

## APPENDICES

### Appendix A—The Nature Conservancy background report

The following is taken from The Nature Conservancy's discussion of the "Borderlands":

“The Atlantic white cedar and giant rhododendron are found in uncommon abundance in the Bell Cedar Swamp. Atlantic white cedar (*Chamaecyparis thyoides*) is a wetland tree that is restricted to coastal and near-coastal areas from New Hampshire to Florida. Not a true cedar like the Arbor Vitae (*Thuja occidentalis*) found on many lawns and gardens, Atlantic white cedar is actually a cypress.

In these swamps, white cedar is host to the globally uncommon butterfly Hessel's hairstreak (*Mitoura hesseli*), and white cedar swamps with sphagnum moss are good environments for the globally rare dragonfly banded boghaunter (*Williamsonia litneri*). Rare plants like the green adders mouth (*Malaxis unifolia*) are also found in Atlantic white cedar swamps in the Borderlands.

Atlantic white cedar was probably never an abundant tree before European settlement, but it declined even further once early settlers recognized its rot-resistant qualities and harvested it in great numbers for fencing and shingles. Also, red maple began to crowd out many Atlantic white cedar forests, shading out cedar seedlings.

Giant rhododendron (*Rhododendron maximum*) is a beautiful flowering evergreen shrub that is a familiar landscaping plant through out southern New England. It is native to the Borderlands and is only found in association with Atlantic white cedar in southeast Connecticut and southwest Rhode Island.

Four good examples of cedar swamp are found in the Borderlands: Pachaug Great Meadow, Rhododendron Sanctuary, and **Bell Cedar Swamp**. Only the Bell Cedar Swamp is entirely in private ownership- the other three are permanently protected by state ownership and Conservancy ownership.”

## The following is from a site walk done for The Nature Conservancy:

CBS Trip Bell Cedar Swamp

Aug 3, 2002

Janet Novak, Lois Van Deusen  
E. Sam Saulys, Sigrun Gadwa

Leaders,  
Jim Cowen, Kevin Essington

On a warm, sunny day we entered Bell Cedar swamp from the north east, with the guidance of Kevin Essington of The Nature Conservancy, hiking down an wooded upland peninsula through an old cemetery (no unique finds). As we entered the swamp, we were struck by numerous *Sphagnum* mats extending into pools and onto hummocks. We were rewarded with Small green wood orchid (*Platanthera clavellata*) in bloom. The tree canopy was predominantly Red Maple and Atlantic White Cedar with Black Gum. Atlantic White Cedar seedlings on hummocks were a welcome sight, confirming recruitment. Though the shade of Red Maple is an ongoing threat.

The understory was thick and difficult to negotiate, consisting of extensive thickets of *Rhododendron maximum* (a few still in bloom) and *Smilax rotundifolia* with *Lindera benzoin*, *Ilex verticillata*, *Rhododendron viscosum*, *Rhododendron nudiflorum*, *Vaccinium corymbosum*, *Vaccinium stamineum*, *Lyonia ligustrina*, *Leucothoe axillaries*, and *Nemopanthus mucronatus*.

In addition to the typical herbs, we saw: *Thalictrum polygamum*, *Scutellaria lateriflora*, *Coptis groenlandica*, *Sium suave*, *Cicuta maculatum*, *Sparganium americanum*, *Caltha palustris*, *Cyperus strigosus*, *Carex intumescens*, *Carex folliculata*, *Carex atlantica*, *Calla palustris*, *Viola pallens*, *Proserpinaca palustris*. Sam Saulys found an unusual form of Netted chain fern (*Woodwardia virginica*).

Jim Cowen

### PLANT SPECIES LIST

Connecticut Botanical Society Field Trip  
Bell Cedar swamp in North Stonington on 8-3-02

#### APPROACH THROUGH UPLAND OAK FOREST (partial)

<i>Quercus coccinea</i>	Scarlet oak
<i>Quercus alba</i>	White oak
<i>Quercus rubra</i>	Red oak
<i>Pin oak</i>	<i>Quercus palustris</i>
<i>Betula lenta</i>	Black birch
<i>Pinus strobus</i>	White pine
<i>Robinia pseudoacacia</i>	Black locust
<i>Castanea dentata</i>	American chestnut
<i>Fagus grandifolia</i>	American beech
<i>Kalmia latifolia</i>	Mountain laurel
<i>Gaylussacia baccata</i>	Black huckleberry
<i>Apocynum androsaemum</i>	Dogbane

## **CEDAR SWAMP**

### **Herbs**

*Osmunda cinnamomea*

*Iris versicolor*

*Symplocarpus foetidus*

*Thalictrum polygamum*

*Onoclea sensibilis*

*Thelypteris noveboracensis*

*Viola cucullata*

*Platanthera clavellata*

*Thalictrum polygamum*

*Scutellaria lateriflora*

*Coptis groenlandica*

*Sium suave*

*Cicuta maculatum*

*Sparganium americanum*

*Caltha palustris*

*Maianthemum canadense*

*Cyperus strigosus*

*Carex intumescens*

*Carex folliculata*

*Carex atlantica*

*Solidago patula*

*Cinna arundinacea*

*Osmunda regalis*

*Glyceria striata*

*Trientalis borealis*

*Mitchella repens*

Cinnamon fern

Blue flag

Skunk cabbage

Meadow rue

Sensitive fern

New York fern

Marsh blue violet

Small green wood orchid

Tall meadowrue

Maddog skullcap

Goldthread

Water parsnip

Water hemlock

American burreed

Marsh marigold

Canada mayflower

Umbrella sedge

Bladder sedge

Follicle-bearing sedge

Atlantic sedge

Rough-leaf goldenrod

Wood reed grass

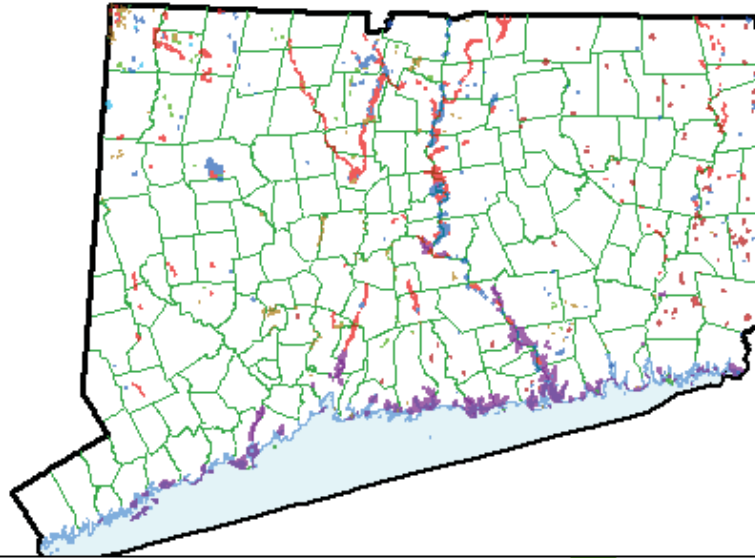
Royal fern

Fowl meadow grass

American starflower

Partridgeberry

## Appendix B. -- Map of CT critical habitats



Critical Habitat		PALUSTRINE NON-FORESTED		TERRESTRIAL NON-FORESTED	
<b>ESTUARINE</b>					
Beachshore, B		Beachshore, B		Dry Connecticut Forest, DCF	
Intertidal Marsh, IM		Connecticut Spring Fen, CIGF		Dry Subbackho Forest, DSF	
<b>PALUSTRINE FORESTED</b>		Floodplain Forest, FF		Old Growth Forest, OGF	
Ackia Atlantic White Cedar Swamp, AAWCS		Freshwater Aquatic, FA		Subbackho Cold Tolerant Forest/Woodland, SubCTFW	
Ackia Red/Black Spruce Basin Swamp, AcR/BS		Medium Fen, MF		Ackia Rocky Summit Outcrop, AcRSO	
Connecticut Northern White Cedar Swamp, CNWCS		Pool Fen, PF		Alluvial Grassland/Outcrop, AIG/O	
Floodplain Forest, FF		Rich Fen, RF		Connecticut Rocky Summit Outcrop, CIRSO	
		Sea Level Fen, SLF		Coastal Bluffs and Headlands, CBH	
		<b>TERRESTRIAL FORESTED</b>		Coastal Grassland, CG	
		Coastal Woodland/Shrubland, CWS		Sand Barren, SB	
		Dry Ackia Forest, DAF		Subbackho Rocky Summit Outcrop, SubRSO	

## Appendix C—Historian's Report

The following is taken from the Historian's Report in the newsletter of the North Stonington Historical Society, January 1976:

### HISTORIAN'S REPORT

Our Historian, A. Morgan Stewart, has furnished us with this wonderfully informative report on the Bell Cedar Swamp and its original owner:

There is no marker designating the final resting place of Thomas Bell, late of North Stonington, who had vast real estate holdings in the late 1600s. But the Bell Cedar Swamp, encircled by Route 184 on the south, Route 49 on the west, Routes 49 and 216 on the north, and the Boom Bridge Road from Clark's Falls to Route 184, will probably bear his name for centuries to come.

Mr. Bell founded the iron works later run by the York, Burtch, and Spaulding families. His product, or the waste therefrom, discolored the water in a major brook running through the swamp. It is still known today, and is shown on old maps, as the Red River, or Red Brook.

The last owner of record of his vast land grants from the town of Stonington was his only surviving daughter, Anna Bell, who married Daniel Button of the Northwest Corner family, according to old papers.

During his life time Mr. Bell traded a large tract with Gershon P Palmer, son of the original Walter. Together they went into the lumber business, operating one of the few large sawmills of the day. In getting enough water to satisfy the large boiler, they accidentally flooded some adjoining lands of neighbor Joshua Holmes. Mr. Holmes protested, but settled his claim on Dec. 3, 1685, by giving Mr. Bell and Mr. Palmer a receipt for 2,000 feet of board, in these words:

Received of Thomas Bell and Gershon Palmer 2,000 feet of board which is in full satisfaction for a bill concerning the damage they have done me or shall doe me by their mill dam. The receipt was signed by Mr. Holmes in the presence of John Brown and Marks Graves.

Shortly thereafter Mr. Bell sold a tract to George Denison, who needed some cedar for his projects.

Anna Button, only surviving daughter of Thomas Bell, held onto most of the cedar swamp until June 25, 1746, when she started selling it off. The last of it went to her son, John Button, and to her daughter, Thankful Button, on April 21, 1757. The latter married David MacCoon in Hopkinton on November 26, 1761. The early ancestors

of all the Coen families in this area today formerly spelled their name MacCoon, McCoon, or Maccoone.

There has always been a tradition hereabouts that families living in the village, on small plots, had to have a few acres elsewhere to insure a reliable source of fire wood. This is well supported by deeds in possession of the Historical Society. Many also had to have a small plot in the Cedar Swamp to insure a supply of cedar shingles for their homes, as well as trim for doors and windows. As a result the swamp, almost impassable except for the most severe of winters, has been cut up into scores of small lots. Few know exactly where their land is located. And no wonder! Your historian has one deed describing the lot as conveyed, covered with a heavy growth of cedar trees in all sizes, as "bounded on all four corners by a cedar tree".

During the month of December your Historian has been successful in carrying some of the present day titles back to the early land grants to Thomas Bell. Some of the deeds offer opportunities for further research. Like where did Break Neck Ledge get its name? And how about the deed of a lot that is bounded on west by the "barways leading to the gallows"?

# APPENDIX D -- LETTER REPORT FROM JAMES COWEN

**Environmental Planning Services**

*Wetland, Biological and Soil Sciences*

---

April 18, 2010

Duncan Schweitzer  
Avalonia Land Conservancy, Inc.  
P.O. Box 49 Old Mystic, Connecticut 06372

**RE: Bell Cedar Swamp  
North Stonington, Connecticut**

Dear Mr. Schweitzer;

Environmental Planning Services Certified Professional Wetland Scientist James Cowen has completed a wetland functions and values assessment on the above-referenced. Field visits were made to the site on Aug 3, 2002 and March 25, 2010.

## WETLAND FUNCTIONS AND VALUES ASSESSMENT

Over the last three decades, ecologists, wetland scientists, biologists, hydrologists, and environmental engineers have recognized not all wetlands perform the same functions, or provide the same values for their various functions. Furthermore, specific attributes of a wetland's hydrology, soils, biota, landscape position, chemistry, etc., can be identified that influence the ability of that wetland to provide a specific function. A variety of functional value assessment methodologies have been developed, to provide a way for a wetland scientist to determine the likelihood that a particular wetland can provide a particular function, and in some cases, the relative magnitude or "value" of that function. The assessment of wetland functions and values was based on the U.S. Army Corp of Engineers Highway Methodology.

Wetlands are typically evaluated based on the following thirteen functions and values: groundwater recharge/discharge, floodwater storage, fish and shellfish habitat, sediment/toxicant/pathogen retention, nutrient removal/retention/transformation, production export, sediment/shoreline stabilization, wetland wildlife habitat, recreational value, educational/scientific value, uniqueness, visual/aesthetic quality and threatened and endangered species habitat<sup>1</sup>.

---

***www.epsct.com***

89 Belknap Road  
West Hartford, CT 06117  
Phone 860-236-1578 Fax  
michael.klein@epsct.com

116 Smith Road  
East Haddam, CT 06423  
Phone 860-873-9119 Fax  
eric.davison@epsct.com

138 Mystic Road  
North Stonington, CT 06359  
Phone 860-535-0625 Fax  
james.cowen@epsct.com

Table 1 provides a tabular evaluation of the functions and values of Bell Cedar Swamp.

The use of subjective weighting (i.e. high, medium, low) is not part of the Army Corp methodology. It is intended to summarize the narrative results of the functional assessment. The ratings in Table 1 are based on best professional judgement and the experience of EPS staff. The rationale for the ratings shown in Table 1 are stated in narrative form in the “Wetland Functions and Values - narrative” section that follows Table 1.

Table 1: Wetland functions and values, Bell Cedar Swamp

<b>Function/Value</b>	<b>Bell Cedar Swamp</b>
Groundwater recharge/discharge	<b>High</b>
Floodwater storage	<b>High</b>
Fish and Shellfish Habitat	N/A
Sediment retention	<b>Potential*</b>
Nutrient removal/retention/transformation	<b>Potential*</b>
Production Export	<b>High</b>
Sediment and Shoreline Stabilization	<b>Moderate</b>
Wetland wildlife habitat	<b>High</b>
Recreation	<b>Moderate-High (Potential)</b>
Educational/scientific value	<b>High (Potential)</b>
Uniqueness	<b>High</b>
Visual/Aesthetic Quality	<b>Moderate-High</b>
Threatened and Endangered Species Habitat	<b>High</b>

**\* If sediment and/or nutrients were introduced into the wetland, the unique flora and fauna would likely be adversely impacted**

## FUNCTIONAL ASSESSMENT - NARRATIVE

The following section provides a rationale for the ratings provided in Table 1.

Bell Cedar Swamp is an extensive, pristine wetland ecosystem with minimal disturbance, relatively intact surrounding uplands, and few invasive non native plants. Its principal functions and values are: ground water recharge, floodflow alteration, production export, wetland wildlife habitat, educational/scientific value, uniqueness, and threatened and endangered species habitat.

Access through proposed trails will provide additional values such a passive recreation and visual/aesthetic quality of the extensive Great Laurel (*Rhododendron maximum*) when in bloom.

1. **Ground Water Recharge**—The soils are mapped as Timakwa and Natchaug glaciofluvial soils<sup>11</sup> which are sands and loams with rapid to slow permeability.
2. **Floodflow Alteration**—The extensive hummock/pool microtopography provides significant flood storage capacity

### Considerations/Qualifiers

- Area of this wetland is large relative to its watershed.
- Wetland occurs in the upper portions of its watershed.
- Effective flood storage is small or non-existent upslope above the wetland.
- Wetland contains hydric soils which are able to absorb and detain water.
- Wetland exists in a relatively flat area that has flood storage potential.
- During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
- Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
- In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
- Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
- The watershed has a history of economic loss due to flooding (March 30 2010).
- Channel flow velocity is affected by this wetland.
- Land uses downstream are protected by this wetland.
- This wetland contains a high density of vegetation.

3. **Production Export**—Atlantic White Cedar is a commercially used product and timber harvests may be potentially feasible under the agricultural exemption of wetland regulations. The wetland is a source of wildlife food with its high density and diversity of vegetation.
4. **Wetland Wildlife Habitat**—Hummock and pool microtopography provides suitable habitat for vernal pool amphibians such as Spotted Salamander and Wood Frog as well as Spotted Turtle and Wood Turtle. No wildlife surveys were conducted at this site. The evaluation of the wildlife function of these wetlands is based on habitat suitability.

Considerations/Qualifiers

- Wetland is not degraded by human activity.
  - Wetland is not fragmented by development.
  - Upland surrounding this wetland is undeveloped.
  - More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
  - Wetland is contiguous with other wetland systems connected by a watercourse or lake.
  - Wildlife overland access to other wetlands is present.
  - Wildlife food sources are within this wetland or are nearby.
  - Density of the wetland vegetation is high.
  - Wetland exhibits a high degree of plant species diversity.
  - Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
  - Wetland contains or has potential to contain a high population of insects.
  - Wetland contains or has potential to contain large amphibian populations.
  - Wetland has a high avian utilization or its potential.
5. **Educational/Scientific Value**—This is a potential educational site which contains a diversity of wetland classes which are accessible from the adjacent Nature Conservancy parcel and by proposed trails.

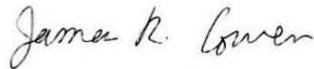
6. **Uniqueness**—This wetland is an Acidic Atlantic White Cedar Swamp which is a critical habitat community (see attached map, [www.cteco.uconn.edu](http://www.cteco.uconn.edu)). It is also classified as a special wetland of Connecticut by DEP<sup>1</sup>. This is the only Acidic Atlantic White Cedar Swamp in North Stonington and is regionally an uncommon habitat type.
7. **Threatened and Endanger Species Habitat**—State-listed species are known to occur in Bell Cedar Swamp (see attached map). In addition there is suitable habitat for:
  - Hessel's Hairstreak, CT endangered
  - Eastern Ribbon Snake, CT Species of Special Concern

### **THREATS**

Atlantic White Cedar is a commercially used product and timber harvests may be potentially feasible under the agricultural exemption of wetland regulations. Such harvests would have a negative impact on the functions and values of this wetland.

In my professional opinion, Bell Cedar Swamp has very high conservation value and is worthy of permanent protection.

Respectfully submitted,



James R. Cowen  
Registered Soil Scientist  
Certified Professional Wetland Scientist

---

<sup>1</sup> **SPECIAL WETLANDS:** The CT addendum (page 3, section C) defines "special wetlands" to include vernal pools, fens, bogs, cedar swamps, spruce swamps and calcareous seepage swamps.

---

<sup>1</sup> **DEFINITIONS OF WETLAND FUNCTIONS AND VALUES**

*The Highway Methodology Workbook Supplement, Wetland Functions and Values: A Descriptive Approach* issued by the US Army Corps of Engineers New England District (ACOE NED), November, 1995.

**(1) Groundwater Recharge/Discharge** – This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers (not necessarily public water supply aquifers), regardless of the size or importance of either.

**(2) Floodwater Storage** – This function considers the effectiveness of the wetland in reducing flood damage by water retention for long periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

**(3) Fish and Shellfish Habitat** – This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish habitat.

**(4) Sediment/Toxicant/Pathogen Retention** – This function reduces or prevents degradation of downstream water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants or pathogens in runoff from surrounding uplands, or eroding upstream wetlands and/or watercourses.

**(5) Nutrient Removal/Retention/Transformation** – This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands, and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers or estuaries.

**(6) Production Export**-- This function relates to the effectiveness of the wetland to produce food or usable products for humans, or other living organisms.

**(7) Sediment/Shoreline Stabilization**-- This function relates to the effectiveness of a wetland to stabilize stream banks and shorelines against erosion.

**(8) Wetland Wildlife Habitat** – This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered.

**(9) Recreational Value** – This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting and other active or passive recreational activities.

---

**(10) Educational/Scientific Value** – This value considers the suitability of the wetland as a site for an “outdoor classroom” or as a location for scientific study or research.

**(11) Uniqueness** – This value considers the effectiveness of the wetland or its associated water body to provide certain special values. These may include archeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location.

**(12) Visual Quality/Aesthetics**-- This value relates to the visual and aesthetic qualities of the wetland.

**(13) Threatened or Endangered Species Habitat**-- This value relates to the effectiveness of the wetland or associated water bodies to support threatened or endangered species.

<sup>ii</sup> Timakwa and Natchaug soils

The Timakwa series consists of very deep, very poorly drained soils formed in woody and herbaceous organic materials over sandy deposits in depressions on lake plains, outwash plains, till plains, moraines, and flood plains. These soils have moderate to very rapid permeability in the organic material and rapid to very rapid permeability in the sandy material. Slope ranges from 0 to 2 percent. Mean annual temperature is about 48 degrees F and the mean annual precipitation is about 47 inches.

The Natchaug series consists of very deep, very poorly drained soils formed in woody and herbaceous organic materials overlying loamy deposits in depressions on lake plains, outwash plains, till plains, moraines, and flood plains. These soils have moderate to very rapid permeability in the organic material and moderately slow to moderately rapid permeability in the loamy material. Slope ranges from 0 to 2 percent. Mean annual temperature is about 48 degrees F. and mean annual precipitation is about 47 inches.

