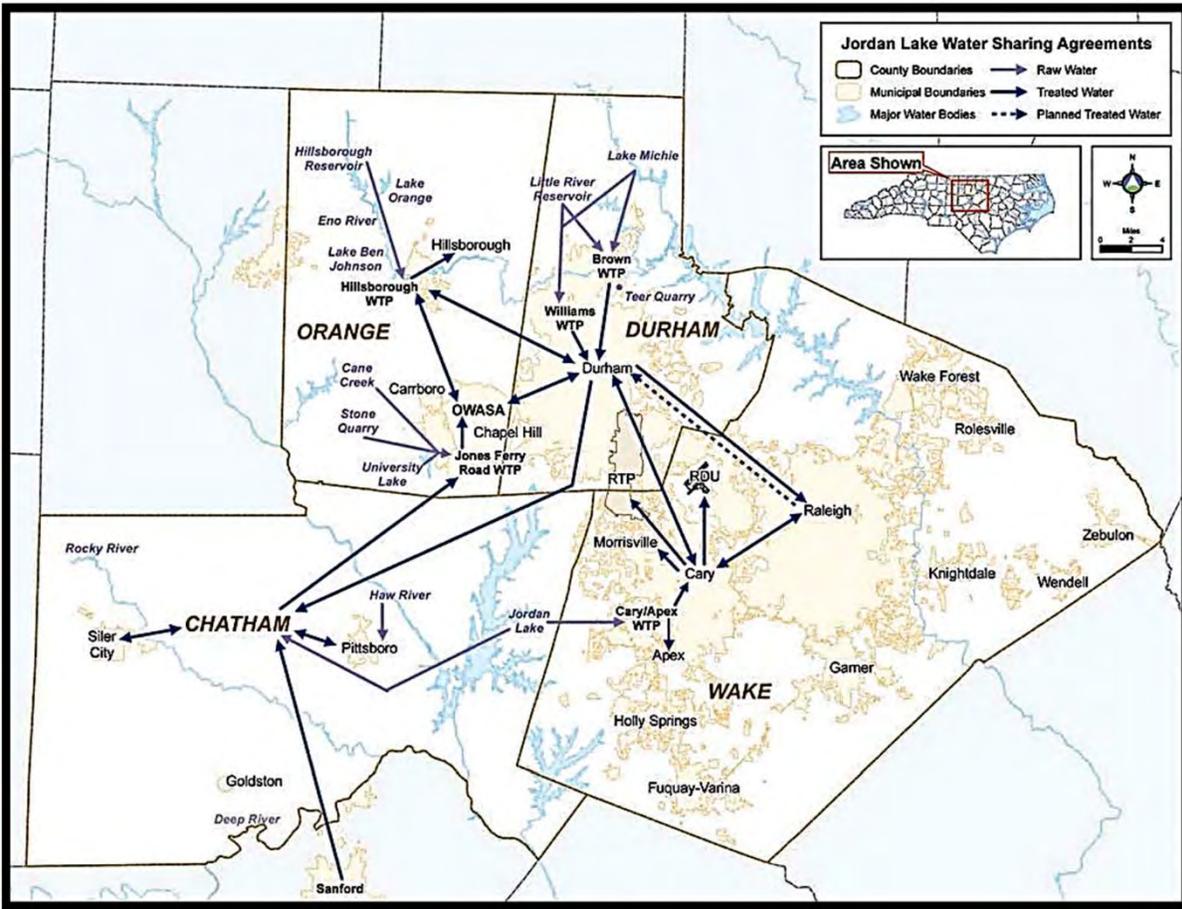


Figure 11: Jordan Lake Water Sharing Agreement and Interconnections

Table 6: Water Supply Demand in Million Gallons Per Day (MGD) by the Surface Water Supply Users from Lock and Dam Number One through Headwaters of Lock and Dam Number Three

Location and Water Users	Demand (MGD) by Year	
	2002	2030
Upstream of Lock and Dam Number One		
– Cape Fear Public Utility Authority (formerly City of Wilmington)	16.6	30.7
– Lower Cape Fear Water and Sewer Authority (Kings Bluff)	43.2	96.1
Upstream of Lock and Dam Number Two		
– Lower Cape Fear Water and Sewer Authority (Bladen Bluffs)	0	12
Upstream of Lock and Dam Number Three		
– Chemours (formerly DuPont)	10.8	19.6
– Fayetteville Public Works Commission (Hoffer and Glenville Lake)*	25.2	82.6
Total	95.8	241.0

*Fayetteville Public Works Commission has two water treatment facilities (WTF) with raw water intakes on the Cape Fear River, they are the Hoffer WTF and Glenville Lake WTF.

A hydrologic analysis was conducted to evaluate the hydrologic impact on the water supply intakes above each of the locks and dams during low flow (drought) conditions for each of the study alternatives. Refer to Appendix B (Hydrologic Analysis) for more detailed information.

Alternative 1 (No Action) does not include removal of the locks and dams, but assumes failure of locks, which would result in reduction of the pools behind the CFRLD. Pool reduction, especially during flow periods, would significantly affect the ability of water systems utilizing the pools behind the locks and dams to withdraw water.

Alternative 2 (Removal) would involve removal of the locks and dams and the resulting loss of pools. The loss of pools, would negatively affect water supply and the ability of current water supply infrastructure to function properly. Of the six water supply intakes, only the LCFWASA Bladen Bluffs intake behind Lock and Dam Number Two and the Chemours (DuPont) intake behind Lock and Dam Number Three would remain operational. The remaining four existing water supply structures would not be able to withdraw water under low-flow / drought conditions, and modifications to maintain operations could become costly for each water supply entity. The removal of locks and dams would adversely affect hundreds of thousands of water users in the Lower Cape Fear Region (~650,000 water users). In the case of the Fayetteville Public Works Commission (FPWC), public health for approximately 250,000 people in FPWC’s service area depends on the pool behind Lock and Dam Number Three. In addition to physical limitations of FPWC’s water intake to accommodate the loss of the pool, quantitative assessments of water availability behind Lock and Dam Number Three by the N.C. Division of Water Resources (NCDWR) are greatly enhanced due to consideration of that storage pool (compared to a free-flowing stream assessment). Without NCDWR’s consideration of this pool, FPWC’s 2060 future water needs would greatly exceed its

available supply. Additionally, there is no water supply allocation from Jordan Lake available to the FPWC. Therefore, FPWC is nearly entirely dependent on the maintenance of the water supply pool maintained by Lock and Dam Number Three for its current and future water supply needs. Additionally, should Lock and Dam Number One be removed, the Cape Fear Public Utility Authority (CFPUA) risks losing access to its Sweeney Water Treatment Plant surface water allocation, and the Lower Cape Fear Water and Sewer Authority's Kings Bluff intake would be impacted (~400,000 water users). Additionally, the removal of Lock and Dam Number One could potentially allow salt water to migrate farther upstream in the Cape Fear River during more severe droughts and could compromise CFPUA's raw water supply.

Alternative 3 (Recommended Plan, Transfer) would have no effect on water supply as compared to current conditions.

10.2 Biological Resources

10.2.1 Wetlands and Floodplains

Most of the wetlands adjacent to the Cape Fear River are located downstream of Lock and Dam Number Two. Wetland hardwood forests attract various fauna and supply the Cape Fear River with non-riverine originated organic materials that provide food and substrate for in-water arthropods, fishes, reptiles, amphibians, and mammals. These wetlands are dominated by bald cypress, black gum, green ash and similar species, and are generally flooded by rising river water on at least an annual frequency and during heavy precipitation events, including hurricanes.

In the immediate vicinities of the CFRLDs, all wetlands are of the 'freshwater forested/shrub wetland' type, according to the National Wetlands Inventory mapper tool (USFWS 2019). At Lock and Dam Number One, wetlands exist on both the eastern and western banks of the river. No USACE-owned infrastructure exists in identified wetland areas. At Lock and Dam Number Two, all wetlands are on the north bank of the river, where no USACE-owned infrastructure exists. At Lock and Dam Number Three, wetlands exist on both the eastern and western banks of the river. No USACE-owned infrastructure exists in identified wetland areas.

Executive Order 11988 states that federal agencies shall avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative; federal agencies shall take action to reduce the risk of flood loss, and minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains. Furthermore, Executive Order 11990 mandates each federal agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of federal lands and facilities; and (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating,

and licensing activities.

Alternative 1 (No Action) does not include removal of the locks and dams, but assumes failure of locks. Failure of the locks would have no effect on flooding in the immediate surrounding areas since the CFRLD are not designed for flood control, but wetlands may be affected due to changes in the water table. A review of the FEMA flood map for all three CFRLD indicates they are located in the FEMA designated Flood Zone AE, which means that they are within the 100-year flood plain (U.S. Dept. of Homeland Security/FEMA, 2019). Surrounding wetlands that are directly abutting the lock and dam features would be impacted by the lowering of the pool level behind the locks and dams. This impact would be expected to be minor and contained to areas located adjacent to the CFRLD. The effect could be a negative impact to area floodplain wetlands that may no longer have the same hydrologic connectivity which could possibly change the wetland dynamic and the overall function of the wetland.

Alternative 2 (Removal) would alter the flooding regime of wetlands in the immediate vicinity of the study areas. The flooding of these wetlands could be altered as compared to current conditions due to lowering of the river elevation in the study areas. There may be a minor adverse effect to wetlands and floodplains in terms of reduced wetlands surface area/acreage.

Alternative 3 (Recommended Plan, Transfer) would have no effect on wetlands and floodplains as compared to current conditions.

10.2.2 Vegetation

On the banks of the Cape Fear River, vegetation in the study areas is primarily comprised of mature forests and wetland areas. Infrastructure built on the southern banks of the Cape Fear River does not exist in areas identified as wetlands (USFWS 2019). USACE-owned lands at Lock and Dams Two and Three consist of high bluffs that rarely become flooded, and are dominated by oak/hickory forests. Undeveloped lands at Lock and Dam Number One are primarily wooded floodplain and contain species typically found in a brownwater river floodplain forest. There is an intermittent natural levee along the Cape Fear River, including in the study areas, that is between two and four feet higher in elevation than the interior floodplain. The over story of this floodplain is mostly a closed canopy, dominated by red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), bald cypress (*Taxodium distichum*), American elm (*Ulmus americana*), and various ash (*Fraxinus* spp.), oaks (*Quercus* spp.) and hickory (*Carya* spp.) species (USDA-NRCS, 2019). Downed trees and snags may be present due to recent hurricanes and other high wind/water events. The under story is fairly open, containing scattered privet (*Ligustrum sinense*), green briar (*Smilax* spp.), and saplings of over story species.

Executive Order 13122 requires federal agencies to prevent the introduction of invasive species, to provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause. No invasive plant species surveys, terrestrial or aquatic, have been conducted at the CFRLD; however, USACE staff have anecdotally noted bamboo species in upland areas. It

is unknown if these species are endemic switch cane (*Arundinaria gigantea* ssp. *tecta*), or an invasive variety.

Alternative 1 (No Action) does not include removal of the locks and dams, but assumes failure of locks. Minor negative impacts to vegetation may be caused by changes in the hydrology of the area directly adjacent to the lock and dam experiencing a mechanical failure due to the lowering of the pool behind the dam and a decrease in wetted perimeter around the area.

Alternative 2 (Removal) may be expected to gradually change the vegetation in the immediate vicinity of the study areas to accommodate new hydrologic conditions associated with lowering of the water level in the river. It is unknown if hydrologic conditions presented by locks and dams removal would favor invasive flora species.

Alternative 3 (Recommended Plan, Transfer) would have no effect on vegetation and floodplains as compared to current conditions .

10.2.3 Fish and Wildlife

The Cape Fear River at all three locks and dams is fresh water, but because the river is tidally influenced in the area below Lock and Dam Number One there is the potential for a diverse assemblage of fishes to occur there. Fishery resources in the Cape Fear River can be classified into three categories: permanent resident species, diadromous species, and estuarine dependent species.

Resident fishes include members of the herring, minnow, sucker, catfish, sunfish, and perch families. Both gizzard shad (*Dorosoma cepedianum*) and threadfin shad (*D. petenense*) commonly occur in the river. The minnows include common carp (*Cyprinus carpio*), whitefin shiner (*Cyprinella nivea*), and spottail shiner (*Notropis hudsonius*). Several species of suckers are present but they are uncommon. Catfishes dominate the biomass of fishes. Two large introduced species, blue catfish (*Ictalurus furcatus*) and flathead catfish (*Pylodictis olivaris*) are most common. At least eight species of sunfish occur in this portion of the Cape Fear River.

Bluegill (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), and largemouth bass (*Micropterus salmoides*) are the most common. A recreational fishery exists here for sunfishes and catfishes.

At least six species of diadromous (anadromous/catadromous) fishes occur in the vicinity of the Cape Fear River Locks and Dams. American shad (*Alosa sapidissima*) is the dominant member of this group. Spawning runs occur each spring in the Cape Fear River and a significant recreational and commercial fishery has developed below the dam. Blueback herring (*Alosa aestivalis*) and hickory shad (*Alosa mediocris*) also make spawning runs, but they occur in much fewer numbers than American shad. A resident population of the striped bass (*Morone saxatilis*) is present and migrates as far upstream as Buckhorn Dam (Figure 5), which is the next upstream impediment to fish passage. Its population is low and it has had to compete with introduced hybrid bass, which have escaped from Jordan Lake. The North Carolina Wildlife Resources Commission stocks Striped Bass in the Cape

Fear River to compliment the resident population. The Atlantic sturgeon (*Acipenser oxyrinchus*) Carolina Distinct Population Segment (DPS), and the shortnose sturgeon (*Acipenser brevirostrum*) are found in the Cape Fear River. Both sturgeon species are federally-listed as endangered under Section 7 of the Endangered Species Act and make spawning runs from the Atlantic Ocean up tributaries of the Cape Fear River (Black and Northeast Cape Fear Rivers). Spawning runs may also occur in the main stem Cape Fear River also. Juvenile catadromous American eel (*Anguilla rostrata*) ascend the Cape Fear River each year to spend their early lives in the freshwater tributaries. Historic records indicate that anadromous fish spawned up to the fall line on the Cape Fear River, which is upstream of the B. Everett Jordan Lake Dam near Moncure, North Carolina. This is no longer possible due to the presence of CFRLD, Buckhorn Dam, and impoundment of B. Everett Jordan Lake (Jordan Dam).

A number of estuarine-dependent fishes are known to occur near Lock and Dam Number One. Dominant in this group are striped mullet (*Mugil cephalus*), freshwater goby (*Gobionellus shufeldti*), and hogchoker (*Trinectes maculatus*). Others noted from the area are Atlantic menhaden (*Brevoortia tyrannus*), ladyfish (*Elops saurus*), Atlantic needlefish (*Strongylura marina*), and southern flounder (*Paralichthys lethostigma*). Others also likely to occur there since they have been found farther downstream include spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogonias undulatus*), and an invertebrate, the blue crab (*Callinectes sapidus*).

Benthic resources in and near the study areas are limited to silted creeks connected to the Cape Fear River. Frequently the creeks are dry, but when water is present in these creeks the flow is generally minimal, except during localized heavy rainfall or when the river rises and movement of water is from the river into the floodplain. Both of these conditions are intermittent. Therefore, the benthos is exposed to high temperatures during the summer and freezing temperatures during the winter. Because of these conditions, the creeks are inhabited by opportunistic species such as diptera, oligocheates, and amphipods. There are few benthic resources in the floodplain on the west bank of the river on USACE-owned property because most of the land is either paved or maintained grassed areas.

In addition to aquatic wildlife in the river and associated creeks, nearby wooded areas provide habitat for a variety of wildlife. Reptiles and amphibians, including various turtles, snakes, and frogs, and the American alligator (*Alligator mississippiensis*) are abundant. Wetland hardwood forests also attract a diverse bird population. As compared to other habitat types, bird species may increase abundance in wetland hardwood forest habitats due to plentiful forage options. Breeding birds associated with wetland hardwood forests include the wood duck (*Aix sponsa*), red-shouldered hawk (*Buteo lineatus*), green heron (*Butorides virescens*), great blue heron (*Ardea Herodias*), belted kingfisher (*Megaceryle alcyon*), American woodcock (*Scolopax minor*), barred owl (*Strix varia*), and prothonotary warbler (*Protonotaria citrea*). Common mammalian species found in wetland hardwood forests and in the Cape Fear River itself include the American mink (*Neovison vison*), North American river otter (*Lontra canadensis*), American beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), North American raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), gray fox (*Urocyon cinereoargenteus*),

Eastern gray squirrel (*Sciurus carolinensis*), Southern flying squirrel (*Glaucomys volans*), common shrew (*Sorex araneus*), and the little brown bat (*Myotis lucifugus*).

All three CFRLD were outfitted with concrete fish ladders in the past. Potential modification to the fish ladder at Lock and Dam Number One was evaluated in 1962; however, fish locking was determined to be an adequate and less-costly method for passage of anadromous fish. Since that time, the locks and dams have been operated for the passage of anadromous fish during the spawning season as resources have allowed. These locking operations were studied by the U.S. Fish and Wildlife Service from 1962-1966 and found to be an acceptable method for the upstream passage of anadromous species in the system. Data from recent State- and university-conducted studies have indicated that locking alone may not be sufficient to restore historic anadromous fish population levels, especially for sturgeons which are not known to readily use the locks. This, and other factors, led to studies exploring alternate means of passage. Eventually, a large rock arch rapids fish passage structure was constructed at Lock and Dam Number One to fulfill a mitigation requirement relating to the deepening of Wilmington Harbor (known as the '96 Act Deepening) using blasting techniques. Construction of the rock arch rapids was completed in November 2012. Monitoring in 2013 and 2014 indicated that 80% of flathead catfish passed Lock and Dam Number One; but only 50-70% of shad and 21-23% of striped bass passed. These passage metrics are below the desired >80% cumulative passage goal. Since the 80% cumulative passage success criteria was not met for all species of interest, there has been interest from stakeholder organizations to modify the rock arch rapids configuration in an attempt to improve fish passage. Discussions with stakeholder organizations concerning modification are ongoing and include proposals to construct similar fish passage structures at Lock and Dam Number Two and Lock and Dam Number Three.

Executive Order 13122 requires federal agencies to prevent the introduction of invasive species, to provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause. No invasive fauna species surveys, terrestrial or aquatic, have been conducted at the CFRLD. The presence of invasive species is unknown.

Alternative 1 (No Action) is expected to have a negative effect on fish resources in the study area. Lock failures will result in negative effects on fish resources. Locking of fish would be impossible with inoperable lock gates. The effect on invasive aquatic species in the area is unknown. There would be no effect on benthic resources or terrestrial wildlife.

Alternative 2 (Removal) would remove three barriers to diadromous fish passage in the Cape Fear River and may make available additional benthic habitat upstream until reaching Buckhorn Dam (Figure 5). The former pools behind the structures would be lowered and river levels would fall. It is possible that lower water levels, as compared to current conditions, would be more susceptible to summer heating and dissolved oxygen depletion, which may negatively affect aquatic species; however, increased water flow velocity in the absence of pools behind the three locks and dams may likely dissipate these potential negative effects. Although not expected,

salt water intrusion upstream of the current location of Lock and Dam Number One may occur with future sea level rise, changing the habitable ranges of particular fish species in terms of salinity tolerance. This alternative would have no effect on terrestrial wildlife.

Alternative 3 (Recommended Plan) will have no effect on fish and wildlife resources in the study area as compared to current conditions, including invasive species. Diadromous fish passage would continue to prove challenging and inefficient for diadromous fishes with the CFRLD in place. Fish passage measures only exist at Lock and Dam Number One. Diadromous fishes would remain dependent on locking at Lock and Dam Number Two and Lock and Dam Number Three. There would be no effect on terrestrial wildlife.

10.2.4 Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531–1543), provides a program for the conservation of threatened and endangered (T&E) plants and animals and the habitats in which they are found. In accordance with Section 7 (a)(2) of the ESA, this integrated report will be coordinated with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to ensure that effects of the proposed project would not jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat of such species.

A complete list of threatened and endangered species potentially present in or near the study area under purview of the USFWS were obtained from the USFWS Information, Planning and Conservation System website (also referred to as IPaC) (USFWS 2019; Appendix C). These species include: Northern long-eared bat (*Myotis septentrionalis*); Red-cockaded woodpecker (*Picoides borealis*); Wood stork (*Mycteria americana*); Atlantic pigtoe clam (*Fusconaia masoni*); American chaffseed (*Schwalbea americana*); Pondberry (*Lindera melissifolia*); Rough-leaved loosestrife (*Lysimachia asperulaefolia*) (Table 7). The West Indian manatee (*Trichechus manatus*) and American alligator (*Alligator mississippiensis*) may be present in the vicinity of the CFRLD as well, although the range of the manatee is not known to extend into Bladen County, NC (USFWS 2003). Table 7 also includes the bald eagle (*Haliaeetus leucocephalus*) which is protected under the Federal Bald and Golden Eagle Protection Act, and the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*) which are under the purview of the NMFS (NMFS, 2019). The likelihood of occurrences of threatened and endangered species in the study areas depends upon the availability of suitable habitat, the season of the year relative to a species' temperature tolerance, migratory habits, and other factors.

Northern long-eared bat (*Myotis septentrionalis*) – The Northern long-eared bat's range includes the study areas. The bat may roost in trees along the banks of the Cape Fear River and may forage in the study areas. Roost habitat and forage areas under Alternatives 1, 2, and 3 will not be altered. Alternatives 1, 2, and 3 will have no effect on the Northern long-eared bat.

West Indian Manatee (*Trichechus manatus*) – Manatees have been sighted in North Carolina waters and may approach Lock and Dam Number One; however, presence of manatees in the study areas is unlikely. Alternatives 1, 2, and 3 will have no effect on the West Indian manatee.

Bald Eagle (*Haliaeetus leucocephalus*) – Bald eagles are predatory birds that also are opportunistic scavengers. Their habitat range includes the entirety of the continental United States, including the study areas. Roost habitat and forage areas under Alternatives 1, 2, and 3 will not be altered. Alternatives 1, 2, and 3 will have no effect on the bald eagle.

Red-cockaded woodpecker (*Picoides borealis*) – Red-cockaded woodpeckers are typically found in fire-maintained longleaf pine savannas, which do not exist in the study areas. Alternatives 1, 2, and 3 will have no effect on the Red-cockaded woodpecker.

Wood stork (*Mycteria americana*) – Wood storks are birds of freshwater and estuarine wetlands, primarily nesting in cypress or mangrove swamps and foraging in freshwater marshes, tidal creeks, or tidal pools. No known wood stork rookeries exist in or near the study areas. Roost habitat and forage areas under Alternatives 1, 2, and 3 will not be altered. Alternatives 1, 2, and 3 will have no effect on the wood stork.

American alligator (*Alligator mississippiensis*) – The American alligator is found in the Cape Fear River, and may be present in the study areas. Implementation of Alternatives 1, 2, and 3 will have no effect on the American alligator.

Atlantic pigtoe (*Fusconaia masoni*) – The Atlantic pigtoe is a freshwater mussel found in the Cape Fear River, that may exist in the study areas. Its habitat preferences include coarse sand and gravel, where silts are few. Alternatives 1, 2, and 3 will have no effect on the Atlantic pigtoe.

American Chaffseed (*Schwalbea Americana*) – The American chaffseed is a flowering plant found in several south Atlantic states, including North Carolina. This plant prefers fire-maintained longleaf pine savannas, which do not exist in the study areas. Alternatives 1, 2, and 3 will have no effect on the American chaffseed.

Pondberry (*Lindera melissifolia*) – The Pondberry is a flowering plant most commonly associated with the interior areas of wetland habitats which are unlikely to exist in the study areas. Alternatives 1, 2, and 3 will have no effect on the Pondberry.

Rough-leaved loosestrife (*Lysimachia asperulaefolia*) – The Rough-leaved loosestrife is a flowering plant having a habitat preference for edges between longleaf pine uplands and pine pine pocosins. These habitat preferences do not exist in the study areas. Alternatives 1, 2, and 3 will have no effect on the Rough-leaved loosestrife.

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) – Atlantic Sturgeon are a large species of fish that can grow to lengths up to 14 feet and weight as much as 800 pounds. Atlantic Sturgeon are bottom feeders with a diet that consists mostly of worms, shrimps, crabs, snails, and small fish and typically require at least 4- feet of water depth to adequately function. The fish have an average life span of around 60 years and although the exact age of maturity for the species found in North Carolina is not known, other close by populations in South Carolina usually reach maturity between the ages of 5 to 13 years for males and 7 to 19 years for females. According to research completed by the NC Division of Marine Fisheries (NCDMF), the Roanoke River is the only river in North Carolina with a current spawning population of Atlantic sturgeon; although, the historic spawning area for the species would have included the Tar/Pamlico, Neuse and Cape Fear Rivers (NCDMF, 2019). The species spawn in intervals of approximately 1 to 5 years for males and 2 to 5 years for females (NMFS, 2019). Atlantic sturgeon were recently sighted upstream of Lock and Dam Number One, meaning that they are currently passing the existing rock arch rapids constructed across the downstream face of Lock and Dam Number One. According to the National Marine Fisheries Service (NMFS), Atlantic sturgeon critical habitat exists from the mouth of the Cape Fear River to Lock and Dam Number Two (Figure 12). Alternative 1 would have no effect on Atlantic sturgeon or critical habitat, although barriers to upstream passage would remain in place; however, Alternative 1 would preclude use of lock chambers as a fish passage technique. Alternative 2 would remove several barriers to anadromous fish passage in the Cape Fear River and may make additional benthic habitat available. Alternative 2 would have no effect on critical habitat. The former pools behind the structures would be lowered and river levels would fall. Alternative 3 would have no effect on Atlantic sturgeon or critical habitat, although barrier to upstream passage would remain in place.

Shortnose sturgeon (*Acipenser brevirostrum*) – Shortnose sturgeons are also known to exist in the study area and share similar life histories to Atlantic sturgeon; however, Shortnose sturgeon are smaller by comparison weighing up to 50 pounds and growing up to 4.5 feet in length. Shortnose sturgeons eat bottom-dwelling food such as insects, crustaceans, worms, and mollusks and typically require at least 4- feet of water depth to adequately function. In southern populations, including those in the study area, males and females mature relatively fast as compared to northern populations. Reproductive maturity for Shortnose sturgeons in the study areas occurs at between two and five years. Alternative 1 would have no effect on Shortnose sturgeon, although barriers to upstream passage would remain in place; however, Alternative 1 would preclude use of lock chambers as a fish passage technique. Alternative 2 would remove several barriers to anadromous fish passage in the Cape Fear River and may make additional benthic habitat available. The former pools behind the structures would be lowered and river levels would fall. Alternative 3 would have no effect on Shortnose sturgeon or critical habitat, although barrier to upstream passage would remain in place.

Table 7: Threatened and Endangered Species Potentially Present in the Study area

Species	Class	Agency with Management Responsibility	Status
Northern long-eared bat (<i>Myotis septentrionalis</i>)	Mammal	USFWS	Threatened
West Indian Manatee (<i>Trichechus manatus</i>)	Mammal	USFWS	Threatened
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Bird	USFWS	Protected under the Bald and Golden Eagle Protection Act
Red-cockaded woodpecker (<i>Picoides borealis</i>)	Bird	USFWS	Endangered
Wood stork (<i>Mycteria americana</i>)	Bird	USFWS	Threatened
American alligator (<i>Alligator mississippiensis</i>)	Reptile	USFWS	Threatened due to similarity of appearance
Atlantic pigtoe (<i>Fusconaia masoni</i>)	Bivalve	USFWS	Proposed Threatened
American chaffseed (<i>Schwalbea americana</i>)	Flowering Plant	USFWS	Endangered
Pondberry (<i>Lindera melissifolia</i>)	Flowering Plant	USFWS	Endangered
Rough-leaved loosestrife (<i>Lysimachia asperulaefolia</i>)	Flowering Plant	USFWS	Endangered
Atlantic sturgeon (<i>Acipenser oxyrhynchus oxyrhynchus</i>)	Fish	NMFS	Endangered
Shortnose sturgeon (<i>Acipenser brevirostrum</i>)	Fish	NMFS	Endangered

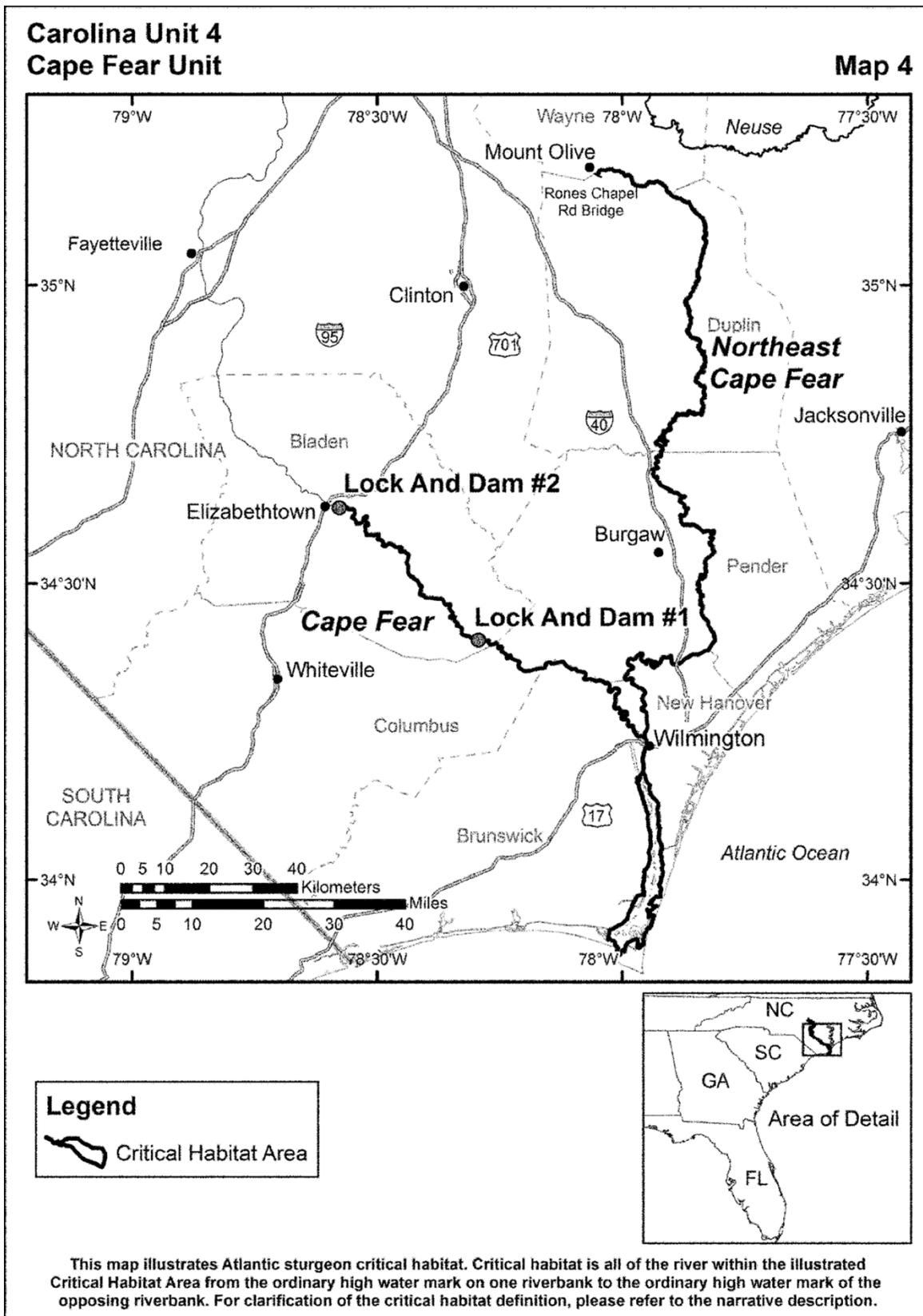


Figure 12: Atlantic Sturgeon Critical Habitat in the Cape Fear River

As described above on an per-species basis, Alternative 1 (No Action) will have a negative effect on endangered fishes in the study area. Mechanical failure would occur rendering lock gates inoperable. The CFRLD would no longer be able to lock fish and facilitate diadromous fish passage upstream of Lock and Dam Number Two. This could have a direct negative effect on both Atlantic and Shortnose sturgeon. The No Action alternative would have no effect on other threatened or endangered species in the study area.

Alternative 2 (Removal) would remove barriers to endangered sturgeons and other diadromous fish in the Cape Fear River and may make additional benthic habitat available. The former pools behind the structures would be lowered and river levels would fall. Sturgeons typically require at least 4-feet of water depth to adequately function. It is possible that lower water levels, as compared to current conditions, would be more susceptible to summer heating and dissolved oxygen depletion, which may negatively affect aquatic species; however, increased water flow velocity in the absence of pools behind the three locks and dams may likely dissipate these negative effects. Additionally, the increased flow velocities resulting from the removal of the locks and dams may uncover historic sturgeon spawning habitat by removing sediments that have accumulated over the past century or so. There will be no effect on the Northern long-eared bat, the Red-cockaded woodpecker, the Wood stork, the American alligator, the Atlantic pigtoe, the American chaffseed, Pondberry, and Rough-leaved loosestrife as the habitat types used by these species, specifically, would not be altered.

Alternative 3 (Recommended Plan, Transfer) will also have no effect on any of the listed threatened or endangered species in the study area as compared to current conditions. Diadromous fish passage would continue to prove challenging and inefficient for Atlantic and Shortnose sturgeons at Lock and Dams Two and Three.

10.3 Cultural and Operational Environment

10.3.1 Cultural Resources and Tribal Interests

The Cape Fear River Locks and Dams have been documented and evaluated per National Register of Historic Places criteria and requirements of the Historic American Engineering Record. The following summary draws from current conditions, and the results of studies conducted by New South Associates for the Wilmington District. These studies include: Phase I Archaeological Survey Cape Fear Locks and Dams and Proposed New Fish Channel (2002), Documentation and Assessment: Cape Fear River Locks and Dams, Bladen County, NC (2003), Phase II Archaeological Testing of Site 31BL147, Bladen County, North Carolina (2008), and Documentation: Lockmaster Houses at Lock and Dam Numbers One and Three, Cape Fear River, Bladen County, North Carolina (2008).

Lock and Dam Number One.

- Five and seven-tenths acres of Lock and Dam Number One are considered eligible for inclusion on the National Register of Historic Places (NRHP). Contributing elements include the lock and dam, the lockmaster residence, and

one original storage shed.

- Lock and Dam Number One property also contains one prehistoric archaeological site that has received Phase II documentation and has been determined ineligible for inclusion on the NRHP. Phase II investigations and associated documentation inform NRHP eligibility determinations.
- Should eligible elements of the Lock and Dam Number One have the potential to be adversely affected, the USACE must coordinate and implement a Memorandum of Agreement (MOA) and Recordation Plan with the State Historic Preservation Officer (SHPO) to allow for proper documentation.

Lock and Dam Number Two.

- Five and one-half acres of Lock and Dam Number Two are considered eligible for inclusion on the NRHP. Contributing elements include the lock and dam, the previously demolished east lockmaster residence, and the existing west lockmaster residence. In coordination with the North Carolina State Historic Preservation Office and the Advisory Council on Historic Preservation, and according to the terms of a memorandum of agreement, the east lockmaster residence was demolished in 2014 because it was deemed structurally unsound and unsafe. Presently, the USACE is working with the same partners, and Elizabethtown, NC, to coordinate the demolition of the west lockmaster residence. The west lockmaster residence was flooded for several weeks during Hurricane Florence in 2018 and sustained extensive damage. It is expected that demolition of the west lockmaster residence will occur in the near future, following appropriate coordination, development of a memorandum of agreement, and required mitigation.
- In the case of eligible elements having the potential to be adversely affected, an MOA with SHPO may be required to consolidate coordination required under Sections 106 and 110 of the National Historical Preservation Act (NHPA).

Lock and Dam Number Three.

- Two and three-quarters acres of Lock and Dam Number Three are considered eligible for inclusion on the NRHP. Contributing elements include the lock and dam, lockmaster residence, tool house, pump house, hydrant house, and garage.
- In the case of eligible elements having the potential to be adversely affected, an MOA with SHPO may be required to consolidate coordination required under Sections 106 and 110 of the NHPA.

These New South and Associates studies were conducted pursuant to Sections 106 and 110 of the National Historic Preservation Act which require federal agencies to inventory and evaluate historic properties under their control and to nominate to the National Register of Historic Places those properties that are found to be historically significant. Given the historical importance of these locks and dams in providing navigation to the inland sections of the state, the three properties are considered eligible for the NRHP under Criterion A; they possess significance on a state and local level for their role in river transportation in North Carolina. The locks and dams and their environs are also significant for their engineering and architectural design

and therefore, are also eligible for the NRHP under Criterion C. These structures, particularly Lock and Dam Numbers One and Two, were essentially built on a bed of sand that posed some complicated engineering dilemmas unique to the sites. The lock floors at Lock and Dam Numbers One and Two were laid underwater using a tremie (a watertight pipe used to pour concrete underwater)—an uncommon practice typically employed on pier and bridge construction. This technique garnered national attention in two contemporary journals—*Engineering News Record* (Vol. 76, September 21, 1916) and *Professional Memoirs* (Vol. 8, 1916 and Vol. 9, 1917). While the timber crib dam at Dam Number One was a common design, the fact that it remained in fair condition for three decades before receiving a concrete apron for stabilization is notable. The dam was then repeatedly altered and improved to sustain its life span. The dam at Lock and Dam Number Two is quite unique in its design. Not a standard rock-fill dam with an impervious central earth core or concrete face, it was simply constructed of rows of steel sheet piles driven in the riverbed on the upstream and downstream sides. Riprap and capstone were then loosely dumped between the sheeting. Dam Number Three appears to be a typical concrete gravity structure similar to those constructed across the country during this period.

Construction of Lock and Dam Number One began in 1913 and concluded in 1915 (Figure 13). The project was part of a 1902 congressional authorization that included three locks and dams to be constructed as improvements to navigation between Wilmington and Fayetteville. At the time of the authorization, transportation by steamboat was common between Elizabethtown, Wilmington, and Southport, with vessels such as the steamers *A. P. Hurt* (ex. *Lyon*), *D. Murchison*, *Navassa*, *City of Fayetteville*, *Frank Sessoms*, and *Cape Fear* making regular passenger, cargo, and mail excursions. These steamers also traveled to Fayetteville, nearly 42 miles above Elizabethtown, but without the desired navigation improvements, the trip proved hazardous due to shallow water and the prospects of foul weather. As construction was ending at Lock and Dam Number One, it was beginning at Lock and Dam Number Two, which was constructed between 1914 and 1917. Construction of these locks was initially delayed due to economic disputes and disagreements over the economic benefit to be realized by construction. While federal officials expressed skepticism over the value of the project and delayed its implementation, steamship companies continued to build and refit vessels during the 1920s specifically for the anticipated improvements in the Fayetteville trade. Local navigation companies and area governments finally won approval for construction of the third lock and dam near Elizabethtown, which began construction in 1933; but by the time the lock was completed in 1935, much of the commercial traffic formerly carried by steamboat was being carried by railroad.

Of all the rivers that empty into the Atlantic Ocean along the coastline of North Carolina, the Cape Fear River is the only one that has a system of locks and dams along its course. Consequently, it is the only “slack water” navigational stream in all of eastern North Carolina - a notable fact given that the State has few significant navigable waterways. Outside of the middle Cape Fear valley, however, few people in North Carolina are even aware that such a system exists.

Executive Order 11593 directs the Federal Government provide leadership in

preserving, restoring and maintaining the historic and cultural environment of the Nation. Federal agencies shall administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, initiate measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored, and maintained for the inspiration and benefit of the people, and, in consultation with the Advisory Council on Historic Preservation (16 U.S.C. 470i), institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures and objects of historical, architectural or archaeological significance. Access to this study report will be provided to appropriate review entities in compliance with Executive Order 11593 and the National Historic Preservation Act.

Executive Order 13007 directs federal agencies to accommodate access to and ceremonial use of Native American religious practitioners, and to avoid adversely affecting sites considered sacred to Native American peoples. Executive order 13175 recognizes tribal rights of self-government and tribal sovereignty, and commits the federal government to work with Native American tribal governments on a government-to-government basis. Based upon readily available information and past use in the study areas, there are no specifically-identified tribal interests in the vicinity of the CFRLD. Federally-recognized tribal governments will be provided access to this study report and will be given the opportunity to offer comments.

Alternative 1 (No Action) will have no effect on tribal interests in the project areas as compared to current conditions; however, properties eligible for listing on the National Register of Historic Places may be negatively affected.

Alternative 2 (Removal) would remove elements of the locks and dams, currently deemed eligible for inclusion on the National Register of Historic Places under criteria A and C. Close coordination with the North Carolina State Historic Preservation office and Office of State Archaeology would be completed prior to removal. There would be no effect to tribal interests.

Alternative 3 (Recommended Plan, Transfer) will have no effect on cultural resources or tribal interests in the study area as compared to current conditions.



Figure 13: Lock and Dam Number One, Circa 1915

10.3.2 Socio-economics

Much of Bladen County's 875 square miles are rural and agricultural. The 2017 population was about 33,478 according to the U.S. Census Bureau (US Census Bureau 2018), with a density of about 40 persons per square mile.

Typical socio-economic and demographic data for Bladen County indicate lower than average income when compared to the rest of the State. Per capita income for 2017 was estimated at \$20,839 and median household income at \$32,396 in 2017 with about 20.7% of the population living in poverty. North Carolina's economy is generally characterized by strong wholesale and retail trade, government and technology sectors. Easily developed land, accessible water supply, abundant natural resources, and the aesthetic beauty of the region are the fundamental building blocks of the local economy. Relative to the national economy, the manufacturing sector has played less of a role in North Carolina, including in the study area; however, over the past two decades, high technology manufacturing has begun to emerge as a significant sector in the State.

As of 2017, 52.2% of Bladen County men and 49.6% of women over 16 years of age

were in the civilian labor force. As compared to the State of North Carolina as a whole, where 61.4% and 57.4% of men and women are employed, respectively, fewer residents of Bladen County are engaged in the workforce

Personal per capita income in North Carolina is \$28,123 (2017), and is lower in Bladen County at \$20,839. As well as having a considerably lower than average per capita income, Bladen County's median household income is lower than that of the State. At \$32,396, it falls short of the State average (\$50,320). The 2017 Census data reports indicate a lower than State average household occupancy rate, at 2.33 persons per household in the study area while the State average household sizes is 2.53. In 2017 it was reported that 14.7 percent of North Carolina's population lived below the poverty level, while 20.7 percent of residents in Bladen County were below the poverty level.

Alternative 1 (No Action) may have a negative effect on socio-economics in the study area as compared to current conditions. There could be negative effects to the socioeconomics of surrounding areas in terms of potential job loss and increased utility costs if the water intakes for any dependent commercial/municipal entities were negatively affected by the lowered pool levels.

Alternative 2 (Removal) would have a negative effect on socio-economics in the study area. There would be negative impacts to employment opportunities for lock masters and recreational facility maintenance workers where the infrastructure supporting these professions would be eliminated. Additionally, utility costs would increase as new water supply sources/infrastructure are explored/modified.

Alternative 3 (Recommended Plan, Transfer) will have no effect on socioeconomics in the study area as compared to current conditions.

10.3.3 Demographics and Environmental Justice

In the past decade, the population of Bladen County, NC has declined by approximately 5 percent. While the majority of County residents are between the ages of 18 and 65, approximately 26 percent are younger than 18, and 21 percent are older than 65 according to the U.S. Census Bureau (U.S. Census Bureau 2018). People identifying themselves as "white alone" comprise approximately 61 percent of the population, people identifying themselves as "black alone" comprise approximately 34 percent of the population, and people identifying themselves as "Hispanic" comprise approximately 8 percent of the population. Approximately 52 percent of men and 50 percent of women over 16 are in the civilian labor workforce. Approximately 21 percent of county residents live in poverty. Demographic information is featured in Table 8 below.

East Arcadia Blue Monday Shad Fry is celebrated the day after Easter. According to legend, slaves were forced to work on Easter Sunday, but were given the Monday after Easter off. Because this was during the annual shad migration, slaves would catch these fish in the Cape Fear River and have a fish fry. Modern Blue Monday celebrations began around 1950 and now draw over 1,000 individuals from at least six states. The House Bill 241 designates the 'East Arcadia Blue Monday Shad Fry'

as the official Blue Monday shad fry of North Carolina (Kemp, 2017). Recreational facilities at Lock and Dam Number One play an integral role in perpetuation and celebration of this tradition. Recreational facilities at other CFRLD are also used for other cultural and recreational events. Additional analysis on impacts to recreation can be found in section 10.3.5 of this report.

Table 8: Bladen County, NC Demographic Profile (2010 and 2017)

BLADEN COUNTY DEMOGRAPHICS	
2017 Population	33,478
2010 Population	35,182
Percent Change	-4.8%
Age and Sex	
Under 5 Years Old	5.0%
Under 18 Years Old	20.9%
65 Years and Older	20.8%
Female	52.3
Male	47.7
Race and Origin	
White Alone	60.6%
Black Alone	34.3%
Native American Alone	3.0%
Two or More Races	1.7%
Hispanic	7.9%
White Alone, Not Hispanic	54.4%
Economy, Income & Poverty	
In Civilian Labor Force Male, 16+	52.2%
In Civilian Force Female, 16+	49.6%
2017 Median Household Income	\$ 32,396
Per Capita Income, 2017	\$ 20,839
Persons In Poverty	20.7%

Alternative 1 (No Action) may have a negative effect on the existing environmental justice communities or the current demographic profile of the study area with lock failure. Numerous low or no cost recreation and water access opportunities could be eliminated or changed for local residents. Loss of these opportunities may disproportionately affect minority communities and those of lower economic status. Utility costs may increase due to the need to modify water supply infrastructure or seek new water sources should pools be lowered.

Alternative 2 (Removal) would have a negative effect on the existing environmental justice communities or the current demographic profile of the study area. Numerous

low or no cost recreation and water access opportunities would be eliminated for local residents. Loss of these opportunities may disproportionately affect minority communities and those of lower economic status. Utility costs would increase due to the need to modify water supply infrastructure or seek new water sources should pools be eliminated.

Alternative 3 (Recommended Plan, Transfer) will have no effect on the existing environmental justice communities or the current demographic profile of the study area as compared to current conditions.

10.3.4 Agriculture and Silviculture

Existing land use in Bladen County can be described as a mixture of agricultural, light urban, industrial, and mixed use. Bladen County, like many rural counties in Eastern North Carolina, has maintained a somewhat static agricultural presence during the past decade, and has seen an increase in the market value of the agricultural products sold such as tobacco and cotton . Table 9 below shows the agricultural characteristics of Bladen County, per the 2012 Census of Agriculture (USDA-NASS 2012).

Table 9: Agriculture Profile, Bladen County, NC (2007 and 2012)

Alternative 1 (No Action) could have a negative effect on agriculture or silviculture in the project areas as compared to current conditions, during times of severe drought and should pool levels fall. Water scarcity would stress crops/timber.

Alternative 2 (Removal) could have a negative effect on agriculture or silviculture in the project areas as compared to current conditions, during times of severe drought and should pools be eliminated. Water scarcity would stress crops/timber.

Alternative 3 (Recommended Plan, Transfer) would have no effect on agriculture or silviculture in the study area as compared to current conditions.

10.3.5 Recreation

Recreational boaters enjoy fishing in the Cape Fear River in the vicinity of the locks and dams, as do members of the public utilizing fishing piers and river banks. Since 1965, the USACE has maintained and upgraded many of the recreational facilities at the CFRLD to provide safe and free accommodations for boaters, fishermen, picnickers, and sightseers. These facilities include picnic areas, restrooms, parking areas, fishing areas, boat launching ramps, and open grassed areas. Recreational and commercial fishermen extensively use the waters around Lock and Dam Number One, specifically downstream of the dam, during the spring spawning runs of anadromous fishes. Additionally, recreational facilities, such as picnic shelters, host culturally significant recreation events such as the 'East Arcadia Blue Monday Shad Fry', as mentioned in section 10.3.3.

Alternative 1 (No Action) may have a negative effect on recreation in the project areas. As funding is expected to continue to decline, the recreation facilities such as boat ramps, restrooms, picnic shelters and fishing piers may fall into disrepair due to lack of funding and may have to be closed, or otherwise rendered unusable due to public safety concerns. Annual community and cultural events held at the locks and dams, such as the 'East Arcadia Blue Monday Shad Fry' would be forced to cease or find other suitable venues. Access to free public recreation and water access at the CFRLD would be altered or eliminated.

Alternative 2 (Removal) would include removal of fishing areas, piers, picnic facilities, boat ramps, and other public recreation opportunities in the project area. The recreating public, especially in terms of fishing, boating, sightseeing, and picnicking, would lose free recreation opportunities. Removal of the recreational facilities would reduce free public access to the river for boat launching or bank fishing by half in Bladen County and one-third along the Cape Fear. Recreational businesses relying on existing infrastructure would be negatively affected as well. Annual community and cultural events held at the locks and dams, such as the 'East Arcadia Blue Monday Shad Fry' would be forced to cease or find other suitable venues.

Alternative 3 (Recommended Plan, Transfer) will have no effect on recreation in the study area as compared to current conditions.

10.3.6 Air Quality and Noise

The ambient air quality for Bladen County, NC has been determined to be in compliance with the National Ambient Air Quality Standards, and this County is designated as an attainment area. Findings of an air quality index report created by the U.S. Environmental Protection Agency regarding Fayetteville, NC, which is city nearest the study areas that has associated data, are featured below in Table 10 (EPA 2019a). Table 10 indicates that air quality in Fayetteville, NC is generally considered good according to measured fields. Fayetteville, NC is also designated as an attainment area.

Bladen County, in the vicinity of the locks and dams, is a rural environment dominated by farming with a modest number of residential and farming and commercial structures. There is some boat traffic on the river, especially during the spring anadromous fish runs. Additionally, there could be temporary increases in area noise during cultural festivals, gatherings, or area maintenance projects (i.e. mowing or maintenance paving projects).

Alternative 1 (No Action) will have no effect on air quality and noise as compared to current conditions; however, cultural festivals and gatherings chose to relocate, noise would be reduced.

Alternative 2 (Removal) would temporarily affect air quality and noise as the locks and dams and associated infrastructure are mechanically removed. The direct and

indirect emissions associated with Alternative 2 would be below prescribed de minimus levels and noise will only be elevated during construction. Additionally, the project areas are located in relatively remote areas with few residences nearby and construction activities would have little overall effect on quality of life for Bladen County residents.

Alternative 3 (Recommended Plan, Transfer) would have no effect on air quality and noise in the study area as compared to current conditions.

Table 10: 2018 Air Quality Index Report for Fayetteville, NC

		Number of Days when Air Quality was...					AQI Statistics			Number of Days when AQI Pollutant was...					
CBSA	# Days with AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Maximum	90th Percentile	Median	CO	NO2	O3	SO2	PM2.5	PM10
Fayetteville, NC	349	284	65	.	.	.	100	57	38	.	.	188	.	154	7

Note: CBSA refers to 'Core Base Statistical Area', AQI refers to 'Air Quality Index', CO refers to 'carbon monoxide', NO2 refers to 'nitrogen dioxide', O3 refers to 'ozone', SO2 refers to 'sulfur dioxide', PM2.5 refers to 'particles smaller than 2.5 micrometers', PM10 refers to 'particles smaller than 10 micrometers'

10.3.7 Climate Change and Sea Level Rise

The projected effects of climate change, as they relate to the Cape Fear River locks and dams, are difficult to predict. Sea level rise may force the salt wedge formed between tidal waters of the Atlantic Ocean and the waters of the Cape Fear River to shift upstream. This shift has the potential to affect aquifers and groundwater in the vicinity of Lock and Dam Number One. Additionally, globally higher average temperatures have the potential to increase the frequency and severity of storm events, such as hurricanes that bring heavy winds and rainfall to the study areas and surrounding lands.

Appendix D presents the results of a climate change assessment of the Cape Fear Watershed using USACE climate hydrology assessment tools. Overall, trends indicate an increase in annual maximum monthly streamflow; however, trends at gages downstream of B. Everett Jordan Dam indicate downward trends, at least partially due to regulation of flows by Jordan Dam.

Regardless, since these locks and dams are run-of-river structures (meaning no flood control storage), impacts from changed future climate conditions are not expected to have a significant impact on their operations or functionality if they remain in place (No Action or Recommended Plan alternatives).

Alternative 1 (No Action) will have no effect from climate change within the project areas, as compared to current conditions. However, saltwater intrusion into groundwater and aquifers may occur.

Alternative 2 (Removal) may alter flooding regimes and frequency of waters overbanking the Cape Fear River to a small degree. Sea level rise may affect river water elevation and force brackish water to reach locations in the Cape Fear River upstream of the current brackish water extent.

Alternative 3 (Recommended Plan, Transfer) will have no effect from climate change within the study area as compared to current conditions; however, salt water intrusion into groundwater and aquifers may occur in the future should sea level rise. Sea level rise may affect river water elevation and force brackish water to reach locations in the Cape Fear River upstream of the current brackish water extent.

10.3.8 Hazardous, Toxic and Radioactive Waste (HTRW)

The United States Environmental Protection Agency's (EPA) Envirofacts website was queried to identify the presence of EPA-regulated facilities near the proposed study area. The Envirofacts website contains information collected from regulatory programs and other data relating to environmental activities with the potential to affect air, water, and land resources in surrounding areas. Regarding information reported in accordance with the Resource Conservation and Recovery Act (RCRA), 24 active sites exist in Bladen County and most are located in close proximity to the Cape Fear River (EPA 2019b).

Multiple on-site inspections of the study areas and surroundings have been performed by USACE, Wilmington District staff. At the study areas, specifically, no evidence of improperly- managed hazardous and/or toxic materials was found. Past sediment assessments performed in the study area were previously discussed in section 10.1.1.

Alternative 1 (No Action) will have no effect regarding HTRW concerns in the study areas as compared to current conditions.

Alternative 2 (Removal) may introduce HTRW substances into the water column that have accreted behind dams; however, additional information is needed to fully understand the effects of sediment mobilization.

Alternative 3 (Recommended Plan, Transfer) will have no effect regarding HTRW concerns in the study areas as compared to current conditions.

10.3.9 Aesthetics

The locks and dams and associated property provide unique viewsapes that integrate feats of manmade engineering into an otherwise natural setting teeming with wildlife. Individuals are able to safely enjoy the Cape Fear River and its natural beauty, and the locks and dams, using the infrastructure currently in place.

Alternative 1 (No Action) will result in negative effect to aesthetics as facilities deteriorate. Provided funding will decrease which will reduce the ability to perform maintenance.

Alternative 2 (Removal) would impact aesthetics by removing large in-water structures and other amenities associated with the CRFLD. Riverbanks in the study area would also become exposed. Exposed riverbanks may become colonized by natural or invasive vegetation where the maintained lock and dam areas once existed.

Alternative 3 (Recommended Plan, Transfer) will have no effect on aesthetics in the study area as compared to current conditions.

10.3.10 Lock and Dam Operations

Typical operations at the CFRLD include maintenance activities such as clearing and snagging of debris and sediment, interacting with the public, and conducting regularly scheduled maintenance locks for the purposes of fish passage and to ensure the lock gates properly function. Locking fish upstream at Lock and Dam Number One has not taken place since the completion of the rock arch rapids in November of 2012. The CFRLD are currently operated by the USACE. Specifically, they are operated by Lock and Dam Equipment Mechanics at the direction of the Piedmont Operations Project Manager, who manages Falls Lake, B. Everett Jordan Lake and the CFRLD. During peak recreation season, some landscape maintenance and janitorial duties are accomplished by a contract to a private company. Otherwise, all janitorial duties, grounds maintenance, operations,

maintenance, and repair or recreational facilities and the lock structure, the lock structure, and mechanical components are accomplished by two USACE staff members. Funding provided to the USACE to conduct operations, maintenance, repair, rehabilitation and replacement (OMRR&R) continues to decline annually, and may result in eventual failure of one or more structures and cessation of janitorial and grounds contracts, and decline of facilities.

Alternative 1 (No Action) would result in reduction or suspension of OMRR&R and loss of public recreational opportunities. Reduction in OMRR&R will contribute to deterioration of lock gates to include loss of function.

Alternative 2 (Removal) would deauthorize and remove all improvements from the Cape Fear River and associated lands and terminate all operations. Removal of all improvements would include the deconstruction of the lock guide-walls, dams, dolphins, lock timber guides, esplanades and other in-water structures including the rock arch rapids at Lock and Dam Number One. However, the rock used to fill the scour holes at Locks and Dams One and Two would not be removed.

Alternative 3 (Recommended Plan, Transfer) would see operations conducted by a new owner. Operations are assumed to continue in a manner similar to the current USACE operations.

10.4 Cumulative Impacts

The purpose of a cumulative impacts analysis is to determine whether any cumulative effects result when the effects of the proposed action are added to or interact with other effects from past, present, and reasonably foreseeable actions by USACE or other parties as described in 40 CFR §1508.7. Cumulative impacts can be either adverse or beneficial, and this assessment of cumulative impacts will focus on three issues related to the CFRLD: water supply, water quality, and diadromous fish passage. Cumulative impacts will focus on the study areas, but will take into account regions adjacent to, connected to, upstream of, and downstream of the study area, where appropriate.

Water Supply

Nearby communities with limited financial resources are reliant on the pools behind the CFRLD for municipal and industrial water supply as discussed in section 7.4.2. These communities have built their water supply around these pools and have limited other, financially-viable options. As discussed in section 10.1.4, municipal water supply would be unaffected under Alternative 3 (Transfer; Recommended Plan). Under Alternative 1 (No Action) in which CFRLD failure is expected (as discussed in section 8.1) or under Alternative 2 (Removal), upstream pools would be lowered or eliminated and hundreds of thousands of customers of the CFPWA and FPWC would be affected. Existing in-river water supply infrastructure would have to be modified at significant cost. Additionally, planning for such infrastructure changes takes years. Removing pools that municipal water suppliers rely on would prove problematic and difficult to address in a timely manner. Further, industry requiring access to the pools

behind the CFRLD may be dissuaded from investing in communities in and near the study area. Given the nearby communities' high levels of poverty, this loss could inhibit efforts to strengthen the local economy.

Water Quality

In the Cape Fear River basin, including within the study area, various past Federal, private, and other actions have impacted water quality including construction of the CFRLD and repairs/improvements, impoundment of B. Everett Jordan Dam and Reservoir, urban development, agricultural activities, navigation channel maintenance, water withdrawals, and other such actions. Increased urban development, reduction in pervious surfaces, and intensive agricultural activities have allowed for elevated nutrient loads to reach the Cape Fear River as compared to historic conditions, notably during heavy rain events. Storm water runoff may contain nutrients such as nitrogen and phosphorus that serve to accelerate growth of algal species, some of which may produce toxins harmful to human health. Using molecular gene markers, recent research has demonstrated that Jordan Lake, which serves as the headwaters of the Cape Fear River, is unlikely to significantly contribute to downstream harmful algal blooms. North Carolina state water quality regulatory standards identify 5.0 mg/L as the minimum value for dissolved oxygen, and 40 µg/L as the maximum for chlorophyll-a. The study area is more often than not in compliance with these standards. Lower water levels in the Cape Fear River, especially during times of drought, may create favorable conditions for algal species to grow as discussed in section 10.1.3. This is especially true in areas of low water velocity, such as behind the CFRLD. Following algal blooms, dissolved oxygen values may fall, which may stress aquatic wildlife. Water quality, including storm water runoff, will be unaffected by Alternative 3 (Transfer; Recommended Plan). Under Alternative 3, relatively low water velocities in the pools upstream may continue to allow for favorable algal bloom conditions. Alternative 1 (No Action) and Alternative 2 (Removal) will have no effect on storm water runoff; however, Alternatives 1 and 2 would positively affect general water quality by increasing water velocities and decreasing water residence time in areas immediately upstream of the CFRLD. Alternative 2 (Removal) would involve physical removal of in-water infrastructure resulting in temporary increases in turbidity during removal operations. During the removal process proper turbidity curtains will be used to minimize impacts. No violations of State water quality standards would occur.

Diadromous Fish Passage

Numerous diadromous fish species are known to exist in the study area, some of which are federally-listed as endangered. For approximately the past century, these fishes have been impacted by the presence of the CFRLD as discussed in sections 7.4.6, 7.4.7, 10.2.3, and 10.2.4. To aid in fish passage, a rock arch rapids was constructed at Lock and Dam Number One in 2012 as mitigation for potential negative effects to Shortnose sturgeon associated with blasting and Wilmington Harbor improvements (see sections 4.2 and 6.2). Under Alternative 1 (No Action), excluding the efforts of non-USACE entities, diadromous fish

passage at the CFRLD through lock gates would be impossible due to inoperability. In this scenario, upstream fish passage would be possible over the rock arch rapids at Lock and Dam Number One but would end below at Lock and Dam Number Two where no fish passage structure exists. Under Alternative 3 (Transfer; Recommended Plan), fish passage would remain challenging and would require locking of fish during spawning season at Lock and Dam Numbers Two and Three to pass fish. However, multiple non-federal entities have shown interest in improving existing fish passage measures and constructing new fish passage measures at the CFRLD, which may come to fruition in the foreseeable future. Under Alternative 1 (No Action) and Alternative 3 (Transfer; Recommended Plan) modifications to the CFRLD to aid in fish passage would be possible. These improvements may aid strengthening naturally occurring diadromous fish populations in the Cape Fear River, and encourage annually stocked species such as the striped bass to reproduce naturally. Under Alternative 2 (Removal), fish passage improvement efforts at the CFRLD would be nullified; however, diadromous fish passage would be improved by eliminating the CFRLD.

Conclusion

Overall effects of the proposed alternatives combined with the effects of other past, present, and reasonably foreseeable future actions are not likely to be substantial. Weighing the beneficial and negative cumulative effects of all alternatives considered, Alternative 3 (Transfer; Recommended Plan) provides the most favorable suite of opportunities to promote/retain municipal water supply, water quality, diadromous fish passage, and industry attraction in the study area.

11.0 PUBLIC AND AGENCY INVOLVEMENT AND ENVIRONMENTAL COMPLIANCE

Resource agencies, the general public, and stakeholders representing municipal, governmental, commercial, and natural resources interests have been informed of this study and have been receptive to coordination and outreach efforts. There are many entities with a keen interest in this study in terms of water supply, fish passage, recreation, and other matters with importance to the public.

Initial outreach to selected resource agency representatives, including the National Marine Fisheries Service, the NC Office of State Archaeology, the NC Wildlife Resources Commission, the US Fish and Wildlife Service, was conducted by phone on April 2, 2018. This early outreach was primarily to inform these stakeholders of an in-person information meeting that was held on May 1, 2018.

On April 19, 2018, an invitation was distributed to selected stakeholders regarding the May 1, 2018 information meeting held at the Bladen County, NC Cooperative Extension Center. Attendees included representatives from American Rivers, Bladen County, Cape Fear Rides, Cape Fear River Watch, a representative from the office of Congressmen David Rouzer (NC District 7), the Fayetteville Public Works Commission, Moffatt & Nichol, Inc., the National Marine Fisheries Service, the NC Department of Transportation, the NC Department of Water Resources, the NC Wildlife Resources Commission, the Town of Elizabethtown, and the US Fish and Wildlife Service. This information meeting was designed to convey information about the study process. Specifically discussed was Cape Fear River Locks and Dams (CFRLD) authorization and purpose, definition of a disposition study, why the CLFD project was a candidate for disposition, process overview, and milestones.

On November 19, 2018, a notice was widely distributed that requested scoping comments from the public and agencies to aid in identifying significant resources and issues of concern with regard to this disposition study. Comments received as a result of scoping have been considered during the development of this report, which was prepared in accordance with the requirements of the National Environmental Policy Act of 1969, as amended. Additionally, a public scoping meeting was held on December 12, 2018 at the Cape Fear Farmer's Market in Elizabethtown, NC. In attendance were representatives from American Rivers, Bladen County, Bladen County Public Utilities, the Bladen Journal, the Blue Monday Shad Fry, the Cape Fear Public Utility Authority, a representative from the office of Congressmen David Rouzer (NC District 7), East Arcadia Senior Citizens, the Fayetteville Public Works Commission, the Lower Cape Fear Water and Sewer Authority, Moffatt & Nichol, Inc., the NC Department of Transportation, the NC Division of Marine Fisheries, the NC Division of Water Resources, the NC Wildlife Resources Commission, a representative from the office of Senator Thom Tillis, the Town of Elizabethtown, the Town of Leland, the Town of Sandyfield, The US Fish and Wildlife Service, and other members of the public. In addition to viewing a presentation describing the disposition study, at this meeting, the public and resource agencies in attendance were given the opportunity to have questions addressed by USACE, Wilmington District staff.

Concerns expressed at and following the information meeting and public scoping meeting primarily included aesthetics, economic growth, human resources (socioeconomic, recreational, and aesthetic resources), future ownership, fish passage, National security

(water supply to Fort Bragg), public health, recreation, socioeconomics, municipal water supply, and disruption of in-progress and planned Section 408 modification efforts to the CFRLD by non-federal entities. These stakeholder concerns were received verbally and/or in writing.

This document will be made available for public and agency review pursuant to the National Environmental Policy Act of 1969, as amended. Comments will be compiled and addressed, accordingly, to ensure compliance with applicable environmental laws, regulations, policies, and Executive Orders.

12.0 CONCLUSIONS

Analysis of potential positive and negative outcomes, and impacts of the three alternatives: Alternative 1: The No Action Plan consisting of no additional Federal actions on the projects, Alternative 2: (Removal) Deauthorize and deconstruct project improvements, and Alternative 3: (Recommended Plan, Transfer) Deauthorize and dispose of the projects to a willing non-federal governmental entity. Alternative 3 has the largest number of positive outcomes to the largest number of stakeholders, and the most benign effects on, and fewest impacts to the environment. This is also the most cost effective plan due to the elimination of OMRR&R costs and avoidance of \$36M in removal costs. A Draft Finding of No Significant Impact (FONSI) is included as Attachment 3.

13.0 RECOMMENDATIONS

I concur with the findings of this report. In due consideration of all significant aspects of the study area, and in the overall public interest, I recommend for implementation, the Recommended Plan presented in this document.

ROBERT J. CLARK
Colonel, EN

14.0 POINT OF CONTACT

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Attachment 1

North Carolina Session Law 2008-186

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**GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2007**

**SESSION LAW 2008-186
HOUSE BILL 2785**

**AN ACT TO ALLOW THE STATE TO ACQUIRE LOCKS AND DAMS ONE, TWO,
AND THREE ON THE CAPE FEAR RIVER FROM THE UNITED STATES.**

Whereas, locks and dams #1, #2, and #3 on the Cape Fear River were constructed by the United States in the period from 1915 to 1935; and

Whereas, it is understood that the Congress some time ago authorized a mission for the Army Corps of Engineers related to the locks and dams in Bladen County that hinged on maintaining commerce through the locks on the Cape Fear River; and there has been no commercial traffic on the Cape Fear River in about twelve years, and there may be no federal role in the maintenance of the locks and dams #2 and #3; and

Whereas, the Army Corps of Engineers is engaged in planning and implementing extensive work in the Wilmington Harbor area. The work has and will involve dredging, blasting, facility relocation, and related activities. In order to be allowed to do the work, the Army Corps of Engineers is working through a commitment to the U.S. Fish and Wildlife Service that involves mitigation activities to compensate for the projected negative environmental impacts on wildlife habitat and other environmental features in the harbor area as a result of the Corps' work to improve the harbor for commerce; and

Whereas, as part of the mitigation negotiated, the U.S. Army Corps of Engineers has committed to construction of a fish passage option (not yet completely defined) for Lock and Dam #1 (just upriver from the Wilmington Harbor area in Bladen County) and the "study" of fish passage options and other issues related to Lock and Dam #2 and the Huske Lock and Dam #3 (both also in Bladen County); and

Whereas, leaving Lock and Dam #1 in place with a rock arch rapids structure would also protect the water supply intakes for the City of Wilmington and the Lower Cape Fear Water and Sewer Authority; and

Whereas, there is concern upriver in Bladen, Cumberland, and Harnett Counties (and to a lesser degree, Sampson, Lee, Chatham, and Moore Counties) that the Army Corps of Engineers is only committed to "study" the second and the third lock and dam complexes. An implication of the Army Corps of Engineers' "study" commitment is that there is currently no funding for any specific recommended activity for locks and dams #2 and #3 that might become identified by the negotiated study. A more basic concern is that there could possibly be no definitive plan or action recommended to leave the locks and dams #2 and #3 in place in the mentioned study; and

Whereas, the nature of the concerns in Bladen, Cumberland, Harnett, and other counties touches on at least three points: (i) a rock arch rapids "fish ladder" on only Lock and Dam #1 does not allow migrating fish to get past locks and dams #2 or #3; (ii) absence of locks and dams #2 and #3 jeopardizes existing and/or potential water supply intakes above those two locks and dams; and (iii) absence of locks and dams #2 and #3 would lower the river surface by upwards of 20 feet and potentially compromise water quality in the middle and lower subbasins of the Cape Fear River; and

Whereas, preliminary legislative steps are being initiated to create an opportunity for a smooth transition of ownership of the locks, dams, and adjoining property from the Army Corps of Engineers to the State of North Carolina, subject to the resolution of these and some other questions regarding the condition of the lock and dam complexes. Such a step would allow for the maximum utilization of the transportation benefit represented by the locks and the recreational benefit created by a river managed by the dams; and

Whereas, there is a proposed water supply intake behind Lock and Dam #2 that would serve Smithfield Packing. There are existing water supply intakes behind Lock and Dam #3 serving DuPont Works and the City of Fayetteville, and it is critical that these and other future water supply intakes be protected for the significant human populations in the region; Now, therefore,

The General Assembly of North Carolina enacts:

SECTION 1. The State of North Carolina may accept from the United States locks and dams #1, #2, and #3 on the Cape Fear River, along with all adjacent lands currently owned by the United States, after the three locks and dams have been properly refurbished and the rock arch rapids fish ladders have been successfully constructed.

SECTION 2. The Secretary of Transportation, in consultation with the Board of Commissioners of Bladen County, shall negotiate the transfer from the United States. When the Secretary of Transportation reaches an acceptable agreement with the United States, he shall recommend its approval to the Council of State. The agreement is then subject to approval by the Council of State. Upon approval, as part of a successful transfer arrangement with the United States, the Council of State shall allocate the property to the Department of Transportation, the Department of Environment and Natural Resources, or such other State department as it deems appropriate.

SECTION 3. This act is effective when it becomes law.

In the General Assembly read three times and ratified this the 16th day of July, 2008.

s/ Marc Basnight
President Pro Tempore of the Senate

General Assembly Of North Carolina

Session 2007

s/ Joe Hackney
Speaker of the House of Representatives

s/ Michael F. Easley
Governor

Approved 5:07 p.m. this 7th day of August, 2008

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Attachment 2

Economic Guidance Memorandum 18-03

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

NOV 20 2017

CECW-P

MEMORANDUM FOR PLANNING COMMUNITY OF PRACTICE

SUBJECT: Economic Guidance Memorandum, 18-03, Unit Day Values for Recreation
for Fiscal Year 2018

The enclosed information is provided for immediate use. Questions related to this memorandum should be addressed to Mr. Jeremy LaDart, CECW-PC, at Jeremy.m.ladart@usace.army.mil or by telephone at (202) 734-1861.

A handwritten signature in cursive script that reads "Theodore A. Brown".

THEODORE A. BROWN, P.E.
Chief, Planning and Policy Division
Directorate of Civil Works

Encl

Unit Day Values for Recreation, Fiscal Year 2018

The National Economic Development (NED) benefit evaluation procedures contained in [ER 1105-2-100](#) (22 Apr 2000), Appendix E, Section VII, include three methods of evaluating the beneficial and adverse NED effects of project recreation: travel cost method (TCM), contingent valuation method (CVM), and unit day value (UDV) method.

The criteria for selecting the appropriate method are described in paragraph E-50, subsection b (4) and Figure E-10 of ER 1105-2-100 and in the attached document. If the UDV approach is used, the range of unit day value for FY 2018 studies is:

General Recreation	\$ 4.05	\$ 12.15
Specialized Recreation	\$16.45	\$ 48.10

If, when using the UDV method, evidence indicates a value outside the published range, use either TCM or CVM to evaluate recreation benefits.

The attached document provides a detailed description of the application of the UDV method. The tables provided in the attachment are constructed as guidance for planners in the selection of unit day values for particular recreation activities. Tables 1 and 2 illustrate a method of assigning a point rating to a particular activity. Point values are assigned based on measurement standards described for the five criteria of activities: recreational experience; availability of opportunity; carrying capacity; accessibility; and environmental quality.

Table 1 covers general recreation, involving relatively intensive development of access and facilities. The specialized recreation category, covered in Table 2, includes such unique experiences as big game hunting, wilderness pack trips, white water canoeing, and other activities generally characterized by more extensive, low density use.

Values provided for FY 2018 may be used to convert points to a UDV dollar amount if the point assignment method is used. The table was adjusted from Table K-3-1, Federal Register Vol. 44, No. 242, p.72962, December 14, 1979, and the subsequent Table VIII-3-1 "Conversion of Points to Dollar Values", *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, March 10, 1983, using the Consumer Price Index (CPI) factors published by the Bureau of Labor Statistics. The CPI basis of Table VIII-3-1 from Principles and Guidelines is July 1, 1982 (CPI value = 97.5). The FY 2018 CPI basis is September, 2017 (CPI value = 246.819).

As a special note of warning, it is important to recognize that all specialized recreation activities claimed will require a regional model or a site-specific study, the results of which would probably not agree with the specialized values in the attached

Encl

1

Unit Day Values for Recreation, Fiscal Year 2018

table. The only exception would be in those specific cases for which the unreliability or infeasibility of TCM or CVM can be stated convincingly.

Conversion of Points to Dollar Values

Point Values	General Recreation Values (1)	General Fishing and Hunting Values (1)	Specialized Fishing and Hunting Values (2)	Specialized Recreation Values other than Fishing and Hunting (2)
0	\$ 4.05	\$ 5.82	\$ 28.35	\$ 16.45
10	\$ 4.81	\$ 6.58	\$ 29.11	\$ 17.47
20	\$ 5.32	\$ 7.09	\$ 29.62	\$ 18.73
30	\$ 6.08	\$ 7.85	\$ 30.38	\$ 20.25
40	\$ 7.59	\$ 8.61	\$ 31.14	\$ 21.52
50	\$ 8.61	\$ 9.37	\$ 34.17	\$ 24.30
60	\$ 9.37	\$ 10.38	\$ 37.21	\$ 26.83
70	\$ 9.87	\$ 10.89	\$ 39.49	\$ 32.40
80	\$ 10.89	\$ 11.64	\$ 42.53	\$ 37.72
90	\$ 11.64	\$ 11.90	\$ 45.57	\$ 43.04
100	\$ 12.15	\$ 12.15	\$ 48.10	\$ 48.10

(1) Points from Table 1 in attachment.

(2) Points from Table 2 in attachment.

Unit Day Method

1. Overview. The unit day value (UDV) method for estimating recreation benefits relies on expert or informed opinion and judgment to approximate the average willingness to pay of users of Federal or Federally assisted recreation resources. If it can be demonstrated that more reliable TCM or CVM estimates are either not feasible or not justified for the particular project under study, the UDV method may be used. By applying a carefully thought-out and adjusted unit day value to estimate use, an approximation is obtained that may be used as an estimate of project recreation benefits.

2. Implementation.

(a) When the UDV method is used for economic evaluations, planners will select a specific value from the range of values provided annually. Application of the selected value to estimated annual use over the project life, in the context of the with- and without-project framework of analysis, provides the estimate of recreation benefits.

(b) Two categories of outdoor recreation days, general and specialized, may be differentiated for evaluation purposes. "General" refers to a recreation day involving primarily those activities that are attractive to the majority of outdoor users and that generally require the development and maintenance of convenient access and adequate facilities. "Specialized" refers to a recreation day involving those activities for which opportunities in general are limited, intensity of use is low, and a high degree of skill, knowledge, and appreciation of the activity by the user may often be involved.

(c) Estimates of total recreation days of use for both categories, where applicable, will be developed. The general category comprises the great majority of all recreation activities associated with water projects, including swimming, picnicking, boating, and most warm water fishing. Activities less often associated with water projects, such as big game hunting and salmon fishing, are included in the specialized category. A separate range of values is provided annually for each category and for fishing and hunting to facilitate adoption of a point system in determining the applicable unit values for each individual project under consideration.

(d) When employing this method to determine recreation benefits, select appropriate values from the range of values provided. If evidence indicates a value outside the published range, use the TCM or CVM method.

(e) In every case, planners are expected to explain the selection of any particular value. To assist in explaining a specific value, a point rating method may be used. The method illustrated here contains five specific criteria and associated measurement standards designed to reflect quality, relative scarcity, ease of access, and aesthetic features. Since the list of criteria and weights assigned may vary with the situation,

Unit Day Method

public involvement should occur in the value determination process. Planners are also expected to make appropriate use of studies of preferences, user satisfaction, and willingness to pay for different characteristics. When these studies are used, particular efforts should be made to use estimates derived elsewhere from applications of the TCM and CVM techniques, to support the value selected.

(1) General recreation (Table 1). Activities in this category are those associated with relatively intensive development of access and facilities as compared to the specialized recreation category. Generally, progressively higher physical standards for each unit of carrying capacity is involved in selecting higher unit values, and these may be accompanied by larger related non-project costs.

(2) Specialized recreation (Table 2).

(a) This category includes those activities whose values are generally lowered, if not actually excluded, by the type of development that enhances activities in the general recreation category. Thus, extensive or low-density use and development constitutes the higher end of this range of values (e.g., big game hunting, and wilderness pack trips). Also included in the upper end of the range are relatively unique experiences such as inland and marine fishing for salmon and steelhead, white water boating and canoeing, and long-range boat cruises in areas of outstanding scenic value. Examples of activities to which values at the lower end of the range would be assigned include upland bird hunting and specialized nature photography.

(b) The unit day values to be used for both the general and specialized recreation categories should be further adjusted to reflect additional quality considerations expected to prevail at various project sites in various regions of the Nation, and weighted according to their importance to users. For example, a reservoir that is expected to carry a relatively heavy load of suspended silt or is expected to be used beyond optimum capacity would be less desirable, and therefore of lower unit value, than one that will have clear water and be less crowded.

(c) Hunting and fishing may be treated either as general recreation (Table 1) or specialized recreation (Table 2) depending upon whether it is associated with developed areas or back country areas, respectively. In either case, the recreation experience (criterion "a" in the tables) will be given points according to the additional consideration of the chances of success; the midpoint of the value range is associated with the region's average catch or bag. Other criteria may be modified if appropriately based on available evidence about the preferences and willingness to pay of hunters and fishermen for different recreation quality factors.

Unit Day Method

(d) The degree to which alternative non-project opportunities are available to users is also considered in the assignment of values. Higher values should be assigned if the population to be served does not have existing water-oriented recreation opportunities. If water-oriented recreation opportunities are relatively abundant, as compared to other outdoor recreation opportunities, lower unit values should be assigned, even if a large number of visitations are expected at the proposed development.

(e) The choice of a unit day value must account for transfers to avoid double counting of benefits. The net value of a transfer of use from one site to another is the difference in unit day values for recreation at the two sites. If recreation activities at the two sites are comparable, travel cost savings are the only NED benefits associated with the transfer. Use at the site must therefore be disaggregated according to the proportion of total estimated use that would not have occurred without the project and the proportion of total use that represents transfers from existing sites. The respective types of uses must then be assigned different daily values as indicated.

(f) Unit values selected are to be considered net of all associated costs of both the users and others in using or providing these resources and related services.

3. Estimating Use.

(a) Using the ranges of values requires the study of estimates of annual use foregone and expected at recreation sites. Use can be estimated by a use estimating equation or per capita use curve as discussed above, but when these means are available, the second step of the travel cost method should generally be used instead of UDV's to derive the benefit.

(b) The capacity method is an alternative method of estimating use, but it has severe limitations. The capacity procedure involves the estimation of annual recreation use under "without project" and "with project" conditions through the determination of resource or facility capacities (taking into consideration instantaneous rates of use, turnover rates, and weekly and seasonal patterns of use). Seasonal use patterns are dependent on climate and culture and probably account for the greatest variation in use estimates derived through this method. In general, annual use of outdoor recreation areas, particularly in rural locations and in areas with pronounced seasonal variation, is usually about 50 times the design load, which is the number of visitors to a recreation area or site on an average summer Sunday. In very inaccessible areas and in those known for more restricted seasonal use, the multiplier would be less; in urban settings or in areas with less pronounced seasonal use patterns, the multiplier would be greater. In any case, the actual estimation of use involves an analytical procedure using instantaneous capacities, daily

Unit Day Method

turnover rates, and weekly and seasonal use patterns as specific data inputs.

(c). Because the capacity method does not involve the estimation of site-specific demand, its use is valid only when it has been otherwise determined that sufficient demand exists in the market area of project alternatives to accommodate the calculated capacity. Its greatest potential is therefore in urban settings where sufficient demand obviously exists. Additionally, its use should be limited to small projects with (1) a facility orientation (as opposed to a resource attraction), and (2) restricted market areas that would tend to make the use of alternative use estimating procedures less useful or efficient.

4. Calculating Values.

The estimates of annual use are combined with the selected unit day values to derive an estimate of annual recreation benefits. The value assigned to each activity or category of activities is multiplied by the number of recreation days estimated for that activity. The products are then summed to obtain the estimate of the total value of an alternative. Recreation days to be gained and lost or foregone as a result of a particular alternative are listed and valued separately, not merely shown as net recreation days. Transfers of recreational users to or from existing sites in the region must be calculated, and the net regional gain or loss used in the final benefit estimated. Adequate information must appear in the discussion of the use estimation and valuation procedure or elsewhere in the report concerning the alternative being considered, so that the reader can derive a similar value for each activity.

Unit Day Method

Table 1: Guidelines for Assigning Points for **General Recreation**

Criteria	Judgment factors				
Recreation experience ¹ Total Points: 30 Point Value:	Two general activities ²	Several general activities	Several general activities; one high quality value activity ³	Several general activities; more than one high quality high activity	Numerous high quality value activities; some general activities
	0-4	5-10	11-16	17-23	24-30
Availability of opportunity ⁴ Total Points: 18 Point Value:	Several within 1 hr. travel time; a few within 30 min. travel time	Several within 1 hr. travel time; none within 30 min. travel time	One or two within 1 hr. travel time; none within 45 min. travel time	None within 1 hr. travel time	None within 2 hr. travel time
	0-3	4-6	7-10	11-14	15-18
Carrying capacity ⁵ Total Points: 14 Point Value:	Minimum facility for development for public health and safety	Basic facility to conduct activity(ies)	Adequate facilities to conduct without deterioration of the resource or activity experience	Optimum facilities to conduct activity at site potential	Ultimate facilities to achieve intent of selected alternative
	0-2	3-5	6-8	9-11	12-14

Unit Day Method

Table 1: Guidelines for Assigning Points for **General Recreation** (Continued)

Accessibility	Limited access by any means to site or within site	Fair access, poor quality roads to site; limited access within site	Fair access, fair road to site; fair access, good roads within site	Good access, good roads to site; fair access, good roads within site	Good access, high standard road to site; good access within site
Total Points: 18					
Point Value:	0-3	4-6	7-10	11-14	15-18
Environmental quality	Low aesthetic factors ⁶ that significantly lower quality ⁷	Average aesthetic quality; factors exist that lower quality to minor degree	Above average aesthetic quality; any limiting factors can be reasonably rectified	High aesthetic quality; no factors exist that lower quality	Outstanding aesthetic quality; no factors exist that lower quality
Total Points: 20					
Point Value:	0-2	3-6	7-10	11-15	16-20

¹ Value for water-oriented activities should be adjusted if significant seasonal water level changes occur.

² General activities include those that are common to the region and that are usually of normal quality. This includes picnicking, camping, hiking, riding, cycling, and fishing and hunting of normal quality.

³ High quality value activities include those that are not common to the region and/or Nation, and that are usually of high quality.

⁴ Likelihood of success at fishing and hunting.

⁵ Value should be adjusted for overuse.

⁶ Major esthetic qualities to be considered include geology and topography, water, and vegetation.

⁷ Factors to be considered to lowering quality include air and water pollution, pests, poor climate, and unsightly adjacent areas.

Unit Day Method

Table 2: Guidelines for Assigning Points for **Specialized Recreation**

Criteria	Judgment factors				
Recreation experience ¹ Total Points: 30 Point Value:	Heavy use or frequent crowding or other interference with use 0-4	Moderate use, other users evident and likely to interfere with use 5-10	Moderate use, some evidence of other users and occasional interference with use due to crowding 11-16	Usually little evidence of other users, rarely if ever crowded 17-23	Very low evidence of other users, never crowded 24-30
Availability of opportunity ² Total Points: 18 Point Value:	Several within 1 hr. travel time; a few within 30 min. travel time 0-3	Several within 1 hr. travel time; none within 30 min. travel time 4-6	One or two within 1 hr. travel time; none within 45 min. travel time 7-10	None within 1 hr. travel time 11-14	None within 2 hr. travel time 15-18
Carrying capacity ³ Total Points: 14 Point Value:	Minimum facility for development for public health and safety 0-2	Basic facility to conduct activity(ies) 3-5	Adequate facilities to conduct without deterioration of the resource or activity experience 6-8	Optimum facilities to conduct activity at site potential 9-11	Ultimate facilities to achieve intent of selected alternative 12-14

Unit Day Method

Table 2. Guidelines for Assigning Points for **Specialized Recreation** (Continued)

Accessibility	Limited access by any means to site or within site	Fair access, poor quality roads to site; limited access within site	Fair access, fair road to site; fair access, good roads within site	Good access, good roads to site; fair access, good roads within site	Good access, high standard road to site; good access within site
Total Points: 18					
Point Value:	0-3	4-6	7-10	11-14	15-18
Environmental quality	Low aesthetic factors ⁴ that significantly lower quality ⁵	Average aesthetic quality; factors exist that lower quality to minor degree	Above average aesthetic quality; any limiting factors can be reasonably rectified	High aesthetic quality; no factors exist that lower quality	Outstanding aesthetic quality; no factors exist that lower quality
Total Points: 20					
Point Value:	0-2	3-6	7-10	11-15	16-20

¹ Value for water-oriented activities should be adjusted if significant seasonal water level changes occur.

² Likelihood of success at fishing and hunting.

³ Value should be adjusted for overuse.

⁴ Major esthetic qualities to be considered include geology and topography, water, and vegetation.

⁵ Factors to be considered to lowering quality include air and water pollution, pests, poor climate, and unsightly adjacent areas.

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Attachment 3

Draft Finding of No Significant Impact (FONSI)

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DRAFT FINDING OF NO SIGNIFICANT IMPACT

Section 216 Disposition Study, Draft Integrated Report and Environmental Assessment
 Cape Fear River Locks and Dams, Bladen County, North Carolina

The U.S. Army Corps of Engineers, Wilmington District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Section 216 Disposition Study, Draft Integrated Report (IR) and Environmental Assessment (EA), Cape Fear River Locks and Dams, Bladen County, North Carolina, dated **DATE OF IFR/EA** evaluates the current and future usage and continued federal interest in ownership and maintenance of these projects for their authorized purpose of facilitating commercial navigation in the Cape Fear River between Wilmington and Fayetteville, North Carolina. The final recommendation is contained in the report of the Chief of Engineers, dated **DATE OF CHIEF'S REPORT**.

The Draft IR/EA, incorporated herein by reference, evaluated three alternatives regarding future ownership and maintenance of the Cape Fear River Locks and Dams in Bladen County, North Carolina. The recommended plan is the Locally Preferred Plan (LPP) and includes:

- Deauthorization of the project and disposal (transfer) of all real property and improvements to a willing non-federal governmental entity

In addition to a "no action" plan, which consists of leaving the structures in their current state (i.e., "caretaker status"), two alternatives were evaluated. The alternatives, to include the recommended plan, included:

- Deauthorization of the project and disposal of real property and improvements, including removal of improvements
- Deauthorization of the project and disposal (transfer) of all real property and improvements to a willing non-federal governmental entity

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan is listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Aesthetics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Air quality	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Aquatic resources/wetlands	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Invasive species	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fish and wildlife habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Threatened/Endangered species/critical habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Historic properties	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>



	Insignificant effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Other cultural resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Floodplains	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hazardous, toxic & radioactive waste	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hydrology	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Landuse	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Navigation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Noise levels	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Public infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Socio-economics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental justice	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tribal trust resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Water quality	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Climate change	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the IR/EA will be implemented, if appropriate, to minimize impacts.

No compensatory mitigation is required as part of the recommended plan.

Public review of the draft IR/EA and FONSI was completed on **DATE DRAFT EA AND FONSI REVIEW PERIOD ENDED**. All comments submitted during the public review period were responded to in the Final IR/EA and FONSI. A 30-day state and agency review of the Final IR/EA was completed on **PICK OPTION BASED ON RESULTS OF STATE AND AGENCY REVIEW**.

Pursuant to section 7(a)(2)/7(d) of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers determined that the recommended plan will have no effect on the following federally listed species or their designated critical habitat:

- Northern long-eared bat (*Myotis septentrionalis*)
- Red-cockaded woodpecker (*Picoides borealis*)
- Wood stork (*Mycteria Americana*)
- Atlantic pigtoe clam (*Fusconaia masoni*)
- American chaffseed (*Schwalbea americana*)
- Pondberry (*Lindera melissifolia*)
- Rough-leaved loosestrife (*Lysimachia asperulaefolia*)
- West Indian manatee (*Trichechus manatus*)
- American alligator (*Alligator mississippiensis*)



- Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*)
- Shortnose sturgeon (*Acipenser brevirostrum*)

The U.S. Fish and Wildlife Service (FWS) provided their response regarding the Corps' determinations presented in the IR/EA on **DATE OF CONCURRENCE LETTER**.

Additionally, the National Marine Fisheries Service (NMFS) provided their response regarding the Corps' determinations presented in the IR/EA on **DATE OF CONCURRENCE LETTER**.

Pursuant to sections 106 and 110 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the recommended plan will have no effect on historic properties. The **North Carolina State Historic Preservation Office** provided their response regarding the Corps' determination presented in the IR/EA on **DATE OF AGREEMENT**.

Pursuant to the Clean Water Act of 1972, as amended, no discharge of dredged or fill material is associated with the recommended plan. The recommended plan is compliant with section 404(b)(1) guidelines (40 CFR 230).

A determination of consistency with the North Carolina Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 is not required. The recommended plan occurs in Bladen County, which is not a coastal county.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and economic criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Date

Robert J. Clark
Colonel, Corps of Engineers
District Commander

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Appendix A

Real Estate

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**Locks One, Two, and Three
Real Estate Appendix A
August 2019**

Executive Summary

The Real Estate Appendix A supports the draft recommended plan. The Appendix summarizes the market analysis and investigates the potential for alternative uses of the real property based on maximum economic productivity and/or value to the public. The Appendix is written in accordance with Real Estate Policy Guidance Letter 33.

If disposal of the fee-owned Upper Cape Fear Locks and Dams One, Two and Three and associated easement estates plus improvements are approved for disposition there are two likely methods for real estate disposal. North Carolina Session Law 2008-186 passed in 2007 states that the State of North Carolina would accept transfer of all the locks if the locks were rehabilitated. Therefore the State of North Carolina would be a willing and ideal grantee for the project. Given there is limited marketability for a lock and dam project other than public entities; to have a willing partner in the State of North Carolina is fortuitous.

The first is disposal by special congressional legislation. This method would be the most efficient and quickest method for disposal. Traditionally special legislation would name the grantee(s) who the project would be conveyed too. Sometimes the legislation would provide a timeline for completion and could direct the Department of the Army Savannah Real Estate Division to execute the disposal. It is estimated this would be a 6 month to a 2 year process.

Absent special legislation, real estate disposal would be through the normal General Services Administration (GSA) disposal process. A Report and Recommendation of Excess (RROE) is prepared and submitted, along with environmental and cultural resources clearances, through the South Atlantic Division to U.S. Army Corps of Engineers (USACE) headquarters for approval. When approval of the RROE is received, the USACE would screen the property with the Department of Defense for interests. If there is no Department of Defense interest, a SF 118 - Report of Excess Real and Related Personal Property would then be prepared and forwarded to the appropriate General Services Administration (GSA) regional office. GSA would perform the disposal including screening with the Department of Housing and Urban Development (HUD), and Federal, state and local governments. A conservative timeline would be 2-5 years for the disposal process.

Real Estate Appendix, Table of Contents

1. Project Background and Authorization.....	1
1.1 Current Status of Project.....	1
2. Description of Project Lands and Improvements.....	2
2.1 Project Locations	2
2.2 Real Estate Interests Held by the Government	7
2.2a Deed Reservations.....	9
2.3 Site Access	9
2.4 Existing Outgrants	9
2.5 Real Property Inventory.....	9
2.6 Statement of Environmental Investigations	10
3. Annual Holding Costs.....	11
4. Market Analysis.....	11
4.1 Potential Re-Use Options.....	11
4.2 Constraints	11
4.2a Physical Characteristics.....	11
4.2b Historical Significance Constraints.....	11
4.2c Other Constraints.....	11
4.3 Alternatives Evaluated.....	12
5. Disposal Methods.....	13
5.1 Special Legislation Disposal Authority	13
5.2 Department of Defense Real Property Authority.....	13
5.3 GSA Real Property Authority.....	13
6. Anticipated Local Support or Opposition	14
7. Estimate of Administrative Cost and Time of Disposal.....	15
8. Recommendation of Preferred Divestiture Path	16
9. Level of Confidence.....	16
Exhibit "A" – Inventory Report.....	17

I. Project Background and Authorization

The Cape Fear Locks and Dams (CFLD) are a series of three locks and dams (Number One, Two and William O. Huske hereinafter Number Three) constructed between 1910 and 1935 on the Cape Fear River in southeastern North Carolina. Over many years, their use for commercial navigation has declined, with the last known commercial lockage occurring in 1995. The projects continue to require substantial historic operations and maintenance (O&M) funding, totaling approximately \$800,000 annually, but averaging just less than \$500,000 in recent years, for operations/labor, routine repairs, electricity, and facility maintenance. The purpose of a study was to evaluate the current and future usage of the projects, to compare a “No-Action” alternative in which the project continues to be owned by the Federal government (but not fully maintained due to lack of funds), and an alternative consisting of the rendering safe, de-authorization, and potential disposal of the projects. The study is being conducted under “Interim Guidance on the Conduct of Disposition Studies”, issued 22 August 2016, by the Director of Civil Works, U.S. Army Corps of Engineers and “Real Estate Policy Guidance Letter Number 33—Interim Guidance on Disposition Studies” , issued 28 September 2016, by Director of Real Estate, U.S. Army Corps of Engineers.

Locks and Dams Number One and Two for the Cape Fear River above Wilmington navigation project, along with an eight-foot [deep – NGVD 1928] channel, were authorized by HD 890/60/1 on June 25, 1910. The authorization for the third and final lock and dam, later renamed the William O. Huske Lock and Dam, followed on August 30, 1935 (HD 786/71/3). The Rivers and Harbor Act of August 26, 1937 (R&H Com. Doc. 17/75/1) authorized a 25-foot [deep] channel to a basin at Navassa, North Carolina (2.9 miles up the Cape Fear River above Wilmington) and an eight-foot [deep] navigation channel for the remaining 108 miles to Fayetteville, North Carolina. Recreation facilities at each lock were authorized by Section 4 of the Flood Control Act, December 22, 1944. Finally, with the passage of HD 252/89/1 on October 27, 1965, the navigation channel was authorized for deepening from 8 to 12 feet between Navassa and Mileboard 30, just downstream of the first lock and dam.

1.1 Current Status of Project

The projects are currently in an operational status however the projects no longer meets its authorized purpose for navigation. The facilities has been placed in “Caretaker” status for several decades due to the persistent decline in commerce moving through the Locks. Caretaker status denotes a limited preservation status, with minimal personnel employed to safeguard the facility (against fire, theft, and damage) and conduct minimal maintenance activities. Funding for caretaker activities continues today and is expected to continue unless the facility is transferred.

The Wilmington District does not forecast a resurgence of commercial traffic on the Cape Fear River above Wilmington to justify the cost of repairs and value to the nation needed to reopen the facility for navigation.

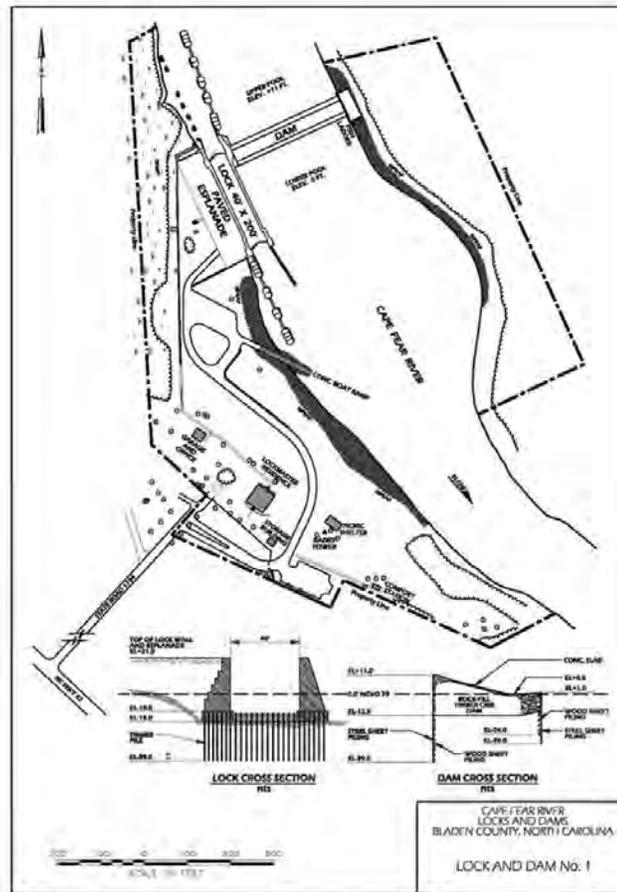
Currently at Lock and Dam Number Two, Bladen County, North Carolina there is a lease issued for public park and recreation purposes to the Town of Elizabethtown.

2. Description of Project Lands and Improvements

2.1 Project Locations

Lock and Dam Number One consists of a narrow 16.618-acre parcel with the upper Cape Fear River dividing the property. The Project is open to vessel traffic and to the public for various recreation activities including fishing. The USACE continues minimal maintenance activities on the site.

Figure 1: General Map of Lock and Dam Number One



Number Three Dam consists of a narrow 20.5 acre parcel with the upper Cape Fear River dividing the property. The Project is open to vessel traffic and to the public for various recreation activities including fishing. The USACE continues minimal maintenance activities on the site.

Figure 3: General Map of Number Three Dam and Lock

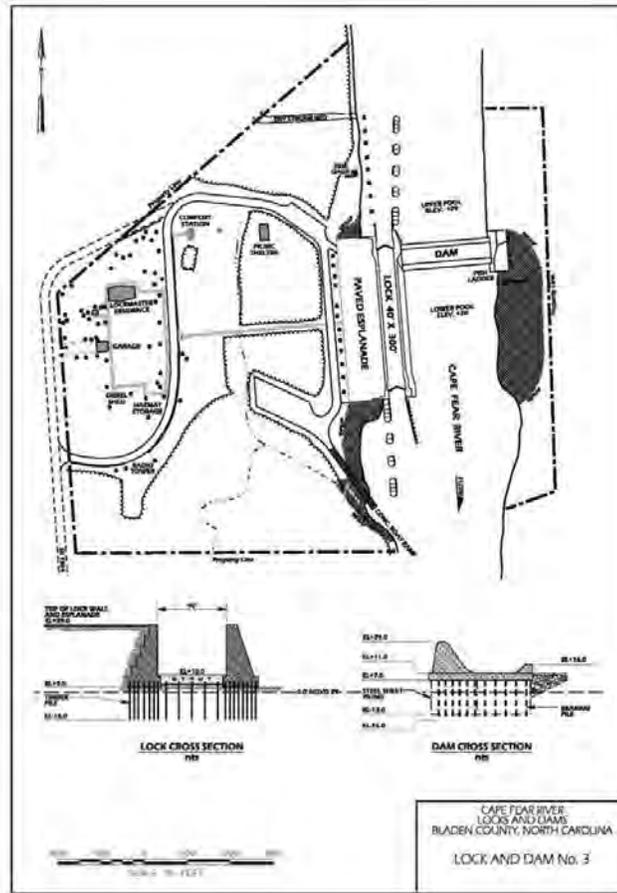
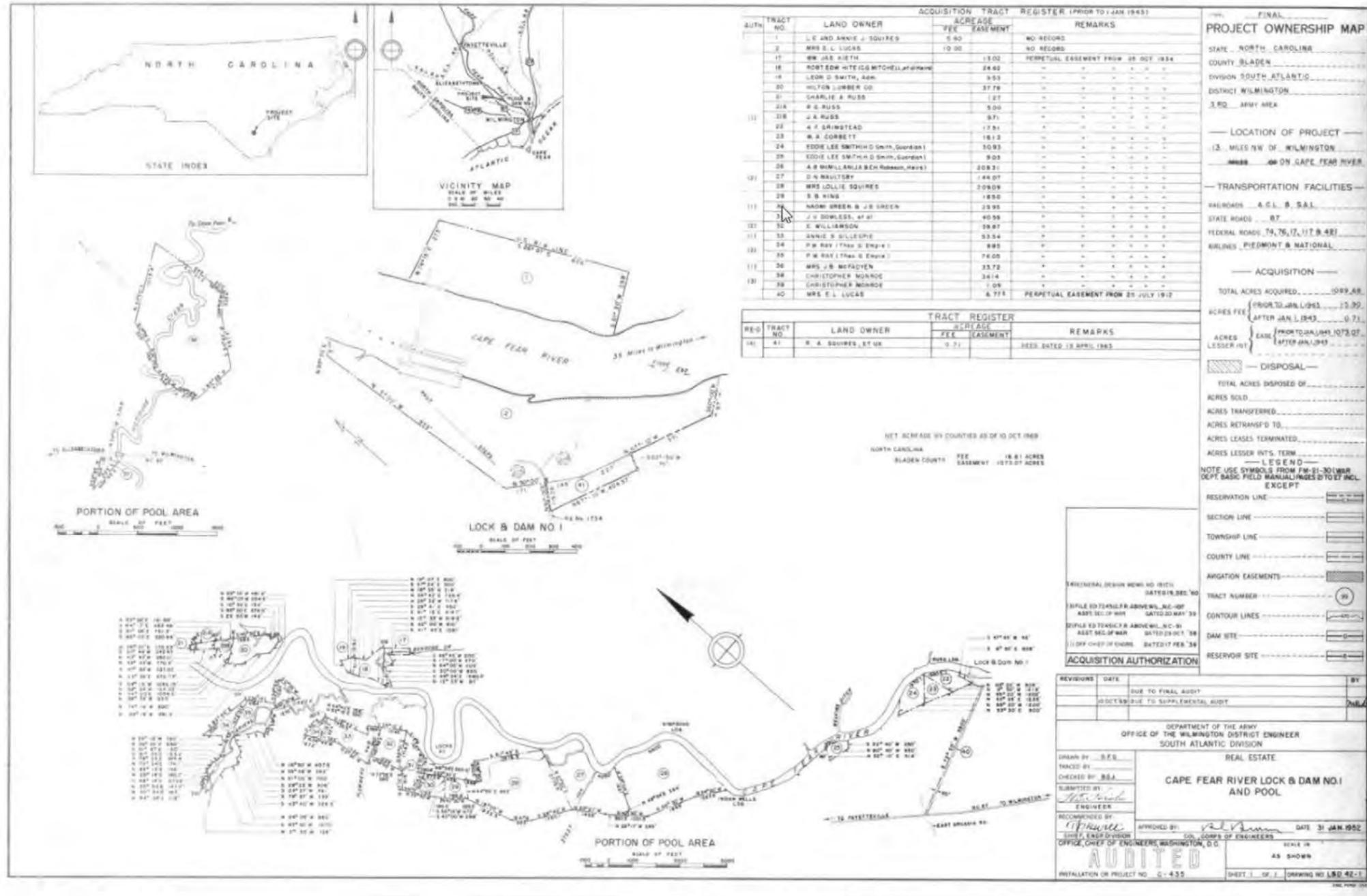


Figure 4: Flowage Easements



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2.2 Real Estate Interests Held by the Government

LOCK AND DAM Number One-The U.S. Government holds three fee real estate interests, a telephone easement and several flowage easements at the Project:

Tract Number 1 – Title to 11.18 acres fee interest was vested in the United States of America by deed dated February 25 1907 from L.E. Squires and Annie Jane Squires and recorded in the records of Bladen County, North Carolina in Deed Book 48, Page 504. A copy of the acquisition deed is in the records of the Savannah District: \$295.00

Tract Number 2 – Title to 9.12 easement acres for fee interest was vested in the United States of America by deed dated February 25 1907, from the E.L. Lucas and recorded in the records of Bladen County, North Carolina in Deed Book 48, Page 501. A copy of the acquisition deed is in the records of the Savannah District: \$500.00

Tract Number 41- Title to 0.710 acres fee interest was vested in the United States of America by deed dated April 19, 1936 from R.E.A. Squires and Flossie E. Squires and recorded in the records of Bladen County, North Carolina in Deed Book 156, Page 300. A copy of the acquisition deed is in the records of the Savannah District: \$700.00

Tract Number 40- Title to 6.75 acres easement interest for telephone line was vested in the United States of America by deed recorded November 6, 1912 from E.L. Lucas and recorded in the records of Bladen County, North Carolina in Deed Book 59, Page 291. A copy of the acquisition deed is in the records of the Savannah District: \$50.00

Tracts 17,18,19,20,21,21A,21B,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39
Title to 1073.34 acres flowage easement interest was vested in the United States of America by various deeds shown in “Table 1: Real Estate Summary”

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Table 1: Real Estate Summary

TRACT NO.	LAND OWNER	ACREAGE		REGISTER	REMARKS
		FEE	EASEMENT		
1	L E AND ANNIE J. SQUIRES	5.90			NO RECORD
2	MRS E. L. LUCAS	10.00			NO RECORD
17	WM. JAS. KIETH		13.02		PERPETUAL EASEMENT FROM 25 OCT. 1934
18	ROBT EDW. HITE (GG MITCHELL, et al Heirs)		24.82		" " " " " "
19	LEON D. SMITH, Adm.		9.53		" " " " " "
20	HILTON LUMBER CO.		37.78		" " " " " "
21	CHARLIE A. RUSS		1.27		" " " " " "
21A	R. G. RUSS		5.00		" " " " " "
21B	J. A. RUSS		9.71		" " " " " "
22	A. F. GRIMSTEAD		17.51		" " " " " "
23	W. A. GORBETT		16.13		" " " " " "
24	EDDIE LEE SMITH (H.D. Smith, Guardian)		30.93		" " " " " "
25	EDDIE LEE SMITH (H.D. Smith, Guardian)		9.03		" " " " " "
26	A. B. McMILLAN (JA & EH Robeson, Heirs)		208.31		" " " " " "
27	D. N. MAULTSBY		144.07		" " " " " "
28	MRS LOLLIE SQUIRES		209.09		" " " " " "
29	S. B. KING		18.50		" " " " " "
30	NAOMI GREEN & J.B. GREEN		23.95		" " " " " "
31	J. V. DOWLESS, et al		40.59		" " " " " "
32	E. WILLIAMSON		39.87		" " " " " "
33	ANNIE S. GILLESPIE		53.54		" " " " " "
34	P. W. RAY (Theo. G. Empe)		8.65		" " " " " "
35	P. W. RAY (Theo. G. Empe)		76.05		" " " " " "
36	MRS J.B. McFADYEN		33.72		" " " " " "
38	CHRISTOPHER MONROE		34.14		" " " " " "
39	CHRISTOPHER MONROE		1.09		" " " " " "
40	MRS E. L. LUCAS		6.77 ²		PERPETUAL EASEMENT FROM 25 JULY 1912

LOCK AND DAM Number Two- The U.S. Government holds three fee real estate interests, and a revetment easement Project:

Tract Number 1 – Title to 7.58 acres fee interest was vested in the United States of America by deed dated February 17, 1917 from Carrie H. Clark, Guardian of Mabel Clark and Myrtle Clark, minors and recorded in the records of Bladen County, North Carolina in Deed Book 457, Page 574. A copy of the acquisition deed is in the records of the Savannah District: \$250.00

Tract Number 2 – Title to 16.32 acres fee interest was vested in the United States of America by deed dated May 18, 1911 from J.P. Mercer and recorded in the records of Bladen County, North Carolina in Deed Book 57, Page 145. A copy of the acquisition deed is in the records of the Savannah District: \$825.00

Tract Number 3 – Title to 2.26 acres fee interest was vested in the United States of America by deed dated May 20, 1917 from A.E. Martin and Company, Inc. and recorded in the records of Bladen County, North Carolina in Deed Book 57, Page 149. A copy of the acquisition deed is in the records of the Savannah District: \$200.00

Tract Number 4 – Title to 1.33 acres revetment easement interest was vested in the United States of America by deed recorded March 6, 1945 from Maude A. Smith and recorded in the records of Bladen County, North Carolina in Deed Book 113, Page 143.

A copy of the acquisition deed is in the records of the Savannah District: \$Lock and Dam.00

LOCK AND DAM Number Three-The U.S. Government holds three fee real estate interests, at the Project:

Tract Number 1 – Title to 1.81 acres fee interest was vested in the United States of America by deed dated May 7, 1907 from Essie M. Williams, et. al. and recorded in the records of Bladen County, North Carolina in Deed Book 95, Page 167. A copy of the acquisition deed is in the records of the Savannah District.

Tract Number 2 – Title to 4.51 acres fee interest was vested in the United States of America by deed dated May 7, 1936 from E.N. Davis et. al. and recorded in the records of Bladen County, North Carolina in Deed Book 95, Page 168. A copy of the acquisition deed is in the records of the Savannah District.

Tract Number 3 – Title to 10.16 acres fee interest was vested in the United States of America by deed dated August 7, 1907 from Algernon F. Cain, et. al. and recorded in the records of Bladen County, North Carolina in Deed Book 95, Page 255. A copy of the acquisition deed is in the records of the Savannah District.

2.2a Deed Reservations

The deed to Tract Number 41 Lock and Dam Number One is subject to existing easements for public roads and highways, railroads, transmission lines, pipe lines, and other utilities as now located over and across said tract.

2.3 Site Access

The major road for accessing the properties is State Route 87. Access to the Projects is via public rights-of-way.

2.4 Existing Outgrants

The Real Estate Management Information System (REMIS) lists one outgrant at the Projects.

Lock and Dam Number Two has a recreational lease to the Town of Elizabethtown, Bladen County, North Carolina.

2.5 Real Property Inventory

The REMIS Real Property Inventory (RPI) lists 25 line items on the inventory report for the Lock and Dam Number One Project. The REMIS Real Property Inventory (RPI) lists 20 line items on the inventory report for the Lock and Dam Number 2 Project. The REMIS Real Property Inventory (RPI) lists 27 line items on the inventory report for the Number Three

Project. A summary inventory report with betterments/components showing each item is included with this appendix as Exhibit A.

The Cape Fear River Lock & Dams One, Two & Three were acquired between 1910 and 1934. Lock & Dam One consists of 16.61 acquired in fee and 1,073.34 acres in Flowage Easement. The site is improved with an office, numerous out buildings, 5 picnic sites, 2 picnic shelters, a comfort station and a paved boat ramp with parking for 10 trailers. Although per REMIS approximately \$10,900,000 was spent to construct a fish passage structure (rock arch rapids), the fish passage project was not considered to contribute to the value of the site.

Lock & Dam Two consists of 28.5 acres acquired in in fee and 1.39 in revetment easement. The site is improved with an office, numerous out buildings, 5 picnic sites, 1 picnic shelter, a comfort station, a wood deck with surrounding benches used as an overlook and a paved boat ramp with parking. There is a current lease to the Town of Elizabethtown for recreational purposes on a portion of the property.

Lock and Dam Three consists of 20.50 acres acquired in fee. The site is improved with an office, numerous out buildings, 7 picnic sites, 1 picnic shelter and a paved boat ramp with parking.

2.6 Statement of Environmental Investigations

An Environmental Assessment (EA) was prepared for the Disposition Study. The EA addresses impacts in the study area, which includes the property owned by the U.S. Government.

The EA concludes that the recommended plan will not result in significant adverse impacts to water quality, aquatic resources, terrestrial resources, air quality, land use, infrastructure, or noise. The only facilities with the potential to contain asbestos and/or lead-based materials and finishes are the remaining lockmaster residences. Suspected asbestos and/or lead containing facilities have not been tested, or testing results are unavailable at this time. No significant issues were noted regarding hazardous, toxic, or radioactive materials. A Finding of No Significant Impact has been drafted but is unsigned.

Prior to a real estate action to dispose of the property, a Phase One Environmental Site Assessment will be implemented to fully characterize and disclose the status of legacy hazardous materials on the site. The recommended plan would adhere to any conditions set forth as a result of the Phase One Environmental Site Assessment. After the disposal of the property, the United States will no longer have any obligations with respect to the site that would give rise to liability, beyond what might be required to address the release of hazardous substance under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund).

3. Annual Holding Costs

The Wilmington District estimates the annual recurring cost to maintain the facility in the current caretaker status to be at \$450,000 includes administration of the real estate and outgrant as well. This includes minimum caretaker maintenance, dam safety actions, periodic assessments and inspections, and emergency action plan drills.

4. Market Analysis

The potential re-uses of the property were studied through a market analysis taking into consideration the constraints of the property associated with its physical characteristics, historical significance, and other relevant factors. The market analysis reviewed uses that the project area is capable of providing with the associated land and improvements. It also reviewed the potential interest those uses would generate from a public or private entity.

4.1 Potential Re-Use Options

The potential re-uses are limited. The narrow shape of the property, liability associated with the locks, and the position of the lock channel in the center of the property result in a negative effect to a market based re-use scenario. The lack of commercial traffic in the Upper Cape Fear River eliminates income potential from use of the lock system.

4.2 Constraints

4.2a Physical Characteristics

Narrow and small parcels of land limit marketability.

4.2b Historical Significance Constraints

Elements of the Projects are eligible to be placed on the National Register of Historic Places.

4.2c Other Constraints

The Project Delivery Team for the Disposition Study established that there will be no adverse effect upon the falls. The disposition shall avoid adverse impacts to the aquatic species listed as Threatened or Endangered under the Endangered Species Act (ESA), 16 U.S.C. §§ 1531–1544, within the migration corridor near and around the Falls so that the associated functional fish ladders will continue to operate as intended. In addition, the disposition shall avoid adverse impacts to benefits derived from upstream Corps fish passage and ecosystem restoration investments.

4.3 Alternatives Evaluated

Alternative One: No-Action Plan: Existing (i.e., continued project operations with no changed Federal action) operations, maintenance, repair, rehabilitation and replacement for the existing projects:

Alternative Two: Deauthorize the projects and dispose of real property and improvements, including removal of improvements; including consideration of future uses:

Alternative Three: Deauthorize the projects and dispose of real property and improvements, to willing stakeholders, at no additional cost to the Federal government:

(1) The projects (Cape Fear Locks and Dams One through Three) are not currently operated for their authorized commercial inland navigation purpose. They no longer see any commercial navigation traffic, and do not in the foreseeable future. The projects are in operational condition, but are only operated to ensure functionality, and incidentally for fish passage at Locks and Dams Two and Three. The fish passage structure at Lock and Dam One provides fish passage, so no locking of fish is required.

(2) There is no reason to expect that the future will see any need for commercial inland navigation on the Cape Fear River.

(3) The projects components (Locks and Dams One, Two and Three) could be modified to serve either, but not both (a) water supply, or (b) ecosystem restoration purposes at Lock and Dam Two and Three, unless fish passage structures were constructed; there are current 408 requests to construct fish passage structures at Locks and Dams Two and Three. The most reasonable users would be a public agency or a non-profit organization. The transferees would undoubtedly consider the high costs and high risk liability of maintaining the property. They would also consider the amount of public interest or tourism the property could generate as a historic/recreation sites. The market for the property is limited and divestiture via the market use could turn into a lengthy and expensive venture.

Table 5: Alternatives Evaluated

Alternatives Evaluated		
No.	Alternative	Transfer Method
1	No-Action	Status Quo
2	Non-Operational Locks	Transfer to Identified Transferee (Transfer thru GSA viable, but not preferred)
3	Operational Locks	Transfer thru GSA

5. Disposal Methods

As the disposal of the real estate would involve the entire federally authorized Project, Congress must first deauthorize the Project. If deauthorization was deemed necessary and appropriate, the Wilmington District could proceed with disposal of the real estate.

The power to dispose of real estate belonging to the United States is vested in Congress (paragraph 2, Section 3, Article IV, Constitution of the United States). No real estate under USACE jurisdiction may be sold or otherwise disposed of without authority of Congress. Special legislative disposal authority and real property disposal authority from the Department of Defense (DoD) and General Services Administration provide disposal methods available for the property.

5.1 Special Legislation Disposal Authority

Congress has the authority to enact special legislation directing the disposal of specific Federal property. Special legislation reduces time and cost expenses by directing the conveyance to a specifically named entity. Special legislation also provides clear guidance on the screening requirements or waiver thereof, administrative costs, conveyance costs, and the overall disposal process. The specifically named entity identified in the legislation is typically a local organization, such as a county, or a designated local reuse authority or local economic development agency established by a state legislature to acquire and hold title to the property.

The USACE has experience with assisting in the technical writing of special legislative disposal actions. Clarity on the costs of the administrative process and overall transfer are paramount to a successful special legislative disposal.

5.2 Department of Defense Real Property Authority

The Federal Property Management Regulation (FMR) outlines procedures that must be followed prior to an agency declaring property as excess. First the property must be screened against the needs of other Army components. After screening and compliance with Title 10 USC 2662, the Deputy Assistant Secretary of the Army, Installations, Housing and Partnerships (DASA, IH&P) may report the property as excess to the DoD.

5.3 GSA Real Property Authority

Public Law 107-217, the Property Act (Traditional Disposal)

If the USACE reports the property to GSA as excess to its needs under the Property Act, the disposal requirements of the Act will be followed. The Act mandates statutory timeframes for identification of interest in the property, the hierarchy of availability and the actual process for disposal. GSA determines the highest and best use of the property and makes it available for certain uses including up to 100% public benefit discount for public benefit purposes. GSA ultimately decides the disposal method after considering all factors. The disposal process is as follows:

- The property is available for transfer to other Federal agencies for 30 days.
- If there is no Federal interest and if determined suitable and available by the U. S. Department of Housing and Urban Development, the property is made available via the McKinney-Vento Homeless Assistance Act for 30 days.
- Initiated at the same time as the McKinney-Vento offering and also available for a period of 30 days, the property is available to government entities for negotiated purchase and potentially to other public entities and non-profit organizations via a discounted conveyance for specific public uses such as schools, health clinics, correctional facilities or several other uses.
- The Property Act includes an option for a negotiated exchange of the property in this phase of the process. A negotiated sale at fair market value to a local or state government body for economic development is authorized by this section of the Property Act. It does not have a provision for a discounted or no cost conveyance for economic development. The sales agreement must be reviewed by GSA's oversight committees in Congress prior to execution.
- Pursuant to the statutory process, a public sale is the last phase.

6. Anticipated Local Support or Opposition

The U.S. Government has solicited the intent to dispose of the Locks One, Two, and Three to any Congressional District, State Government, or County Officials. The delegations are aware of the study and potential for deauthorization and disposition.

Numerous organizations and individuals in the region voiced interest in the uncertainty of the future of the Project throughout the public comment period. The deauthorization and disposition have the potential to impact historic, cultural, recreational, endangered species, and economic resources.

One stakeholder supporting the disposal is the State of North Carolina. The State passed Session Law 2008-186 in 2008 that states the State of North Carolina would accept transfer of all the locks and dams, if the locks were rehabilitated.

7. Estimate of Administrative Cost and Time of Disposal

The below table identifies estimated administrative costs and time for the two action alternatives for transfer to willing partner and identifies the responsible disposal agency with each scenario. It assumes that Congress has deauthorized the Project. The no-action alternative was not studied for the purposes of this table.

Estimate of Administrative Cost and Time and Disposal					
No.	Alternative	Disposal Agency	Corps Admin Cost*	Time**	Notes
1	Operational Lock with Special Legislation	USACE	\$50,000	6 Months-2 years	This method assumes that special legislation was passed, and the recipient is willing to accept a quitclaim deed for the property.
2	Operational Lock with GSA as the Transfer Agency	GSA	\$50,000	2 -5 Years	This method assumes that special legislation was not passed.

**The time to dispose after the property is declared excess by the Deputy Assistant Secretary of the Army (DASA) is only an estimate for the purpose of this appendix. It does not include the time it takes to receive that declaration of excess from the DASA.

8. Recommendation of Preferred Divestiture Path

The Real Estate factors considered within this support the preferred Alternative Three, Operational Locks with a transfer to an identified non-federal transferee via special legislation.

It is recommended for the special legislation to include the passage of the title to the identified transferee by quitclaim deed.

It is recommended for the special legislative authority to waive certain screening requirements, such as screening for other DoD or Federal interest in accordance with 10 USC 2696, if they are deemed advantageous to the process.

It is recommended for the USACE to continue to work with the State of North Carolina to identify a governance structure to own and operate the property as a historical locks and dams.

Without the enactment of special legislation, there is a strong possibility that no non-federal transferees are discovered through the standard disposal process, and the USACE may have to continue ownership of a non-operable facility. The USACE would remain responsible and accountable for the property, including related personal property, and must perform the protection and maintenance of the property. Guidelines for protection and maintenance of excess and surplus real property are in the GSA Customer Guide to Real Property Disposal, FMR 102-75.965-980.

9. Level of Confidence

The results of the Real Estate Appendix reveal a high level of confidence that a transaction can be consummated if special legislative authority is approved. The recommendations will assist the USACE in working with the Congressional delegation and local support agencies in identifying a non-federal transferee and completing a successful transfer.

The results of the Real Estate Appendix reveal a low level of confidence that a transaction can be consummated if GSA disposal authorities are approved. There is significant risk in not identifying a transferee who would purchase the property at fair market value, or accept the property at no cost, due to the ongoing operation, maintenance costs associated with care and custody of the property.

Cape Fear River Locks & Dams
Section 216 - Disposition Study

Exhibit "A" - Inventory Report

UNCLASSIFIED-FOUO
Inventory Report By Project

rem_inv_000.rdf District/Division : BAW Project : FEAR#1 Name : CAPE FEAR LOCK & DAM #1 26-Mar-2018 05:48 AM

Structure Number	Property ID	Location	Description	Cost	ACQ Date	INSP Date
LD1A01	FEAR#1-16961	LOCK & DAM NO 1 - LOCATED ON NC HWY 87. (LD1A01)	ENTRANCE AREA WITH WOOD FIRM. (*LOCK & DAM NO. 1, CAPE FEAR RIVER PROJECT*). EXPENSED ASSET VALUE: \$1,300.00.	0.00	12/30/1960	02/02/2017
LD1A02	FEAR#1-16962	LOCK & DAM NO 1, BLDG. #2. (LD1A02)	WORKSHOP & ATTACHED WOOD BOAT SHED, STEEL WALLS & ROOF ON CONCRETE SLAB, SIDING. EXPENSED ASSET VALUE: \$24,240.00.	0.00	01/01/1964	02/02/2017
LD1A03	FEAR#1-16963	LOCK & DAM NO 1, ESPLANADE AREA BLDG #9. (LD1A03)	OFFICE & STORAGE AREA (ESPLANADE), WOOD ON WOOD FLOOR WITH METAL ROOF, CONCRETE STEP & WALKWAY & 2 SECURITY LIGHTS (WOOD POLE). EXPENSED ASSET VALUE: \$2,750.00.	4.00	02/01/1964	02/02/2017
LD1B02	FEAR#1-30336	LOCK & DAM NO 1. (LD1B02)	PAVED BOAT RAMP, CONCRETE, 1-LANE WITH WOOD INFORMATION BOARD & SECURITY LIGHT (SINGLE, WOOD POLE). (\$449,647.37)	449,647.37	03/12/2011	02/02/2017
LD1C03	FEAR#1-16965	LOCK & DAM NO 1, BLDG #5. (LD1C03)	SEPTIC TANK, 1500 GAL & 200' LATERAL LINE (UTILIZED BY COMPOST STATION LD1C02). EXPENSE ASSET VALUE: \$2,000.00.	0.00	12/30/1960	02/02/2017
LD1C02	FEAR#1-24762	LOCK & DAM NO 1. (LD1C02)	COMPOST STATION (NEED TO VERIFY SQUARE FOOTAGE ON NEXT INSPECTION).	154,685.02	09/18/2003	02/02/2017
LD1D03	FEAR#1-16568	LOCK & DAM NO 1. (LD1D03)	DAM AND LOCK CHAMBER SIDE BRIDGE, 575' CONCRETE DAM, LOCK CHAMBER: 40' X 200'; WITH 4 METAL GATES, (33' X 22'), & IMMOVABLE FISH LADDER.	659,326.00	01/01/1916	02/02/2017
LD1D02	FEAR#1-16849	LOCK & DAM NO 1 UPSTREAM AND ON NORTH SIDE ONLY. (LD1D02)	11 TIMBER DIKES, VARYING IN LENGTH, LOCATED ON SMALL TO LARGE DITCHES & CREEKS.	320,000.00	01/01/1920	02/02/2017
LD1E01	FEAR#1-16566	LOCK & DAM NO 1 SECURITY LINE. (LD1E01)	FENCING, 7' HIGH CHAIN LINK (11 GAUGE GALVANIZED STEEL), WITH 3 STRANDED BARBED WIRE ON TOP. BARRICADE (OFFICE ENTRANCE \$250.00). EXPENSED ASSET VALUE: \$11,487.80.	0.00	12/30/1960	02/02/2017
LD1E02	FEAR#1-16961	LOCK & DAM NO 1 ESPLANADE AREA	FENCING, 3' HIGH CHAIN LINK (11 GAUGE GALVANIZED STEEL) WITH DOUBLE GATE. BARRICADE MAIN ENTRANCE (\$750.00). EXPENSED ASSET VALUE: \$4,500.00.	0.00	12/30/1960	02/02/2017
LD1E03	FEAR#1-73912	LOCK & DAM NO 1	FISH PASSAGE (SERIES OF CONSTRUCTED ROCK POOLS PLACED IN A RADIAL INCLINE DESIGN IS EXTENDED TO WASH PILE AREA (BRACKETING THE LOCK FOR NAVIGATION AND WATER LEVELS FOR MUNICIPAL INTAKE.)	10,890,488.97		02/02/2017
LD1E03	FEAR#1-88169	LOCK & DAM NO 1.	NEW PIPE ON THE CAPE FEAR RIVER ASSET VALUE \$94,344.24	94,344.24		02/02/2017

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Page 2

UNCLASSIFIED-FOUO
Inventory Report By Project

rem_inv_000.rdf District/Division : BAW Project : FEAR#1 Name : CAPE FEAR LOCK & DAM #1 26-Mar-2018 05:48 AM

Structure Number	Property ID	Location	Description	Cost	ACQ Date	INSP Date
LD1F01	FEAR#1-16972	LOCK & DAM NO 1. (LD1F01)	2 SETS OF STEPS, 1 NEAR OFFICE/WORKSHOP, 1 NEAR PICKNIC SHELTER. EXPENSED ASSET VALUE: \$1,000.00.	0.00	01/01/1964	02/02/2017
LD1F02	FEAR#1-16973	LOCK & DAM NO 1 BOAT RAMP AREA. (LD1F02)	PARKING, ASPHALT, 10 TRAILER SPACES, 48' X 120'. EXPENSED ASSET VALUE: \$2,312.00.	0.00	01/01/1964	02/02/2017
LD1F03	FEAR#1-16974	LOCK & DAM NO 1 PICKNIC AREA. (LD1F03)	PARKING, ASPHALT, WITH CAN BRACKS, 80' X 60' & TWO (2) WOOD POLES WITH SECURITY LIGHTS (LIGHTS & POLES INSTALLED BY POOR COUNTY ELECTRIC COMPANY, PROJECT PAYS MONTHLY FEE). EXPENSED ASSET VALUE: \$1,332.00.	0.00	01/01/1964	02/02/2017
LD1F03	FEAR#1-16975	LOCK & DAM NO 1. (LD1F03)	ROAD, ASPHALT, 1200' X 18'. EXPENSED ASSET VALUE: \$12,200.00.	0.00	01/01/1964	02/02/2017
LD1F04	FEAR#1-16976	LOCK & DAM NO 1	ESPLANADE, CONCRETE, NEAR LOCK, 70' X 270' WITH 2 JOULEN LIGHTING SYSTEMS (3 LIGHTS, METAL POLE). EXPENSED ASSET VALUE: \$4,440.00.	0.00	01/01/1964	02/02/2017
LD1G01	FEAR#1-16977	LOCK & DAM NO 1 BY PICKNIC SHELTER. (LD1G01)	DRINKING FOUNTAIN, STONE WITH CONCRETE STEP, 1000' OF DITCHES EXPENSED ASSET VALUE: \$1,850.00.	0.00	01/01/1964	02/02/2017
LD1H02	FEAR#1-16980	LOCK & DAM NO 1 PICKNIC AREA. (LD1H02)	5 PICKNIC SITES, LEVELLED AREA WITH WOOD & METAL TABLES. EXPENSED ASSET VALUE: \$1,200.00.	0.00	01/01/1964	02/02/2017
LD1H03	FEAR#1-24763	LOCK & DAM NO 1. (LD1H03)	PICKNIC SHELTER	17,713.16	09/18/2003	02/02/2017
LD1H04	FEAR#1-89023	LOCK & DAM NO 1	PICKNIC SHELTER	49,614.33	11/18/2013	02/02/2017
LD1I01	FEAR#1-16981	LOCK & DAM NO 1, BLDG. # 1. (LD1I01)	OFFICE (FORMER LOCK TENDER'S DWELLING), WOOD FRAME WITH ALUMINUM SIDING, 2 PORCHES & ASPHALT SHINGLE ROOF W/FIBERGLASS FLENGOLA (3 PLAYS) ON CONCRETE FOUNDATION & 2 LIGHTS FOR FLARE. EXPENSED ASSET VALUE: \$5,359.00.	0.00	01/01/1913	02/02/2017
LD1E02	FEAR#1-16982	LOCK & DAM NO 1, BLDG # 3. (LD1E02)	STORAGE BLDG (FORMER GARAGE), WOOD ON WOOD FLOOR WITH METAL ROOF, DOUBLE DOORS, WOOD RAMP, & SECURITY LIGHT (SINGLE, WOOD POLE). EXPENSED ASSET VALUE: \$1,800.00.	0.00	01/01/1913	02/02/2017
LD1J02	FEAR#1-16986	LOCK & DAM NO 1. (LD1J02)	CANOE FOOTAGE, NEAR LOCK WITH WOOD STAIRWAY ON DOWNSTREAM SIDE. EXPENSED ASSET VALUE: \$2,713.60.	0.00	01/01/1964	02/02/2017

Project Total 12,699,811.68

UNCLASSIFIED-FOUO
Page 2

Cape Fear River Locks & Dams Section 216 - Disposition Study

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Inventory Report By Project

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District/Division : SAW Project : FEAR#2 Name : CAPE FEAR LOCK & DAM #2

Structure Number	Property ID	Location	Description	Cost	ACQ Date	INSP Date
LD2A01	FEAR#2-16984	LOCK & DAM NO 2, ON NC HWY #7, [LD2A01]	ENTRANCE AREA (LOCK & DAM 2) & SECURITY LIGHT (SINGLE, WOOD POLE). EXPENSED ASSET VALUE: \$1,050.00.	0.00	01/01/1964	02/02/2017
LD2A02	FEAR#2-16989	LOCK & DAM NO 2, BLDG # 2. [LD2A02]	WORKSHOP & ATTACHED WOOD BOAT SHED, STEEL BLDG & ROOF ON CONCRETE SLAB WITH STEEL ROLLUP DOOR. EXPENSED ASSET VALUE: \$4,000.00.	0.00	08/01/1973	02/02/2017
LD2A03	FEAR#2-16993	LOCK & DAM NO 2, BLDG # 4. [LD2A03]	MAIN OFFICE (OLD LOCK TENDER'S DWELLING), 1 STORY, 3 BEDROOMS, 1 BATH, 2 PORCHES, WOOD FRAME WITH ALUMINUM SIDING ON CONCRETE FLOOR BASEMENT, ASPHALT SHINGLE ROOF. EXPENSED ASSET VALUE: \$4,700.00.	0.00	01/01/1917	02/02/2017
LD2B03	FEAR#2-26879	LOCK & DAM NO2. [LD2B03]	1 LANE PAVED BOAT RAMP WITH WOOD INFORMATION BOARD	232,278.78	05/27/2004	02/02/2017
LD2D01	FEAR#2-16994	LOCK & DAM NO 2. [LD2D01]	DAM & LOCK CHAMBER PLUS KIPRAP, 228.8' CONCRETE DAM, LOCK CHAMBER (40' X 200') WITH 4 MITER GATES (30' X 22'), FISH LADDER (INOPERABLE).	909,633.00	01/01/1917	02/02/2017
LD2F01	FEAR#2-17063	LOCK & DAM NO 2 PROPERTY LINE. [LD2F01]	FENCING, 7' HIGH CHAIN LINK (11 GAUGE GALVANIZED STEEL) WITH 3 STRANDS OF BARBED WIRE ON TOP.	26,760.00	09/25/1961	02/02/2017
LD2F02	FEAR#2-17064	LOCK & DAM NO 2 ESPLANADE AREA [LD2F02]	FENCING, 6' HIGH CHAIN LINK (11 GAUGE GALVANIZED STEEL). EXPENSED ASSET VALUE: \$3,000.00.	0.00	10/02/1975	02/02/2017
LD2K01	FEAR#2-11677	LOCK & DAM NO 2	NEW PIER 90' X 8' ADA ACCESSIBLE PIER ON PILING BELOW DAM, ACCESSED BY 93'X7' ADA WALKWAY ON PILING - ASSET VALUE \$199,274.00	109,274.00		02/02/2017
LD2N02	FEAR#2-20872	LOCK & DAM NO 2. [LD2N02]	OVERLOOK, WOOD DECK WITH SURROUNDING WOOD BENCHES & WOOD STEPS, (14' X 14'). EXPENSED ASSET VALUE: \$5,000.00.	0.00	01/01/1998	02/02/2017
LD2P01	FEAR#2-16999	LOCK & DAM NO 2 BOAT RAMP. [LD2P01]	PARKING, ASPHALT, WITH TRAILER SPACES, 15' X 140' (& BULLETIN BOARD). EXPENSED ASSET VALUE: \$3,645.00.	0.00	08/01/1973	02/02/2017
LD2P02	FEAR#2-17008	LOCK & DAM NO 2 PICNIC AREA. [LD2P02]	PARKING, ASPHALT, WITH CAR SPACES, 60' X 100'. EXPENSED ASSET VALUE: \$4,450.00.	0.00	08/01/1973	02/02/2017
LD2P03	FEAR#2-17001	LOCK & DAM NO 2, TO PICNIC AREA & RAMP. [LD2P03]	ROAD, ASPHALT, 1680' X 18'. EXPENSED ASSET VALUE: \$13,000.00.	0.00	08/01/1971	02/02/2017
LD2P05	FEAR#2-17003	LOCK & DAM NO 2	ESPLANADE, CONCRETE, 100' X 250' WITH 2 JOGLYN LIGHTING SYSTEMS (3 LIGHTS, STEEL POLES) & 2 SECURITY LIGHTS (SINGLE, STEEL POLE). EXPENSED ASSET VALUE: \$6,055.99.	0.00	09/25/1961	02/02/2017
LD2P06	FEAR#2-69156	LOCK & DAM NO 2	PAVED ROAD. ASSET VALUE: \$80,000.00	79,996.54	08/01/1973	02/02/2017
LD2Q02	FEAR#2-17003	LOCK & DAM NO 2 ESPLANADE AREA. [LD2Q02]	FLAG POLE, 3 FLAG, STEEL POLE ON CONCRETE FOUNDATION. EXPENSED ASSET VALUE: \$1,050.00.	0.00	09/25/1961	02/02/2017

UNCLASSIFIED-FOUO
Page 1

UNCLASSIFIED-FOUO
Inventory Report By Project

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District/Division : SAW Project : FEAR#2 Name : CAPE FEAR LOCK & DAM #2

Structure Number	Property ID	Location	Description	Cost	ACQ Date	INSP Date
LD2B02	FEAR#2-17007	LOCK & DAM NO 2 PICNIC AREA. [LD2B02]	5 PICNIC SITES, LEVELED AREA WITH CONCRETE PADS, WOOD TABLES WITH METAL FRAMES, GRILLS NEAR SMALL PARKING LOT. EXPENSED ASSET VALUE: \$2,400.00.	0.00	01/01/1964	02/02/2017
LD2B03	FEAR#2-19999	LOCK & DAM #2. [LD2B03]	PICNIC SHELTER WITH RESTROOMS (14' X 37'), WOOD FRAME, OPEN SIDES, CONCRETE SLAB & SIDEWALKS WITH DRINKING FOUNTAIN & GRILL (52' X 27' WITH 2 WINGS, 13' X 27' EACH)	355,719.68	01/01/1997	02/02/2017
LD2B01	FEAR#2-17008	LOCK & DAM NO 2, BLDG #1. [LD2B01]	DAINTY STORAGE BLDG & COVERED STORAGE TANK, WOOD ON WOOD FLOOR WITH ASPHALT SHINGLE ROOF. EXPENSED ASSET VALUE: \$1,000.00.	0.00	08/01/1974	02/02/2017
LD2B03	FEAR#2-20000	LOCK & DAM NO 2. [LD2B03]	COVERED STORAGE, BUILT WITH SCRAP MATERIAL. EXPENSED ASSET VALUE: \$200.00.	0.00	01/01/1995	02/02/2017
LD2Y02	FEAR#2-17012	LOCK & DAM NO 2. [LD2Y02]	1 CRANE POSTAGE, WIRE LOCK. EXPENSED ASSET VALUE: \$2,713.60.	0.00	01/01/1964	02/02/2017
Project Total				1,612,551.97		

I am satisfied as to the accuracy of this real property account, and do, on this date, assume responsibility for the real property listed on the preceding pages of this inventory record, subject to the changes and remarks noted and jointly initialed on those pages.

(Date) (Signature of Responsible Employee) (Account No.)

Cape Fear River Locks & Dams Section 216 - Disposition Study

UNCLASSIFIED-FOUO
Inventory Report By Project

rem_inv_sas.rdf Project : HUSKE Name : WILLIAM O. HUSKE LOCK & DAM 26-MAR-2018 05:51 AM

District/Division : SAW Project : HUSKE Name : WILLIAM O. HUSKE LOCK & DAM

Structure Number	Property ID	Location	Description	Cost	ACQ Date	INSP Date
LD3A01	HUSKE-17014	WILLIAM O HUSKE LOCK & DAM NO 3 LOCATED AT LOCK ENTRANCE. [LD3A01]	ENTRANCE AREA WITH WOOD SIGN (*WILLIAM O. HUSKE LOCK & DAM, CAPE FEAR RIVER PROJECT*, 2'11" X 4'2"). DOUBLE GATES, TRAFFIC COUNTER (SECURITY LIGHT, SINGLE, WOOD POLE OWNED BY COUNTY ELECTRIC). EXPENSED ASSET VALUE: \$1,200.00.	0.00	01/01/1963	02/02/2017
LD3A02	HUSKE-17015	WILLIAM O HUSKE LOCK & DAM NO 3 TOP OF HILL, BLDG # 6. [LD3A02]	OFFICE & STORAGE BLDG (FORMER LOCK TENDER'S DWELLING), 3 BEDROOMS, 1 BATH, 2 PORCHES, BRICK VENEER, FIBERGLASS SHINGLE ROOF. AUTO RAIN GAUGE. EXPENSED ASSET VALUE: \$8,000.00.	0.00	01/01/1936	02/02/2017
LD3A03	HUSKE-73634	WILLIAM O HUSKE LOCK & DAM NO 3	METAL SHUTTER 20 X 24 \$1395.00	0.00		02/02/2017
LD3B02	HUSKE-49847	WILLIAM O HUSKE LOCK & DAM NO 3	PAVED BOAT RAMP AT LOCK AND DAM #3	267,427.22		02/02/2017
LD3C01	HUSKE-17017	WILLIAM O HUSKE LOCK & DAM NO 3 TOP OF HILL, BLDG # 8	SEPTIC TANK 1000 GAL & 200' LATERAL LINES. EXPENSED ASSET VALUE: \$10,213.80.	0.00	01/01/1963	02/02/2017
LD3C02	HUSKE-26764	WILLIAM O HUSKE LOCK & DAM NO 3. [LD3C02]	COMFORT STATION (REHABBED WITH ABRU MONEY)	165,189.07	09/18/2003	02/02/2017
LD3D01	HUSKE-17020	WILLIAM O HUSKE LOCK & DAM NO 3. [LD3D01]	DAM AND LOCK CHAMBER PLUS RIPRAP, DAM 220' LOCK CHAMBER 40' X 200' WITH 8 MITER GATES 30' X 22', FISH LADDER (INOPERABLE).	660,930.00	01/01/1936	02/02/2017
LD3F01	HUSKE-17018	WILLIAM O HUSKE LOCK & DAM NO 3 ESPLANADE AREA	FENCING, 6' HIGH CHAIN LINK (11 GAUGE GALVANIZED STEEL). EXPENSED ASSET VALUE: \$2,800.00.	0.00	01/01/1963	02/02/2017
LD3F02	HUSKE-17019	WILLIAM O HUSKE LOCK & DAM NO 3 PROPERTY LINE. [LD3F02]	FENCING, 7' HIGH CHAIN LINK ALL LIGHT POLES 4 COUNTY ELECTRIC (11 GAUGE GALVANIZED STEEL) WITH 3 STRANDE BARBED WIRE ON TOP & SECURITY LIGHT (SINGLE, WOOD POLE). EXPENSE D ASSET VALUE: \$22,000.00.	0.00	05/01/1963	02/02/2017
LD3G01	HUSKE-17023	WILLIAM O HUSKE LOCK & DAM NO 3. [LD3G01]	STEPS BETWEEN RESIDENCE & ESPLANADE AREAS WITH SECURITY LIGHT. (2) TWO SPOTLIGHTS ADDED FOR FLAG (\$743.00). ACQUIRED 3/27/03. EXPENSED ASSET VALUE: \$1,000.00.	0.00	01/01/1936	02/02/2017
LD3P01	HUSKE-17024	WILLIAM O HUSKE LOCK & DAM NO 3 PICNIC AREA. [LD3P01]	ROAD, ASPHALT, 18' X 1350' (W/GATES). EXPENSED ASSET VALUE: \$10,000.00.	0.00	01/01/1964	02/02/2017
LD3P02	HUSKE-17027	WILLIAM O HUSKE LOCK & DAM NO 3	PARKING, REPAVED W/1 HANDICAP SPACE, 333 BY LOCATED AT PICNIC AREA. EXPENSED ASSET VALUE: \$1,200.00.	0.00	01/01/1964	02/02/2017
LD3P03	HUSKE-17028	WILLIAM O HUSKE LOCK & DAM NO 3 BOAT RAMP. [LD3P03]	PARKING, REPAVED W/1 HANDICAP SPACE, 700 SY W/TRAILER SPACE LOCATED AT BOAT RAMP. EXPENSED ASSET VALUE: \$3,500.00.	0.00	01/01/1964	02/02/2017

UNCLASSIFIED-FOUO
Page 1

UNCLASSIFIED-FOUO
Inventory Report By Project

rem_inv_sas.rdf Project : HUSKE Name : WILLIAM O. HUSKE LOCK & DAM 26-MAR-2018 05:51 AM

District/Division : SAW Project : HUSKE Name : WILLIAM O. HUSKE LOCK & DAM

Structure Number	Property ID	Location	Description	Cost	ACQ Date	INSP Date
LD3P04	HUSKE-17029	WILLIAM O HUSKE LOCK & DAM NO 3	ESPLANADE, CONCRETE, NEAR LOCK, 90' X 265' WITH 3 JOSLYN LIGHTING SYSTEMS (2 LIGHTS) & 1 SECURITY LIGHT. EXPENSED ASSET VALUE: \$3,500.00.	0.00	01/01/1964	02/02/2017
LD3Q01	HUSKE-17100	WILLIAM O HUSKE LOCK & DAM NO 3 TOP OF HILL, STRUC #11. [LD3Q01]	FLAG POLE, 3 FLAG, STEEL POLE WITH CONCRETE FOUNDATION. EXPENSED ASSET VALUE: \$1,050.00.	0.00	01/01/1964	02/02/2017
LD3Q02	HUSKE-17101	WILLIAM O HUSKE LOCK & DAM NO 3 PICNIC AREA. [LD3Q02]	DRINKING FOUNTAIN, STONE, BY PICNIC SHELTER. EXPENSED ASSET VALUE: \$1,050.00.	0.00	01/01/1963	02/02/2017
LD3R01	HUSKE-17102	WILLIAM O HUSKE LOCK & DAM NO 3 PICNIC AREA, BLDG #9. [LD3R01]	PICNIC SHELTER, 6 PICNIC TABLES, WOOD FRAME, OPEN SIDES, CONCRETE SLAB, 2 SIDING GRILLS, & TRASH CONTAINER. EXPENSED ASSET VALUE: \$9,500.00.	0.00	01/01/1964	02/02/2017
LD3R02	HUSKE-17029	WILLIAM O HUSKE LOCK & DAM NO 3 PICNIC AREA, STRUC #10. [LD3R02]	7 PICNIC SITPS, LEVELLED AREA 17 WITH TABLES & GRILLS). EXPENSED ASSET VALUE: \$2,200.00.	0.00	01/01/1964	02/02/2017
LD3R03	HUSKE-26765	WILLIAM O HUSKE LOCK & DAM NO 3	PICNIC SHELTER WITH 4 GRILLS AND 5 TABLES.	60,863.17	09/18/2003	02/02/2017
LD3S02	HUSKE-17031	WILLIAM O HUSKE LOCK & DAM NO 3 TOP OF HILL, BLDG #4. [LD3S02]	GARAGE & WORKSHOP, BRICK VENEER ON CONCRETE SLAB, ASPHALT SHINGLE ROOF, 2 ROLLUP DOORS. EXPENSED ASSET VALUE: \$1,500.00.	0.00	01/01/1964	02/02/2017
LD3S03	HUSKE-17032	WILLIAM O HUSKE LOCK & DAM NO 3 TOP OF HILL, BLDG #5. [LD3S03]	TANK HOUSE, WATER & TOOL STORAGE, WOOD FRAME, LAP SIDING & ASPHALT SHINGLE ROOF. EXPENSED ASSET VALUE: \$1,500.00.	0.00	01/01/1964	02/02/2017
LD3S04	HUSKE-16078	WILLIAM O HUSKE, BLDG #1. [LD3S04]	PESTICIDE STORAGE BLDG, STEEL SIDING & ROOF, CONCRETE SLAB. EXPENSED ASSET VALUE: \$4,000.00.	0.00	01/01/1972	02/02/2017
LD3S05	HUSKE-20001	LOCK & DAM NO 3. [LD3S05]	STORAGE TANK (DIESEL FUEL), CONTAINED & COVERED. BUILT WITH SCRAP MATERIAL. EXPENSED ASSET VALUE: \$200.00.	0.00	01/01/1995	02/02/2017
LD3W01	HUSKE-17033	WILLIAM O HUSKE LOCK & DAM NO 3 TOP OF HILL, BLDG #7	PUMP HOUSE (48 HP), WOOD FRAME, LAP SIDING, CONCRETE SLAB, ASPHALT SHINGLE ROOF. EXPENSED ASSET VALUE: \$1,000.00.	0.00	01/01/1964	02/02/2017
LD3W02	HUSKE-17034	WILLIAM O HUSKE LOCK & DAM NO 3 TOP OF HILL	FRESH WATER STORAGE (567' (FORMER FIRE BOSE HOUSE) (9 SF), WOOD FRAME, LAP SIDING & ASPHALT SHINGLE ROOF. EXPENSED ASSET VALUE: \$1,000.00.	0.00	01/01/1964	02/02/2017
LD3X01	HUSKE-17035	WILLIAM O HUSKE LOCK & DAM NO 3 RIVER BANK, STRUC #14. [LD3X01]	TOWER, STREAM GAUGE - CONCRETE & STEEL WITH SATELLITE LINK-UP 24" HIGH, 5'6" DIAMETER. EXPENSED ASSET VALUE: \$1,732.53.	0.00	01/01/1964	02/02/2017

UNCLASSIFIED-FOUO
Page 2

Appendix B
Hydraulic Analysis

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**CAPE FEAR RIVER LOCKS & DAMS
CAPE FEAR RIVER
BLADEN COUNTY, NORTH CAROLINA
(SECTION 216)
DISPOSITION STUDY**

APPENDIX B -- HYDROLOGIC ANALYSIS

1.1 The Study Area

The locks and dams are located on the Cape Fear River, which is formed in central North Carolina by the confluence of the Deep and Haw Rivers (Figure 1). The Cape Fear River flows generally southeast 198 miles and empties into the Atlantic Ocean just west of Cape Fear, 28 miles south of Wilmington. All three of the Cape Fear River Lock & Dams (CFRL&D) are located in Bladen County, which is in the southeastern section of North Carolina (Figure 2).

1.2 Hydrology and the Watershed

As previously stated, the Cape Fear River is formed in central North Carolina by the confluence of the Deep and Haw Rivers. B. Everett Jordan Dam and Lake, owned and operated by the U.S. Army Corps of Engineers and located just above this confluence on the Haw River, is the most important regulating component in this river basin. However, the Corps' ability to regulate flows does not mean that B. Everett Jordan Dam has significant control over flow rates and volumes in the entirety of the Cape Fear River basin downstream of the dam. The drainage area at the mouth of the Cape Fear River is 8,570 square miles. The drainage areas at Lock and Dam Numbers 1, 2, and 3 are 5,220, 4,980, and 4,810 square miles, respectively.

Although the primary hydrologic benefit from the CFRL&D system is to ensure a dependable controlling depth for commercial barge traffic, the pools of convenience behind each lock and dam have become closely linked to the operations of multiple municipal and commercial entities. However, no agreements exist between the U.S Army Corps of Engineers and these entities regarding water supplies.

The pool above Lock and Dam Number 1 contains two water supply intake structures—one owned by Cape Fear Public Utilities Authority (CFPUA) and one owned by Lower Cape Fear Water and Sewer Authority (LCFWASA; Kings Bluff). LCFWASA also owns a more recently constructed intake (Bladen Bluffs) in the pool above Lock and Dam Number 2. The pool above Lock and Dam Number 3 contains two water supply intake structures (Hoffer and Glenville Lake) owned by the Fayetteville Public Works Commission (FPWC). In addition, Chemours (formerly Dupont Fayetteville) operates an intake upstream of Lock and Dam #3.

In addition to the pools provided by the locks and dams for the water supply intakes, Lock and Dam Number 1 would potentially prevent saltwater from traveling any farther upstream, which would impact water supply intakes. However, saltwater has not been documented that far upstream in the past and is not considered an issue.

Figure 1 Cape Fear River Watershed

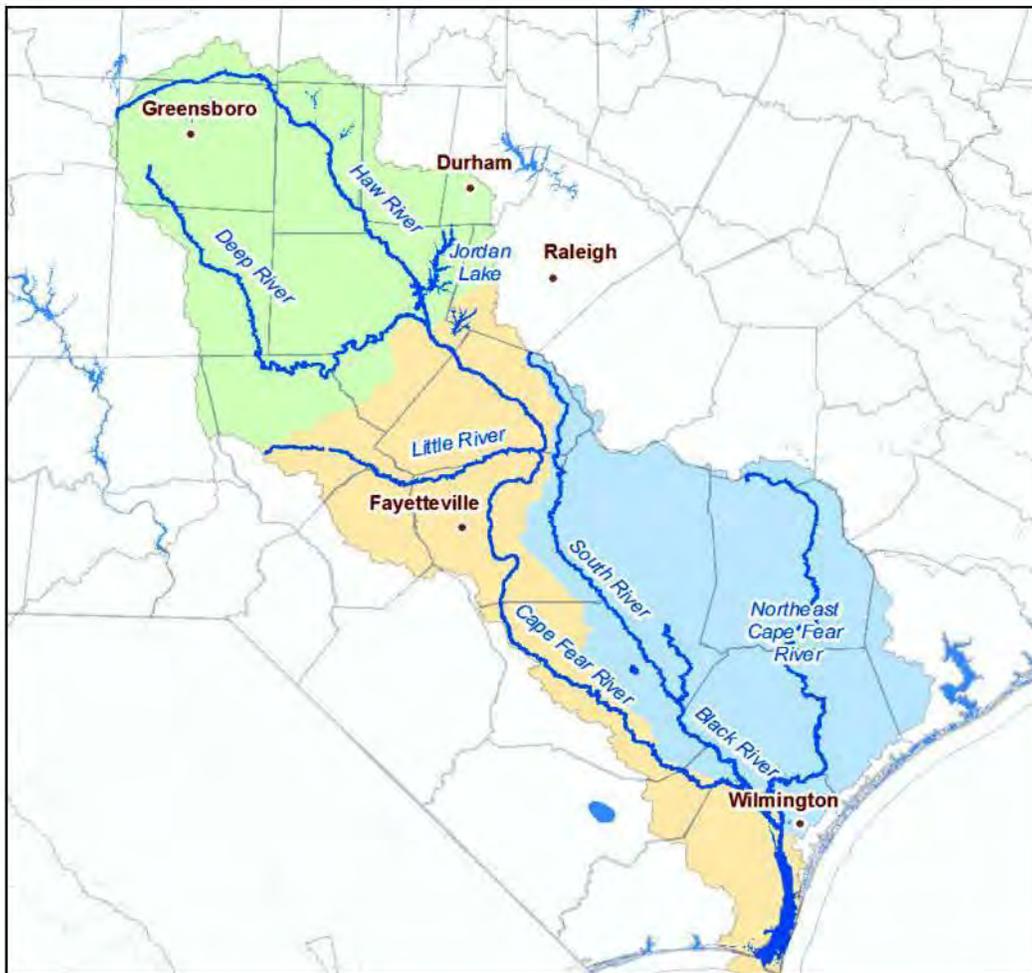
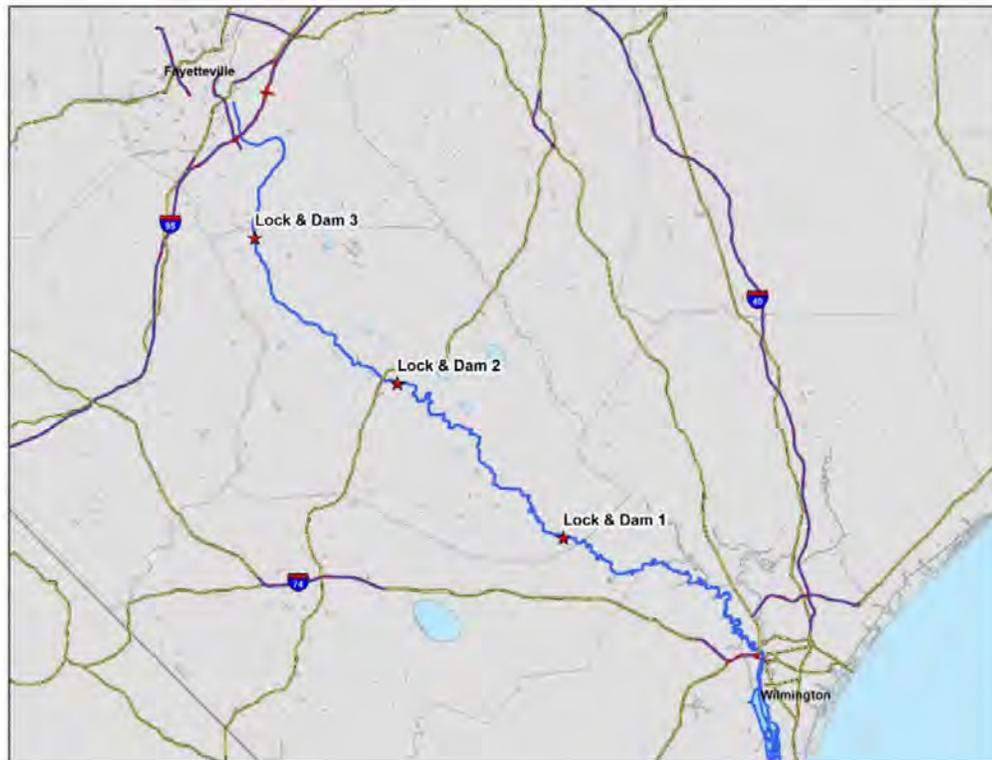


Figure 2. Location of Locks and Dams on the Cape Fear River



1.3 Hydrologic Analysis of Alternatives

1.3.1 Previous Applicable Hydrologic Analysis

Detailed hydrologic analysis was previously conducted related to the mitigating proposals for the Wilmington Harbor Turning Basins project of the Lower Cape Fear (Wilmington Harbor GRR Lock and Dam Study Intake Evaluation, USACE, March 2007). The mitigating proposals, modification to the lock & dams, were to offset the decreased fish passage that was determined to be the result of the planned turning basin project.

Alternatives considered in that previous hydrologic analysis included: (a) removing the lock & dams; (b) lowering the lock & dams such that the reduced flow would not require water supply structures to be modified, but may reduce water supply capacity; (c) lowering the lock & dams such that no rock ramps would be needed for fish passage; and (d) removing only lock & dam #2.

The low flow rates considered in that previous hydrologic analysis were appropriate for use in this disposition study as well, since they are still representative of the drought of record for the Cape Fear watershed.

1.3.2 Lock & Dam #1

Alternative #1: No action, with future deterioration resulting in partial failure of upstream valves and downstream gates allowing for pool loss during low flow periods. Impacts during low flow periods resulting in pool loss would be similar to removal impacts described for Alternative #2 below; however, pool loss would not be permanent.

Alternative #2: De-authorize, deconstruct and render safe the lock & dam to its preauthorization condition (remove the lock & dam entirely). A minimum flow of 300 cfs was used to model water intakes in the lower Cape Fear River with the lock and dam removed (GRR 2007). This flow rate coincides with the period of record drought in late 2007 at Lock & Dam 1, a flow at or near 300 cfs.

Cape Fear Public Utilities Authority Intake: From the Wilmington Harbor GRR¹, The intake to the pump station is an inlet canal at elevation 4.00 ft NGVD29 and the low water levels established for this alternative was determined to be at elevation 0.00 ft NGVD29. No water will enter the wet well of the pumping station at this lower flow rate. Major removal and replacement of intake screens, intake pipes and pumping station was recommended. Preliminary planning cost estimate for improvements in April 2007 price levels was \$6,059,000.

Lower Cape Fear Water and Sewer Authority (Kings Bluff) Intake: From the Wilmington Harbor GRR², the 48" intake pipe is at invert elevation 1.25 ft NGVD29 has intake screens at elevation 6.25 ft NGVD29. In this alternative the river level will be at 0.00 ft NGVD29. Water will not enter the pumping station. Major removal and replacement of intake screens, intake pipes and pumping station was recommended. Preliminary planning cost estimate for improvements in April 2007 price levels was \$8,500,000.

Alternative #3: De-authorize, award as-is to a non-Federal entity. No impacts from the US Army Corps of Engineers surrendering of the Lock & Dam.

1.3.3 Lock & Dam 2

Alternative #1: No action, with future deterioration resulting in partial failure of upstream valves and downstream gates allowing for pool loss during low flow periods. Impacts during

¹ Wilmington Harbor GRR, Lock & Dam Study, Intake evaluation, March 2007, Narrative 2, Page 5, Section E, Paragraph 2

² Wilmington Harbor GRR, Lock & Dam Study, Intake evaluation, March 2007, Narrative 2, Page 3, Section D, Paragraph 2

low flow periods resulting in pool loss would be similar to removal impacts described for Alternative #2 below; however, pool loss would not be permanent.

Alternative #2: De-authorize, deconstruct and render safe the lock & dam to its preauthorization condition (remove the lock & dam entirely). A minimum flow of 300 cfs was used to model water intake in the lower Cape Fear River with the lock and dam removed (GRR 2007). This flow rate coincides with the period of record drought in late 2007 at Lock & Dam 2, a flow rate estimated to be between 300 and 370 cfs.

Lower Cape Fear Water and Sewer Authority (Bladen Bluffs) Intake: As of 2007, the date of the Wilmington Harbor GRR study, the LCFWASA (Bladen Bluffs) project had not begun. Construction began in 2010 and completed in 2012. However, The GRR study did recommend to LCFWASA that the Bladen Bluffs project water supply intake be sufficiently low in elevation so as not to be affected by low river flows of 300 cfs.³ LCFWASA has confirmed to Wilmington District that their intake should remain functional even if the lock and dam were removed.

Alternative #3: De-authorize, award as-is to a non-Federal entity, No impacts from the US Army Corps of Engineers surrendering of the Lock & Dam. No impacts.

1.3.4 Lock & Dam 3

Alternative #1: No action, with future deterioration resulting in partial failure of upstream valves and downstream gates allowing for pool loss during low flow periods. Impacts during low flow periods resulting in pool loss would be similar to removal impacts described for Alternative #2 below; however, pool loss would not be permanent.

Alternative #2: De-authorize, deconstruct and render safe the lock & dam to its preauthorization condition (remove the lock & dam entirely). A minimum flow of 300 cfs was used to model water intake in the lower Cape Fear River with the lock and dam removed (GRR 2007). This flow rate is near the period of record drought in late 2007 at Lock & Dam 3, a flow rate of near 370 cfs.

Chemours (Dupont) Pump Station: This pump station will remain operational for all alternatives with no changes.⁴

Hoffer Pump Station (Fayetteville Public Works Commission): The top elevation of two 60" diameter intake pipes and intake screens are at elevation 27.50 ft NGVD29. The low water levels for this alternative are at elevation 23.00 NGVD29. The existing intake

³ 96 Act General Re-evaluation Report (GRR) for relocated Turning Basin and Remaining Mitigation Features, Section 3.8.1 Water Supply, Page 3-82, Paragraph 3

⁴ Wilmington Harbor GRR, Lock & Dam Study, Intake evaluation, March 2007, Narrative 2, Page 3, Section C, sentence 7.

would not be submerged at this flow rate.⁵ It is recommended that extensive changes be made to this pump station, if the lock and dams were removed. Preliminary planning cost estimate for improvements in April 2007 price levels was \$1,100,000.

Glenville Lake Pump Station (Fayetteville Public Works Commission): The top elevation of the intake screen is at 34.50 ft NGVD29, and the invert elevation of the 48" intake pipe is at elevation 22.00 ft NGVD29. The low water levels for this alternative are at elevation 23.00 ft NGVD29, which would be well below the top of the intake pipe (26 ft NGVD29).⁶ It is recommended that extensive changes be made to this pump station, if the lock and dams were removed. Preliminary planning cost estimate for improvements in April 2007 price levels was \$500,000.

Alternative #3: De-authorize, award as-is to a non-Federal entity. No impacts from the US Army Corps of Engineers surrendering of the Lock & Dam. No impacts.

⁵ Wilmington Harbor GRR, Lock & Dam Study, Intake evaluation, March 2007, Narrative 2, Page 2, Section B, paragraph 3.

⁶ Wilmington Harbor GRR, Lock & Dam Study, Intake evaluation, March 2007, Narrative 2, Page 1, Section A, paragraph 3.

Appendix C
USFWS IPaC Query

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IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Bladen County, North Carolina



Local office

Raleigh Ecological Services Field Office

(919) 856-4520

(919) 856-4556

MAILING ADDRESS

Post Office Box 33726

Raleigh, NC 27636-3726

PHYSICAL ADDRESS

551 Pylon Drive, Suite F

Cape Fear River Locks & Dams
Section 216 - Disposition Study

2/22/2019

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Raleigh, NC 27606-1487

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<https://ecos.wis.gov/ipac/location/42AKDAMBAADKOMYGSKRIMHNLE/resources>

2/15

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME

STATUS

2/22/2019

IPAC: Explore Location

Northern Long-eared Bat *Myotis septentrionalis* Threatened
No critical habitat has been designated for this species.
<https://ecos.fws.gov/ecp/species/9045>

Birds

NAME	STATUS
Red-cockaded Woodpecker <i>Picoides borealis</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7614	Endangered

Wood Stork <i>Mycteria americana</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8477	Threatened
--	------------

Reptiles

NAME	STATUS
American Alligator <i>Alligator mississippiensis</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/776	SAT

Clams

NAME	STATUS
Atlantic Pigtoe <i>Fusconaia masoni</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5164	Proposed Threatened

Flowering Plants

NAME	STATUS
American Chaffseed <i>Schwalbea americana</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1286	Endangered
Pondberry <i>Lindera melissifolia</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1279	Endangered
Rough-leaved Loosestrife <i>Lysimachia asperulaefolia</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2747	Endangered

2/22/2019

IPAC: Explore Location

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USEWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

<https://ecos.fws.gov/ipac/location/42AK0#/MBA/BADCOMYGSKR/IMHNL/RESORT02>

5/15

Cape Fear River Locks & Dams
Section 216 - Disposition Study

2/22/2019

#30: Explore Location

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. 'BREEDS ELSEWHERE' INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

American Kestrel *Falco sparverius paulus*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA.

Breeds Apr 1 to Aug 31

Bald Eagle *Haliaeetus leucocephalus*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1626>

Breeds Sep 1 to Jul 31

Eastern Whip-poor-will *Antrostomus vociferus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 1 to Aug 20

Lesser Yellowlegs *Trijinga flavipes*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/19679>

Breeds elsewhere

Prairie Warbler *Dendroica discolor*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 1 to Jul 31

Prothonotary Warbler *Protonotaria citrea*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds Apr 1 to Jul 31

Red-headed Woodpecker *Melanerpes erythrocephalus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 10 to Sep 10

<https://ecos.fws.gov/pac/location/#AQAKO#/MBA/BADCOMYGSKR/IMHNL/ressource>

6/15

2/22/2019

IPAC: Explore Location

week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

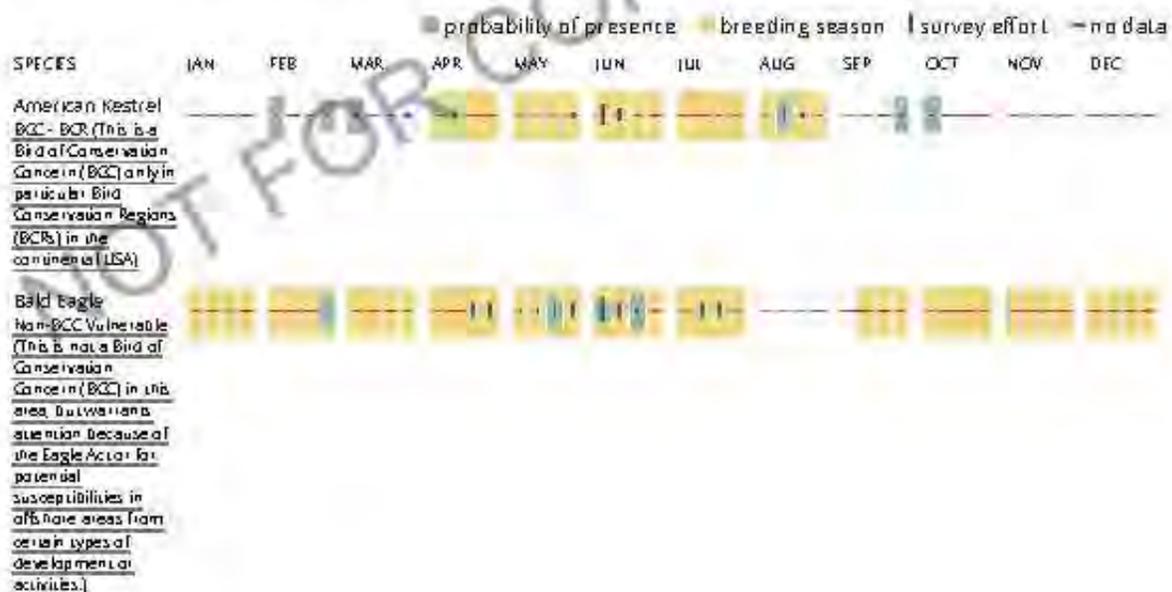
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Cape Fear River Locks & Dams
Section 216 - Disposition Study

2/22/2019

IPaC: Explore Location

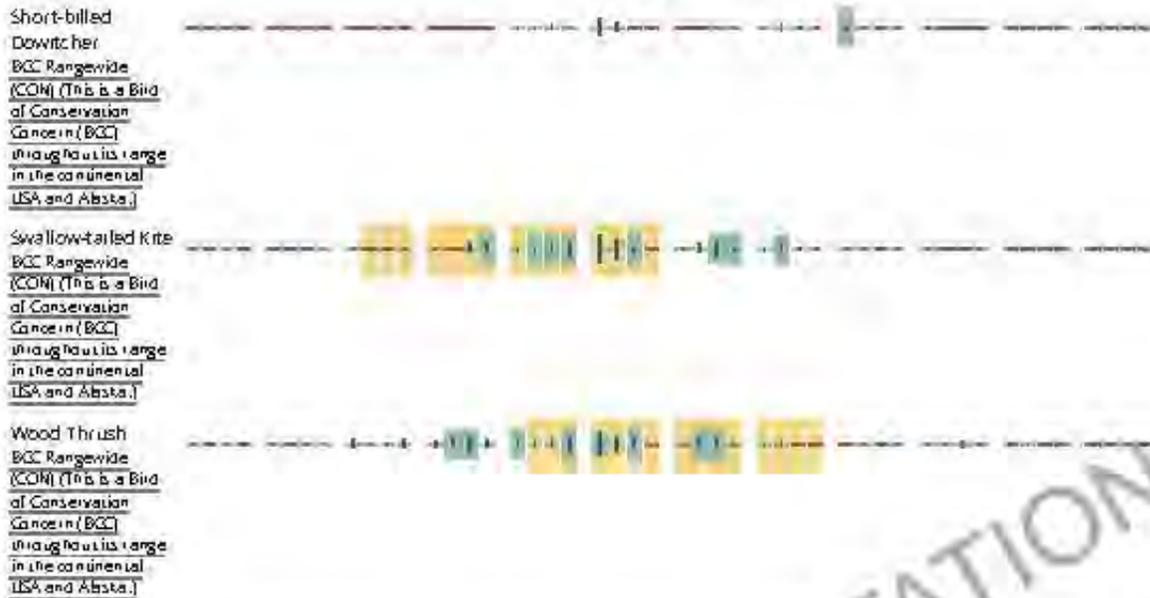


<https://ecos.fws.gov/ipac/location/4QAKDAMBA/BADCOMYGSKRIMHNL/thesources>

9/15

2/22/2019

IPaC: Explore Locator



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the [Probability of Presence Summary](#). [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [E-bird Explore Data Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

2/22/2019

IPaC: Explore Location

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the [Probability of Presence Summary](#) and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern \(BCC\)](#) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [manatee studies](#), or contact [Caleb Spiegel](#) or [Pam Louie](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cells that overlap your project, not your exact project footprint. On the graphs provided, please also look

<https://ecos.fws.gov/ipac/location/140AKD/00BA8ADCOMYGSKRIMHNE/resources>

11/15

2/22/2019

IPaC: Explore Location

carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the [NWI map](#) for a full list.

2/22/2019

IPAC: Explore Location

FRESHWATER EMERGENT WETLAND

[PEM1A](#)
[PEM1C](#)
[PEM1Cd](#)
[PEM1E](#)
[PEM1B](#)
[PEM1Ch](#)
[PEM1Fh](#)
[PEM1Ex](#)

FRESHWATER FORESTED/SHRUB WETLAND

[PFO1C](#)
[PFO1/2E](#)
[PFO1A](#)
[PFO4B](#)
[PFO1Ch](#)
[PFO1/3B](#)
[PFO1/4B](#)
[PFO1/4A](#)
[PSS1C](#)
[PFO1F](#)
[PFO1B](#)
[PFO4/1B](#)
[PFO4A](#)
[PSS1A](#)
[PFO1/2Fh](#)
[PFO1/4C](#)
[PFO6E](#)
[PFO1Ah](#)
[PFO4/1A](#)
[PSS1E](#)
[PSS1/4A](#)
[PFO1Ad](#)
[PSS1/2E](#)
[PFO3/4B](#)
[PFO1/SS1Ch](#)
[PSS4B](#)
[PSS1Ah](#)
[PFO2E](#)
[PFO3/4C](#)
[PFO1/2C](#)
[PSS1/4C](#)
[PFO1/4Ad](#)
[PFO1Cd](#)
[PFO1/3C](#)
[PFO3/4A](#)
[PFO1Fh](#)
[PSS3/4C](#)

<https://ecos.wis.gov/ipac/location/42AKDAM/BA/BA/COM/YGSKR/IMH/LE/re/sol/trace>

13/15

2/22/2019

IPAC: Eriole Locator

[PSS4A](#)
[PEO4/1C](#)
[PSS3/4Ad](#)
[PSS1B](#)
[PEO1/3A](#)
[PSS1/3B](#)
[PSS3/4A](#)
[PSS1/4Ah](#)
[PEO4C](#)
[PEO1Ax](#)
[PSS1Eh](#)

FRESHWATER POND

[PUBHh](#)
[PUBHx](#)
[PUBF](#)
[PAB3H](#)
[PUBH](#)
[PAB4F](#)
[PAB4Fh](#)

RIVERINE

[R4SBC](#)
[R5UBH](#)
[R4SBCx](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#).

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercled worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

2/22/2019

IPAC: Explore Location

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

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Appendix D
Climate Change Analysis

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Climate Change Assessment

The USACE Climate Hydrology Assessment Tool was used to examine observed and projected trends in the Cape Fear watershed hydrology to support this qualitative assessment. These trends are based on analysis of projected annual maximum monthly flows for 93 climate ensembles through the year 2099.

As expected for this type of qualitative analysis, there is considerable variability in these maximum flows (Figure 2); however, after 2024 numerous annual maximum monthly flows do exceed maximum flows prior to 2024. Figure 3 shows the resulting trend in mean annual maximum monthly flows over time for the Cape Fear watershed (Figure 3). While this may suggest potential for higher flood risk impacts in the Cape Fear watershed in the future, it would not adversely affect operations of the Cape Fear Locks and Dams in the future since they are all run-of-river projects. However, this trend in maximum monthly flows does not imply either less frequent or less severe droughts in the Cape Fear watershed, therefore future water supply impacts associated with removal of the locks and dams would still be significant. These results are qualitative only.

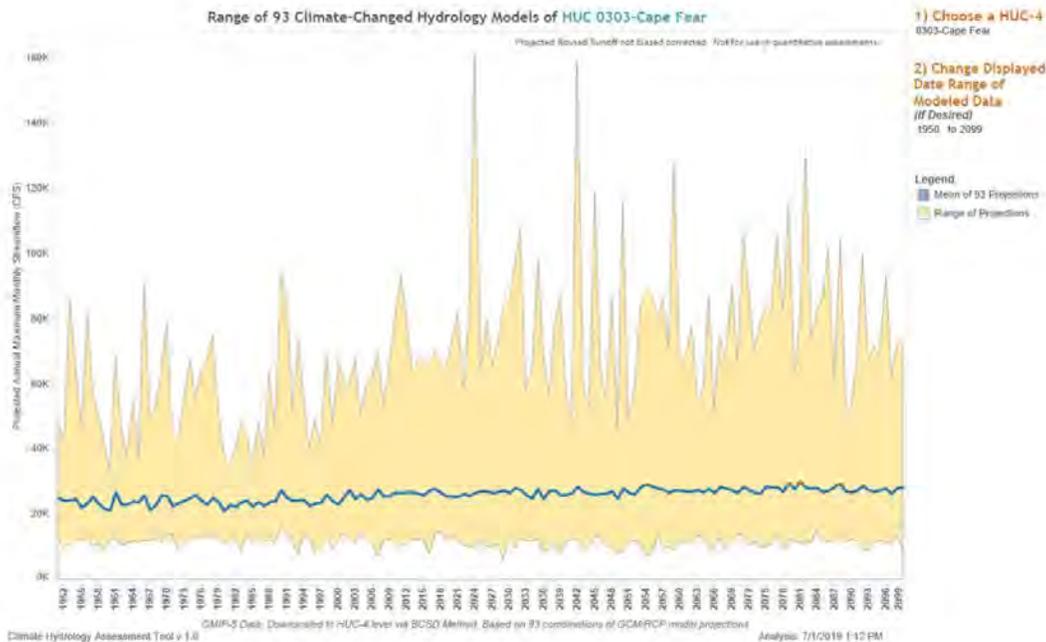


Figure 2 - Range of Projected Annual Maximum Monthly Streamflow for Cape Fear Watershed

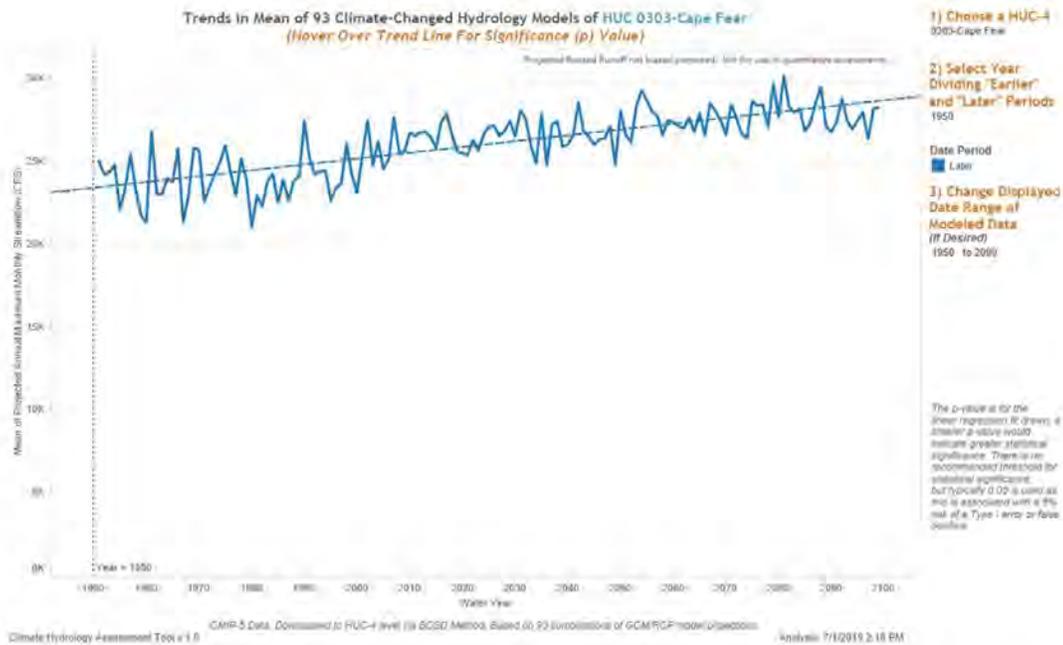


Figure 3 – Trends in Mean Projected Annual Maximum Monthly Streamflows for Cape Fear Watershed

Figures 4 and 5 show the annual peak instantaneous streamflows and trend lines for two USGS streamgages that bracket the locks and dams—Cape Fear River at Lillington (USGS 02102500, located about 55 miles above Lock #3) and Cape Fear River at Lock #1 nr Kelly (USGS 02105769). Over the full period of record for these gages, the trend lines for both these gages show a downward trend in annual peak instantaneous flow, which is somewhat contrary to the monthly maximum flow trends for the Cape Fear watershed presented earlier. These gages are regulated by the Wilmington District’s B. Everett Jordan flood control reservoir located about 25 and 135 miles upstream of those two gages, respectively. In addition, the USACE Climate Hydrology Assessment Tool analysis didn’t include 2 major floods that occurred in 2016 and 2018 (flood of record). These would have likely flattened the negative slope of that downward trend line. Regardless, since these three locks and dams are run of river projects, climatic trends would not impact their operations or functionality, since there is no longer any commercial lockage. In addition, if the locks and dams were removed, the impacts on the water supply intakes behind the dams during droughts will be severe regardless of whatever the future climatic trend is at those gage locations.

Cape Fear River Locks & Dams Section 216 - Disposition Study

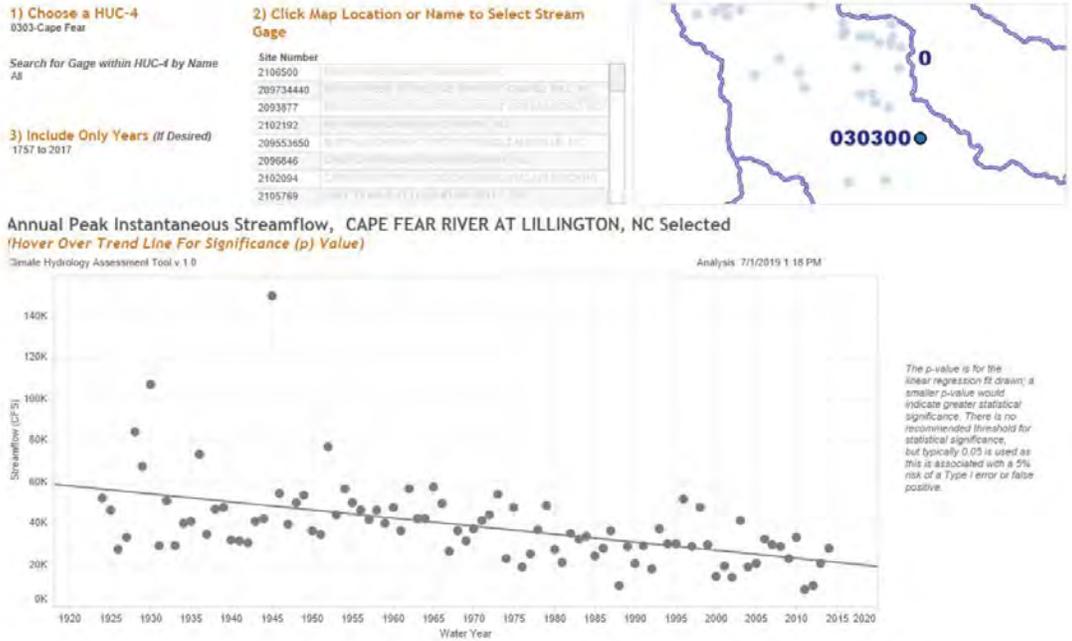


Figure 4 - Annual Maximum Streamflow for Cape Fear River at Lillington, NC

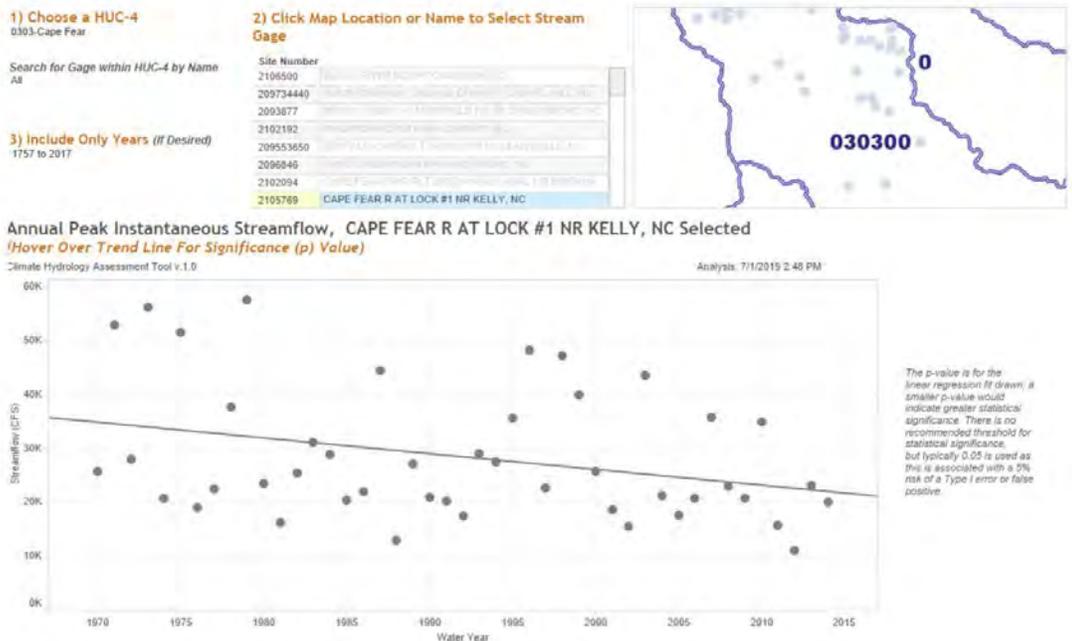


Figure 5 - Annual Maximum Streamflow for Cape Fear River at Lock #1 nr Kelly, NC

The Non-stationarity Detection Tool was also used to examine the hydrologic time series (annual peak streamflows) at the same two USGS gages discussed earlier that bracket the locks and dams (Figure 6 – Cape Fear River at Lillington and Figure 7 – Cape Fear River at Lock #1 nr Kelly). The Lillington gage had some expected non-stationarities in the mean during the 1970s and early 1980s, during which time the Corps' B. Everett Jordan dam (located about 25 miles upstream) was constructed (early to mid 1970s) and then operated as a dry reservoir until it was finally filled in 1982. Non-stationarities for this same timeframe were not detected at the Lock #1 nr Kelly gage, since it is much farther downstream with a much larger contributing unregulated drainage area; however, there was a minor non-stationarity detected in the mean in the late 1990s that is not readily explainable. Both these plots also depict the negative trend in annual peak inflows at those gages; however, as mentioned previously, these time series do not include the near-record and record floods that occurred in the Cape Fear watershed during 2016 and 2018.

Overall, USACE tools show maximum flows trending higher in the future based; however, evaluation of historical peak flows indicate a negative trend. Regardless, since these locks and dams are run-of-river structures, impacts from changed future climate conditions are not expected to have a significant impact on their operations or functionality if they remain in place. In addition, removal of these structures will significantly impact water supply intakes upstream of these structures regardless of future climate conditions.

Cape Fear River Locks & Dams Section 216 - Disposition Study

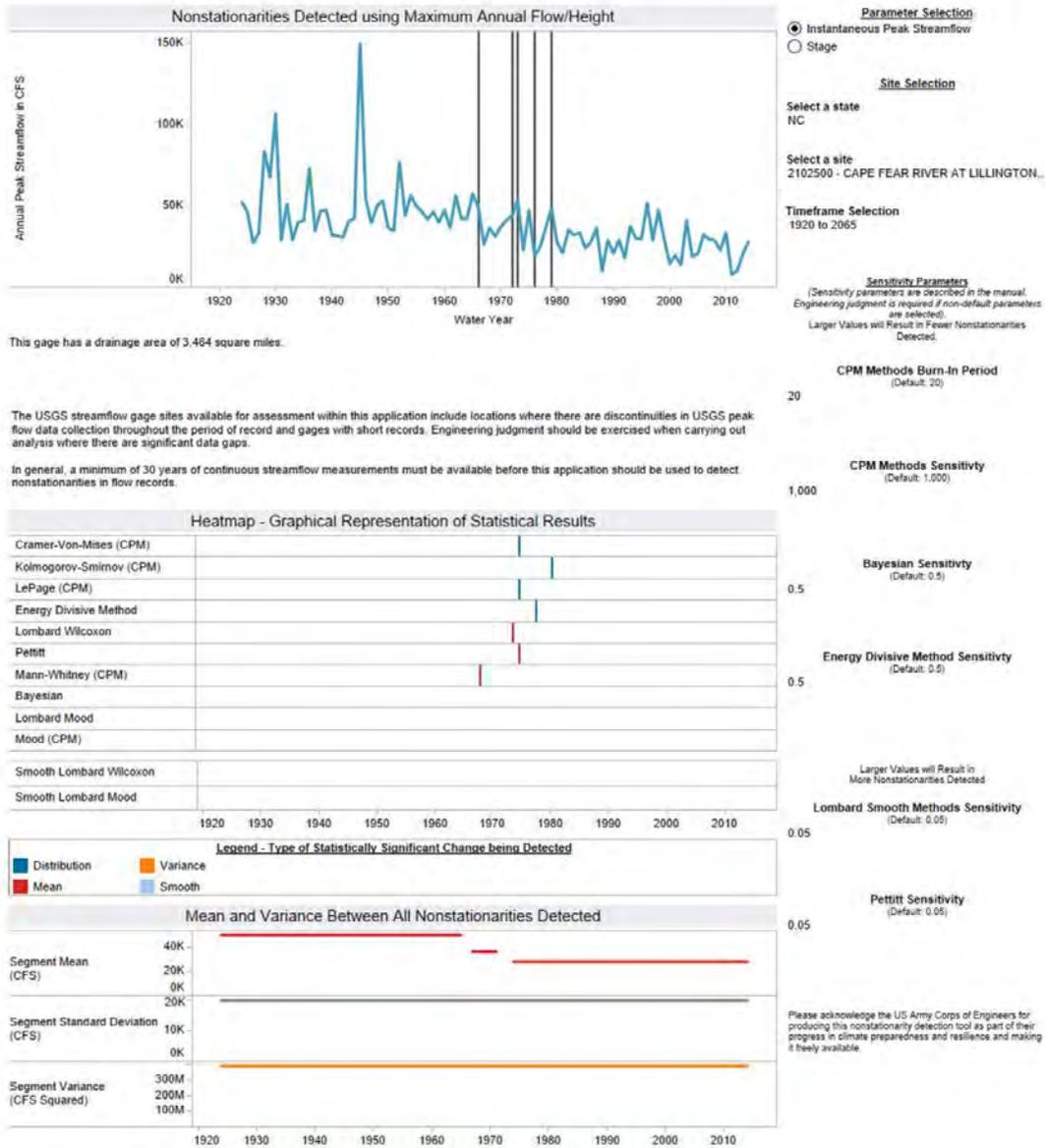


Figure 6 – Non-Stationarity Analysis of Maximum Annual Flow for Cape Fear River at Lillington, NC

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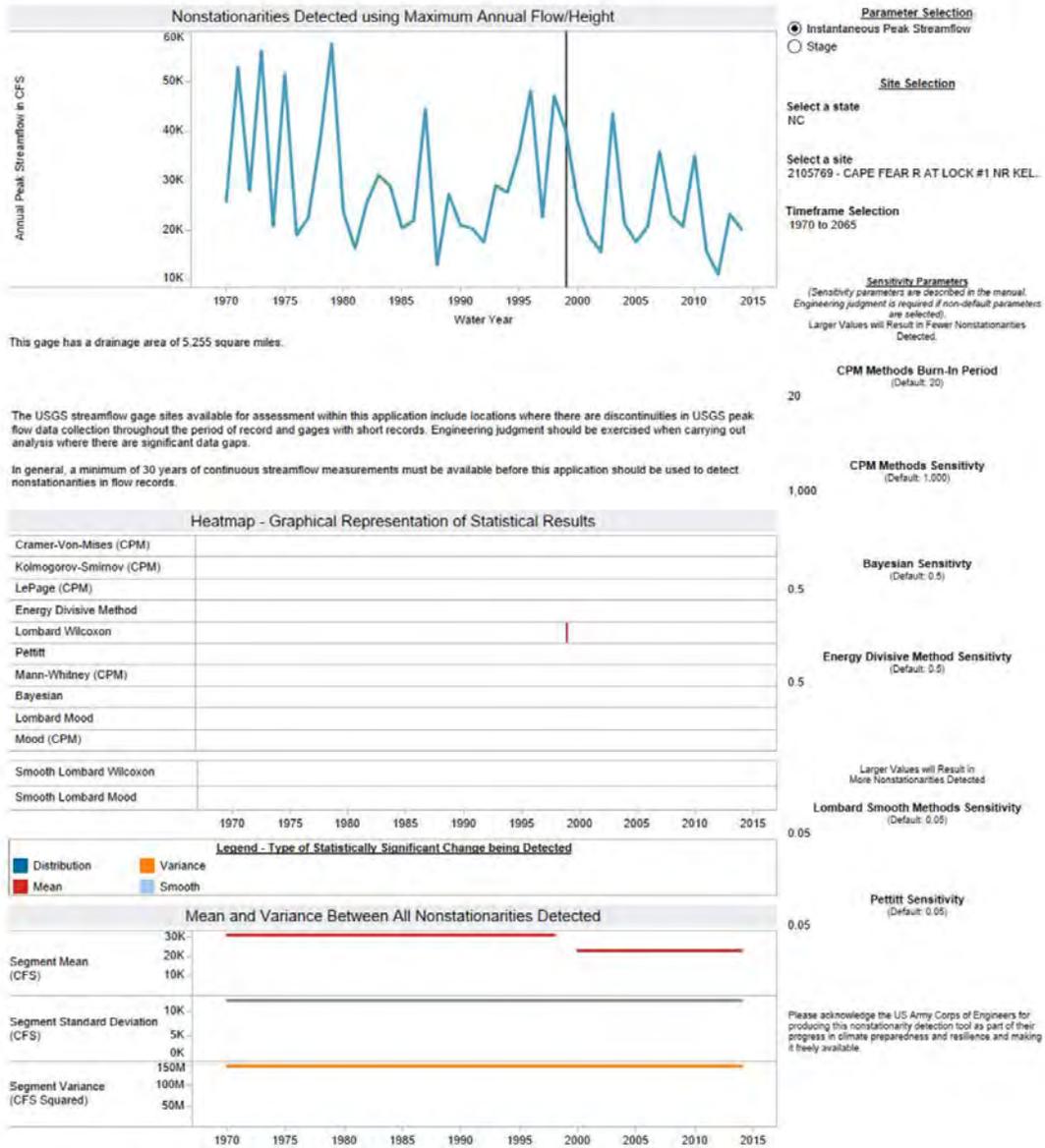


Figure 7 – Non-Stationarity Analysis of Maximum Annual Flow for Cape Fear River at Lock #1 nr Kelly, NC