

**Candidate Conservation Agreement (CCA)
for the
Yadkin River Goldenrod (*Solidago plumosa*)
Montgomery & Stanly Counties, North Carolina**



Yadkin River Goldenrod (*Solidago plumosa*)

**Alcoa Power Generating Inc.
United States Fish & Wildlife Service**

July 2013

Contents

I. INTRODUCTION	1
II. PARTIES and COOPERATORS TO THE AGREEMENT	1
A. Parties to the Agreement	1
B. Cooperators to the Agreement	2
II. AUTHORITY AND PURPOSE	2
III. PROJECT SITE EXISTING CONDITIONS	3
A. Description of the Area Surrounding Existing Population Sites.....	3
B. Hydroelectric Project Description.....	3
IV. STATUS OF THE YADKIN RIVER GOLDENROD.....	4
A. Species Background.....	4
B. Species Description.....	6
C. Species Life History	6
D. Species Habitat.....	7
E. Species Distribution.....	7
V. THREATS TO THE SPECIES	8
VI. CONSERVATION MEASURES	9
A. Conservation Benefits	9
B. Conservation Actions	9
VII. EXPECTED BENEFITS	10
VIII. NOTICES AND REPORTS.....	10
IX. DURATION	11
A. Term	11
B. Continuation	11
C. Termination	11
X. FEDERAL ENERGY REGULATORY COMMISSION COMPLIANCE.....	11
XI. OTHER STATE AND FEDERAL AGENCY COMPLIANCE	12
XII. SIGNATURES	13
Appendix 1: References	18

List of Figures

Figures	Page
1 Map showing locations of existing populations of Yadkin River goldenrod and the proposed Project Site on the Yadkin River, North Carolina	14
2 Map showing locations and GPS coordinates of the Project Site boundaries and the proposed Yadkin River goldenrod transplant sites within the Project Site on the Yadkin River, North Carolina.....	15
3 Photographs of the existing population area located in the tailrace area of APCI's Falls Hydroelectric Plant and headwaters of Progress Energy's Lake Tillery	16

List of Tables

Table	Page
1 Yadkin River goldenrod monitoring statistics for the period of 1999-2001.....	17
2 Status of <i>Solidago plumosa</i> clumps in eight subpopulations at Yadkin River, NC near Narrows Dam and Falls Dam in 2004	17

List of Appendices

Appendix 1	
References	18

Definitions

1. **Candidate Conservation Agreement (CCA)** – a voluntary conservation agreement between the U.S. Fish and Wildlife Service (USFWS) and one or more public or private parties. The USFWS works with its partners to identify threats to candidate species, plan the measures needed to address the threats and conserve these species, identify willing landowners, develop agreements, and design and implement conservation measures and monitor their effectiveness.
2. **Narrows and Falls Developments** – The hydroelectric facilities and reservoirs owned by Alcoa Power Generating Inc. (APGI), as part of the Yadkin Project. The Yadkin Project is licensed by the U.S. Federal Energy Regulatory Commission (FERC), under the Project No. 2197.
3. **Property Covered by this Agreement** – That property owned by APGI along the Yadkin River within the Yadkin Project (P-2197) FERC boundary, bounded on the upstream end by APGI’s Narrows Hydroelectric Dam and the lower end by APGI’s Falls Dam.
4. **Non-viable Population** – A population of Yadkin River goldenrod, which does not exhibit successful flowering, seed production, and seed germination to produce additional offspring, and plants to sustain the population over time.
5. **Parties** – Parties specified in section II of this Agreement are APGI and the USFWS. North Carolina Department of Agriculture’s Plant Conservation Program (NCPCP) is a cooperator to the Agreement.
6. **Self-sustaining Population** – A population of Yadkin River goldenrod that exhibits successful flowering, seed production, seed germination, and juvenile recruitment to maintain the population and its genetic integrity over successive generations of the plants.
7. **Senescent Population** – A population that is non-flowering and therefore not producing viable seeds and plant offspring to sustain the population over the long-term. Factors contributing to a senescent population may include, but are not limited to, unfavorable or sub-optimal habitat conditions, competition from other native or non-native plants, anthropogenic-related factors, or disease and parasites. A senescent population can also be termed as a non-viable population.
8. **Sub-population** – An isolated cluster of plants, which may or may not be associated with a contiguous larger identified population within the habitation area. Such sub-populations may or may not be self-sustaining.

Preface

History and Development of the Agreement for Yadkin River Goldenrod

In June 2000, APCI and CP&L were approached by personnel with the NCPCP about the possibility of re-establishing this rare plant species in areas of the Narrows Canyon that it historically occupied prior to the construction of Narrows, Falls, and Tillery reservoirs, according to the account given by John Small during 1896. The NCPCP proposed to collect seeds from the existing, flowering population located along the shorelines of Falls Reservoir and grow the seedlings under controlled, nursery conditions. These nursery seedlings would be used to reintroduce the species along rocky outcrops located in upper portion of Lake Tillery, which is also the tail water of the Falls Hydroelectric Development. Establishment of another population (i.e., refugial population) could provide additional assurance that the species could survive should any unforeseen circumstances happen to the existing populations.

APCI initiated the federal relicensing of the Yadkin Project in September 2002 and the focus of APCI, the USFWS, and others shifted. At the request of the USFWS, during relicensing, APCI evaluated the status of the Yadkin River goldenrod at the Narrows and Falls developments tailwaters and assessed the potential impacts to existing plant populations which might result from the continued operation of the Yadkin Project. After conducting surveys in 2005, APCI published a final study report in 2006. The relicensing process culminated in the development of a Relicensing Settlement Agreement wherein APCI agreed to develop a Rare, Threatened, and Endangered Species Management Plan (RTE Plan) within two years of receiving a new Project license. When developed, the RTE Plan will address the impact of continued Project operations on the Yadkin River goldenrod among other plant and animal species.

In the absence of a new Project license, APCI continues to operate the Yadkin Project under annual licenses from FERC. In 2011, at the request of the USFWS, APCI and USFWS staff surveyed the Yadkin River goldenrod population below Narrows Dam and again began discussing conservation measures and the need to renew the effort for this Candidate Conservation Agreement for the Yadkin River Goldenrod (*Solidago plumosa*) Montgomery & Stanly Counties, North Carolina

I. INTRODUCTION

This Candidate Conservation Agreement (Agreement) for the Yadkin River goldenrod (*Solidago plumosa* Small) has been developed as a collaborative and cooperative effort between APGI and the USFWS, in order to implement conservation measures for the species. This Agreement allows for modifications to formally involve other state and private parties named in the agreement as cooperators. These conservation measures will be implemented in accordance with the Endangered Species Act of 1973, as amended, 16 U.S.C. § 1531 *et. seq.* (ESA), the North Carolina Plant Protection and Conservation Act of 1979 (NCPPCA) and applicable federal and state regulations. Successful implementation of this Agreement should reduce or eliminate potential threats to the Yadkin River goldenrod and its habitat.

II. PARTIES and COOPERATORS TO THE AGREEMENT

A. Parties to the Agreement

Alcoa Power Generating Inc. (Property Owner)

APGI is an electric generation and land management subsidiary of Alcoa Inc. APGI owns and operates the four hydroelectric power plants, High Rock, Tuckertown, Narrows, and Falls, known as the Yadkin Project, located in North Carolina's Yadkin River watershed.

APGI designates the following individual as the contact for this Agreement:

Ms. Karen Baldwin
Environmental & Natural Resources Manager
293 NC Highway 740
Badin, NC 28009
704-422-5525

U. S. Department of the Interior (USFWS)

The USFWS works to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. The Southeast Region is committed to expanded partnerships, which offer innovative opportunities to enhance fish and wildlife resources. The USFWS will assist with technical matters and permit application development.

The USFWS designates the following individual as the Agreement Administrator for this Agreement:

Mark A. Cantrell
U.S. Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801
828-215-1739

B. Cooperators to the Agreement

North Carolina Department of Agriculture, Plant Conservation Program (Cooperator)

The North Carolina Plant Conservation Program (“NCPCP”) is responsible for the listing and protection of North Carolina's endangered plants and threatened plant species. The NCPCP was established by passage of the NCPPA in 1979. The NCPCP (1) maintains the list of endangered, threatened, and special concern plant species; (2) enforces regulations and issues permits concerning state-listed plant species; (3) carries out field projects in biology, monitoring and managing populations of listed species; (4) provides educational materials to the public; and, (5) monitors trade in American ginseng.

II. AUTHORITY AND PURPOSE

Sections 2, 7, and 10 of the ESA authorize the USFWS to enter into this Agreement. Section 2 of the ESA states that encouraging interested parties, through Federal financial assistance and a system of incentives, to develop and maintain conservation programs is essential to safeguarding the Nation’s heritage in fish, wildlife, and plants. Section 7 of the ESA requires the USFWS to review the programs it administers and utilize those programs to further the purposes of the ESA. By entering into the Agreement, the USFWS is utilizing the Candidate Conservation Programs to further the conservation of the Nation’s fish and wildlife.

The purpose of this Agreement is to:

- A. implement conservation measures for the Yadkin River goldenrod through cooperative work among the Parties and Cooperators to conserve existing populations of this species within APGI’s Yadkin Project area between the Narrows and Falls dams; and
- B. increase the understanding of Yadkin River goldenrod habitat requirements and life history characteristics so that population expansion and augmentation can be achieved.

The use of a Candidate Conservation Agreement is appropriate since the Yadkin River goldenrod was listed as a formal candidate (USFWS 2005). In providing for Candidate Conservation Agreements, the USFWS did not intend to exclude species that are not officially listed as candidate species, but are nevertheless at risk if populations decline (see the Final Policy, page 32732). Instead, the USFWS recognizes that taking steps before a species enters into a serious decline is often the most effective way to conserve that species, thereby possibly precluding the need to list the species under the ESA.

All Parties to this Agreement recognize that there are specific statutory responsibilities that cannot be delegated by the NCPCP or the USFWS, particularly with respect to the management and conservation of natural resources. Similarly, it is recognized by all Parties that APGI’s specific responsibilities with regard to the Yadkin River goldenrod are described by and limited to the terms of the FERC Project license and this Agreement. This Agreement is subject to and is intended to be consistent with all applicable Federal and State laws.

III. PROJECT SITE EXISTING CONDITIONS

This Agreement includes conservation measures that will be implemented on property owned and managed by APGI, generally identified as the area immediately downstream of the Narrows Dam and the Falls Dam (Figure 1). These areas, which also serve as the upstream limit of Falls Reservoir, are characterized by extensive rock outcroppings along the river shoreline and within the tailwater. These two areas are collectively referred to as the “Project Site” throughout this Agreement.

A. Description of the Area Surrounding Existing Population Sites

The area around existing Yadkin River goldenrod population sites lies in the piedmont of North Carolina, which is predominately rural and undeveloped. The region is characterized by a network of generally east-flowing streams in terrain that is mostly gently rolling and hilly with narrow floodplains and low flat ridges. The Uwharrie Mountains, within which the Project Site is situated, provide significant topographic relief. Additionally, the Uwharrie National Forest is also located adjacent to, but not within, the Project Site.

Several small cities, including Albemarle, Badin, and Troy are located within 30 miles of the area. Some of North Carolina's largest cities, including Charlotte, Winston-Salem, and Greensboro, are located within an hour's drive. The predominant land use around the reservoirs historically was agricultural or forested. Farms and timberlands are still common in this area, but residential development in the region, particularly along reservoir shorelines, has increased significantly in the last 10 years.

The area is located on the boundary between two major geologic belts, the Charlotte Belt to the northwest and the Carolina Slate Belt to the southeast. The Charlotte Belt is underlain by primarily igneous and metamorphic rocks, and the Carolina Slate Belt consists of metamorphic and sedimentary rocks. Fractured outcrops of various sizes occur throughout the Project Site, especially on the steeper slopes and bluffs adjacent to the river, and are an important feature in the habitat requirements for Yadkin River goldenrod.

Soils surrounding the Project Site area are generally of the more widespread Uwharrie series, which consists mostly of stony to very stony loam on gentle to very steep slopes. The natural drainage of the area is moderate to rapid.

B. Hydroelectric Project Description

The Narrows and Falls developments are part of the four development Yadkin Project (FERC Project No. 2197), which is owned and operated by APGI. The four developments include High Rock, Tuckertown, Narrows and Falls from upstream to downstream order. The existing larger population of Yadkin River goldenrod is located entirely within the tailwaters area of Narrows Dam and along the shoreline areas of Falls Reservoir.

The Narrows Development was the first of the Yadkin Project developments to be built, and was completed in 1917. Narrows Dam is located on the Yadkin River at river mile 236.5 and impounds a useable storage capacity of approximately 128,926 acre-feet at the full pond elevation of 541.1 feet (Yadkin datum). The impoundment has a full pond area of approximately 5,355 acres with approximately 115 miles of shoreline. Narrows is operated as a peaking facility with discharges ranging from 0 to 10,000 cfs. It has a maximum draw down capability of approximately 30 feet, but during normal operations Narrows Reservoir typically fluctuates over a 3-foot range. During periods of low inflow, available storage at Narrows Reservoir may be used to maintain downstream releases and drawdowns during such periods may exceed 3 feet. Narrows has four generating units and an installed capacity of 107.78 MW.

The Falls Development was the second of the Yadkin Project developments to be built, and was completed in 1919. Falls Dam is located on the Yadkin River at river mile 234 and impounds a useable storage capacity of approximately 1,825 acre-feet at the full pond elevation of 364.0 feet (Yadkin datum). The surface area of the reservoir is 204 acres with approximately 6 miles of shoreline. Falls is operated essentially as a run-of-river facility with an installed capacity of 31.13 MW and discharges ranging from 0 to 8,570 cfs. Falls Reservoir has a maximum drawdown capability of 10 feet; but during normal operations, the average daily drawdown is approximately 1 foot. Falls Reservoir extends upstream to the tailrace of Narrows Dam with a total length of approximately 2.5 miles.

IV. STATUS OF THE YADKIN RIVER GOLDENROD

A. Species Background

The Yadkin River goldenrod (*Solidago plumosa* Small) is a rare plant species endemic to the Yadkin River in North Carolina (Figure 1). John Kunkell Small originally described the plant from the Narrows Canyon and Falls area of the Yadkin River in 1894 (Small 1896, 1898). Small noted the species in the latter part of August 1894. In 1896, Small wrote in the Bulletin Torrey Botanical Club, "I was surprised to find handsome specimens growing in the crevices of the rocks at the bottom of the cañon at the falls of the Yadkin river, and at the Narrows some miles above the falls in the middle North Carolina" (Small 1896). After concluding that Yadkin River goldenrod was a true species, Small included it in his 1903, 1913, and 1933 floras (Small 1903, 1913, 1933).

Subsequent to the original discovery of the plant by Small, two hydroelectric dams (Narrows and Falls dams) were constructed on the Yadkin River in the vicinity of the Narrows Canyon and Falls area. The Narrows (also known as Badin Lake) Dam was built in 1917, and the Falls Dam was built in 1919. Today these two dams and associated reservoirs are operated by the Yadkin Division of APGI as part of the four-development Yadkin Hydroelectric Project (FERC Project No. 2197). Another two-development hydroelectric project, the Yadkin-Pee Dee River Hydroelectric Project, consisting of the Tillery and Blewett Falls hydroelectric power plants (FERC Project No. 2206) is located downstream of the Falls Dam. These two power plants and associated reservoirs are owned and operated by Duke Energy

Progress, Inc.. Lake Tillery was impounded in 1928, shortly after the construction of the Narrows and Falls dams.

For several decades, there was no mention of Yadkin River goldenrod in the available literature (Radford et al. 1964; Radford et al. 1968). In 1994, the plant was independently rediscovered by two North Carolina Natural Heritage Program botanists along the shorelines of Falls Reservoir and the tailwaters of Narrows Reservoir during surveys of the area first examined by John Small in 1894. Subsequent surveys conducted since the rediscovery of this species have documented one significant population in the Narrows Canyon area (Figure 1). This population consists of approximately 2,000 to 5,000 flowering plants and is located along the east and west shorelines of Falls Reservoir adjacent to the tailwaters area of the immediate upstream impoundment—Narrows Reservoir. Several smaller sub-populations also exist and are located along the base of Falls Dam and the western shoreline of Lake Tillery at Morrow Mountain State Park, respectively (Figure 1). Lake Tillery is the next impoundment located immediately downstream of Falls Reservoir. These sites are the only known locations where this species currently exists.

In 1995, after rediscovery of the plant, the USFWS reviewed the plant's status and decided at that time not to list the species as either threatened or endangered. The decision not to list the species was based upon the USFWS's determination that the existing population located below Narrows Dam appeared healthy and there were no immediate threats to the existing habitat at that time.

In recent years (2004 – 2005), staff from the USFWS, NCPCP, and the North Carolina Zoological Park has informally surveyed plant locations and monitored the status of these plants. These surveys confirmed the plant locations below Narrows and Falls dams and identified the presence of invasive plants, as well as recreational use, both of which may be impacting the existing Yadkin River goldenrod populations.

The most recent surveys (2011) were conducted by the USFWS. This survey counted rosettes (285 in total) in each of several general locations in the Narrows tailwater / upper Falls Reservoir. In 2012, APGI staff made qualitative surveys and noted apparent vigor and potential increase in total stems in areas at the same locations.

The USFWS assigned Candidate status to the Yadkin River goldenrod in May 2005. A candidate species is a species for which the Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened. The entire current and historical distribution of *Solidago plumosa* is confined to a short (2.5 mile) segment of the Yadkin River in which hydrologic regimes are controlled by the operation of two hydroelectric projects (the Yadkin and the Yadkin-Pee Dee Hydroelectric Projects). Within this area, *Solidago plumosa* occurs in the crevices of infrequently flooded bedrock reductions in these infrequent, high velocity events may be facilitating the establishment of other plant species at lower elevations (closer to the reservoir) which could in turn compete with *Solidago plumosa*. Some of these species are invasive exotic plants whose rates of reproduction and spread far exceed that of *Solidago plumosa*. All habitats currently occupied by *Solidago plumosa* are threatened by the spread of non-native invasive

plant species including *Albizia julibrissin* (Mimosa), a non-native under story tree that also grows in rock crevices at the Narrows/Badin Dam site, and bush honeysuckle (*Lonicera x bella*), privet (*Ligustrum sinense*) and Japanese honeysuckle (*Lonicera japonica*) also occur nearby in dense understory colonies and could pose similar threats to *Solidago plumosa* in the future. The habitat occupied by *Solidago plumosa* is also threatened by disturbance and trampling on the part of anglers and boaters that are attracted to the seasonal fisheries within tailwater areas of Narrows and Falls Dams. The habitat currently available to this species is limited, and yet the very areas that *Solidago plumosa* inhabits tend to attract anglers who have moored and walked on the rocks extended along the shore and within the channel, disturbing and potentially uprooting established vegetation while also contributing to soil compaction and/or soil detachment. The peninsula below Narrows/Badin powerhouse is posted as a "no fishing" area since 2011 to minimize trampling.

The Yadkin River goldenrod is listed as Threatened by the State of North Carolina (02 NCAC 48F .0301 PROTECTED PLANT SPECIES LIST, December 1, 2010).

B. Species Description

In 1898, Small published a species description for Yadkin River goldenrod and distinguished it from *Solidago purshii*, a northern goldenrod species (Small 1898). The description follows:

"Perennial, bright green, glabrous or nearly so below the inflorescence, included to be glutinous, especially above. Stems erect, often tufted, 4-10 dm high, ridged, purple, strict; leaves alternate; blades spatulate to narrowly linear, 2-30 cm long obtuse, acute to acuminate, thickish, entire or remotely and shallowly toothed, narrowed into slightly margined petioles or the upper ones nearly sessile with smaller ones sometimes clustered in their axils: heads numerous in narrow terminal panicles, 5-8 mm long, often densely disposed: involucre campulate at maturity: bracts crowded; rays 3-5, yellow, 5-6 mm long: achenes 3-3.5 mm long, glabrous."

This description and recognition of Yadkin River goldenrod as a separated species is still accepted today by botanists and natural resource professionals that evaluate species distinctions and distributions (Semple and Cook 2006, Semple 2013). Although one researcher collected leaf samples to investigate levels of genetic variation in the species using amplified fragment-length polymorphisms (AFLPs) in 2005, to date this study has not been completed. Recent genetic comparisons of *Solidago* species (Peirson et al. 2012) represents the first reported DNA ploidy determination for *S. plumosa*, significant because diploid *S. plumosa* is distinct from ecologically and morphologically similar forms of *S. simplex* var. *racemosa*.

C. Species Life History

Yadkin River goldenrod is a long-lived perennial that grows in rock crevices within eight to ten meters from the shoreline of the Yadkin River. Its short, dense rhizome grows in rock crevices and rosettes sprout from the rhizomes. Flowering occurs during late August and September and seeds begin to mature by the end of October. Seeds germinate in the rock

crevices during December. The pappus at the tip of the seed coat and the rootlets of the young seedlings enable the seedlings to float on water. Therefore, water may serve as a dispersal mechanism for the species. In December 1999, the NCPCP established plots to determine seedling survivorship in the field. Four-hundred-fourteen seedlings were counted in four plots. By October 2000, only six seedlings reached the rosette stage, a survivorship of 1%; none of these rosettes produced flowering stems.

Numerous insects have been observed visiting Yadkin River goldenrod flowers by NCPCP botanists for the period of 1999 to 2001. The following insects were observed probing the flowers and possessing pollen on their bodies: *Bombus impatiens* (a bumble bee), *Archytus metallicus* (a tachinid fly), *Lycomorpha pholus* (black-and-yellow lichen moth), and a syrphid fly. *Diabrotica undecimpunctat howardi* (spotted cucumber beetle) was noted visiting the flowers, but not probing the flowers.

D. Species Habitat

Yadkin River goldenrod is a narrow endemic and occurs only along the shorelines of the Yadkin River. The species grows in rock crevices of periodically flooded bedrock outcrops of mafic rock, in gladelike areas or "river scour prairies." The Lake Tillery/Falls Dam transplant sites also consist of mafic volcanic rock. However, a few plants have been observed growing from concrete pilings below Narrows Dam, which suggests that substrate type may not be critical for plant establishment.

A few other plant species that occur in the vicinity of Yadkin River goldenrod include *Pinus virginiana*, *Ulmus alata*, *Liquidambar styraciflua*, *Vaccinium arboreum*, *Amorpha schwerinii*, *A. fruticosa*, *Hypericum prolificum*; associated herbs include *Schizachyrium scoparium*, *Hypericum gentianoides*, *Baptisia alba*, *Aster patens*, and *Sporobolus clandestinus*.

E. Species Distribution

Yadkin River goldenrod is endemic to the North Carolina Fall Line geographic zone and historically is known to have occurred at the Narrows Canyon and Falls area along the Yadkin River. Currently, there is only one known viable, self-sustaining population of Yadkin River goldenrod in the world. This population occurs in Stanly and Montgomery counties, North Carolina, in Falls Reservoir near the base of the Narrows Dam (Figure 1).

Vicinity of Narrows Dam. During a search conducted in September 1997, several subpopulations of Yadkin River goldenrod were found on rock outcrops downstream of the extant population and at the base of Narrows Dam (Figure 1). Three rosette clumps were noted on the tip of a small island below Narrows Dam on the Montgomery County side of the reservoir (Site 1). About 350 plus rosette clumps were noted on a larger island on the Montgomery County side of the reservoir, and this site is located slightly upstream of the smaller island (Site 2). Another site is also located along the Montgomery County shoreline, which represents the largest subpopulation where permanent plots have been established (Site 3). About 25 clumps were also noted growing from an old concrete bridge piling at Narrows Dam (Site 4). Flowering plants were noted at a site near Narrows Dam; however, no count

was possible due to proximity to the dam tail waters (Site 5). Another large subpopulation of approximately 500 plus rosette clumps occurs adjacent to the fifth site on the Stanly County shoreline (Site 6). Finally, two clumps were noted at another Stanly County shoreline site (Site 7) located downstream near Sites 1 and 2. No other individuals were noted on other rock outcrops in Falls Reservoir, between the Narrows Dam and Falls Dam.

Vicinity of Falls Dam. NCPCP personnel searched rock outcrops along Lake Tillery between Morrow Mountain State Park and the Falls Dam on October 10, 1998. An additional subpopulation consisting of nine non-flowering rosettes was noted on a rock outcrop on Duke Energy Progress, Inc. property that is leased to Morrow Mountain State Park (Figure 1). Because of the small number of plants and the non-flowering status, the NCPCP considers this cluster of plants a non-flowering, senescent population.

Potential Habitat. Botanists have surveyed additional areas at Blewett Falls Lake and other sections of Lake Tillery and Falls Reservoir on the Yadkin River for other populations of Yadkin River goldenrod and for suitable habitat since 1999. Further searches on Lake Tillery shorelines were conducted on September 21, 1999, and on October 5, 2000; however, no other populations of Yadkin River goldenrod were found. During these two surveys, a series of rock outcrops, potentially suitable as re-introduction habitat, were identified in the area below Falls Dam, at the upper end of Lake Tillery. This potential habitat occurs either on APGI's or Duke Energy Progress' property. No populations were found on rock outcrops during a survey of Blewett Falls Lake during June of 1999. To date, no other populations have been documented to exist in the Yadkin-Pee Dee River watershed.

The NCPCP began monitoring the Narrows Dam population in 1999 (Table 1). Six permanent plots were established along the shoreline located in Montgomery County. The number of rosette clumps, flowering stems, and isolated small plants were recorded for each plot. An isolated plant is defined as a plant that is 3 cm or greater distance from other rosettes and its longest leaf length is 2.5 cm or less. There were no significant annual differences in the data collected from 1999 to 2001 (Table 1).

V. THREATS TO THE SPECIES

The limited range and historical loss of suitable habitat are the primary factors affecting the Yadkin River goldenrod. The construction of the Narrows Dam in 1917, the Falls Dam in 1919, and Lake Tillery in 1928 possibly reduced available habitat and altered flow regimes. There are two other potential factors that may affect the viability of the only known extant population. The first potential factor is competition from the introduction and proliferation of non-native plants. *Albizia julibrissin* (Mimosa) is a non-native under story tree that also grows in the crevices at the Narrows Dam site. Mimosa may reduce suitable habitat and limit sunlight to Yadkin River goldenrod. The hybrid Bush Honeysuckle (*Lonicera x bella*) occurs nearby in dense understory colonies and could pose a potential threat in the future. The other potential threat to Yadkin River goldenrod is trampling from foot traffic associated with recreational users. Neither of these threats has been documented or has impacted the population to date based on available scientific data collected since 1999. However, the

objective of establishing a second population or additional clumps within the current population of Yadkin River goldenrod is to help ensure the species survival, in case these potential threats or an unanticipated catastrophic event should impact the extant population.

In summary, the limited amount of suitable habitat is the most serious threat to Yadkin River goldenrod. Additionally, trampling by human foot traffic and invasive species may further threaten Yadkin River goldenrod.

VI. CONSERVATION MEASURES

To accomplish the objectives of this Agreement, the Parties agree to undertake the conservation measures described herein. These measures are in addition to the conservation actions currently being undertaken by the NCPCP in cooperation with the other parties, including research on habitat and life history requirements, seedling germination and dispersal success, intensive culture techniques, and on-going reintroduction efforts into the existing Falls Reservoir population. Actions taken under this Agreement are cooperative and voluntary and may help with the understanding of the habitat and life history requirements for this species.

A. Conservation Benefits

This Agreement supports the NCPCP's goals of conservation, protection, and enhancement of native rare plants in the state. The intent of this Agreement is consistent with the goals of the USFWS in protecting and enhancing plant and animal species throughout the nation.

B. Conservation Actions

The following conservation actions are specific to the Project Site, and the responsible parties are identified for each.

At the direction of the USFWS and NCPCP, APGI will conduct annual control of invasive exotic species, which include *Albizia julibrissin* (Mimosa), bush honeysuckle (*Lonicera x bella*), privet (*Ligustrum sinense*) and Japanese honeysuckle (*Lonicera japonica*) at the Project Site.

APGI will continue to maintain signs below Narrows Dam to discourage recreationists from entering the tailwaters area and trampling the plant.

By separate agreement, APGI will provide NCPCP and USFWS personnel access to its property for the sole purposes established by this Agreement including monitoring the Yadkin River goldenrod at its existing sites.

APGI, its contractors, the USFWS, and NCPCP, will conduct annual monitoring to include standardized enumeration of stems and rosettes (Bates 2005) combined with georeferenced maps/photographs.

The USFWS and NCPCP will continue to explore opportunities to harvest and spread seed to suitable habitat in and near the existing population.

VII. EXPECTED BENEFITS

Control of invasive exotic plant species will protect existing, limited plants in the best habitat. Inadvertent trampling by recreationists could reduce the number stems, interrupt seeding, or alter the limited habitat. Monitoring the existing populations may benefit the species by contributing to understanding of the habitat requirements of the species. Monitoring also allows greater understanding of how the species is adapted to its environment and how it may or may not be able to withstand environmental habitat disturbances. Monitoring is also crucial to the long-term management of the species by tracking the size and health of both populations of Yadkin River goldenrod. Additionally, annual control of invasive exotic species at the Project Site will reduce/eliminate competition for the species. Finally, efforts to deter trampling of the plants will only help further stabilize the existing population. Establishment of Yadkin River goldenrod at additional potentially suitable habitat will add numerically to the population, and potentially increase the population stability.

These benefits can be realized through implementation of the specific conservation measures outlined in section VI.

VIII. NOTICES AND REPORTS

The following reporting guidelines will be used by the Parties of this Agreement to evaluate the implemented conservation actions outlined in section VI, Conservation Measures.

APGI will prepare a comprehensive evaluation report after the fifth year and submit the report to the USFWS during the first quarter of the following year. The report will be submitted to the USFWS and Cooperators to this Agreement. The frequency of submitting evaluation reports can be modified, if conditions warrant and all Parties agree. Any reports will provide the basis for a joint decision by the Parties as to whether the Agreement should be extended for another term.

In the event that any of the Parties to this Agreement determine that there are adverse conditions that may affect the success of the conservation measures of Yadkin River goldenrod defined in this Agreement, such conditions will be reported to all the Parties.

Any notices and reports required by this Agreement shall be delivered to the persons listed in section II, at a minimum and as appropriate.

B. North Carolina Plant Protection and Conservation Act of 1979 (“NCPPCA”) Permit.

Upon entering into this Agreement, APGI will apply to NCPCP for a permit under the NCPPCA (the "N.C. Permit"). APGI will request this N.C. Permit to (1) authorize any acts otherwise prohibited by the NCPPCA associated with the implementation of the conservation objectives of the Agreement, including, but not limited to, the monitoring and study of Yadkin River goldenrod and (2) authorize any acts, that in the absence of such a permit, would be otherwise prohibited by the NCPPCA concerning the operation of APGI's Yadkin Project as those operations relate to or affect the Yadkin River goldenrod, including, but not limited to, any activity which is covered by a FERC license or conducted pursuant to the reasonable operation of a hydroelectric project in varied conditions.

IX. DURATION

A. Term

This Agreement will be in effect for a duration of 30 years following its approval and signing by the Parties.

B. Continuation

After this initial time period, further conservation and management efforts for Yadkin River goldenrod may be addressed through an extension of this Agreement. A continuation of this Agreement must be made in writing and signed by all Parties.

C. Termination

If some portion of this Agreement cannot continue to be carried out or if cancellation is desired, APGI will notify the USFWS within 30 days of the changed circumstances. APGI will remain responsible for any outstanding conservation actions identified in section VI "Conservation Measures" until the early termination date is effective. After giving such notice APGI may revoke any permission given to plant or collect seed from Yadkin River goldenrod populations located anywhere on APGI-owned property or within the FERC project boundary for the Yadkin Project.

The USFWS may withdraw from this Agreement at any time by submitting a letter with 60 days' notice indicating the desire to terminate the Agreement. The USFWS will remain responsible for any outstanding conservation actions identified in Section VI "Conservation Measures" until the early termination date is effective.

X. FEDERAL ENERGY REGULATORY COMMISSION COMPLIANCE

Lands owned by APGI contemplated under this Agreement lie within the FERC project boundary for the Yadkin Project (FERC No. 2197). The current license for the Yadkin

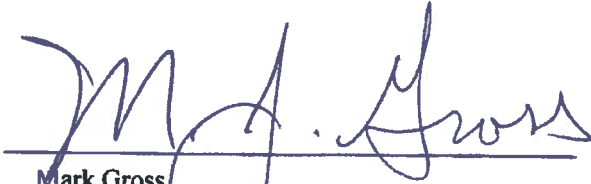
Project expired on April 30, 2008 and the Project has operated under an annual license since that point. APCI is actively pursuing a new FERC license. APCI operates and manages the Project in accordance with the terms of its FERC license and the applicable rules and regulations of FERC. No terms specified within this Agreement obligates APCI to take actions that may be inconsistent with the terms of its existing FERC license or elements proposed in the *Yadkin Project Relicensing Settlement Agreement (February 2006)* and considered by FERC in its *Final Environmental Impact Statement For Hydropower Licenses Yadkin Hydroelectric Project FERC Project Number 2197-073, Yadkin-Pee Dee River Hydroelectric Project - FERC Project No. 2206-030 North Carolina (April 2008)*. Moreover, the Parties to this Agreement recognize that FERC has authority for the operation of the Project and may within its authority order APCI to take actions that could at any time affect the existing populations of Yadkin River goldenrod and the terms specified in this Agreement. As a federal agency, FERC actions are subject to consultation requirements under section 7 of the Endangered Species Act, as well as its own implementing guidance, including designation of non-federal representative to conduct informal consultation and/or to prepare any biological assessment (50 CFR § 402.02).

XI. OTHER STATE AND FEDERAL AGENCY COMPLIANCE

Conservation measures stated in this Agreement and agreed to by the cooperating Parties are consistent with statutes in the North Carolina Endangered Species Act of 1973, Public Law 93-205 (87 Stat. 884) and the North Carolina Plant Protection and Conservation Act of 1979 and as amended in 1989 (Chapter 106, Agriculture, Article 19B; 202.12-202.22).

XII. SIGNATURES

IN WITNESS WHEREOF, THE PARTIES HERETO have, as of the last signature date below,
executed this Agreement to be in effect.



Mark Gross
Vice President Operations
Alcoa Power Generating Inc.
Yadkin Division



Leopoldo Miranda
Assistant Regional Director for Ecological Services
Southeast Region
U.S. Fish & Wildlife Service

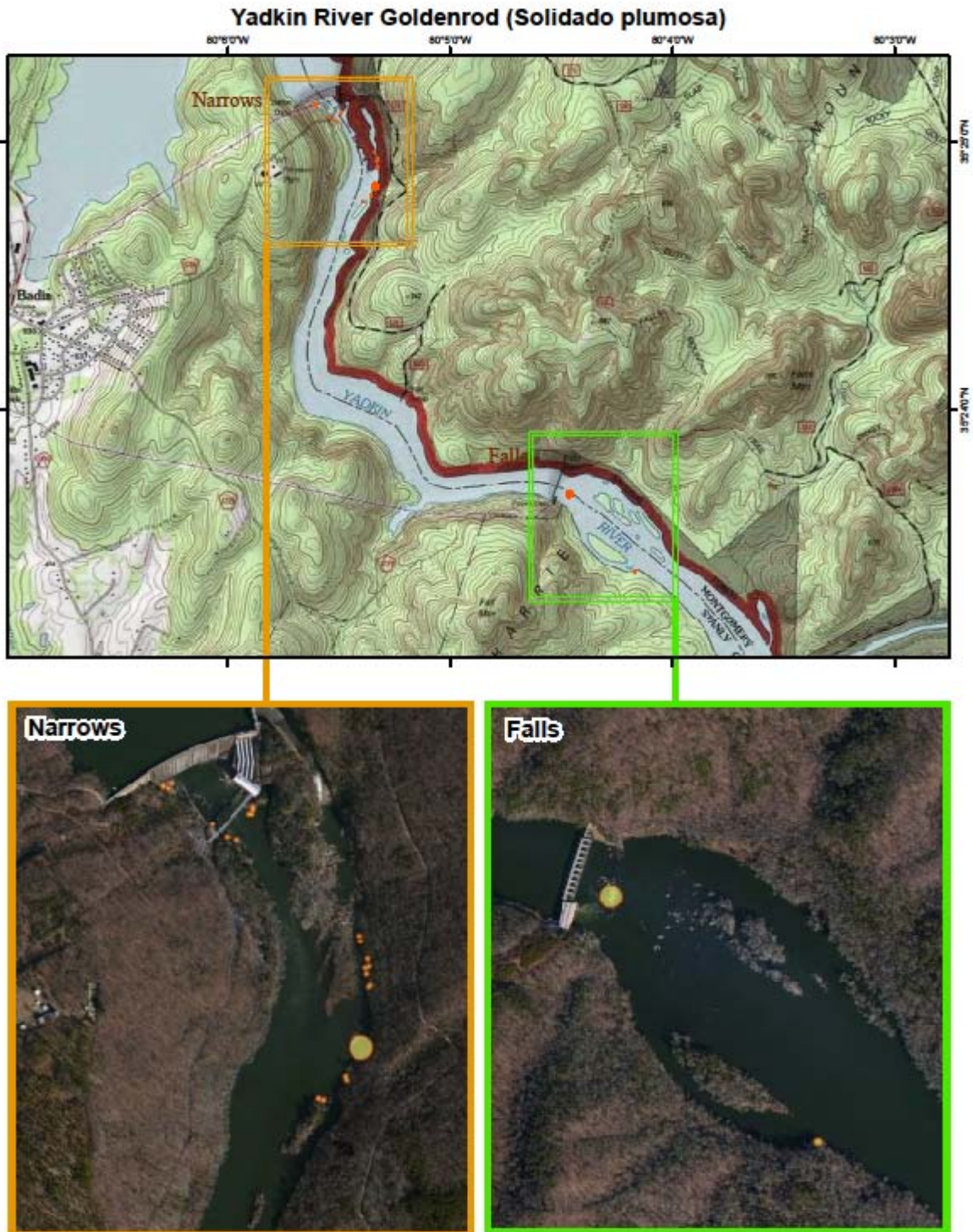


Figure 1. Map showing locations of existing populations of Yadkin River goldenrod *Solidago plumosa* (Small) at the Narrows Dam vicinity and the Falls Dam vicinity. Proposed transplant sites are at potential habitat on unoccupied rock outcrops in each area on the Yadkin River, North Carolina.

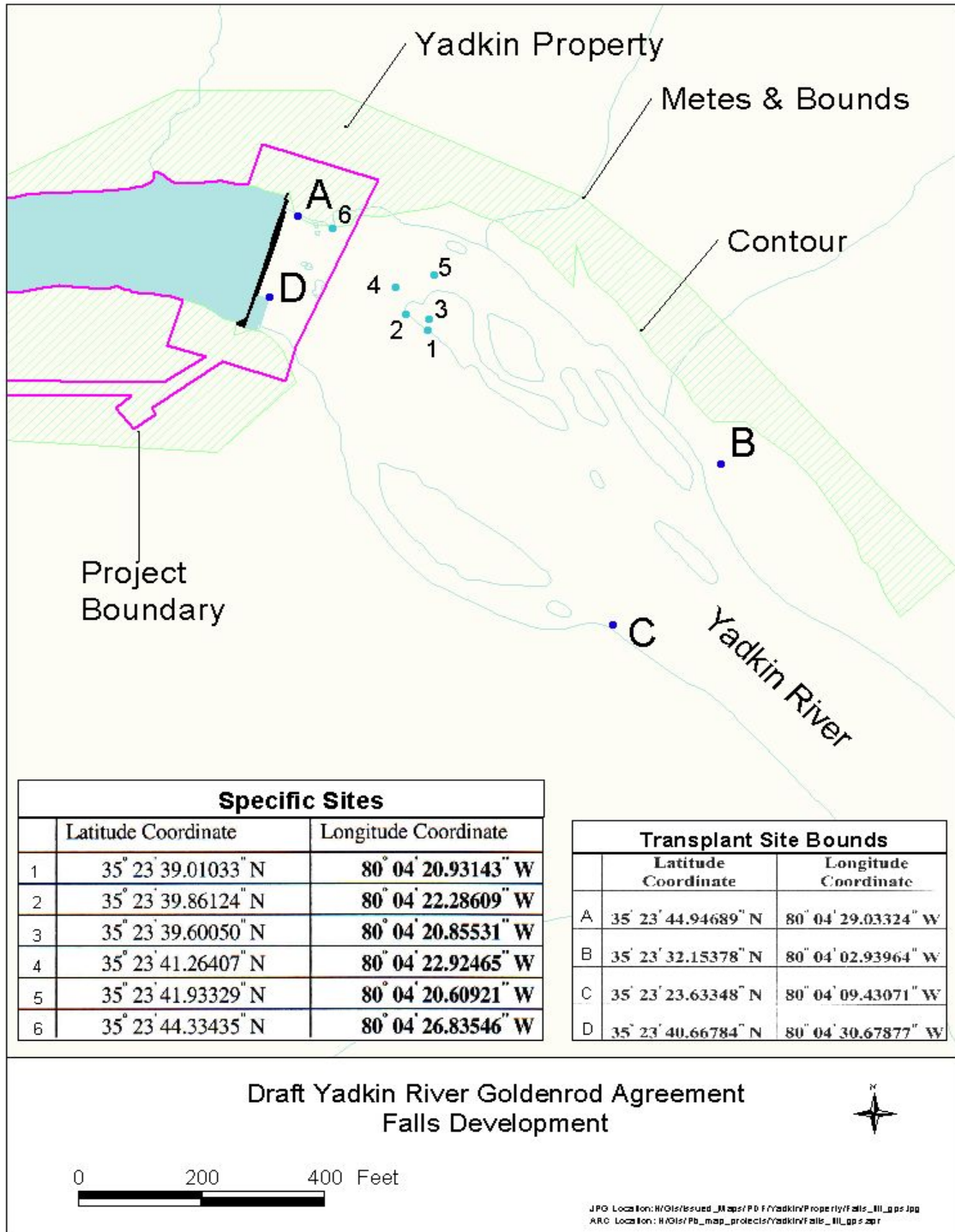


Figure 2. Map showing locations and GPS coordinates of the Project Site boundaries (A-D) and the proposed Yadkin River goldenrod transplant sites (1-6) within the Project Site on the Yadkin River, North Carolina.



Figure 3. Photographs of existing populations in the tailrace area of APCI's Narrows Hydroelectric Plant.

Table 1. Yadkin River goldenrod monitoring statistics for the period of 1999-2001. There were no significant differences among years in the mean number of rosette clumps, flowering stems, or juveniles per plot.

Year	Mean number of rosette clumps/plot (Standard deviation)	Mean number of flowering stems/plot (Standard deviation)	Mean number of juveniles/plot (Standard deviation)
1999	46.5 (28.1)	20.5 (18.5)	1.5 (1.6)
2000	47.0 (29.6)	46.8 (43.9)	3.7 (5.0)
2001	43.2 (27.4)	26.7 (23.6)	1.5 (2.5)

Table 2. Status of *Solidago plumosa* clumps in eight subpopulations at Yadkin River, North Carolina near Narrows Dam and Falls Dam in 2004 (summarized from Bates 2005, p10).

Subpopulation	Adult Clumps	Juvenile Clumps	Proportion Adult Flowering Clumps
1	1	0	100% (1)
2	3	0	67% (2)
3	280	22	8% (21)
4	131	9	11% (14)
5	201	3	19% (38)
6	50	2	22% (11)
7	705	22	20% (144)
8	770	24	15% (113)
Total	2,141	82	16% (344/2141)

Appendix 1: References

- Alcoa Power and Generating, Inc. (APGI). Yadkin River goldenrod survey, Final Study Report, September 2006.
- Bates, M. 2005. Range Expansion Survey and Monitoring of *Solidago plumosa* (Yadkin River goldenrod). Report prepared for U.S. Fish and Wildlife Service, submitted February 15, 2005.
- FERC. 2008. Final Environmental Impact Statement For The Yadkin And Yadkin-Pee Dee River Projects, Docket Nos. P-2197-073 and 2206-030. Federal Energy Regulatory Commission, Office of Energy Projects, Washington, DC, 423pp.
- Peirson, J.A., A.A. Reznicek, & J.C. Semple. 2012. Polyploidy, speciation, and infraspecific cytotype variation in Goldenrods: the cytogeography of *Solidago* subsection *Humiles* (Asteraceae: Astereae) in North America. *Taxon* 61:197-210.
- Radford, A.E., H.E. Ahles, and C.R. Bell. 1964. Guide to the vascular flora of the Carolinas. The University of North Carolina Press, Chapel Hill, NC.
- Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. Manual of the vascular flora of the Carolinas. The University of North Carolina Press, Chapel Hill, NC.
- Semple, J.C. & Cook, R.E. 2006. *Solidago*. Pp. 107–166 in: Flora of North America Editorial Committee (ed.), *Flora of North America*, vol. 20. New York: Oxford University Press.
- Small, J. K. 1896. *Solidago plumosa*. Studies in the botany of southeastern United States - IV. Bulletin Torrey Botanical Club. 23: 300.
- Small, J. K. 1898. *Solidago plumosa*. Studies in the botany of southeastern United States - XIV. Bulletin Torrey Botanical Club. 25: 476.
- Small, J. K. 1903. Manual of the southeastern flora.
- Small, J. K. 1913. Manual of the southeastern flora, revised edition. The University of North Carolina Press, Chapel Hill, NC.
- Small, J. K. 1933. Manual of the southeastern flora. The University of North Carolina Press, Chapel Hill, NC.
- Weakley, A.S. 2010. Flora of the Carolinas, Virginia, and Georgia and Surrounding Area. Working Draft of 8 March 2010. 994pp.