

**A BIOLOGICAL SURVEY  
FOR RARE AVIAN SPECIES  
ASSOCIATED WITH THE  
NANTHALA POWER & LIGHT  
RELICENSING PROJECT AREA**

**CLAY, MACON, AND JACKSON COUNTIES  
NORTH CAROLINA**

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- Attachment A – Study Area Location Maps**
- Attachment B – Avian Point Count Data**
- Attachment C – Study Area Photographs**
- Attachment D - Avian Data Forms**

## EXECUTIVE SUMMARY

Duke Power-Nantahala Area (Duke Power) is currently in the process of relicensing several hydroelectric power projects with the Federal Energy Regulatory Commission (FERC). These power projects are associated with the Nantahala Power & Light (NPL) power facilities in western North Carolina. Duke Power is a division of the Duke Energy Corporation.

Due to the FERC requirements for relicensing hydroelectric generation projects, the compliance of environmental protection requirements, agency recommendations, and requirements associated with Section 7 of the Endangered Species Act (16 U.S.C. 1531 *et seq.*), NPL requested that Duke Engineering & Services (DE&S) conduct surveys for avian PETS (Proposed /Endangered /Threatened /Sensitive) species. All avian PETS species determined to be within or immediately adjacent to the FERC project boundaries in Clay, Jackson, Macon, and Swain Counties were to be surveyed. DE&S, following consultations and recommendations of the U.S. Fish and Wildlife Service (USFWS), the North Carolina Wildlife Resources Commission (NCWRC), and the U.S. Forest Service (USFS), selected three avian species to survey. The avian surveys were associated with the Nantahala Development Project (FERC No. 2692) and the West Fork Project (Tuckasegee River) Project (FERC No. 2686).

The three avian PETS species selected were the Cerulean warbler (*Dendroica cerulea*) (Federal Species of Concern and NC Significantly Rare), Blue-winged warbler (*Vermivora pinus*) (NC Significantly Rare), and the Golden-winged warbler (*Vermivora chrysoptera*) (NC Significantly Rare).

The objective of this avian study, is to characterize suitable habitat within project boundaries for use by PETS avian species noted by the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and the NC Wildlife Resources Commission (NCWRC), determine actual occurrence of the species in the project area, and evaluate the extent of any potential project-related impacts on these species.

The two study area types selected are distinctly different due to specific species habitat requirements. The two habitat types selected are deciduous forests in association with the Cerulean warbler, and early successional rights-of-way areas associated with the Golden-winged and Blue-winged warblers. The deciduous forest habitat preferred by the Cerulean Warbler, can be described generically as cove forests or mixed mesophytic hardwood forests on the slopes of Nantahala Lake. The early successional rights-of-way habitats associated with the Golden-winged and Blue-winged warblers are characterized by low growing shrubs, grasses and various herbs.

During the standard point count and call playback surveys, conducted during the peak-breeding season (May-June) for the targeted PETS species, 266 birds were counted representing 35 different species. These numbers include all birds counted at each of the

four stations totaling 13 sample points. The six points comprising Station 1 (i.e., Nantahala Lake) were sampled on two different dates. Stations 2-4 (i.e., Tuckasegee, Shook Cove, and Dicks Creek penstock rights-of-way) were sampled only one time.

No targeted avian PETS species, which include the Cerulean warbler, Golden-winged warbler, and Blue-winged warbler, were encountered during the surveys conducted during May and June 2001. Due to the lack of evidence showing confirmation of their presence, no potential impacts are expected to these targeted species due to continued operation of the hydroelectric projects and their associated facilities (e.g., transmission line corridors). However, should evidence (i.e. confirmed sightings) showing their presence become available, land use changes and habitat improvement measures can be taken to increase suitable nesting areas and success rates within the project boundaries.

## 1.0 INTRODUCTION

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The three avian PETS species selected were the Cerulean warbler (*Dendroica cerulea*) (Federal Species of Concern and NC Significantly Rare), Blue-winged warbler (*Vermivora pinus*) (NC Significantly Rare), and the Golden-winged warbler (*Vermivora chrysoptera*) (NC Significantly Rare). These species were chosen and all others were eliminated based on a review of county and quadrangle records, Breeding Bird Survey data, the Atlas of Cerulean Warbler Populations, known habitat preferences, and other information.

The objective of this avian study, is to characterize suitable habitat within project boundaries for use by PETS avian species noted by the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and the NC Wildlife Resources Commission (NCWRC), determine actual occurrence of the species in the project area, and evaluate the extent of any potential project-related impacts on these species.

## 2.0 STUDY AREA

The study areas for this avian survey project are located in Clay, Jackson, and Macon Counties. These counties are situated in western North Carolina (Blue Ridge area) within the southern Appalachian Mountains. Rugged mountains, long ridges, steep slopes, and deep ravines characterize the topography of this area. Nearly 80 percent of this region is covered by forest. Major land uses in this area include timber harvesting, farming, and recreational activities (i.e. camping, hiking, fishing, etc.) This area receives regular and abundant rainfall. Some areas receive over 60 inches of rain per year. Due to the relatively high elevation ranges, snow is also a regular occurrence in the study area. Measurable snowfall is common, occurring 10 days or more in an average year. Elevations in the selected study areas ranged from approximately 2,200 to 3,200 feet above mean sea level (MSL).

The two study area types associated with the avian surveys are distinctly different due to specific species habitat requirements (Table 1.). The two habitat types selected are deciduous forests, and early successional rights-of-way ('ROW').

### Station 1- Nantahala Lake

The six points visited at Station 1, the deciduous forest type, can be described generically as cove forests or mixed mesophytic hardwood forests on the immediate slopes of Nantahala Lake (Attachment A). Point 1 is located Macon County, closest to Nantahala dam, on the northwest shore of the lake. It is one of the lake coves formed by Lambert Mountain. The elevation of this point, and all other points at Station 1, is 3,013 feet above MSL. This elevation is the full pool level of Nantahala Lake. Point 1 has a relatively dense forest canopy dominated by red maple (*Acer rubrum*), red oak (*Quercus rubra*), and tuliptree (*Liriodendron tulipifera*), and an understory/shrub layer of mountain laurel (*Kalmia latifolia*), great rhododendron (*Rhododendron maximum*), eastern hemlock (*Tsuga canadensis*), and root shoots of chestnut (*Castanea dentata*).

Point 2 is located on the western shore of Nantahala Lake just south of the Wolf Creek arm of the lake. This cove is also in Macon County and has a canopy layer of red maple, tuliptree, red oak, and eastern hemlock, and a sparse understory/shrub layer of smooth alder (*Alnus serrulata*), and silky dogwood (*Cornus amomum*).

Point 3 is also located on the western shore of the lake in Macon County. This cove is formed by the confluence of Johnson Branch and Nantahala Lake. This point has a canopy dominated by red maple, red oak, eastern hemlock, and white oak (*Quercus alba*), and an understory/shrub layer of mountain laurel, great rhododendron, and black locust (*Robinia pseudo-acacia*).

Point 4 is located due south of point 3, and is a much deeper cove with a more gradual slope. This point is also in Macon County and has a canopy dominated by red maple, red oak, black birch (*Betula lenta*), and eastern hemlock, and an understory/shrub layer of mountain laurel and great rhododendron.

Point 5 is located on the western shore of the lake in Macon County near the Clay County border. This double pronged cove is formed by the confluence of an unnamed creek and Nantahala Lake. This point has a canopy dominated by red oak, white oak, eastern hemlock, tuliptree, and black birch, and an understory/shrub layer of mountain laurel, great rhododendron, and flame azalea (*Rhododendron calendulaceum*).

Point 6 is located at the extreme southern end of the lake in Clay County. This point is formed by the confluence of Clear Creek and Nantahala Lake. This point has a canopy dominated by red maple, black birch, red oak, and eastern hemlock, and an understory/shrub layer of mountain laurel, great rhododendron and flame azalea. Several other locations on the eastern side of the lake were considered for surveys, but were not used due to residential development and the presence of less favorable habitat.

### Station 2- Tuckaseege Power House Right-of-Way

Stations 2 through Station 4 are of the rights-of-way type habitats. These stations can be described generically as manipulated early succession or semi-permanent scrub/shrub areas due to the regular maintenance and periodic clearing.

The three points located at Station 2 range in elevation from approximately 2,200 to 2,440 feet above MSL. The sampled points of Station 2 are located along the electric transmission 'ROW' to the east of the Tuckaseege Power Plant (Attachment A). The power plant can be reached by traveling south on NC 107 from Sylva, NC. The plant and 'ROW' are located approximately one half mile south of Hooper Road in Jackson County, North Carolina. These three points are composed of the same general species within the two strata present. The shrub layer is dominated by blackberry (*Rubus allegheniensis*), elderberry (*Sambucus americana*), fire cherry (*Prunus pensylvanica*), *Viburnum* spp., smooth sumac (*Rhus glabra*) and white oak. The herbaceous layer is dominated by goldenrod (*Solidago* spp.), spotted joe-pye-weed (*Eupatorium maculatum*), common mullein (*Verbascum thapsus*), daisy fleabane (*Erigeron* spp.), bluestem broomsedge (*Andropogon virginicus*), and bullbrier greenbrier (*Smilax bona-nox*).

### Station 3- Shook Cove Road Right-of-Way

The three points located at Station 3 range in elevation from approximately 2,260 to 3,000 feet above MSL. The sampled points of Station 3 are located along the electric transmission 'ROW' to the west of the NP&L yard on Shook Cove Road in Jackson County, North Carolina (Attachment A). The NP&L yard can be reached by traveling south on NC Highway 107 from Sylva, NC and turning east on Shook Cove Road approximately one quarter mile past the junction of NC Highway 281. These three points are composed of the same general species within the strata present. The strata present are high shrub, low shrub, and herbaceous. The dominant species of the high shrub stratum are flowering dogwood (*Cornus florida*), elderberry, great rhododendron, and American plum (*Prunus americana*). The dominant species of the low shrub stratum

**TABLE 1. Avian Study Locations Associated with the Nantahala Power & Light Hydroelectric Relicensing Project.**

<b>STATION NUMBER</b>	<b>SURVEY POINT</b>	<b>LOCATION</b>	<b>TARGET SPECIES</b>	<b>HABITAT</b>
Station 1	Point 1	Northwestern shoreline of Nantahala Lake near the dam (Macon County)	Cerulean Warbler	Cove Forest consisting of mature hardwoods represented by red maple, red oak, tuliptree. Some understory of mountain laurel, and eastern hemlock
Station 1	Point 2	Western shoreline of Nantahala Lake, just south of Wolf Creek arm (Macon County)	Cerulean Warbler	Cove Forest consisting of mature hardwoods represented by red maple, red oak, tuliptree. Some understory of mountain laurel
Station 1	Point 3	Western shoreline of Nantahala Lake, at confluence of Johnson Branch (Macon County)	Cerulean Warbler	Cove Forest consisting of mature hardwoods represented by red maple, red oak, white oak, and eastern hemlock. Sparse understory of mountain laurel.
Station 1	Point 4	Western shoreline of Nantahala Lake, just south of Johnson Branch (Macon County)	Cerulean Warbler	Cove Forest consisting of mature hardwoods represented by red maple, red oak, white oak, and black birch. Sparse understory of mountain laurel.
Station 1	Point 5	Western shoreline of Nantahala Lake near the Clay County boundary (Macon County)	Cerulean Warbler	Cove Forest consisting of mature hardwoods represented by red maple, red oak, white oak, and black birch. Sparse understory of mountain laurel.
Station 1	Point 6	Extreme southern end of Nantahala Lake at confluence of Clear Creek (Clay County)	Cerulean Warbler	Cove Forest consisting of mature hardwoods represented by red maple, red oak, white oak, and black birch. Sparse understory of mountain laurel and flame azalea
Station 2	Point 1	Electric transmission right-of-way east of the Tuckasegee Power House (Jackson County)	Golden-winged and Blue-winged Warblers	Early successional habitat consisting of shrubs such as blackberry, elderberry, fire cherry, viburnum, smooth sumac. Forbs such as goldenrods, greenbrier and grasses.
Station 2	Point 2	Electric transmission right-of-way east of the Tuckasegee Power House (Jackson County)	Golden-winged and Blue-winged Warblers	Early successional habitat consisting of shrubs such as blackberry, elderberry, fire cherry, viburnum, smooth sumac. Forbs consisting of goldenrods, greenbrier and grasses.

<b>STATION NUMBER</b>	<b>SURVEY POINT</b>	<b>LOCATION</b>	<b>TARGET SPECIES</b>	<b>HABITAT</b>
Station 2	Point 3	Electric transmission right-of-way east of the Tuckasegee Power House (Jackson County)	Golden-winged and Blue-winged Warblers	Early successional habitat consisting of shrubs such as blackberry, elderberry, fire cherry, viburnum, smooth sumac. Forbs consisting of goldenrods, greenbrier and various grasses.
Station 3	Point 1	Electric transmission right-of-way along Shook Cove near Cedar Cliff Reservoir Road (Jackson County)	Golden-winged and Blue-winged Warblers	Early successional habitat (high and low shrub strata) consisting of shrubs such as dogwoods, elderberry, plum, blackberry, and mountain laurel. Forbs consisting of asters, pokeweed, greenbrier and various grasses.
Station 3	Point 2	Electric transmission right-of-way along Shook Cove near Cedar Cliff Reservoir Road (Jackson County)	Golden-winged and Blue-winged Warblers	Early successional habitat (high and low shrub strata) consisting of shrubs such as dogwoods, elderberry, plum, blackberry, and mountain laurel. Forbs such as asters, pokeweed, greenbrier and grasses.
Station 3	Point 3	Electric transmission right-of-way along Shook Cove near Cedar Cliff Reservoir Road (Jackson County)	Golden-winged and Blue-winged Warblers	Early successional habitat (high and low shrub strata) consisting of shrubs such as dogwoods, elderberry, plum, blackberry, and mountain laurel. Forbs consisting of asters, pokeweed, greenbrier and various grasses.
Station 4	Point 1	Penstock right-of-way near Nantahala Recreation Park (Junaluska Road) (Macon County)	Golden-winged and Blue-winged Warblers	Early successional habitat consisting of shrubs such as red maple, red oak, and sourwood. Forbs consisting of asters, ferns, Joe-pye-weed, and various grasses

are blackberry, mountain laurel, and greenbrier spp., and the dominant species of the herbaceous stratum are common mullein, goldenrods, pokeweed (*Phytolacca americana*), fleabane and *Aster* spp.

#### Station 4- Dicks Creek Penstock Right-of Way

The one point located at Station 4 has an approximate elevation of 3,200 feet above MSL. The sampled point at Station 4 is located along the penstock 'ROW' to the north of Junaluska Road in Macon County, North Carolina (Attachment A). The penstock can be accessed via the Nantahala Recreation Park off Junaluska Road. The park can be reached by traveling west on US 64 from Franklin, NC to Wayah Road (Bike Route #2). Follow Wayah Road to Dicks Creek Road and continue to the park entrance (Dicks Creek Road becomes Junaluska Road). This point has two stratum present, the understory or shrub stratum dominated by red maple, red oak, and sourwood (*Oxydendrum arboreum*), and the herbaceous stratum dominated by christmas fern (*Polystichum acrostichoides*), spotted joe-pye-weed, fleabane, and tansy (*Tanacetum vulgare*). The aboveground penstock occupies approximately 50 percent of the right-of-way.

### 3.0 LIFE HISTORY

#### 3.1 Cerulean Warbler

- **Distribution-** The Cerulean warbler has a broad range covering the majority of the eastern United States and Ontario, Canada during the breeding season. This range covers the area from Minnesota east to New Hampshire; south to North Carolina and west to Arkansas. However, distribution is scattered across this range. The species breeds most commonly in the upper Ohio River Valley and the Alleghany Region (DeGraaf and Rappole 1995; Dunn and Garrett 1997). In North Carolina, the largest concentrations of this species are found in the Blue Ridge area of the Appalachian Mountains. These areas include the Pisgah National Forest in Buncombe County and the Nantahala National Forest in Graham, Clay, and Macon counties (Kendeigh et. al., 1981; Rosenberg et. al. 2000; Johnston 1964). Other North Carolina concentrations are found in the bottomlands of the Roanoke River basin in Halifax and Northhampton counties. North Carolina is located at the southern portion of this species' range. This neotropical migratory species winters exclusively in South America from Columbia to northern Bolivia (Peterson 1980). Neotropical bird species are those that breed in the Nearctic faunal region (i.e., North America) and winter in the Neotropics (i.e., tropical Middle and South American and the West Indies) (DeGraaf and Rappole 1995).
- **Habitat –** Mature and virgin stands of mixed mesophytic hardwood forests support the largest populations of Cerulean warblers in the southeastern U.S. including the North Carolina. The presence of these warblers appears to be associated with a high percentage of relatively few but large, hardwood canopy trees (Hunter et. al., 1999). The species is documented as a canopy specialist in these habitats (DeGraaf and Rappole 1995; Dunn and Garrett 1997). Tulip poplars and oaks make up a high percentage of the stocking in these areas. In the mountains of North Carolina which includes the Nantahala project area, this species is found in forested areas with diverse canopy layers of mature cove hardwood stands. These areas are classified as rich cove forest and acidic cove forest by the NC Natural Heritage Program (Schafale and Weakley 1990). The term “cove” implies that these landforms are typically found in mesic (moist) sites in concave areas and ravines, or on protected north or east facing slopes (Hunter et. al.,1999). These upland sites are dominated by oaks (i.e., white oak, red oak and scarlet oak), hickories, red maple, and tulip poplar. The preferred habitats are found at elevations from approximately 2,000 feet to 3,800 feet (Rosenberg et. al., 2000). The Buncombe County population is found at elevations from 3,100 to 3,700 feet (Rosenberg et. al., 2000).
- **Life History-** This species is one of the most distinctive warblers with its blue color, short tailed appearance, and small size. This is the smallest *Dendroica* species and among the smallest of the warblers (Dunn and Garrett 1997).

During the spring migration, the warblers reach the southern Appalachians by mid to late April (Dunn and Garrett 1997). The Cerulean warbler is one of the earliest fall migrants. Most of the breeding ground singing ceases after early July and the species is rarely detected after that (Dunn and Garrett 1997).

This arboreal neotropical migrant has a buzzy, frequently two-parted song, which is similar to that of the northern parula (*Parula americana*). The initial portion of the song is measured, with three or four notes, followed by a second part on a higher pitch of a similar number of notes but sung twice as fast. The song is distinguished from that of the northern parula in that Cerulean warblers do not terminate their song with a rising trill, or with the "tipping over" note with which the northern parulas typically end their songs. However, songs of northern parulas that terminate in neither of these features are very similar to those of Cerulean warblers and considerable practice in the field is necessary to distinguish the two quickly and confidently. Others note the similarity of the pattern of the song to that of the black-throated blue warbler (*Dendroica caerulescens*).

The birds typically forage in the upper canopy of the tall deciduous trees well within the forest (Dunn and Garrett 1997). The species works methodically and relative sluggishly outward among the thin branches. Feeding movement involves gleaning the undersides of leaves, with occasional short sallies (Dunn and Garrett 1997). The diet typically consists of insects and spiders. Breeding territorial males are vigorous and persistent singers, usually singing from the highest available foliage (Dunn and Garrett 1997).

The nest is made of brown bark covered with gray plant material such as lichens and mosses and lined with mosses. The Cerulean warbler is a monogamous, single brooded species. The compact nest is built by the female on the lateral limbs of a tree and placed at a considerable distance from the trunk of the tree, usually saddled on a large, lateral branch, attached perhaps to a small protruding twig. The nest is rather shallow for a warbler. Variation in site selection is considerable, particularly with respect to the distance from the tree trunk. All experts agree that nests are not built near the ground. Nest heights up to 70 feet have been reported. The female lays three to five eggs. Incubation is believed to be about 12 days, and nest life of the young is nine to ten days.

- Reasons for Decline- From 1966 to at least 1995, this species has showed the most precipitous decline of any North American warbler species (DeGraaf and Rappole 1995; Rosenberg et. al., 2000). The threats and limiting factors most frequently mentioned are destruction of both breeding and wintering habitat. In each case, human impact is associated with the destruction as the primary threat. The traits of the species as a single brooded, forest nesting neotropical migrant are believed to be the features that put the species at risk for population decline resulting from forested habitat destruction in both North

American and the South American wintering grounds. Cerulean warblers are highly area-sensitive in at least some physiographic regions, requiring at least 10,000 acres of continuous forested habitat to support a sustainable population (Hunter et. al., 1999). However, in the heavily forested areas of the Appalachians this may not be a limiting factor. The greatest declines have been reported in the Ohio, Mississippi, and lower Missouri River valleys due to large scale conversion from forest to farmland (Dunn and Garrett 1997). Cowbird (*Molothrus ater*) parasitism is also listed as a reason for the decline.

- Status- The Cerulean warbler is listed as a Federal Species of Concern by the USFWS, a Viability Concern and Sensitive Species by the U.S. Forest Service, and a Significantly Rare species by the NCNHP. Researchers state that the Cerulean warbler is “rare” in lower mountain elevations and Coastal Plain bottomlands of North Carolina. The species is uncommon through most of the range. The Partners in Flight Bird Conservation Plan for the southern Blue Ridge lists the Cerulean warbler as a “Priority Species” (Hunter et. al., 1999).

### **3.2 Golden-winged Warbler**

- Distribution- The Golden-winged warbler has an extensive breeding range covering an area that includes: northeastern North Dakota and southern Manitoba across Great Lakes region to New England, south to southeastern Iowa, northern Indiana, eastern Kentucky, northern Georgia, western Virginia, north-central Maryland, southeastern Pennsylvania, and southern Connecticut (AOU 1983). In the Southeast and North Carolina (Macon and Jackson counties), this species is largely restricted to early successional shrub/scrub areas in the southern Blue Ridge area (Kendeigh et. al., 1981; Johnston 1964). The NPL study area is located at the southern extreme of this species’ range. The species is expanding northward and withdrawing from the south (DeGraaf and Rappole 1995; Dunn and Garrett 1997). The winter range covers an area including central Guatemala and northern Honduras south to northern Venezuela and western Colombia. This species is a rare transient through eastern Mexico and, perhaps accidentally, the Caribbean (AOU 1983).
- Habitat – In North Carolina, the Golden-winged warbler is restricted to early successional habitats in the Blue Ridge Mountains (Hunter et. al., 1999). This habitat specialist is found in early successional and typically short-lived openings of shrub/scrub mixed with dense grass and forbs, at elevations from 2,000 to 4,000 feet. Hunter (1999) states that historically this warbler was most likely associated with high elevation wetlands, balds, old fields, and forest edges that were subject to frequent disturbances. Currently, this warbler is most often associated with mid to high elevation clearcuts and utility right-of-ways. It has also been reported in shrub/scrub wetlands with vegetation such as alder and willow bogs.

- Life History- The distinctively patterned males are unmistakable due to the bright yellow wing patch and black throat and confusion with any other warbler is unlikely (Dunn and Garrett 1997). Hybridization with the Blue-winged warbler (*Vermivora pinus*) is common with this migratory warbler, and produces two color patterns once thought to be separate species: the Brewster's and Lawrence's warblers. The Brewster's warbler has a white throat and, like the Golden-winged warbler, usually has a white breast and gray back, but has a thin eye line and separate wing bars typical of the Blue-winged warbler. The Lawrence's warbler has the black eye and black throat patch of a Golden-winged warbler but has the yellow undersides and yellow-olive back of a Blue-winged warbler. Intermediate forms occur and may result from breeding between two hybrids and between hybrids and parental phenotypes. Intermediates show all degrees of variation in color hue and pattern between the parental types.

During the spring migration, this species usually arrives in the southern Appalachians in late April and early May (DeGraaf and Rappole 1995; Dunn and Garrett 1997). Fall migration typically begins by early to mid-August.

This species mirrors the Blue-winged warbler in behavior. It gleans leaves and twigs for insects, spiders, and insect eggs, often concentrating foraging in dead leaf clusters (Dunn and Garrett 1997). The foraging is quite acrobatic with the species often hanging upside down much like a chickadee (Dunn and Garrett 1997). Territorial males often sing from a fixed, and conspicuous perch high on a branch or treetop (Dunn and Garrett 1997).

The nest of this species is coarse with an outer wrapping of bark and straw with leaf petioles protruding outward. The nest is lined with a criss-cross of fine, reddish-brown material. The cup is only a few inches deep. The eggs of this species are pale cream to very pale blue with a scattering of fine reddish-brown dots concentrated at the blunt end, occasionally with a variety of other dark markings.

The two song types of the Golden-winged warbler have been extensively studied. One, common early in the breeding season, appears to advertise the territorial boundary and the male's presence and seems to have primarily an intersexual function. A second song is given during male to male encounters. Males of this species sing the second song almost constantly for about a half-hour just before sunrise from the beginning of the nesting season up to the time of fledging. Almost all males can be detected, barring inclement weather, in May and June by their singing in this pre-dawn period. Females are usually inconspicuous and both sexes are usually secretive around the nest. However, as young fledge the adults become very noisy, frequently giving a distinctive "zzzzzp" call as they seem to lead the young from the nest or bring food to them. This species produces one brood per year. The nests are commonly in loose colonies of 2-6 pairs. Monogamy is the norm, but

polygamy may occur. Renesting is not known to occur after a successful clutch, but can occur after an initial nest failure. Eggs are laid in May-June. Usually four to six (maximum of seven) eggs are laid per nest. Incubation by the female lasts 10-11 days. The nestling stage lasts eight to ten days with feeding by both sexes.

- Reasons for Decline- This species is moderately threatened throughout its range. The specific, early successional habitat it uses lends itself to alternate land use. Decline is attributed to loss of breeding habitat (reforestation, intensive agriculture, urban/suburban development), possibly loss of wintering habitat (by deforestation), and possibly competition and hybridization with the similar Blue-winged warbler. Nest parasitism by the brown-headed cowbird may additionally contribute to the decline of this species (Confer 1992).
- Status - The Golden-winged warbler is listed as an Area Sensitive Species by the U.S. Forest Service, and a Significantly Rare species by the NCNHP. The Partners in Flight Bird Conservation Plan for the Southern Blue Ridge lists this warbler as a “Priority Species” (Hunter et. al., 1999).

### **3.3 Blue-winged Warbler**

- Distribution- This species has a breeding range covering eastern Nebraska east across Great Lakes region to New England, south to Arkansas, northern Alabama, northern Georgia, Maryland, and Delaware (AOU 1998). This species has dramatically expanded its northern range since 1900 (DeGraaf and Rappole 1995; Dunn and Garrett 1997). In the Southeast and North Carolina, the species has a range similar to the Golden-winged warbler. In North Carolina, it has been documented in Allegheny, Ashe, Buncombe, Cherokee, Graham, and Macon counties (Kendeigh et. al., 1981; Johnston 1964). Its wintering range includes the Mexican area covered by Puebla south through Veracruz, Oaxaca, Yucatan Peninsula, Belize, Guatemala, and Honduras, to central Panama (AOU 1998).
- Habitat – In North Carolina, the Blue-winged warbler is restricted to early successional habitats in the Blue Ridge Mountains. This habitat specialist is found in dry, early successional shrub/scrub (i.e., red oak, locust, catbrier and blackberry) mixed with an abundant growth of forbs and grass, at elevations from 2,000 to 4,000 feet (Dunn and Garrett 1997). In some situations, the species may also be found in scrubby borders along swamps and streams (DeGraaf and Rappole 1995). This species prefers habitat similar to that of the Golden-winged warbler, however, the habitat typically has greater shrub/scrub diversity and age. The species seems to prefer early successional areas with saplings greater than eight feet tall (DeGraaf and Rappole 1995). Currently, this warbler is most often associated with mid to high elevation clearcuts and utility rights-of-way.

- Life History- The Blue-winged warbler is a medium-sized warbler with a moderately long tail and rather long and sharply pointed bill (Dunn and Garrett 1997). Age and sex differences are slight with this species. This migratory songbird, as mentioned above, hybridizes with the Golden-winged warbler.

Spring migration arrivals in the southern Appalachians are usually by the second to fourth week in April (Dunn and Garrett 1997). Peak fall migration usually takes place from mid to late August (Dunn and Garrett 1997).

Similar to the Golden-winged warbler, this species often feeds hanging upside down while gleaning leaves and twigs. Most of the foraging for insects and insect eggs is done at low to moderate heights within the vegetation (Dunn and Garrett 1997). Territorial males often sing from high and exposed perches along the edges of fields (Dunn and Garrett 1997).

The nests of this species are difficult to find and are built on or close to the ground. Large, coarse material is used on the outside, while fine shreds of grapevine and sometimes horsehair or split grass stems form the inside of the nest (Andrle and Carroll 1988). Clutch size is usually four to seven, and averages five eggs per nest. Nesting occurs only once per year with re-nesting attempts common when the first attempt is unsuccessful. Incubation, which is performed by the female, lasts about 10-12 days, and fledging occurs in approximately 10 days.

- Reasons for Decline- This species is doing well across portions of its range (i.e., northeast) and poorly in others (i.e., Midwest). The most common threat to this species is brood parasitism by the brown-headed cowbird. This parasitism contributes to poor nesting success. In addition to the parasitism, loss of habitat including the maturation of forest areas and the increase intensive farming in the Midwest are a contributing factor to the overall declining numbers of this species.
- Status - The Blue-winged warbler is listed as an Area Sensitive Species by the U.S. Forest Service, and a Significantly Rare species by the NCNHP. The species is not listed by the USFWS.

### **3.4 Magnolia Warbler**

The magnolia warbler (*Dendroica magnolia*) was not one of the targeted avian PETS species considered for inclusion in the study. However, this species was identified during point counts conducted to determine the presence of other selected PETS species.

- Distribution – The magnolia warbler has an extensive breeding range that extends from the Yukon Territories and British Columbia across the boreal

forests of Canada to Labrador, and south to northern Minnesota, Wisconsin and Michigan, throughout New England and locally south in the Appalachians to West Virginia, Virginia, and North Carolina (Cornell Lab of Ornithology 2001). The NPL study area is located at the southern extreme of this species' breeding range. The winter range covers an area including southern Mexico, especially the Yucatan Peninsula, central America south to Panama, and the West Indies.

- Habitat – In the southern Appalachian Mountains including North Carolina, the magnolia warbler typically breeds in stands of hemlock (*Tsuga canadensis*), and rarely may nest in drier oak-hickory woodlands. Magnolia warblers are tolerant of disturbed woodlands and readily use recovering clearcuts, edges, and other types of forest openings such as rights-of-way (Cornell Lab of Ornithology 2001), however, these disturbed areas are generally located in close proximity to stands of hemlock.
- Life History – The magnolia warbler is a medium sized black and yellow warbler with a black tail that is crossed midway by a broad white stripe. The plumage of this species differs only slightly between the sexes (Peterson 1980).

Spring migration for this species arrives in the southern Appalachians by the end of April or the first part of May. Fall migration is protracted, lasting from late August through September (Cornell Lab of Ornithology 2001).

Although magnolia warblers will eat berries during inclement weather, they use less vegetable food than other *Dendroica* warblers and are normally exclusively insectivorous. They glean insects from the undersides of leaves and occasionally from bark crevices at low to middle levels of the forest. While foraging, the magnolia warbler frequently spreads its tail, exposing bold white patches (Cornell Lab of Ornithology 2001).

Nests are flimsy constructions concealed within small conifers in a bog or overgrown clearing. They are usually located close to the trunk, from one to fifteen feet off the ground. The female does most of the assembly of small twigs, grasses, mosses, pine needles, and rootlets that make up the nest. Invariably she lines the nest with fine black rootlets. Typically, the female lays a single clutch of four eggs, which is incubated for 11 to 13 days. The fledglings leave the nest after eight to ten days (Cornell Lab of Ornithology 2001).

- Reasons for Decline – This species is doing well across its range. Breeding Bird Survey data indicate a significant population increase in eastern North America (Droege and Sauer 1990, Sauer and Droege 1992). This population increase is likely due to the increase of suitable habitat resulting from the maturing of abandoned farmland.

- Status – The magnolia warbler is listed as Significantly Rare species by the NCNHP. The species is not listed by the USFWS.

#### 4.0 SURVEY METHODS

After consultation with the interested agencies, site selection was achieved by first reviewing existing information to determine if the birds of concern were in the specific project areas. The information reviewed included the USFWS NC County Species List, the NC Natural Heritage Program's species of occurrence list (by 7.5 minute quadrangle), USFWS Breeding Bird Survey route information, and other pertinent information such as the Atlas of Cerulean Warbler Populations (Cornell Laboratory of Ornithology 2000). Three species, the Cerulean warbler, the Blue-winged warbler, and the Golden-winged warbler, were documented in the specific project areas. Secondly, a review of aerial photographs, land use classifications, and other large-scale representations were used to determine the locations of suitable habitat types for the three avian PETS species in or immediately adjacent to the FERC project boundaries. A field reconnaissance was then conducted on the various listed habitats in an effort to determine habitat suitability.

The standard point count method was utilized (Ralph et al. 1993; Ralph et al. 1995). Standard point counts require a qualified observer to stand in a fixed position and record all the birds seen and heard over a time period of five minutes. Distances and time are each subdivided. Distances are divided into less than 50 meters and greater than 50 meters categories (estimated by the observer), and the time is divided into two categories, 0-3 minute and 3-5 minute segments. All birds seen and heard at each station/point visited were recorded on standard point count forms. Each of the four stations totaling 13 points were visited in May and June (i.e. the breeding season) 2001. All surveys were conducted from 0615 to 1030 hours to coincide with the territorial males' peak singing times. Where possible, these stations/points were recorded using the Global Positioning System (GPS) enabling the observer to make return visits. Surveys were only conducted if fog, wind and rain did not interfere with the observer's ability to accurately record the data.

As previously mentioned, the four stations totaling 13 points fall into two distinctly different habitat types. The stations/points were selected based on the habitat preferences of the three target species surveyed. The six points associated with Station 1 were selected to coincide with the habitat preferences of the Cerulean warbler, which include cove forests and riparian areas along Nantahala Lake and river. The seven points associated with Stations 2-4 were selected to coincide with the habitat preferences of the Blue-winged warbler and the Golden-winged warbler which includes early successional areas such as powerline and penstock 'ROW's.

Playback calls were also utilized for the Cerulean warbler portion of the study. Guidelines for this survey method followed the protocol set forth by the Cornell Lab of Ornithology in their Cerulean Warbler Atlas Project (Cornell Laboratory of Ornithology 2000). Tape-recorded calls of the Cerulean warbler were used to elicit a response from this territorial species. The playback call was used at the conclusion of each point count survey and at several other locations (i.e., areas between individual points) that may contain Cerulean warblers.

## 5.0 RESULTS AND DISCUSSION

During the standard point counts, conducted during the peak-breeding season (May-June) for the targeted PETS species, 266 birds were counted representing 35 different species. No targeted avian PETS species were encountered during the surveys conducted during May and June 2001. These numbers include all birds counted at each of the four stations totaling 13 sample points. The six points comprising Station 1 were sampled on two different dates. Stations 2-4 were sampled only one time (Table 2).

### Station 1- Nantahala Lake

Station 1, point 1 was surveyed using the standard point count method on May 31 and June 21, 2001 (Visit 1 and Visit 2). Visit 1 to this cove forest community resulted in American crow (*Corvus brachyrhynchos*)(1), ovenbird (*Seiurus aurocapillus*)(1), red-eyed vireo (*Vireo olivaceus*)(3) and woodthrush (*Hylocichla mustelina*)(1) being recorded. Visit 2 to this cove forest resulted in American crow (2), black-throated blue warbler (*Dendroica caerulescens*)(2), northern parula warbler (*Parula americana*)(1), ovenbird (2), scarlet tanager (*Piranga olivacea*)(1), and wood thrush (2) being recorded.

Station 1, point 2 was surveyed using the standard point count method on May 31 and June 21, 2001(Visit 1 and Visit 2). Visit 1 to this cove forest resulted in black-throated blue warbler (3), eastern wood pewee (*Contopus virens*)(2), northern parula warbler (2), northern rough-winged swallow (*Stelgidopteryx serripennis*)(2), ovenbird (2) and red-eyed vireo (2) being recorded. Visit 2 to this cove forest resulted in American goldfinch (*Carduelis tristis*)(4), Carolina chickadee (*Poecile carolinensis*)(3), northern parula warbler (4), ovenbird (3), red-eyed vireo (3), ruby-throated hummingbird (*Archilochus colubris*)(1), tufted titmouse (*Baeolophus bicolor*)(1), and white-breasted nuthatch (*Sitta carolinensis*)(1) being recorded.

Station 1, point 3 was surveyed using the standard point count method on May 31 and June 21, 2001(Visit 1 and Visit 2). Visit 1 to this cove forest resulted in black-throated blue warbler (4), blue-headed vireo (*Vireo solitarius*)(1), eastern wood pewee (2), and red-eyed vireo (1) being recorded. Visit 2 to this cove forest resulted in American crow (1), American goldfinch (2), black-throated blue warbler (1), indigo bunting (*Passerina cyanea*)(1), red-eyed vireo (3), and white-breasted nuthatch (2) being recorded.

Station 1, point 4 was surveyed using the standard point count method on May 31 and June 21, 2001(Visit 1 and Visit 2). Visit 1 to this cove forest resulted in northern parula warbler (2), ovenbird (4), red-eyed vireo (3), and scarlet tanager (4) being recorded. Visit 2 to this cove forest resulted in acadian flycatcher (*Empidonax vireescens*)(1), black-throated blue warbler (1), blue-headed vireo (2), gray catbird (*Dumetella carolinensis*)(1), northern parula warbler (1), ovenbird (4), and red-eyed vireo (3) being recorded.

**TABLE 2. Summary of Avian Point Count Data Associated with the Nantahala Power & Light Hydroelectric Relicensing Project.**

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
<b>Nantahala Lake</b>							
Station 1 Point 1 Visit 1	ovenbird	<i>Seiurus aurocapillus</i>	cove forest	5/31	1	standard point count	leafy deciduous woods
	red-eyed vireo	<i>Vireo olivaceus</i>	cove forest	5/31	3	standard point count	woodlands and shade trees
	woodthrush	<i>Hylocichla mustelina</i>	cove forest	5/31	1	standard point count	deciduous woodlands
	American crow	<i>Corvus brachyrhynchos</i>	cove forest	5/31	1	standard point count	woodlands and farmlands
Station 1 Point 1 Visit 2	scarlet tanager	<i>Piranga olivacea</i>	cove forest	6/21	1	standard point count	forests and shade trees
	ovenbird	<i>Seiurus aurocapillus</i>	cove forest	6/21	2	standard point count	leafy deciduous woods
	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	6/21	2	standard point count	undergrowth of woodlands
	American crow	<i>Corvus brachyrhynchos</i>	cove forest	6/21	2	standard point count	woodlands and farmlands
	northern parula warbler	<i>Parula americana</i>	cove forest	6/21	1	standard point count	humid woods with <i>Usnea</i> or Spanish moss
	woodthrush	<i>Hylocichla mustelina</i>	cove forest	6/21	2	standard point count	deciduous woodlands
Station 1 Point 2 Visit 1	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	5/31	3	standard point count	undergrowth of woodlands
	ovenbird	<i>Seiurus aurocapillus</i>	cove forest	5/31	2	standard point count	leafy deciduous woods
	northern parula warbler	<i>Parula americana</i>	cove forest	5/31	2	standard point count	humid woods with <i>Usnea</i> or Spanish moss

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
	northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	cove forest	5/31	2	standard point count	near streams, lakes and river banks
	eastern wood pewee	<i>Contopus virens</i>	cove forest	5/31	2	standard point count	woodlands and groves
	red-eyed vireo	<i>Vireo olivaceus</i>	cove forest	5/31	2	standard point count	woodlands and shade trees
Station 1 Point 2 Visit 2	northern parula warbler	<i>Parula americana</i>	cove forest	6/21	4	standard point count	humid woods with <i>Usnea</i> or Spanish moss
	ovenbird	<i>Seiurus aurocapillus</i>	cove forest	6/21	3	standard point count	leafy deciduous woods
	red-eyed vireo	<i>Vireo olivaceus</i>	cove forest	6/21	3	standard point count	woodlands and shade trees
	Carolina chickadee	<i>Poecile carolinensis</i>	cove forest	6/21	3	standard point count	mixed and deciduous woods; thickets
	ruby throated hummingbird	<i>Archilochus colubris</i>	cove forest	6/21	1	standard point count	wood edges and gardens
	white-breasted nuthatch	<i>Sitta carolinensis</i>	cove forest	6/21	1	standard point count	forests and woodlots
	American goldfinch	<i>Carduelis tristis</i>	cove forest	6/21	4	standard point count	open woods, edges and patches of weeds
	tufted titmouse	<i>Baeolophus bicolor</i>	cove forest	6/21	1	standard point count	woodlands and shade trees
Station 1 Point 3 Visit 1	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	5/31	4	standard point count	undergrowth of woodlands
	red-eyed vireo	<i>Vireo olivaceus</i>	cove forest	5/31	1	standard point count	woodlands and shade trees
	blue headed vireo	<i>Vireo solitarius</i>	cove forest	5/31	1	standard point count	mixed woods

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
	eastern wood pewee	<i>Contopus virens</i>	cove forest	5/31	2	standard point count	woodlands and groves
Station 1 Point 3 Visit 2	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	6/21	1	standard point count	undergrowth of woodlands
	white-breasted nuthatch	<i>Sitta carolinensis</i>	cove forest	6/21	2	standard point count	forests and woodlots
	American goldfinch	<i>Carduelis tristis</i>	cove forest	6/21	2	standard point count	open woods, edges and patches of weeds
	red-eyed vireo	<i>Vireo olivaceus</i>	cove forest	6/21	3	standard point count	woodlands and shade trees
	American crow	<i>Corvus brachyrhynchos</i>	cove forest	6/21	1	standard point count	woodlands and farmlands
	indigo bunting	<i>Passerina cyanea</i>	cove forest	6/21	1	standard point count	brushy wood edges
Station 1 Point 4 Visit 1	ovenbird	<i>Seiurus aurocapillus</i>	cove forest	5/31	4	standard point count	leafy deciduous woods
	red eyed vireo	<i>Vireo olivaceus</i>	cove forest	5/31	3	standard point count	woodlands and shade trees
	scarlet tanager	<i>Piranga olivacea</i>	cove forest	5/31	1	standard point count	forests and shade trees
	northern parula warbler	<i>Parula americana</i>	cove forest	5/31	2	standard point count	humid woods with <i>Usnea</i> or Spanish moss
Station 1 Point 4 Visit 2	acadian flycatcher	<i>Empidonax vireescens</i>	cove forest	6/21	1	standard point count	deciduous forests, ravines, and swampy woods
	red-eyed vireo	<i>Vireo olivaceus</i>	cove forest	6/21	3	standard point count	woodlands and shade trees

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
	ovenbird	<i>Seiurus aurocapillus</i>	cove forest	6/21	4	standard point count	leafy deciduous woods
	blue headed vireo	<i>Vireo solitarius</i>	cove forest	6/21	2	standard point count	mixed woods
	gray catbird	<i>Dumetella carolinensis</i>	cove forest	6/21	1	standard point count	undergrowth and brush
	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	6/21	1	standard point count	undergrowth of woodlands
	northern parula warbler	<i>Parula americana</i>	cove forest	6/21	1	standard point count	humid woods with <i>Usnea</i> or Spanish moss
Station 1 Point 5 Visit 1	woodthrush	<i>Hylocichla mustelina</i>	cove forest	5/31	2	standard point count	deciduous woodlands
	red-eyed vireo	<i>Vireo olivaceus</i>	cove forest	5/31	3	standard point count	woodlands and shade trees
	northern cardinal	<i>Cardinalis cardinalis</i>	cove forest	5/31	1	standard point count	woodland edges and thickets
	black and white warbler	<i>Mniotilta varia</i>	cove forest	5/31	1	standard point count	mixed woods
	northern parula warbler	<i>Parula americana</i>	cove forest	5/31	2	standard point count	humid woods with <i>Usnea</i> or Spanish moss
	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	5/31	3	standard point count	undergrowth of woodlands
	Carolina chickadee	<i>Poecile carolinensis</i>	cove forest	5/31	2	standard point count	mixed and deciduous woods; thickets
Station 1 Point 5 Visit 2	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	6/21	5	standard point count	undergrowth of woodlands
	northern parula warbler	<i>Parula americana</i>	cove forest	6/21	3	standard point count	humid woods with <i>Usnea</i> or Spanish moss

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
	red eyed vireo	<i>Vireo olivaceus</i>	cove forest	6/21	5	standard point count	woodlands and shade trees
	ruby throated hummingbird	<i>Archilochus colubris</i>	cove forest	6/21	1	standard point count	wood edges and gardens
	scarlet tanager	<i>Piranga olivacea</i>	cove forest	6/21	1	standard point count	forests and shade trees
	white breasted nuthatch	<i>Sitta carolinensis</i>	cove forest	6/21	1	standard point count	forests and woodlots
	acadian flycatcher	<i>Empidonax virescens</i>	cove forest	6/21	1	standard point count	deciduous forests, ravines, and swampy woods
	Carolina chickadee	<i>Poecile carolinensis</i>	cove forest	6/21	1	standard point count	mixed and deciduous woods; thickets
Station 1 Point 6 Visit 1	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	5/31	1	standard point count	undergrowth of woodlands
	northern parula warbler	<i>Parula americana</i>	cove forest	5/31	2	standard point count	humid woods with <i>Usnea</i> or Spanish moss
	black and white warbler	<i>Mniotilta varia</i>	cove forest	5/31	1	standard point count	mixed woods
Station 1 Point 6 Visit 2	red-eyed vireo	<i>Vireo olivaceus</i>	cove forest	6/21	5	standard point count	woodlands and shade trees
	blackthroated blue warbler	<i>Dendroica caerulescens</i>	cove forest	6/21	3	standard point count	undergrowth of woodlands
	northern parula warbler	<i>Parula americana</i>	cove forest	6/21	4	standard point count	humid woods with <i>Usnea</i> or Spanish moss
	blue headed vireo	<i>Vireo solitarius</i>	cove forest	6/21	1	standard point count	mixed woods

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
<b>Tuckasegee Power Plant right-of-way</b>							
Station 2 Point 1 Visit 1	blue gray gnatcatcher	<i>Poliophtila caerulea</i>	early successional forest/'ROW'	6/20	1	standard point count	mixed conifers
	chestnut-sided warbler	<i>Dendroica pensylvanica</i>	early successional forest/'ROW'	6/20	2	standard point count	slashings and brushy pastures
	yellow breasted chat	<i>Icteria virens</i>	early successional forest/'ROW'	6/20	1	standard point count	brushy tangles, briars and thickets
	red-eyed vireo	<i>Vireo olivaceus</i>	early successional forest/'ROW'	6/20	2	standard point count	woodlands and shade trees
	American goldfinch	<i>Carduelis tristis</i>	early successional forest/'ROW'	6/20	3	standard point count	open woods, edges and patches of weeds
	American redstart	<i>Setophaga ruticilla</i>	early successional forest/'ROW'	6/20	1	standard point count	deciduous woods with saplings
	American robin	<i>Turdus migratorius</i>	early successional forest/'ROW'	6/20	1	standard point count	forests, farmland, and towns
	indigo bunting	<i>Passerina cyanea</i>	early successional forest/'ROW'	6/20	2	standard point count	brushy wood edges
	blue headed vireo	<i>Vireo solitarius</i>	early successional forest/'ROW'	6/20	1	standard point count	mixed woods
	field sparrow	<i>Spizella pusilla</i>	early successional forest/'ROW'	6/20	1	standard point count	brush and scrub
Station 2 Point 2 Visit 1	red-eyed vireo	<i>Vireo olivaceus</i>	early successional forest/'ROW'	6/20	2	standard point count	woodlands and shade trees
	blue headed vireo	<i>Vireo solitarius</i>	early successional forest/'ROW'	6/20	1	standard point count	mixed woods
	American goldfinch	<i>Carduelis tristis</i>	early successional forest/'ROW'	6/20	1	standard point count	open woods, edges and patches of weeds

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
	common yellowthroat	<i>Geothlypis trichas</i>	early successional forest/'ROW'	6/20	1	standard point count	swamps, marshes and wet thickets
	indigo bunting	<i>Passerina cyanea</i>	early successional forest/'ROW'	6/20	3	standard point count	brushy wood edges
	American redstart	<i>Setophaga ruticilla</i>	early successional forest/'ROW'	6/20	2	standard point count	deciduous woods with saplings
	yellow breasted chat	<i>Icteria virens</i>	early successional forest/'ROW'	6/20	4	standard point count	brushy tangles, briars and thickets
	field sparrow	<i>Spizella pusilla</i>	early successional forest/'ROW'	6/20	2	standard point count	brush and scrub
	ruby throated hummingbird	<i>Archilochus colubris</i>	early successional forest/'ROW'	6/20	1	standard point count	wood edges and gardens
	Carolina wren	<i>Thryothorus ludovicianus</i>	early successional forest/'ROW'	6/20	1	standard point count	tangles and brushy undergrowth
	blue gray gnatcatcher	<i>Poliptila caerulea</i>	early successional forest/'ROW'	6/20	1	standard point count	mixed conifers
Station 2 Point 3 Visit 1	indigo bunting	<i>Passerina cyanea</i>	early successional forest/'ROW'	6/20	4	standard point count	brushy wood edges
	northern parula warbler	<i>Parula americana</i>	early successional forest/'ROW'	6/20	3	standard point count	humid woods with <i>Usnea</i> or Spanish moss
	eastern wood pewee	<i>Contopus virens</i>	early successional forest/'ROW'	6/20	1	standard point count	woodlands and groves
	American goldfinch	<i>Carduelis tristis</i>	early successional forest/'ROW'	6/20	1	standard point count	open woods, edges and patches of weeds
	scarlet tanager	<i>Piranga olivacea</i>	early successional forest/'ROW'	6/20	1	standard point count	forests and shade trees
	chestnut-sided warbler	<i>Dendroica pensylvanica</i>	early successional forest/'ROW'	6/20	2	standard point count	slashings and brushy pastures

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
	magnolia warbler	<i>Dendroica magnolia</i>	early successional forest/'ROW'	6/20	1	standard point count	low conifers and other trees
	yellow breasted chat	<i>Icteria virens</i>	early successional forest/'ROW'	6/20	1	standard point count	brushy tangles, briars and thickets
	American redstart	<i>Setophaga ruticilla</i>	early successional forest/'ROW'	6/20	3	standard point count	deciduous woods with saplings
	common yellowthroat	<i>Geothlypis trichas</i>	early successional forest/'ROW'	6/20	1	standard point count	swamps, marshes and wet thickets
<b>NP&amp;L Shook Road Maintenance Area</b>							
Station 3 Point 1 Visit 1	yellow breasted chat	<i>Icteria virens</i>	early successional forest/'ROW'	6/20	1	standard point count	brushy tangles, briars and thickets
	American robin	<i>Turdus migratorius</i>	early successional forest/'ROW'	6/20	1	standard point count	forests, farmland, and towns
	blue jay	<i>Cyanocitta cristata</i>	early successional forest/'ROW'	6/20	2	standard point count	oak and pine woods
	northern cardinal	<i>Cardinalis cardinalis</i>	early successional forest/'ROW'	6/20	1	standard point count	woodland edges and thickets
	red-eyed vireo	<i>Vireo olivaceus</i>	early successional forest/'ROW'	6/20	3	standard point count	woodlands and shade trees
	indigo bunting	<i>Passerina cyanea</i>	early successional forest/'ROW'	6/20	4	standard point count	brushy wood edges
	black and white warbler	<i>Mniotilta varia</i>	early successional forest/'ROW'	6/20	1	standard point count	mixed woods
	American goldfinch	<i>Carduelis tristis</i>	early successional forest/'ROW'	6/20	2	standard point count	open woods, edges and patches of weeds
	field sparrow	<i>Spizella pusilla</i>	early successional forest/'ROW'	6/20	3	standard point count	brush and scrub

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
	Carolina wren	<i>Thryothorus ludovicianus</i>	early successional forest/'ROW'	6/20	1	standard point count	tangles and brushy undergrowth
	northern parula warbler	<i>Parula americana</i>	early successional forest/'ROW'	6/20	1	standard point count	humid woods with <i>Usnea</i> or Spanish moss
	eastern towhee	<i>Pipilo erythrophthalmus</i>	early successional forest/'ROW'	6/20	1	standard point count	open woods, undergrowth and brushy edges
Station 3 Point 2 Visit 1	yellow breasted chat	<i>Icteria virens</i>	early successional forest/'ROW'	6/20	4	standard point count	brushy tangles, briars and thickets
	red-eyed vireo	<i>Vireo olivaceus</i>	early successional forest/'ROW'	6/20	2	standard point count	woodlands and shade trees
	American redstart	<i>Setophaga ruticilla</i>	early successional forest/'ROW'	6/20	3	standard point count	deciduous woods with saplings
	Carolina chickadee	<i>Poecile carolinensis</i>	early successional forest/'ROW'	6/20	3	standard point count	mixed and deciduous woods; thickets
	northern parula warbler	<i>Parula americana</i>	early successional forest/'ROW'	6/20	1	standard point count	humid woods with <i>Usnea</i> or Spanish moss
	blue jay	<i>Cyanocitta cristata</i>	early successional forest/'ROW'	6/20	5	standard point count	oak and pine woods
	northern cardinal	<i>Cardinalis cardinalis</i>	early successional forest/'ROW'	6/20	4	standard point count	woodland edges and thickets
	field sparrow	<i>Spizella pusilla</i>	early successional forest/'ROW'	6/20	2	standard point count	brush and scrub
	indigo bunting	<i>Passerina cyanea</i>	early successional forest/'ROW'	6/20	2	standard point count	brushy wood edges
Station 3 Point 3 Visit 1	indigo bunting	<i>Passerina cyanea</i>	early successional forest/'ROW'	6/20	1	standard point count	brushy wood edges
	American redstart	<i>Setophaga ruticilla</i>	early successional forest/'ROW'	6/20	1	standard point count	deciduous woods with saplings

LOCATION	COMMON NAME	SCIENTIFIC NAME	HABITAT ASSOCIATION	DATE	SPECIES NUMBERS	SURVEY METHOD	COMMENTS
	ruby throated hummingbird	<i>Archilochus colubris</i>	early successional forest/'ROW'	6/20	1	standard point count	wood edges and gardens
	yellow breasted chat	<i>Icteria virens</i>	early successional forest/'ROW'	6/20	3	standard point count	brushy tangles, briars and thickets
	red-eyed vireo	<i>Vireo olivaceus</i>	early successional forest/'ROW'	6/20	2	standard point count	woodlands and shade trees
	common yellowthroat	<i>Geothlypis trichas</i>	early successional forest/'ROW'	6/20	2	standard point count	swamps, marshes and wet thickets
	ovenbird	<i>Seiurus aurocapillus</i>	early successional forest/'ROW'	6/20	1	standard point count	leafy deciduous woods
	blue headed vireo	<i>Vireo solitarius</i>	early successional forest/'ROW'	6/20	3	standard point count	mixed woods
	rose breasted grosbeak	<i>Pheucticus ludovicianus</i>	early successional forest/'ROW'	6/20	1	standard point count	deciduous woods and thickets
	eastern towhee	<i>Pipilo erythrophthalmus</i>	early successional forest/'ROW'	6/20	1	standard point count	open woods, undergrowth and brushy edges
	mourning warbler	<i>Oporornis philadelphia</i>	early successional forest/'ROW'	6/20	2	standard point count	clearings, thickets and slashings
<b>Nantahala Lake Penstock Right-of-Way</b>							
Station 4 Point 1 Visit 1	gray catbird	<i>Dumetella carolinensis</i>	early successional forest/'ROW'	6/20	1	standard point count	undergrowth and brush
	American goldfinch	<i>Carduelis tristis</i>	early successional forest/'ROW'	6/20	1	standard point count	open woods, edges and patches of weeds
	American crow	<i>Corvus branchyrnchos</i>	early successional forest/'ROW'	6/20	1	standard point count	woodlands and farmlands
	red-eyed vireo	<i>Vireo olivaceus</i>	early successional forest/'ROW'	6/20	1	standard point count	woodlands and shade trees
	dark eyed junco	<i>Junco hyemalis</i>	early successional forest/'ROW'	6/20	1	standard point count	conifer and mixed woods
	indigo bunting	<i>Passerina cyanea</i>	early successional forest/'ROW'	6/20	1	standard point count	brushy wood edges

<b>LOCATION</b>	<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>HABITAT ASSOCIATION</b>	<b>DATE</b>	<b>SPECIES NUMBERS</b>	<b>SURVEY METHOD</b>	<b>COMMENTS</b>
	magnolia warbler	<i>Dendroica magnolia</i>	early successional forest/'ROW'	6/20	1	standard point count	low conifers and other trees
	magnolia warbler	<i>Dendroica magnolia</i>	early successional forest/'ROW'	6/20	1	standard point count	low conifers and other trees

Station 1, point 5 was surveyed using the standard point count method on May 31 and June 21, 2001 (Visit 1 and Visit 2). Visit 1 to this cove forest resulted in black-throated blue warbler (3), black and white warbler (*Mniotilta varia*)(1), Carolina chickadee (2), northern cardinal (*Cardinalis cardinalis*)(1), northern parula warbler (2), red-eyed vireo (3), and woodthrush (2) being recorded. Visit 2 to this cove forest resulted in acadian flycatcher (1), black-throated blue warbler (5), Carolina chickadee (1), northern parula warbler (3), red-eyed vireo (5), ruby-throated hummingbird (1), scarlet tanager (1), and white-breasted nuthatch (1) being recorded.

Station 1, point 6 was surveyed using the standard point count method on May 31 and June 21, 2001 (Visit 1 and Visit 2). Visit 1 to this cove forest resulted in black-throated blue warbler (1), black and white warbler (1), and northern parula warbler (2) being recorded. Visit 2 to this cove forest resulted in black-throated blue warbler (3), blue-headed vireo (1), northern parula warbler (4), and red-eyed vireo (5) being recorded.

At the conclusion of each standard point count at Station 1 (points 1-6), and several other likely locations along Nantahala Lake, a call playback survey was conducted for the Cerulean warbler. No response either by call or by sight was recorded during the two visits.

#### Station 2- Tuckasegee Power House Right-of-Way

Station 2, point 1 was surveyed using the standard point count method on June 20, 2001. The survey of this early successional forest/'ROW' resulted in American goldfinch (3), American redstart (*Setophaga ruticilla*)(1), American robin (*Turdus migratorius*)(1), blue-gray gnatcatcher (*Polioptila caerulea*)(1), blue-headed vireo (1), chestnut-sided warbler (*Dendroica pensylvanica*)(2), field sparrow (*Spizella pusilla*)(1), indigo bunting (2), red-eyed vireo (2), and yellow-breasted chat (*Icteria virens*)(1) being recorded.

Station 2, point 2 was surveyed using the standard point count method on June 20, 2001. The survey of this early successional forest/'ROW' resulted in American goldfinch (1), American redstart (2), blue-gray gnatcatcher (1), blue-headed vireo (1), Carolina wren (*Thryothorus ludovicianus*)(1), common yellowthroat (*Geothlypis trichas*)(1), field sparrow (2), indigo bunting (3), red-eyed vireo (2), ruby-throated hummingbird (1), and yellow-breasted chat (4) being recorded.

Station 2, point 3 was surveyed using the standard point count method on June 20, 2001. The survey of this early successional forest/'ROW' resulted in American goldfinch (1), American redstart (3), chestnut-sided warbler (2), common yellowthroat (1), eastern wood pewee (1), indigo bunting (4), magnolia warbler (*Dendroica magnolia*)(1), northern parula warbler (3), scarlet tanager (1), and yellow-breasted chat (1) being recorded.

### Station 3- Shook Cove Road Right-of-Way

Station 3, point 1 was surveyed using the standard point count method on June 20, 2001. The survey of this early successional forest/'ROW' resulted in American goldfinch (2), American robin (1), black and white warbler (1), blue jay (*Cyanocitta cristata*)(2), Carolina wren (1), eastern towhee (*Pipilo erythrophthalmus*)(1), field sparrow (3), indigo bunting (4), northern cardinal (1), northern parula warbler (1), red-eyed vireo (3), and yellow-breasted chat (1) being recorded.

Station 3, point 2 was surveyed using the standard point count method on June 20, 2001. The survey of this early successional forest/'ROW' resulted in American redstart (3), blue jay (5), Carolina chickadee (3), field sparrow (2), indigo bunting (2), northern cardinal (4), northern parula warbler (1), red-eyed vireo (2), and yellow-breasted chat (4) being recorded.

Station 3, point 3 was surveyed using the standard point count method on June 20, 2001. The survey of this early successional forest/'ROW' resulted in American redstart (1), blue-headed vireo (3), common yellowthroat (2), eastern towhee (1), indigo bunting (1), mourning warbler (*Oporornis philadelphia*)(2), ovenbird (1), red-eyed vireo (2), rose-breasted grosbeak (*Pheucticus ludovicianus*)(1), and ruby-throated hummingbird (1) being recorded.

### Station 4- Dicks Creek Penstock Right-of Way

Station 4, point 1 was surveyed using the standard point count method on June 20, 2001. The survey of this early successional forest/'ROW' resulted in American crow (1), American goldfinch (1), dark-eyed junco (*Junco hyemalis*)(1), gray catbird (1), indigo bunting (1), magnolia warbler (1), and red-eyed vireo (1) being recorded.

### Discussion

Cerulean warblers inhabit deciduous forests with tall, mature trees, mostly near stream bottoms, along lake and river shores, or on river islands. In some areas such as western North Carolina, they are also found in mature forests on dry slopes and ridges. Common tree species include oaks, maples, sycamore, black locust, and elms (Rosenberg et. al., 2000). Even though prime habitat existed in the study area, no Cerulean warblers were documented within or immediately adjacent the project boundaries. It was surmised that the elevations in and around the project area are too low in elevation to facilitate Cerulean warbler populations.

Golden-winged warblers occupy a wide variety of early successional or disturbed habitats that vary geographically across the bird's range. These include abandoned farmland, shrubby fields, successional forest, pine barrens, conifer plantings, abandoned strip mines, clear cuts, utility rights-of-way, alder swamps, tamarack bogs, and beaver wetlands. The common features of these habitats are patches of dense herbaceous growth and shrubs, as well as scattered trees within the territory and, often, a forested perimeter

(Golden-winged Warbler Atlas Project 2000). Even though the required habitat was present within the study areas, no Golden-winged warblers were documented within or immediately adjacent the project boundaries. It was surmised that the elevations in and around the project area are too low in elevation to facilitate Golden-winged warbler populations.

Blue-winged warblers, like Golden-winged warblers, are found in brushy fields, swamps, edges and openings in woodlands, and streamside thickets. Blue-winged warblers, however, tolerate a wider range of these successional habitats, and it is thought that this tolerance is contributing to its greater success relative to Golden-winged warblers (Cornell Laboratory of Ornithology 2000). Even though the required habitat was present in the study areas, no Blue-winged warblers were documented within or immediately adjacent the project boundaries. It was surmised that the elevations in and around the project area are too low in elevation to facilitate Blue-winged warbler populations.

No targeted avian PETS species were encountered during the surveys conducted during May and June 2001. Due to the lack of evidence showing confirmation of their presence, no potential impacts are expected to these targeted species due to continued operation of the hydroelectric projects and their associated facilities (e.g., utility line corridors). However, should evidence (i.e. confirmed sightings) showing their presence become available, land use changes and habitat improvement measures may be taken to increase suitable nesting areas and success rates within the project boundaries.

One additional PETS species, the magnolia warbler (*Dendroica magnolia*) was encountered during the avian surveys. The magnolia warbler is listed as State Significantly Rare by the NCNHP. This avian PETS species was found at Station 2 point 3, the Tuckasegee Powerhouse 'ROW', and at Station 4 point 1, the Nantahala Recreation Park – Penstock 'ROW'. One magnolia warbler was found at each of these locations. In the Appalachian Mountains, magnolia warblers commonly breed in stands of hemlock. Rarely, they may also nest in drier oak-hickory woodlands. Magnolia warblers are tolerant of disturbed woodlands and readily use recovering clearcuts, edges, and other types of forest openings such as rights-of-way. The preferred habitat types correspond with the habitat type recorded at each of the two sampling points. Within each of the locations sampled, hemlocks were observed growing along the edges of the right-of-way. It should also be noted that this is the extreme southern edge of the breeding range for this species, and breeding individuals are normally low in number, if present at all. Due to the specific habitat type preferred by this species and no planned changes in facility operations, no impacts to this species are anticipated.

## 6.0 LITERATURE CITED

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<http://www.mbr-pwrc.usgs.gov/cgi-bin/rtena.pl?632222>

## **ATTACHMENTS**

**ATTACHMENT A**  
**STUDY AREA LOCATION MAPS**







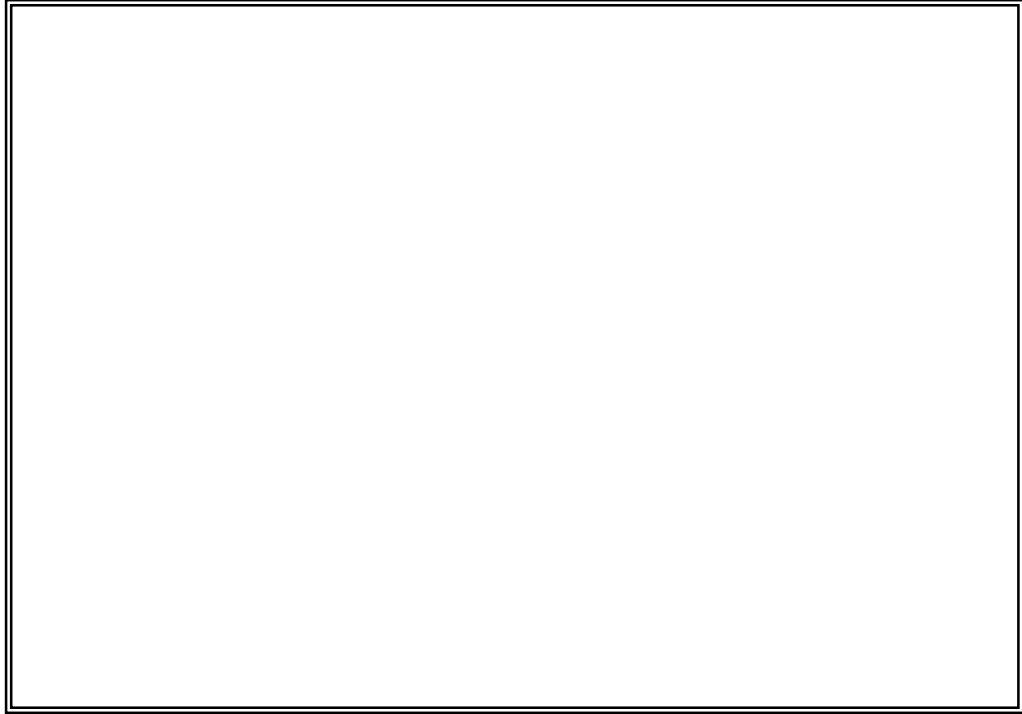


**ATTACHMENT B  
AVIAN POINT COUNT DATA**

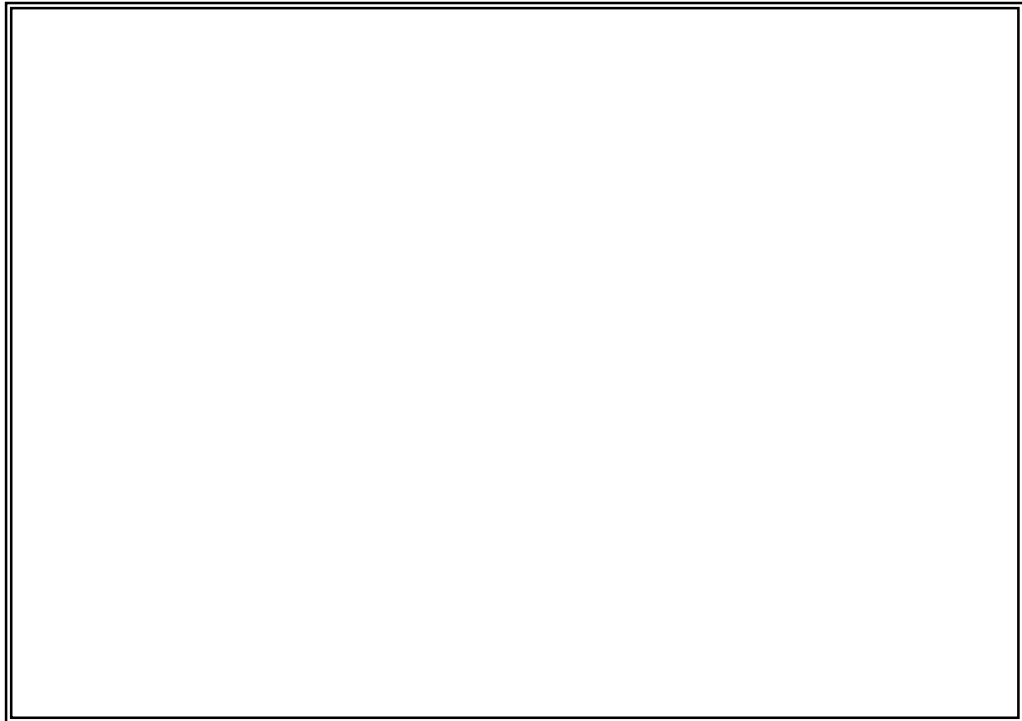




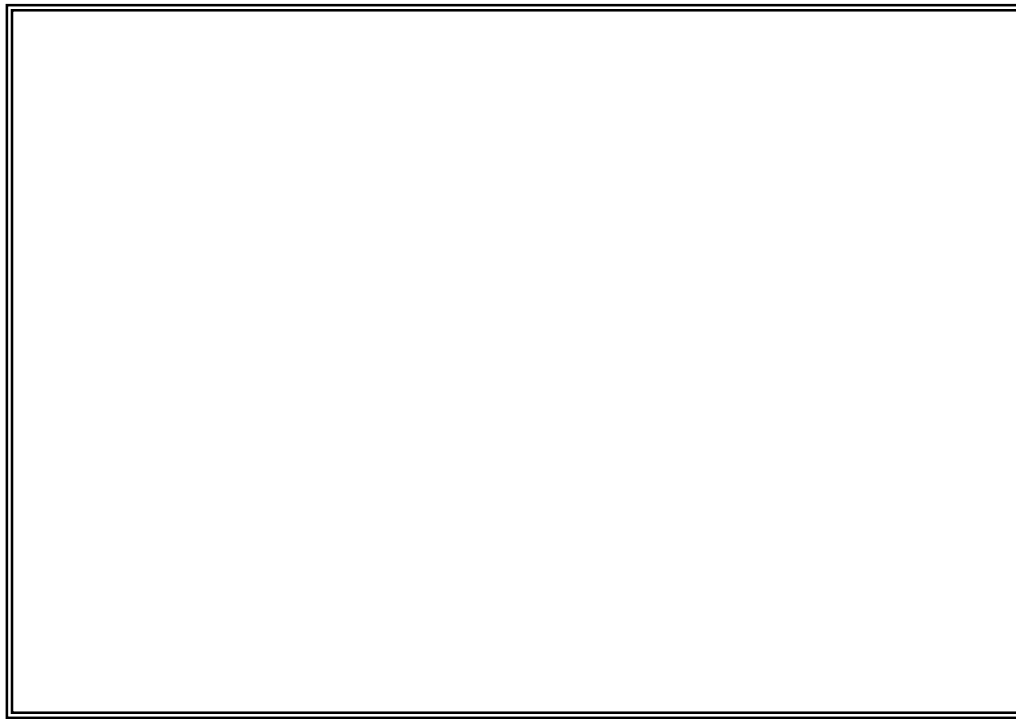
**ATTACHMENT C**  
**STUDY AREA PHOTOGRAPHS**



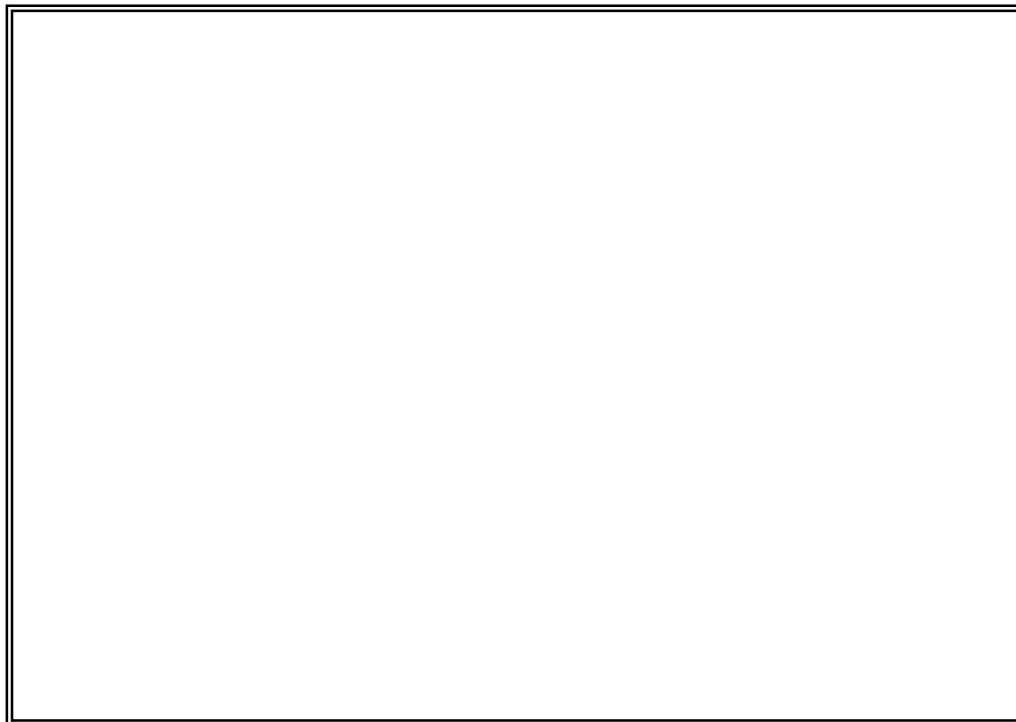
*View of Nantahala Power & Light Relicensing Project.  
Photograph of cove forest bordering Nantahala Lake. Standard Point Count  
Location: Station 1 Point 1.*



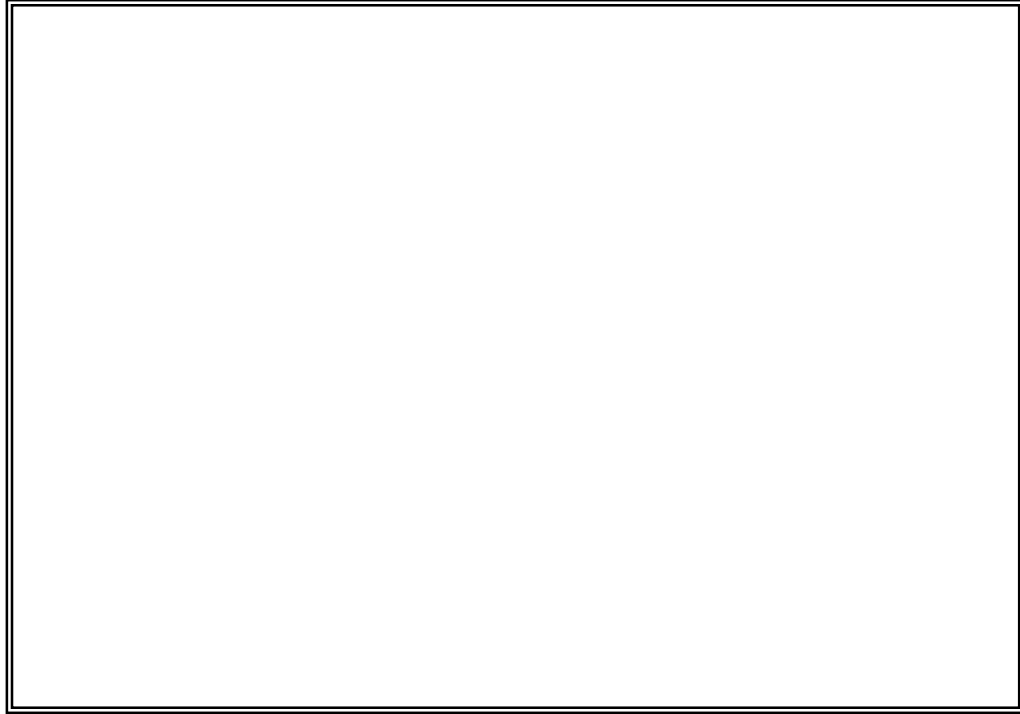
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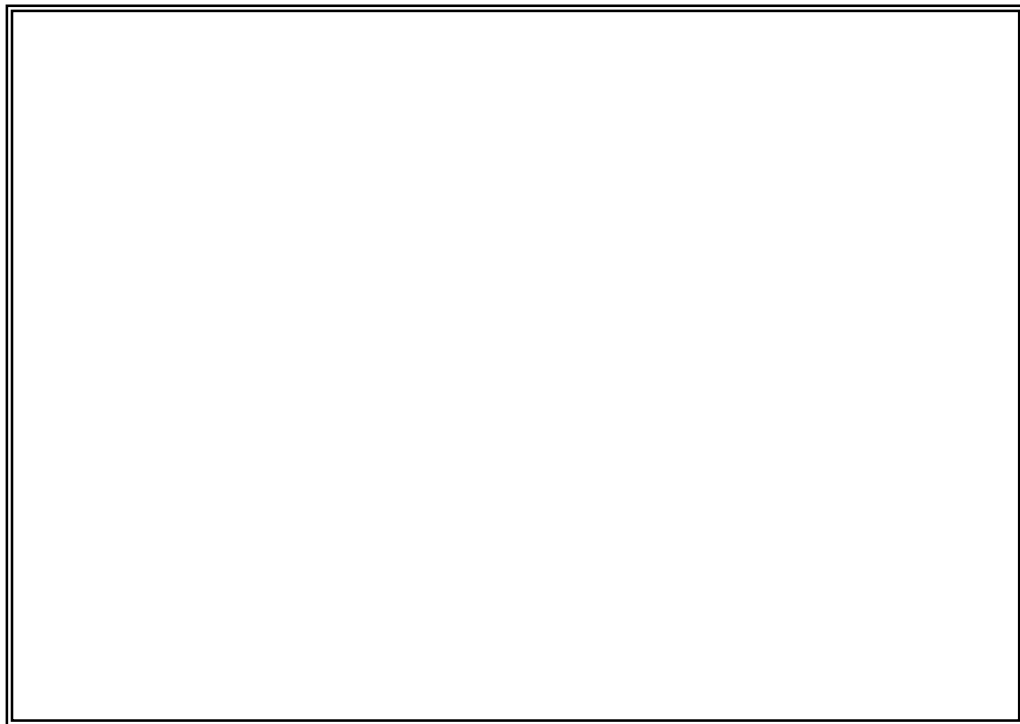
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Photograph of cove forest bordering Nantahala Lake. Standard Point Count  
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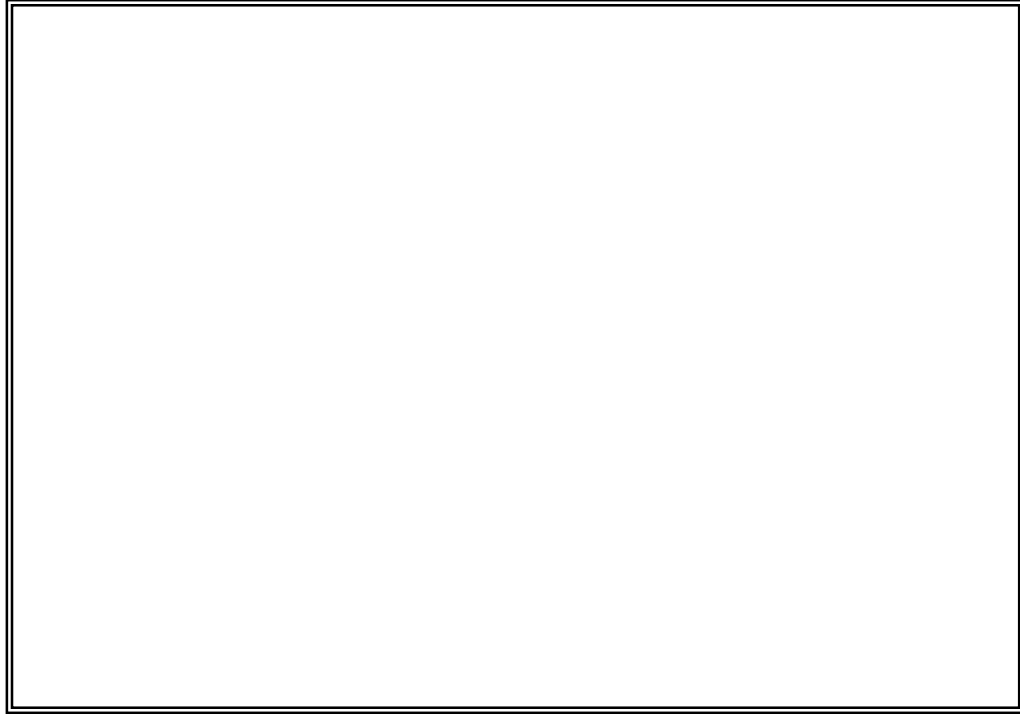
*View of Nantahala Power & Light Relicensing Project.  
Photograph of cove forest bordering Nantahala Lake. Standard Point Count  
Location: Station 1 Point 4.*



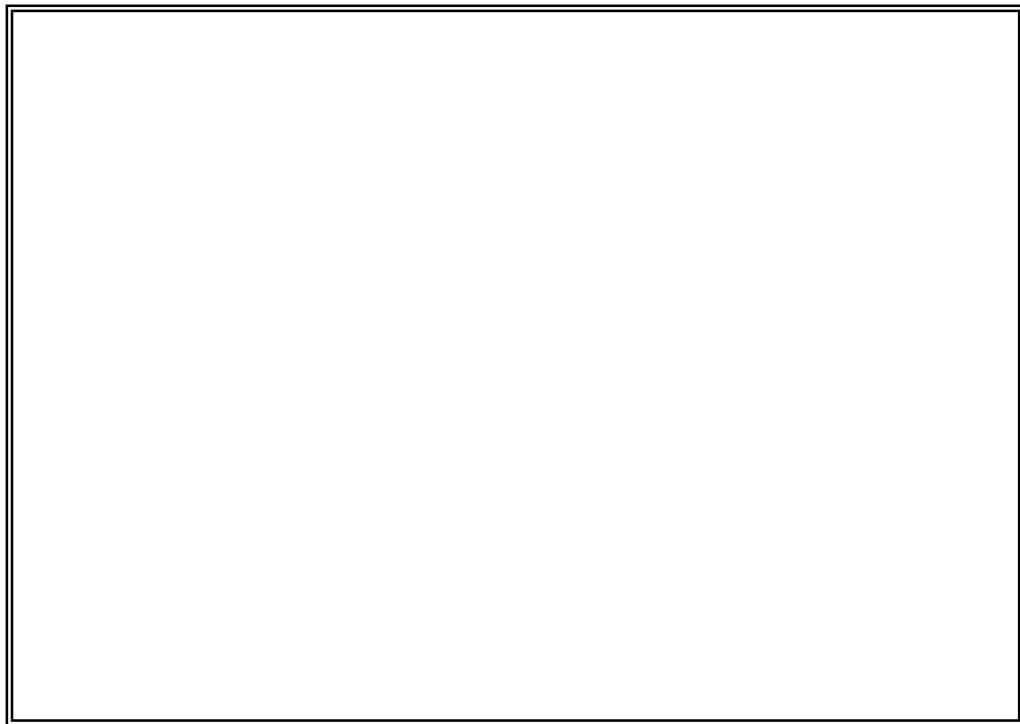
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Photograph of cove forest bordering Nantahala Lake. Standard Point Count  
Location: Station 1 Point 5.*



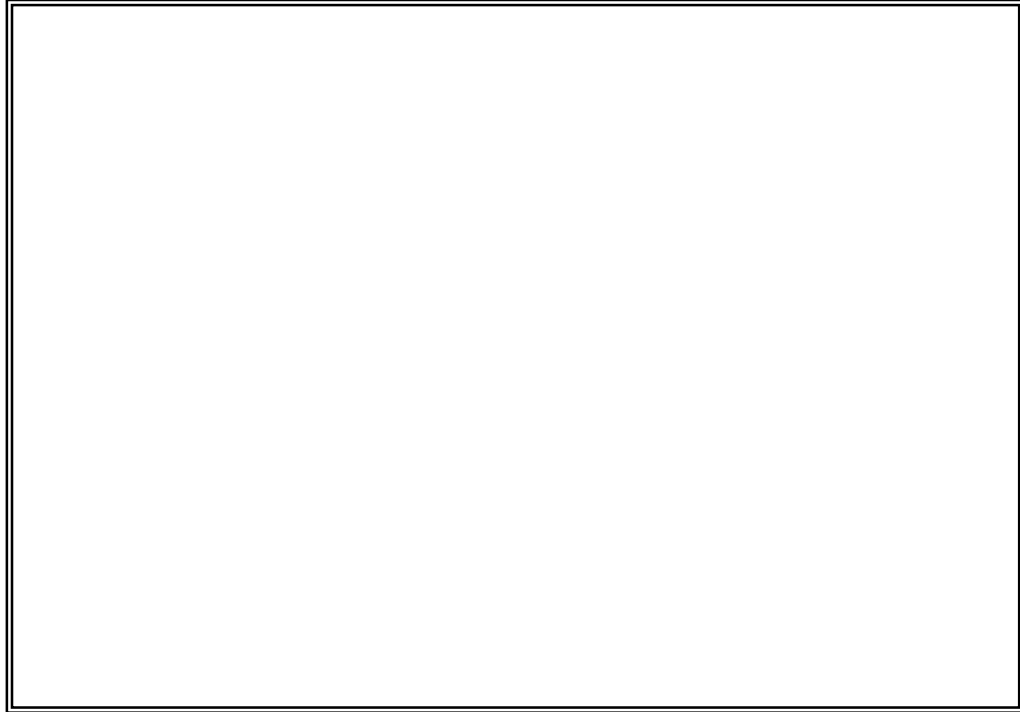
*View of Nantahala Power & Light Relicensing Project.  
Photograph of cove forest bordering Nantahala Lake. Standard Point Count  
Location: Station 1 Point 6.*



*View of Nantahala Power & Light Relicensing Project. Photograph of Tuckasegee Powerhouse right-of-way. Standard Point Count Location: Station 2 Point 1.*



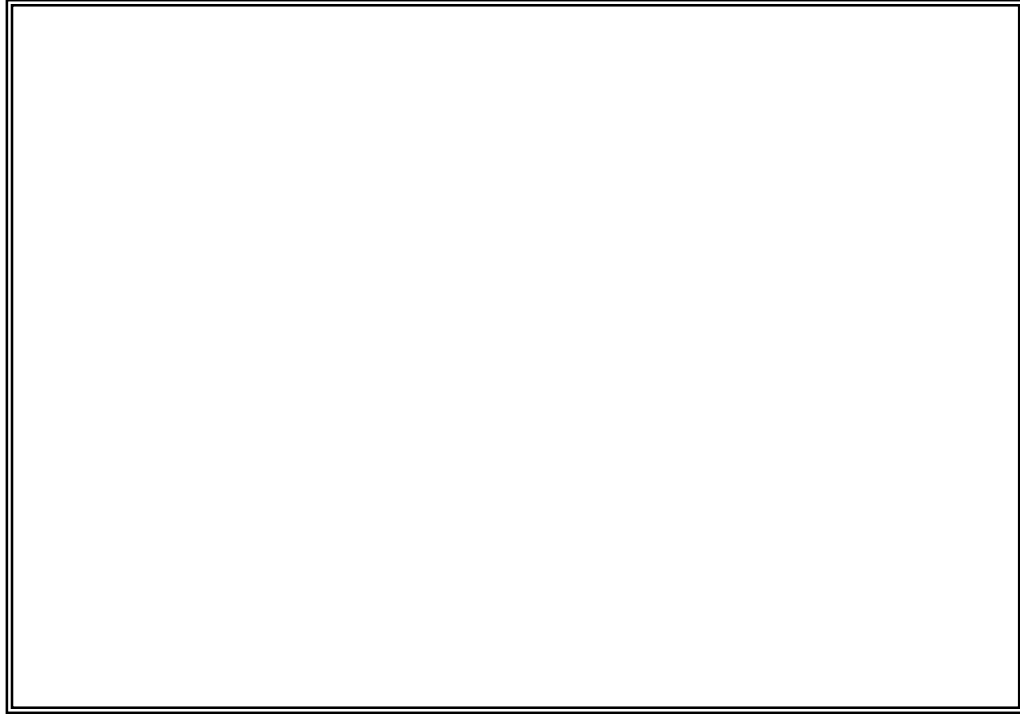
*View of Nantahala Power & Light Relicensing Project. Photograph of Tuckasegee Powerhouse right-of-way. View representative of right-of-way vegetation.*



*View of Nantahala Power & Light Relicensing Project. Photograph of Tuckasegee Powerhouse right-of-way. Standard Point Count Location: Station 2 Point 2.*



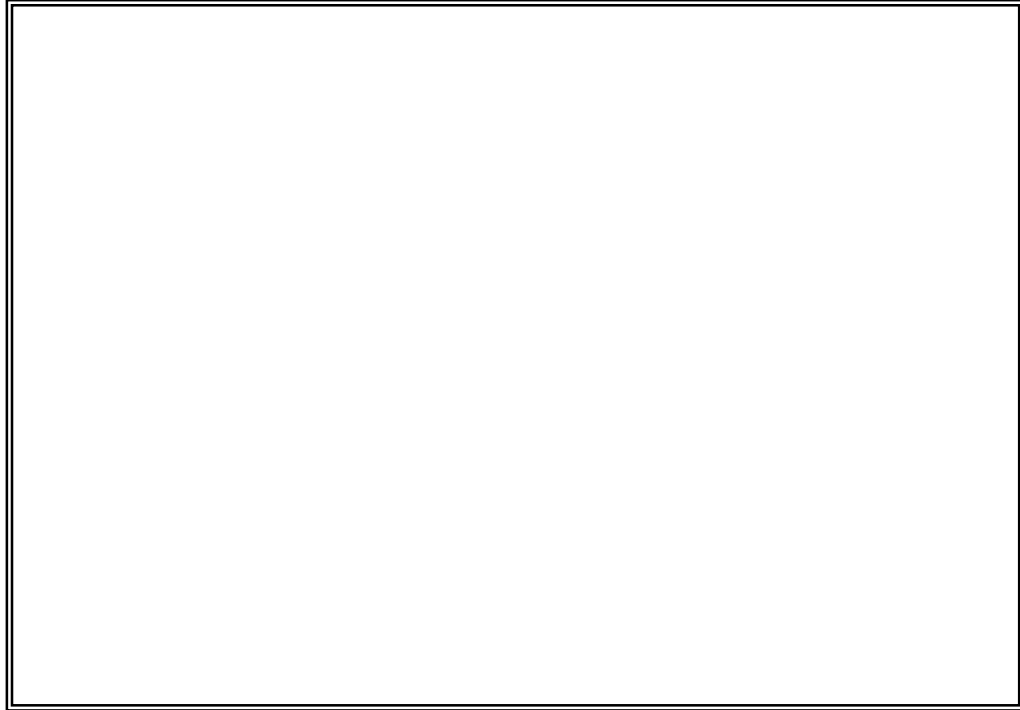
*View of Nantahala Power & Light Relicensing Project. Photograph of Tuckasegee Powerhouse right-of-way. Standard Point Count Location: Station 2 Point 3.*



*View of Nantahala Power & Light Relicensing Project. Photograph of Shook Cove Road right-of-way. Standard Point Count Location:  
Station 3 Point 1.*



*View of Nantahala Power & Light Relicensing Project.  
Photograph of Shook Cove Road right-of-way. Standard Point Count Location:  
Station 3 Point 2.*



*View of Nantahala Power & Light Relicensing Project.  
Photograph of Shook Cove Road right-of-way. Standard Point Count Location:  
Station 3 Point 3.*



*View of Nantahala Power & Light Relicensing Project.  
Photograph of Penstock at Nantahala Recreation Park. Standard Point Count Location:  
Station 4 Point 1.*

**ATTACHMENT D**  
**AVIAN FIELD FORMS**