

## APPENDIX A

### U.S. DEPARTMENT OF COMMERCE SECTION 18 FISHWAY PRESCRIPTIONS

#### **6. FINAL (MODIFIED) SECTION 18 PRESCRIPTION FOR FISHWAYS:**

##### **General Terms and Conditions for Fishways**

To ensure the timely implementation of fish passage, the following measures are included and shall be incorporated by the Licensee to ensure the effectiveness of the fishways pursuant to Section 1701(b) of the 1992 National Energy Policy Act (P.O. 102-0486, Title XVII, 106 Stat. 3008).

Section 1701(b) states: “The items which may constitute a ‘fishway’ under section 18 for the safe and timely upstream and downstream passage of fish shall be limited to physical structures, facilities, or devices necessary to maintain all life stages of such fish, and project operations and measures related to such structures, facilities, or devices which are necessary to ensure the effectiveness of such structures, facilities, or devices for such fish.”

Consistent with the Settlement Agreement, fishways shall be constructed, operated, and maintained to provide effective (safe, timely, convenient) passage for American shad, river herring (blueback and alewife), and American eel and other diadromous species at the Licensee’s expense. Based on participation in the settlement process, thorough review of available range-wide and local Roanoke River biological information pertinent to target diadromous fish species, and review of comments on the Preliminary Prescription for Fishways, NOAA Fisheries has modified its Preliminary Prescription for Fishways to include the diadromous fish passage and restoration provisions of the Settlement Agreement (specifically article FS-2). The fish passage provisions of article FS-2 (Pages TS-30 through TS-40) are hereby incorporated by reference (Appendix I), and should be included in any license issued by FERC for the Project. Following are additional supplementary and clarifying fish passage considerations, consistent with the Settlement Agreement.

The Roanoke Basin design population (upstream passage) for each target species is:

Target Species	Phase 3 (reserved)***	Intermediate Basin Goal*	Existing/Near Future Need**
American shad	500,000	363,000	50,000 (Priority target species)
River herring	5,000,000	3,630,000	500,000 (Second priority species)
American eel	unquantified	unquantified	Unquantified

\* Intermediate goal based on access to existing open river habitats above Kerr Reservoir, excluding extensive riverine reaches above tributary and mainstem Staunton/Roanoke River dams. Phases 1 and 2.

\*\* Immediate goal based on access to spawning habitat in the Roanoke River (8km) below Kerr Dam, and the Roanoke and Gaston Reservoirs. Phases 1 and 2).

\*\*\* Phase 3 goal upon construction of volitional fish passage facilities capable of passing the present Phase 3 basin target numbers.

1. Upstream fishways shall be operational (on demand when fish are available) during the designated migration period from March 15 to June 30, or other additional period determined on an annual basis by the Resource agencies and the DFRTAC based on experience, weather, timing of fish runs or other biological management factors.
2. Fishways shall be fully operational as soon as possible but not later than the phased schedule set out in the Settlement Agreement, so that continuing impacts of the project may be mitigated and benefits of passage improvements realized as soon as practicable.
3. Fishways shall be maintained and operated, at the licensee's expense during the upstream migration (and downstream where appropriate) migration periods for the target species, as provided for in the Settlement Agreement, and consistent with the time periods specified by the DFRTAC. The approximate migration periods (these are subject to variability from year to year due to climactic or other factors) for diadromous target species are as follows:

<u>Species</u>	<u>Upstream Migration*</u>	<u>Downstream Migration</u>
American shad	March 15 -- June 30	essentially year round
river herring	March 15 – June 30	essentially year round
American eel	To be determined	To be determined

\* The migration periods may be amended or otherwise changed during the term of the license by NOAA Fisheries in consultation with the resource agencies and

the DFRTAC, based on experience, management objectives, data, or new information.

4. The Licensee shall keep the fishways in proper order and shall keep fishway areas clear of trash, logs, and material that would hinder passage. Anticipated maintenance shall be performed sufficiently before a migratory period such that fishways can be tested and inspected, and will operate effectively prior to and during the migratory periods. In consultation with NOAA Fisheries, the DFRTAC, and the Resource agencies, the licensee shall develop a fishway maintenance and operations plan describing the anticipated maintenance, a maintenance schedule, and contingencies. The plan, containing the consultation comments of the resource agencies and other members of the DFRTAC, shall be submitted to NOAA Fisheries for review and approval. Upon such approval the plan shall be submitted to the Commission for approval.
5. The licensee shall provide personnel of NOAA Fisheries, the Resource agencies, the DFRTAC, and other designated representatives, access to the project site and to pertinent project records for the purpose of inspecting the fishways to determine compliance with the fishway prescriptions and for general evaluation and overview observations.
6. The licensee shall develop in consultation with and submit for approval by NOAA Fisheries all functional and final design plans, construction schedules, and any hydraulic model or other studies for the fishways described herein.
7. An adequate continuous minimum zone-of-passage flow shall be provided in the fishway operational area during the designated upstream passage periods.
8. The licensee shall develop plans for, and conduct fishway effectiveness evaluations in consultation with NOAA Fisheries and the Resource agencies on both upstream and downstream facilities. Plan development shall follow the framework recommended by NOAA Fisheries during detailed fishway design. The plans and results of effectiveness studies shall be submitted to NOAA Fisheries and the Resource agencies for review and comment prior to being filed for approval by the Commission. If the licensee disagrees with any of the comments and recommendations from the resource agencies, it shall provide an explanation in its filing with the Commission.

#### **6.1 Passage of Diadromous Fish at the Roanoke Rapids and Gaston Hydroelectric Project: American Eel Passage**

Appendix A (Article 8) of the Settlement Agreement contains proposed FERC license articles for implementation of agreed upon diadromous fish restoration actions.

Sections 8(3) through (14) (Pages PL-14 through 17) specify actions to be taken in support of American eel restoration objectives. The aforementioned sections are incorporated here by reference and are included in Appendix II to this document.

Section 6.4 of NOAA Fisheries' Preliminary Prescription for Fishways required construction of safe and effective passage facilities at Roanoke Rapids Dam for American eel within 4 years after license issuance, and at Gaston Dam 2 years after construction of facilities at Roanoke Dam. The Settlement Agreement provides a longer period of eel distribution and abundance studies to allow for phased implementation of instream flows to the bypassed reach of the Roanoke River in accordance with Settlement Article FL-1. In accordance with the Settlement Agreement as specified in Article FS-2 (3.4) the Roanoke Rapids eelway is to be constructed in year 5 or earlier, based on the results of eel migration in response to bypassed reach flow restoration. The Gaston Dam eelway is to be constructed in year 9 after license issuance, depending upon the results of eel passage at the Roanoke Dam and study of eel distribution and availability for passage at Gaston Dam. The additional study and minor delay in construction of upstream passage for American eel will allow for development of valuable biological data, and is not expected to result in undue delay in providing safe and effective upstream passage. The Settlement Agreement provides for study of downstream passage effectiveness and mortality, and provides for implementation of safe and effective downstream passage facilities and/or operations at Gaston and Roanoke Dams.

## **6.2 Passage of Diadromous Fish at the Roanoke Rapids and Gaston Hydroelectric Project:**

### **Phase 1: Baseline Study and Initial Trap and Transport for American Shad**

Appendix A (Article 8) of the Settlement Agreement contains proposed FERC license articles for implementation of agreed upon diadromous fish restoration actions. Sections 8(15) through (29) specify monitoring studies, coordination, and scheduling of actions in support of diadromous fish restoration (primarily American shad) in Phase 1.

Section 6.1 of NOAA Fisheries' Preliminary Prescription for Fish Passage (Phase 1) specified construction and operation of an initial trap and transport facility with an annual capacity of 2,000 adult American shad no later than the second spawning season following license issuance. A program of baseline shad population, behavior, downstream passage effectiveness and turbine mortality studies was also specified. The Settlement Agreement provides for a comprehensive program of shad population and life history studies, habitat characterization in and above the project reservoirs, outmigration and turbine mortality studies, and fry stocking in the Roanoke River tributaries. The Settlement Agreement also provides for implementation of an initial upstream trap and transport operation capable of providing upstream transport of a minimum of 2,000 adult

spawners by year 2 after issuance of a project license. Construction of permanent trap and transport facilities will be delayed until year 5 unless the initial operation fails to meet the objectives of Phase I (capacity to transport 2,000 adult spawning shad).

### **6.3 Passage of Diadromous Fish at the Roanoke Rapids and Gaston Hydroelectric Project:**

#### **Phase 2: Interim Passage for American Shad**

Appendix A (Article 8) of the Settlement Agreement contains proposed FERC license articles for implementation of agreed upon diadromous fish restoration actions. Section 8(30) specifies monitoring studies, coordination, and actions agreed upon to support Phase 2 of the restoration program utilizing a trap and transport passage facility and operation primarily for American shad.

Section 6.2 of NOAA Fisheries' Preliminary Prescription for Fishways specified construction and operation of a full-capacity trap and transport facility capable of providing safe and effective upstream transport of 50,000 adult shad per year in spawning condition to be operational no later than the fifth spawning season after issuance of the new project license. The Settlement Agreement provides for 3-4 years of shad population, behavior, life history, other beneficial studies, and a fry stocking program prior to construction and operation of the full-capacity trap and transport facility. During or after year 4, NOAA Fisheries and/or U.S. Fish and Wildlife Service will determine, in coordination with NC WRC and VA DGIF, when to require construction and operation of the Phase 2 transport facilities. In accordance with the Settlement Agreement and following the decision to initiate Phase 2, the licensee will provide fully operational trap and transport facilities capable of passing 500,000 adult shad annually, within 2 additional years (as early as 7 years after license issuance). NOAA Fisheries notes that while the Settlement Agreement specifies the Phase 2 trap and transport facility capacity of 500,000 shad annually, achieving transport numbers to meet the full Roanoke Basin capacity with presently available trap and transport facility designs and operations may not be achievable. NOAA Fisheries anticipates the proposed licensee-funded study program provided for in the Settlement Agreement will provide important management information and result in more effective restoration of shad and other diadromous fish populations levels in the Roanoke River Basin.

### **6.4 Passage of Diadromous Fish at the Roanoke Rapids and Gaston Hydroelectric Project:**

#### **Phase 3: Full Capacity Volitional Passage**

Appendix A (Article 8) of the Settlement Agreement contains proposed FERC license articles for implementation of agreed upon diadromous fish restoration actions.

Sections 8(30) and (31) describe Phase 3 actions concerning potential future installation of full basin-capacity volitional upstream fish passage and downstream passage facilities. NOAA Fisheries reserves section 18 authority and decisions regarding the specific type, design or operation of upstream passage facilities that may be required in the future, during the term of the license, to maintain timely, safe and effective upstream passage of adult shad and other target species up to the habitat capacity of the Roanoke River basin. Authority is also reserved regarding specific types, design or operation of downstream passage facilities.

## **7. RESERVATION OF AUTHORITY.**

NOAA Fisheries expressly reserves its authority under Section 18 of the FPA to prescribe such additional fishways or modify existing fishways at those locations and at such times as it may subsequently determine are necessary to provide for effective upstream and downstream passage of anadromous fish through the Project facilities. As part of the need to provide effective fish passage, NOAA Fisheries may need to modify the preceding fishway prescriptions upon approval by NOAA Fisheries of such plans, designs and implementation schedules pertaining to fishway construction, operation, maintenance and monitoring as may be submitted by the applicant (licensee) in accordance with the terms of the license articles containing such fishway prescriptions, or upon any other relevant information.

## **LIST OF APPENDICES**

### **APPENDIX I:**

- A. Selected Diadromous Fishes of the Roanoke River and Albemarle Sound
- B. Applicable Sections of the Technical Settlement

### **APPENDIX II:**

Proposed License Articles Appended to the Settlement Agreement

## APPENDIX I

### A. Fish Passage and Instream Flow Sections of the Technical Settlement Agreement

#### **Article FS2 Diadromous Fish Restoration**

##### 1.0 Purpose

1.1 The purpose of this settlement article is to provide a structure for the Licensee to cooperate in the restoration of diadromous fish in the Roanoke River Basin.

1.2 For this settlement article, the five agencies with the responsibility of overseeing diadromous fish restoration in the Roanoke River, USFWS, NMFS, NCWRC, NCDMF, and VDGIF will be referred to collectively as “Agencies”.

1.3 The Agencies and the Licensee agree to form a Diadromous Fish Restoration Technical Advisory Committee (DFRTAC) which will provide a forum for advice and cooperation for restoration of diadromous fish in the Roanoke River Basin. The Agencies and Licensee may elect by unanimous consent to invite other entities, such as the U.S. Army Corps of Engineers or USGS, to join the DFRTAC.

1.4 The establishment of the DFRTAC cannot usurp any regulatory authority from any of the participating agencies.

##### 2.0 Target Species

2.1 Species targeted for restoration include American shad, American eel, striped bass, Atlantic sturgeon, shortnose sturgeon, blueback herring, alewife, sea lamprey, and hickory shad.

2.2 The initial management objectives are for American eel and American shad. At the time of this agreement, the Agencies are not proposing measures specifically for the passage of striped bass, Atlantic sturgeon, shortnose sturgeon, blueback herring, alewife, sea lamprey, or hickory shad.

3.0 American Eel The Licensee will work with the agencies in adhering to the following plan:

3.1 Year 1 Licensee will sample and evaluate elver / yellow eel distribution in the tailrace and bypass of Roanoke Rapids Dam as well as along the dam, from January - through December. Those eels captured below Roanoke Rapids Dam in this sampling program will be marked with appropriate marking techniques and released in Roanoke Rapids Lake. Sampling schedule in Year 2 may be reduced to correspond to the period(s) of peak upstream migration as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures. This study will be repeated in years 2 through 4. In year 1 the members of DFRTAC will decide, through its decision-making

and dispute resolution procedures, upon an implementation and operation plan for the restoration of the A. eel in the Roanoke River Basin below John H. Kerr Dam consistent with the terms set forth in this article.

3.2 Years 2 and 3, evaluation continues, with specified flow in bypass per FL1 §4.3. If the evaluation of eels collected at the base of Roanoke Rapids Dam indicates that provisions for passage are needed earlier than year 5 as indicated in 3.4 below, then 3.3 and 3.4 shall be accelerated accordingly. The agencies shall make this decision with advice from the Licensee. Distribution studies in the bypass may be repeated as bypass flow increases per FL1.

3.3 Year 4 evaluation continues. Licensee will work cooperatively with Agencies to design an eelway for Roanoke Rapids Dam. An eelway shall consist of an Agency-approved safe, timely and effective passage for American eels. This may include trap/transport, ramps, ladders, lifts, etc. The members of DFRTAC will begin at this time an A. eel distribution evaluation on a 3-year cycle. The study area will focus on the tributaries to Roanoke Rapids Lake. There will be at least 3 study cycles but no more than 6 study cycles as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures.

3.4 Year 5, or earlier (see 3.2), Licensee will place in operation an eelway (see definition in 3.3 above) at Roanoke Rapids Dam. In cooperation with Agencies, Licensee will mark eels at the base of the dam and determine the percentage passed upstream. This “efficiency” study shall continue for a maximum of 4 years. If decided to be necessary by the members of DFRTAC through its decision-making and dispute resolution procedures, the Licensee may be required to perform two additional years of passage efficiency study during the spring spawning period when flow in the bypass is increased per FL1 §§ 4.4, 4.5 or 4.6. The members of DFRTAC shall decide upon the appropriate protocol for marking of eels passed over the Roanoke Rapids Dam through its decision-making and dispute resolution procedures.

3.5 Year 5, begin cooperative evaluation of eel distribution at the base of Gaston Dam using a sampling design cooperatively developed by the members of DFRTAC and approved by the Agencies, drawing on experience gained while sampling at the base of Roanoke Rapids Dam in years 1 through 4. This study will be repeated in years 6 through 8.

3.6 Year 8, Licensee will work cooperatively with Agencies to design an eelway for Gaston Dam. An eelway shall consist of an Agency approved safe, timely and effective passage for A. eels. This may include trap/transport, ramps, ladders, lifts, etc. It will also include consideration of information gained during operation of the passage facility at the Roanoke Rapids Dam. If the trap and transport is deemed preferable, the adequacy of the Roanoke Rapids trapping facility to serve as a model or source for Gaston, will be

considered.

3.7 Year 9, Licensee will provide safe, timely and effective upstream passage and, cooperatively with the agencies, conduct efficiency studies at Gaston Dam. Passage may be delayed if 150 eels are not collected at the base of Gaston Dam during the months of February through June (or other months as determined through initial sampling, with a sampling design decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures). If a threshold of 150 eels is not collected, sampling shall continue annually until the threshold is met and construction and operational changes designed to enhance downstream passage at the Gaston Dam ( § 3.10) will be delayed accordingly. The threshold number of 150 eels may be modified by the members of DRFTAC through its decision-making and dispute resolution procedures, based on experience gained while sampling the base of Roanoke Rapids Dam in years 1 through 5. A passage “efficiency” study shall be put in place similar to that described in 3.4 above but incorporating lessons learned in that experience. This “efficiency” study shall continue for a maximum of 4 years. The members of DFRTAC shall decide upon the appropriate protocol for marking of eels passed over the Gaston Dam through its decision-making and dispute resolution procedures. An A. eel distribution evaluation similar to that undertaken in Roanoke Rapids Lake pursuant to § 3.3 will begin in Lake Gaston starting year 9.

3.8 Year 9 the Licensee, in cooperation with the other members of DRFTAC, will conduct a Literature Review and evaluation of current Best Available Technology for downstream passage. Evaluation shall include, among others, costs and determination of downstream passage efficiency criteria.

3.9 Year 12 Licensee agrees to provide safe, timely and effective downstream passage as approved by the Agencies and /or amend operations for eel at Roanoke Rapids Dam consistent with results of 3.8 above at Roanoke Rapids Dam. Safe, timely and effective downstream passage may include use of the Roanoke Rapids bypass system and technology similar in costs to strobe lights at the Roanoke Rapids Dam submerged weir or other comparable technology and seasonal night-time operational modifications. Any agency decision to require means of passage costing substantially more than agreed to herein shall require exercise of reserved authority under § 6.

3.10 Year 15, The Licensee agrees to provide safe, timely and effective downstream passage for eel at Lake Gaston Dam as determined to be necessary by the agencies. Installation of downstream passage may be delayed beyond year 15 if so decided by the members of DFRTAC through its decision-making and dispute resolution procedures. Safe, timely and effective downstream passage will include use of technology similar in costs to strobe lights on the submerged weir at the Gaston Dam, a bypass system and operational changes. (Bypass system not to exceed the bypass flow at Roanoke Rapids Dam and operation of system to target time of day and period in year of peak out-

migration.) Any agency decision to require means of passage costing substantially more than agreed to herein shall require exercise of reserved authority under § 6.

3.11 Licensee will contribute to the above efforts as specified in Table FS2-1

**TABLE FS2-1**

Description of Study	Years	Licensee Cost Share (%)
1. Distribution in tailrace/bypass. (Timing, distribution along dam or tailrace, mark trapped eels repeat as necessary per FL1)	1 – 4	100*
2. Design of eelway at RR	4	100*
3. Passage/trapping efficiency @ RR, 2 yrs. additional study if flows are increased in spring	5 – 8	100*
4. Eel distribution at base of Gaston, same as 1 above.	5 – 8	100*
5. Eel distribution in RR Lake. (Studies concentrate on tribs, study cycle every 3 years for 6 cycles (§ 3.3))	5 – 20	100**
6. Decision on Eelway at Gaston	7	NA
7. Design eelway at Gaston if required	8	100*
8. Passage/efficiency study @Gaston	9 – 12	100***
9. Literature review of downstream passage @ RR	9	100*
10. Eel distribution in Gaston (see 5 above § 3.7))	9 – 24	100**
11. RR and Gaston downstream passage	12, 15	100*

\* Licensee to fund 100%, but any agency contribution in process will be in-kind contribution and not reimbursed by Licensee.

\*\* Agencies will perform any open lake portions of this study, Licensee responsible for tributaries.

\*\*\* This should be similar to Roanoke Rapids

#### 4.0 American Shad

The Licensee agrees to provide safe and effective upstream passage for the number of American shad supported by the available habitat upstream of its facilities, for the duration of the license term, according to the phased implementation program set forth in this § 4. If the criteria for initiating Phase 2 are met pursuant to § 4.2 of this article, the Licensee’s upstream passage obligation is limited to 50,000 American shad annually (the estimated capacity of habitat in the basin between Roanoke Rapids and Kerr Dams). If the criteria for initiating Phase 3 are met pursuant to §4.4 of this article, the Licensee’s obligation to provide safe and effective upstream passage of American shad under this

agreement shall extend up to 500,000 American shad annually (the estimated capacity of habitat in the basin above Roanoke Rapids Dam).

#### 4.1 Phase 1 - Initial Measures

##### 4.1.1 Year 1

4.1.1.1 The Agencies, in consultation with the other members of the DFRTAC, will design and implement a Comprehensive Monitoring Program (CMP) for the American shad population in the Roanoke River basin. The plan, which the Licensee will fund according to table FS2-2, shall include:

- an annual baseline population estimate
- annual spawning stock assessment
- annual out-migrating juvenile monitoring/hatchery evaluation on a system-wide basis
- annual monitoring of returning adults

4.1.1.2 The members of DFRTAC will cooperatively conduct a survey of American shad spawning and nursery habitat in the headwaters of Lake Gaston and in appropriate tributaries of Kerr Reservoir. Assessment of potential habitats will continue in subsequent years until all habitats have been evaluated. The Licensee will assist in funding according to Table FS2-2.

4.1.1.3 The Agencies will initiate stocking of American shad fry in Gaston headwaters and Kerr Reservoir tributaries. The annual stocking target will be 7 million fry, dispersed among upstream Kerr and Gaston headwaters and the lower Roanoke River. The Licensee will contribute to the stocking cost per table FS2-2.

- The Licensee, with the agreement of the other members of DFRTAC, will make an appropriate reduction in its contribution to A. shad fry stocking at such time additional partners are added to fund the stocking effort. The Licensee's contribution for upper river A. shad stocking will cease when the NCWRC no longer stocks fry in the upper Roanoke River Basin upstream of Roanoke Rapids Dam.

4.1.1.4 The Agencies will initiate an Annual Population Estimate and Spawning Stock Assessment. The Licensee shall contribute to the assessment cost per table FS2-2.

- The Licensee's contribution to the Annual Population Estimate and Spawning Stock Assessment shall end after the fifth year of phase 2 (§ 4.2 below).

4.1.1.5 The Licensee will provide funding to the NCWRC to coordinate Adult Shad Telemetry Studies, Out-migrating Juvenile Shad Evaluation, and Habitat Identification and Prioritization per Table

FS2-2.

- The Licensee's contribution to the Out-migrating Juvenile Shad Evaluation study shall end after the third year of phase 2 (§ 4.2 below)

4.1.1.6 The Licensee, working with the other members of DFRTAC, will develop a plan for initial trap and transport facilities, and their management and operation.

4.1.1.7 The Licensee will conduct a literature-based downstream passage and turbine mortality study for post-spawned adults and out-migrating juvenile A. shad. The members of DFRTAC shall determine the need to execute further studies per § 4.1.2.2 below through its decision-making and dispute resolution procedures.

4.1.1.8 The Licensee will explore cost-share partnerships for passage and restoration of American shad upstream of Kerr Dam. The other members of the DFRTAC will support these efforts to the extent they are legally able. If no cost-shared partnerships are formed, the Licensee shall continue to provide funds as per this agreement.

4.1.1.9 The Licensee shall fund 50% of the cost for a Roanoke River Diadromous Fish Restoration Coordinator. The coordinator's duties shall include coordination and monitoring and other duties beneficial to the NCWRC and the Licensee. The Licensee's contribution for the Coordinator position will continue for the term of the license.

- At such time as additional funding partners are added to the restoration effort, the Licensee's contribution to the funding of the Coordinator's position will be reduced as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures.

4.1.1.10 Licensee will assume 25% of costs exceeding the funds established in FS2-2 on an annual basis if study costs designated in FS2-2 are exceeded (over-runs).

#### 4.1.2 Year 2

4.1.2.1 The Agencies will conduct the annual component of the CMP, continue the upstream shad spawning and nursery habitat survey, and continue upstream fry stocking. Licensee agrees to fund these activities as established in Table FS2-2. Monitoring of juvenile out-migrants will continue to be funded as described in § 4.1.1. The Licensee will implement an initial trap and transport program approved by the members of DFRTAC through its decision-making and dispute resolution procedures (subject to the provisions of § 5.4 of this article), capable of providing safe and effective transport (passage) for a minimum of 2,000 adult fish in viable spawning condition. The initial trap and transport program will begin phased

passage of fish to upstream habitats and provide fish for telemetry studies of fish behavior in the reservoirs and tailwater habitats. In the year after the Licensee has demonstrated (or built under § 4.1.4) a successful transport technique, the Licensee will begin to fund telemetry studies on up to 150 fish per year within the Roanoke Rapids and Gaston Reservoirs or as otherwise decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures. The telemetry studies will be conducted for a period of three years or until 450 tagged adult A. shad have been placed in the reservoirs.

4.1.2.2 In Year 2, the Licensee agrees to conduct further turbine mortality studies for the out-migrating juvenile and post spawned adult shad only if the members of DFRTAC through its decision-making and dispute resolution procedures (subject to the provisions of § 5.4 of this article) determine mortality rates are expected to be higher than 7% for juvenile and 15% for post-spawned adults per § 4.1.1.7.

#### 4.1.3 Years 3 and 4

In Years 3 and 4, the Agencies will conduct the annual components of the CMP, continue the upstream shad spawning and nursery habitat survey, and continue upstream fry stocking and monitoring of juvenile out-migrants. The Licensee will continue the initial program of trap and transport, including telemetry studies as described in §4.1.2.1 above and continue to monitor out-migrating juveniles. The Agencies, with input from the other members of DFRTAC will set criteria to determine successful adult and juvenile movement through the reservoirs that will determine, in part, the time to transition into phase 2. The criteria for successful upstream and downstream movement would be a reasonable anticipation of a beneficial stock effect.

4.1.4 The Licensee will not be required to construct permanent trap/sort/transport facilities at Roanoke Rapids dam to collect fish for this initial stage before Year 5, unless during years 2 and 3 the initial trap and transport program specified in § 4.1.1.6 fails to meet the objective of Phase 1. If, after two years NMFS and/or FWS determine that the Licensee's initial trap and transport efforts have not been successful, then the Licensee shall immediately begin the design and construction of a safe and fully effective trap and transport facility and operation that meets the engineering criteria of NMFS and/or USFWS. The facility is to be constructed and fully operational within 2 years. If the criteria ("triggers") described in § 4.2.1 of this article have been met, then the facilities shall be designed and constructed to meet the objective of Phase 2, i.e., sized to transport 500,000 fish. If the criteria ("triggers") described in § 4.2.1 of this article have not

been met, then the facility and operation shall be designed to meet the objectives of Phase 1, as determined by NMFS and/or USFWS in coordination with other members of DFRTAC.

**TABLE FS2-2: Summary of Licensee Cost Contributions**

<b>STUDY / YEAR</b>	<b>Yr. 1</b>	<b>Yr. 2</b>	<b>Yr. 3</b>	<b>Yr. 4</b>	<b>Yr. 5</b>
A. Shad Fry Production	\$14,167	\$23,167	\$21,600	\$31,600	\$31,600
Telemetry Adult Shad			76,600	76,600	76,600
Annual Population Assess.				44,945	44,945
Out-migrating Juvenile	35,600	45,200	45,200	45,200	45,200
Upstream Habitat	8,300	8,300	8,300		
Lit. Rev. Downstream Pass.	Full cost				
Study Coordinator				40,000	40,000

	<b>Yr. 6</b>	<b>Yr. 7</b>	<b>Yr. 8</b>	<b>Yr. 9</b>	<b>Yr. 10</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	38,267
Telemetry Adult Shad	4,200				
Annual Population Assess.	14,915	14,915	14,915	14,915	29,765
Out-migrating Juvenile	49,200	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 11</b>	<b>Yr. 12</b>	<b>Yr. 13</b>	<b>Yr. 14</b>	<b>Yr. 15</b>
A. Shad Fry Production	31,600	31,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	16,565
Out-migrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 16</b>	<b>Yr. 17</b>	<b>Yr. 18</b>	<b>Yr. 19</b>	<b>Yr. 20</b>
A. Shad Fry Production	40,600	31,600	31,600	31,600	38,267
Annual Population Assess.	14,915	14,915	14,915	14,915	29,765
Out-migrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 21</b>	<b>Yr. 22</b>	<b>Yr. 23</b>	<b>Yr. 24</b>	<b>Yr. 25</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	14,915
Out-migrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 26</b>	<b>Yr. 27</b>	<b>Yr. 28</b>	<b>Yr. 29</b>	<b>Yr. 30</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	16,565
Out-migrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 31</b>	<b>Yr. 32</b>	<b>Yr. 33</b>	<b>Yr. 34</b>	<b>Yr. 35</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	16,565
Out-migrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 36</b>	<b>Yr. 37</b>	<b>Yr. 38</b>	<b>Yr. 39</b>	<b>Yr. 40</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	16,565
Out-migrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

#### 4.2 Transition to Phase 2

- 4.2.1 During or after Year 4, NMFS and/or USFWS will determine, in coordination with NCWRC and VDGIF, when to transition into Phase 2. This determination will be based on adult and juvenile movement through the reservoirs and obtaining a lower river American shad population estimate of approximately 20,000 adults based upon two annual spawning run population estimates, which do not have to be consecutive, as determined by the annual baseline population estimate (see 4.1.1.1), and also taking into account available scientific and fishery management information. The need to transition to Phase 2 will be assessed annually by NMFS and USFWS until a decision is made to proceed to Phase 2.
- 4.2.2 Within 12 months after a decision has been made by NMFS and USFWS to proceed to Phase 2, the Licensee shall submit the final design and operation plan for the fishway facilities for USFWS and NMFS approval.
- 4.2.3 Within two years after the decision to proceed to Phase 2, the Licensee will complete construction, engineering testing, and effectiveness evaluation and initiate operation of a trap/sort/transport facility at Roanoke Rapids Dam to provide safe, timely, and effective passage upstream. The design capacity of the facility shall be for 500,000 American shad annually.

#### 4.3 Phase 2.

During phase 2:

- 4.3.1 The Licensee will fully fund and operate the Phase 2 Trap and Transport facility and operation (refer to § 4.2.3).

- 4.3.2 The Licensee will provide funding for additional Phase 2 studies and measures per Table FS2-2.
- 4.3.3 The Agencies agree to support Licensee's efforts to obtain financial support from the USACE for construction and operation of the trap/sort/transport facility and its other diadromous fish restoration efforts.
- 4.3.4 The Agencies will conduct the annual components of the CMP and continue upstream fry stocking and monitoring of juvenile migrants, all under the same arrangements as in previous years per 4.1.1 above.
- 4.3.5 Agencies will not require construction or operation of upstream passage facilities (except for American eel as determined by § 3.0) at the Gaston Dam during Phase 2.
- 4.3.6 The Licensee will operate the trap and transport facility for a period of time each year sufficient to encompass 8 to 12 weeks of the peak(s) of the A. shad migration season, as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures.
- 4.3.7 The Licensee will provide transport capacity (number of trucks, tanks, etc.) in each shad migration season sufficient to pass the number of A. shad anticipated to be trapped in that migration season as decided by DFRTAC through its decision-making and dispute resolution procedures. The commitment to provide transport capacity extends up to the estimated capacity of the basin between Roanoke Rapids and Kerr Dams, currently estimated at 50,000 A. shad.
- 4.3.8 Any species of anadromous fish may be transported within the transport capacity and timeframe of the trap and transport operation in any given year. However, transport of species other than A. shad shall be considered incidental and not place undue burden on the Licensee.
- 4.3.9 The Licensee agrees to safely and effectively transport the American shad to any location identified by the agencies within a geographic radius determined by the number of road miles between the Roanoke Rapids dam and sufficiently upstream of Kerr Dam to minimize fallback through the turbines.
- 4.3.10 The Licensee will make any trapped fish (including any adult fish in excess of the above mentioned 50,000) available to the USFWS, NMFS, NCWRC, NCDMF, USGS or the VDGIF who want to sort and move them at their own expense to other locations within the Roanoke River Basin. Any other parties desiring additional fish to be sorted and moved must be approved and permitted by the NCWRC. The Licensee has the right to require reasonable compensation for use of the trap and sort facility by parties other than the 6 agencies listed above.
- 4.3.11 The Licensee will continue to fund studies agreed to above in Phase 2. The Agencies will not require the Licensee to fund additional studies during Phase 2, and some may be discontinued when appropriate.
- 4.3.12 If the juvenile A. shad mortality is expected or demonstrated (see § 4.1.2.2)

to be greater than 7%, the Licensee agrees to make minor adjustments in operations to facilitate downstream passage of out-migrating A. shad, as determined by the members of DFRTAC through its decision-making and dispute resolution procedures (subject to the provisions of § 5.4 in this article). Minor adjustments may include installation of low cost technologies such as lighting, as well as changes in the operational regime of the Projects. Spillage will not be required for American shad at Gaston for Phase 2. Adjustments to operations will only be required during the days of peak out-migration of juvenile A. shad. This window may vary from year to year and shall be determined by the Agencies. Major adjustments or spillage are not within the scope of Phase 2 and will require exercise of reserved authority by the Agencies.

4.3.13 If the post spawned adult A. shad mortality is expected or demonstrated to be greater than 20%, then the members of DFRTAC through its decision-making and dispute resolution procedures (subject to the provisions of § 5.4 in this article) will cooperatively assess the current state of knowledge regarding the contribution of post spawned adults to stock dynamics, and the need for adjustments to reduce mortality. Minor adjustments shall made by the Licensee as decided upon with the other members of DFRTAC through its decision-making and dispute resolution procedures (subject to the provisions of § 5.4 of this article). Minor adjustments shall be similar in scope to adjustments described in 4.3.12. for juvenile shad. Major adjustments or spillage are not within the scope of Phase 2 and will require exercise of reserved authority by the Agencies.

#### 4.4 Phase 3

Phase 3 will be initiated if NMFS or USFWS, in consultation with the other members of DFRTAC, determine that the trap-and-haul facility in phase 2 has become inadequate to meet Licensee's obligation for safe and effective upstream passage under this Agreement, in the event of construction of a passage facility at the Kerr Dam, or in the event of the necessity of major measures to accomplish downstream passage. The decision by the USFWS and NMFS to enter into phase 3 shall require exercise of reserved authority under § 6.0 of this agreement. In the case of such exercise of authority, all reasonable options for fish passage will be considered.

#### 5.0 Dispute Resolution

5.1 The Parties agree to seek unanimous consensus within the framework of DFRTAC for all decisions relating to the restoration of anadromous fish to their habitats in the Roanoke River Basin under this article, except those decisions specifically reserved to one or more parties. The Licensee shall convene a meeting of DFRTAC to discuss any such decision at least 120 days before the decision deadline. The Parties shall have 90 days to reach consensus and, if necessary to

- reach consensus, shall hold at least three meetings during such time period.
- 5.2 If consensus is reached, the Parties shall follow the consensus. If a matter reserved for decision under agency authority is resolved by consensus, the agencies will adopt the consensus as their preferred alternative, subject to any required public process.
  - 5.3 If such consensus is lacking, the matter shall be referred to an agreed-upon arbitrator for final decision except for the agency jurisdictional decisions specified herein.
  - 5.4 Decisions that involve the adequacy and timing of fish passage measures, or the adequacy of studies to determine the same shall be made, if no consensus is possible, by NMFS and USFWS on the basis of the record (including the comments of all DFRTAC members) under the procedures and requirement for decisions by such public agencies.
  - 5.5 Because DFRTAC may provide advice to Federal Fisheries management agencies on decisions within their statutory authority, it shall be chartered under the Federal Advisory Committee Act and subject to the relevant requirements thereof.

#### 6.0 Reservation of Authority

The USFWS and NMFS agree to defer under an appropriate reservation of their Section 18 authority their decisions regarding the specific type, design or operation of passage facilities that may be required in the future during the term of the license, to maintain safe, timely and effective passage for diadromous fish.

#### 7.0 Information Sharing

Licensee agrees to share with the Agencies all relevant non-proprietary information available to support any decision by the USACE to provide safe, timely and effective fish passage at the Kerr Dam, or to otherwise assist with fish passage in the Roanoke River basin.

#### 8.0 Support for Agreement

The Parties agree to refrain from advocating in any forum actions or decisions that would undermine or be inconsistent with this Settlement Agreement, or any provision of this Agreement, including refraining from any advocacy challenging the factual or legal basis for the obligations undertaken by the Parties pursuant to this agreement, provided that, the Licensee retains the right to challenge any agency decision made after the effective date of this Agreement regarding the specific type, design or operation of fishways or timing of passage needed to provide safe, timely and effective passage pursuant to this Agreement.

#### 9.0 Review of Beneficial Effect of Diadromous Species

If after phase 2 is operational, the Licensee believes, on the basis of new evidence, that the continuation of the upstream passage program is no longer likely to provide a beneficial effect for American Shad and/or other diadromous species, that party may

petition DFRTAC to review such evidence. The members of DRFTAC will cooperatively review the information and make recommendations to NMFS and/or USFWS who shall be solely responsible for any determination to discontinue or defer the upstream passage program. Notwithstanding any discontinuation of the Licensee's upstream passage obligations under this Article, the Licensee shall continue to cooperatively fund the Diadromous Fish Coordinator position and fund the A. shad fry stocking effort in the lower river below the Roanoke Rapids Dam.

#### 10.0 USACE Involvement

If, upon initiation of Phase 2 pursuant to § 4.3 above, the USACE has not committed to undertake actions in furtherance of diadromous fishery resource restoration upstream of Kerr Dam or such commitment is not reasonably foreseeable as the outcome of an evaluation (or planning) process by the USACE, the members of DFRTAC shall cooperatively undertake a review of the restoration program under this agreement, and identify alternative long-term plans or programs for continuing restoration efforts in the upper Roanoke Basin, pending a commitment by the USACE to assist in upstream diadromous fishery resource restoration. The members of DFRTAC may decide upon a recommendation, for adoption by the parties, including such amendment to the agreement and the FERC license as may be necessary or appropriate, to refocus the Licensee's actions for diadromous fish restoration upstream of John H. Kerr Dam to restoration actions in Lake Gaston, Roanoke Rapids Lake and the lower Roanoke River. The focus on other diadromous fish restoration actions not dependent upon USACE above John H. Kerr Dam, in Lakes Gaston and Roanoke Rapids, and the lower Roanoke River shall continue.

## APPENDIX II

### Proposed License Articles

#### **Article 8. Diadromous Fish Restoration**

(1) Licensee, shall participate in a Diadromous Fish Restoration Technical Advisory Committee (“DFRTAC”) as defined by Technical Settlement Article FS2, Section 1, with the USFWS, NMFS, NCWRC, NCDMF, and VDGIF (“Agencies”), which will provide a forum for advice and cooperation in restoration of diadromous fish in the Roanoke River Basin. During the term of the license, Licensee shall cooperate in the restoration of diadromous fish in the Roanoke River Basin.

(2) The Licensee shall abide by the dispute resolution provisions of Technical Settlement Article FS2, governing the DFRTAC, including abiding by the results of that dispute resolution process.

#### **American Eel:**

(3) Beginning in the first year after license issuance, the Licensee will sample and evaluate elver / yellow eel distribution in the tailrace and bypass of Roanoke Rapids Dam as well as along the dam, from January through December. This study will be repeated in years 2 through 4. Those eels captured below Roanoke Rapids Dam in this sampling program will be marked with appropriate marking techniques and released in Roanoke Rapids Lake. Sampling schedule in years 2 through 4 of the license may be reduced to correspond to the period(s) of peak upstream migration as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures.

(4) In year 4 of the license, the Licensee will work cooperatively with the Agencies to design an eelway for Roanoke Rapids Dam. An eelway shall consist of an Agency-approved safe, timely and effective passage for American eels.

(5) In year 4 of the license, the Licensee shall begin, in cooperation with the other members of DFRTAC, an A. eel distribution evaluation on a 3-year cycle. The study area will focus on the tributaries to Roanoke Rapids Lake. The Licensee will conduct at least 3 study cycles but no more than 6 study cycles as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures.

(6) In year 5 of the license, or earlier if so decided by the members of DFRTAC through its dispute resolution process, Licensee will place in operation an eelway at Roanoke Rapids Dam as designed and approved in year 4. In cooperation with the Agencies, Licensee will mark eels at the base of the dam and determine the percentage passed upstream. This “efficiency” study shall continue for a maximum of 4

years. If decided to be necessary by the members of DFRTAC through its decision-making and dispute resolution procedures, the Licensee may be required to perform two additional years of passage efficiency study during the spring period when flow in the bypass is increased per Technical Settlement Article FL1.

(7) In year 5 of the license, the Licensee shall begin cooperative evaluation of eel distribution at the base of Gaston Dam using a sampling design cooperatively developed by the members of DFRTAC and approved by the Agencies. This study will be repeated in years 6 through 8 of the license

(8) In year 8 of the license, the Licensee will work cooperatively with Agencies to design an eelway for Gaston Dam. An eelway shall consist of an Agency approved safe, timely and effective passage for A. eels.

(9) In year 9 of the license, Licensee will place in operation an eelway at Gaston Dam as designed and approved in year 8. Passage may be delayed if 150 eels are not collected at the base of Gaston Dam over the months of February through June (or other months as determined through initial sampling, with a sampling design decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures). If a threshold of 150 eels is not collected, sampling shall continue annually until the threshold is met and construction and operational changes designed to enhance downstream passage at the Gaston Dam will be delayed accordingly. The threshold number of 150 eels may be modified by the members of DRFTAC through its decision-making and dispute resolution procedures, based on experience gained while sampling the base of Roanoke Rapids Dam in years 1 thorough 5. In cooperation with the Agencies, Licensee will mark eels at the base of the dam and determine the percentage passed upstream. This “efficiency” study shall continue for a maximum of 4 years.

(10) In year 9 of the license, the Licensee shall begin in Lake Gaston an American Eel distribution evaluation similar to that undertaken in tributaries to Roanoke Rapids Lake pursuant to paragraph 5. If passage is delayed under section 9 of this Article, this evaluation will begin in the year passage is provided.

(11) In year 9 of the license, the Licensee, in cooperation with the other members of DRFTAC, shall conduct a Literature Review and evaluation of current Best Available Technology for downstream passage.

(12) In year 12 of the license the Licensee shall provide safe, timely and effective downstream passage as approved by the Agencies and /or amend operations for eel at Roanoke Rapids Dam consistent with the results of paragraph 11 above at Roanoke Rapids Dam. Safe, timely and effective downstream passage may include use of the Roanoke Rapids bypass system and technology similar in costs to strobe lights at the Roanoke Rapids Dam submerged weir or other comparable technology and seasonal

night time operational modifications. Any agency decision to require means of passage costing substantially more than agreed to herein shall require exercise of the mandatory conditioning and prescriptive authority reserved to the Secretaries of Commerce and Interior in this license.

(13) In year 15 of the license, the Licensee shall provide safe, timely and effective downstream passage for eel at Lake Gaston Dam as determined to be necessary by the agencies. Installation of downstream passage may be delayed beyond year 15 if so decided by the members of DFRTAC through its decision-making and dispute resolution procedures. Safe, timely and effective downstream passage will include use of technology similar in costs to strobe lights on the submerged weir at the Gaston Dam, a bypass system and operational changes. (Bypass system not to exceed the bypass flow at Roanoke Rapids Dam and operation of system to target time of day and period in year of peak outmigration.) Any agency decision to require means of passage costing substantially more than this shall require exercise of the mandatory conditioning and prescriptive authority reserved to the Secretaries of Commerce and Interior in this license.

(14) The Licensee will contribute to the above efforts as specified in Table FS2-1

**TABLE FS2-1**

Description of Study	Years	Licensee Cost Share %
1. Distribution in tailrace/bypass. (Timing, distribution along dam or tailrace, mark trapped eels repeat as necessary per FL1)	1 – 4	100*
2. Design of eelway at RR	4	100*
3. Passage/trapping efficiency @ RR, 2 yrs. additional study if flows are increased in spring	5 – 8	100*
4. Eel distribution at base of Gaston, same as 1 above.	5 – 8	100*
5. Eel distribution in RR Lake. (Studies concentrate on tribs, study cycle every 3 years for 6 cycles (section 3.7))	5 – 20	100**
6. Decision on Eelway at Gaston	7	NA
7. Design eelway at Gaston if required	8	100*
8. Passage/efficiency study @Gaston	9 – 12	100***
9. Literature review of downstream passage @ RR	9	100*
10. Eel distribution in Gaston (see 5 above)	9 – 24	100**
11. RR and Gaston downstream passage	12, 15	100*

\* Licensee to fund 100%, but any agency contribution in process will be in-kind contribution and not reimbursed by Licensee.

\*\* Agencies will perform any open lake portions of this study, Licensee responsible for tributaries.

\*\*\* This should be similar to Roanoke Rapids

### **American Shad:**

(15) The Licensee shall provide safe and effective upstream and downstream passage for the number of American shad supported by the available habitat upstream of its facilities, for the duration of the license term, according to the phased implementation program set forth in sections 15-30. If the criteria for initiating Phase 2 are met pursuant to section 27, the Licensee's upstream passage obligation is limited to 50,000 American shad annually (the estimated capacity of habitat in the basin between Roanoke Rapids and Kerr Dams). If the criteria for initiating Phase 3 are met pursuant to section 31, the Licensee's obligation to provide safe and effective upstream passage of American shad under this agreement shall extend up to 500,000 American shad annually (the estimated capacity of habitat in the basin above Roanoke Rapids Dam).

(16) Beginning in the first year of the license, the Licensee shall cooperate with the other members of DFRTAC in conducting a survey of American shad spawning and nursery habitat in the headwaters of Lake Gaston and in appropriate tributaries of Kerr Reservoir. Assessment of potential habitats will continue in subsequent years until all habitats have been evaluated. The Licensee will assist in funding according to Table FS2-2.

(17) The Licensee will contribute to fry stocking efforts in the Roanoke River basin per Table FS2-2. The Licensee, with the agreement of the other members of DFRTAC, may make an appropriate reduction in its contribution to A. shad fry stocking at such time additional partners are added to fund the stocking effort. The Licensee's contribution for A. shad stocking in the upper Roanoke River Basin will cease when the NCWRC no longer stocks fry in the upper Roanoke River Basin upstream of Roanoke Rapids Dam. Should the Licensee's contribution to A. shad stocking in the upper Roanoke River basin cease, Licensee shall fund the A. shad fry stocking effort in the lower river below the Roanoke Rapids dam, consistent with its obligations under Technical Settlement Article FS2.

(18) The Licensee shall contribute to the cost of an Annual Population Estimate and Spawning Stock Assessment study per Table FS2-2. The Licensee's contribution to the Annual Population Estimate and Spawning Stock Assessment shall end after the fifth year of Phase 2.

(19) The Licensee will provide funding to the NCWRC to coordinate Adult Shad Telemetry Studies, Outmigrating Juvenile Shad Evaluation, and Habitat Identification and Prioritization per Table FS2-2. The Licensee's contribution to the Outmigrating Juvenile Shad Evaluation study shall end after the third year of Phase 2.

(20) The Licensee shall fund 50% of the cost for a Roanoke River Diadromous Fish Restoration Coordinator. The coordinator's duties shall include coordination and monitoring and other duties beneficial to the NCWRC and the Licensee. The Licensee's contribution for the Coordinator position will continue for the term of the license. The Licensee's contribution to the funding of the Coordinator's position may be reduced as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures at such time as additional funding partners are added to the restoration effort.

(21) Licensee shall assume 25% of costs exceeding the funds established in Technical Settlement Article FS2-2 on an annual basis if study costs designated in Technical Settlement Article FS2-2 are exceeded.

(22) In the first year of the license, the Licensee shall conduct a literature-based downstream passage and turbine mortality study for post-spawned adults and outmigrating juvenile A. shad. The Licensee shall conduct further studies as determined by the members of DFRTAC through the decision-making and dispute resolution mechanisms provided for in this license. Further studies of downstream passage and turbine mortality of outmigrating juvenile and post spawned adult shad shall be required in year 2 only if mortality rates are expected to be higher than 7% for juvenile and 15% for post-spawned adults according to the first year study.

(23) In the first year of the license, the Licensee, working with the other members of DFRTAC, shall develop a plan for an initial trap and transport program for Phase 1 fish passage.

(24) In year 2 of the license, the Licensee will implement an initial trap and transport program approved by the members of DFRTAC through its decision-making and dispute resolution procedures capable of providing safe and effective transport (passage) for a minimum of 2,000 adult fish in viable spawning condition. The initial trap and transport program will begin phased passage of fish to upstream habitats and provide fish for telemetry studies of fish behavior in the reservoirs and tailwater habitats. In the year after the Licensee has demonstrated (or built under Article 25) a successful transport technique, the Licensee will begin to fund telemetry studies on up to 150 fish per year within the Roanoke Rapids and Gaston Reservoirs or as otherwise decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures. The telemetry studies will be conducted for a period of three years or until 450 tagged adult A. shad have been placed in the reservoirs.

(25) The Licensee will not be required to construct permanent trap/sort/transport facilities at Roanoke Rapids dam to collect fish for this initial stage before Year 5, unless during years 2 and 3 the initial trap and transport program specified in section 24 fails to meet the objective of Phase 1. If, after two years NMFS and/or FWS determine that the Licensee’s initial trap and transport efforts have not been successful, then the Licensee shall immediately begin the design and construction of a safe and fully effective trap and transport facility and operation that meets the engineering criteria of NMFS and/or USFWS. The facility is to be constructed and fully operational within 2 years. If the criteria (“triggers”) described in section 27 of this Article have been met, then the facilities shall be designed and constructed to meet the objective of Phase 2, i.e., sized to transport 500,000 fish. If the criteria (“triggers”) described in section 27 of this Article have not been met, then the facility and operation shall be designed to meet the objectives of Phase 1, as determined by NMFS and/or USFWS in coordination with other members of DFRTAC. The facility may be designed and constructed to transport 50,000 to 500,000 fish, as the Licensee chooses.

(26) **TABLE FS2-2: Summary of Licensee cost contributions**<sup>1</sup>

<b>STUDY / YEAR</b>	<b>Yr. 1</b>	<b>Yr. 2</b>	<b>Yr. 3</b>	<b>Yr. 4</b>	<b>Yr. 5</b>
A. Shad Fry Production	\$14,167	\$23,167	\$21,600	\$31,600	\$31,600
Telemetry Adult Shad			76,600	76,600	76,600
Annual Population Assess.				44,945	44,945
Outmigrating Juvenile	35,600	45,200	45,200	45,200	45,200
Upstream Habitat	8,300	8,300	8,300		
Lit. Rev. Downstream Pass.	100%				
Study Coordinator				40,000	40,000

	<b>Yr. 6</b>	<b>Yr. 7</b>	<b>Yr. 8</b>	<b>Yr. 9</b>	<b>Yr. 10</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	38,267
Telemetry Adult Shad	4,200				
Annual Population Assess.	14,915	14,915	14,915	14,915	29,765
Outmigrating Juvenile	49,200	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 11</b>	<b>Yr. 12</b>	<b>Yr. 13</b>	<b>Yr. 14</b>	<b>Yr. 15</b>
A. Shad Fry Production	31,600	31,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	16,565
Outmigrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

<sup>1</sup> Specified costs do not address fish passage facilities.

	<b>Yr. 16</b>	<b>Yr. 17</b>	<b>Yr. 18</b>	<b>Yr. 19</b>	<b>Yr. 20</b>
A. Shad Fry Production	40,600	31,600	31,600	31,600	38,267
Annual Population Assess.	14,915	14,915	14,915	14,915	29,765
Outmigrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 21</b>	<b>Yr. 22</b>	<b>Yr. 23</b>	<b>Yr. 24</b>	<b>Yr. 25</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	14,915
Outmigrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 26</b>	<b>Yr. 27</b>	<b>Yr. 28</b>	<b>Yr. 29</b>	<b>Yr. 30</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	16,565
Outmigrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 31</b>	<b>Yr. 32</b>	<b>Yr. 33</b>	<b>Yr. 34</b>	<b>Yr. 35</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	16,565
Out-migrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

	<b>Yr. 36</b>	<b>Yr. 37</b>	<b>Yr. 38</b>	<b>Yr. 39</b>	<b>Yr. 40</b>
A. Shad Fry Production	31,600	40,600	31,600	31,600	31,600
Annual Population Assess.	14,915	14,915	14,915	14,915	16,565
Out-migrating Juvenile	35,600	35,600	35,600	35,600	35,600
Study Coordinator	40,000	40,000	40,000	40,000	40,000

(27) During or after Year 4, NMFS and/or USFWS will determine, in coordination with NCWRC and VDGIF, when to transition into Phase 2, based on a) adult and juvenile movement through the reservoirs, and b) obtaining a lower river American shad population estimate of approximately 20,000 adults based on two annual spawning run population estimates, which do not have to be consecutive, as determined by the annual baseline population estimate (see section 18), The determination will also take into account available scientific and fishery management information. The need to transition to Phase 2 will be assessed annually by NMFS and USFWS until a decision is made to proceed to Phase 2.

(28) Within 12 months after a decision has been made by NMFS and USFWS to proceed to Phase 2, the Licensee shall submit the final design and operation plan for the

fishway facilities for USFWS and NMFS approval. The Licensee shall submit final design and operation plan of the Phase 2 fishway facilities for USFWS and NMFS approval within 12 months after a decision has been made to proceed to Phase 2.

(29) Within two years after the decision to proceed to Phase 2, the Licensee shall complete construction, engineering testing, and effectiveness evaluation and initiate operation of a trap/sort/transport facility at Roanoke Rapids Dam to provide safe, timely, and effective passage upstream. The design capacity of the facility shall be for 500,000 American shad annually. Within 2 years of the decision to proceed to Phase 2, the Licensee will construct and initiate operation of a trap/sort/transport facility at Roanoke Rapids Dam to provide safe, timely and effective passage upstream.

(30) During Phase 2:

(a) The Licensee will fund and operate the Phase 2 facility, and provide funding for additional Phase 2 studies and measures per Table FS2-2.

(b) The Licensee will operate the trap and transport facility for a period of time each year sufficient to encompass 8 to 12 weeks of the peak(s) of the A. shad migration season, as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures.

(c) The Licensee shall provide transport capacity (number of trucks, tanks, etc.) in each shad migration season sufficient to pass the number of A. shad that are anticipated will be trapped that season, as decided upon by the members of DFRTAC through its decision-making and dispute resolution procedures up to the estimated capacity of the basin between Roanoke Rapids and Kerr Dams, currently estimated at 50,000 A. shad.

(d) Any species of anadromous fish may be transported within the transport capacity and timeframe of the trap and transport operation in any given year, provided that transport of species other than A. shad is incidental and does not place undue burden on the Licensee.

(e) The Licensee shall haul the A. shad to any location identified by the Agencies within a geographic radius determined by the number of road miles between the Roanoke Rapids dam and sufficiently upstream of Kerr Dam to minimize fallback through the turbines.

(f) The Licensee will make any trapped fish (including any adult fish in excess of the above mentioned 50,000) available to the USFWS, NMFS, NCWRC, NCDMF, USGS or the VDGIF who want to sort and move them at their own expense to other locations within the Roanoke River Basin.

(g) The Licensee will continue to fund studies agreed to above (section 25) in Phase 2.

(h) If the juvenile A. shad mortality is expected or demonstrated pursuant to Technical Settlement Article 4.1.2.2 to be greater than 7%, the Licensee shall cooperate with Agencies to make minor adjustments in operations to facilitate downstream passage of outmigrating A. shad. Minor adjustments may include

installation of low cost technologies such as lighting, as well as changes in the operational regime of the Projects. Spillage will not be required at Gaston for Phase 2 for American shad. Adjustments to operations will only be required during the days of peak outmigration of juvenile A. shad. This window may vary from year to year and shall be determined by the Agencies. Major adjustments shall require exercise of reserved mandatory conditioning and prescriptive authority by the Agencies.

(i) If the post spawned adult A. shad mortality is expected or demonstrated to be greater than 20%, then the members of DRFTAC will cooperatively assess the current state of knowledge regarding the contribution of post spawned adults to stock dynamics, and the need for adjustments to reduce mortality. Minor adjustments shall be made by the Licensee as decided upon with the other members of DFRTAC through its decision-making and dispute resolution procedures. Minor adjustments shall be similar in scope to adjustments described in (h) for juvenile shad. Major adjustments shall require exercise of reserved mandatory conditioning and prescriptive authority by the Agencies.

(31) Phase 3 of the A. Shad passage program will involve the construction of further facilities or alteration of operations should the trap-and-haul facility in Phase 2 become inadequate, in the event of construction of a passage facility at the Kerr Dam, or in the event of the necessity of major measures to accomplish downstream passage. The decision by the USFWS and NMFS to enter into Phase 3 shall require exercise of the authority reserved to them under this license.

(32) Pursuant to Section 18 of the Federal Power Act, the Secretaries of Interior and Commerce herein exercise their authority under said Act by reserving their authority to prescribe fishways during the term of this license and by entering into the Comprehensive Relicensing Settlement Agreement with the Licensee and other parties.