Atlantic White Cedar Success Criteria

This document was last revised on 6/30/2003 and is a living document subject to change. Please ensure you have the most recent version.

For a Restoration Site

1. Site preparation
   - Removal of exotics/invasives, and/or inappropriate or competing species, verify conditions of saturation and show similarity to the hydroperiod of an established Atlantic White Cedar reference site. (Water table should be (47 inches) 1.2m to (12 inches) 0.3 m deep.)
   - Removal of all logging debris. Burning may be appropriate to add nutrients to the soil prior to planting. (Atkinson, 2001)
   - Elimination of impediments to desired hydrology (removal of roads or berms, filling of ditches, ruts, etc.)

2. Development of hydrology (continuation of site preparation)
   - Installation of monitoring wells/piezometers/flood gages.

3. Tree planting
   - Atlantic White Cedar (Chamaecyparis thyoides) should be planted as a monoculture at a density sufficient to exceed 2000 stems/acre for each of the first five years after planting. Seeding is a preferred method of establishment. (Atkinson, 2001)

4. Shrub and herbaceous layer
   - Shrub layer should be less than 10% cover at year 5 after planting.
   - Herbaceous layer varies widely in cover and may contain species include sphagnum moss (Sphagnum spp.), sedges (Carex spp.), round-leaved sundew (Drosera rotundifolia), partridge-berry (Mitchella repens), cinnamon fern (Osmunda cinnamomea), and royal fern (Osmunda regalis) (Laderman, 1989).

Monitoring (later credit release based on monitoring results)
Monitoring plots should include a specific number of set plots monitored during each period and for final credit release, an equal number of randomly placed plots to show site variation. All plots should meet minimum criteria.
   - Hydrology: well reports showing appropriate hydroperiod
   - Vegetation: positive growth of root collar, height, cover, basal area
   - Exotics: <1% cover at all times (no seed bearing plants at any time)
   - Management period is a minimum of eight years or when more than 70% of the saplings have reached a height of eight feet.


For an Enhancement Site
This document was last revised on 6/30/2003 and is a living document subject to change. Please ensure you have the most recent version.

1. Site preparation
   - Removal of exotics/invasives, and/or inappropriate/nontypical species such as oaks
   - Removal of all logging debris. Burning may be appropriate to add nutrients to the soil prior to planting.
   - Elimination of impediments to desired hydrology (removal of roads or berms, filling of ditches, ruts, etc.)

2. Development of hydrology (continuation of site preparation)
   - Installation of monitoring wells/piezometers/flood gages.

3. Tree planting
   - Atlantic White Cedar (*Chamaecyparis thyoides*) should be planted to establish a density sufficient to exceed 350 to 800 stems/acre coverage for all of the first five years after planting and a target mature canopy coverage of 75-85% of which more than 70% should be Atlantic White Cedar (Atkinson, 2001). Basal area can trend from 245 ft$^2$ per acre upwards. Seeding is a preferred method of establishment.
   - Associated canopy species can include Bays, Slash pine, Black Gum (Swamp Tupelo), Cypress, American Holly, and Red Maple (Laderman, 1989).

4. Shrub and herbaceous layer
   - Shrub layer can vary widely in coverage and should be composed of Red chokecherry (*Aronia arbutifolia*), sweet pepperbush, bitter gallberry (*Ilex glabra*), fetterbush (*Leucothoe racemosa*), swamp honeysuckle, poison ivy (*Toxicodendron radicans*), poison sumac (*Toxicodendron vernix*), and high bush blueberry (Laderman, 1989). At the end of the fifth year post planting the shrub layer should not exceed 40 to 50% coverage.
   - Herbaceous layer may contain species include sphagnum moss (*Sphagnum spp.*), sedges (*Carex spp.*), round-leaved sundew (*Drosera rotundifolia*), partridge-berry (*Mitchella repens*), cinnamon fern (*Osmunda cinnamomea*), and royal fern (*Osmunda regalis*) (Laderman, 1989).
   - Cools burns during periods of high water may be used to control the shrub layer, herbaceous layer, and exotic species and composition (Atkinson, 2001).

Monitoring (later credit release based on monitoring results)
Monitoring plots for vegetation and exotics should include a specific number of set plots monitored during each period and, for final credit release, an equal number of randomly placed plots to show site variation. All plots should meet minimum criteria.
   - Hydrology: well reports showing appropriate hydroperiod verifying conditions of saturation and show similarity to an established Atlantic White Cedar reference site.
   - Vegetation: positive growth of root collar, height, cover, basal area
   - Exotics: <1% cover at all times (no seed bearing plants at any time)
   - Assuming mature seed producing trees are on-site, the management period is five years or until natural regeneration meets or exceeds the canopy success criteria.

**Sites chosen for enhancement work may already have an established population of trees. In that case, the current conditions and population must be detailed with a reasonable level of confidence.**
Atlantic White Cedar Restoration Proposed Credit Release Schedule

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20% - Initial release for conservation easement and financial assurance.

15% - Upon completion of site preparation and hydrology work (criteria 1 & 2)
   - Removal of exotics, invasives, or inappropriate species
   - Removal of all logging debris
   - All earthwork completed
   - Monitoring equipment installed
   - Must show that target hydrology is occurring before trees are planted

25% - Post-planting of trees (criterion 3)
   - 10% Actual Planting or Seeding in of Atlantic White Cedars
   - 15% Visual evidence of seedling establishment (1-year survival) in all permanently monitored plots at sufficient densities to reach target.

25% - Incremental Credit Release
   - 5% credit release for each 1 year after planting that the minimum criteria are met for overstory, shrub/sapling layer, and exotic species.

15% - Final credit release
   - Monitored hydrology show positive correlation with the target hydrology for the site
   - 2000 stems/acre or more of Atlantic White Cedar
   - Average height of individual trees per monitoring plot at least 8’
   - Positive growth of root collars and basal area
   - Shrub layer has less than 10% coverage
   - <1% cover by exotics and no seed bearing plants
**Atlantic White Cedar Enhancement Proposed Credit Release Schedule**

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- **20%** - Initial release for conservation easement and financial assurance.

- **15%** - Upon completion of site preparation and hydrology work (criteria 1 & 2)
  - Removal of exotics, invasives, or inappropriate species
  - Removal of all logging debris
  - All earthwork completed
  - Monitoring equipment installed
  - Must show that target hydrology is occurring before trees are planted

- **25%** - Post-planting of trees (criterion 3)
  - Visual evidence of seedling establishment (1-year survival) in all permanently monitored plots at sufficient densities to reach target.

- **25%** - Incremental Credit Release
  - 5% credit release for each 1 year after planting that the minimum criteria are met for overstory, shrub/sapling layer, and exotic species.

- **15%** - Final credit release
  - Monitored hydrology show positive correlation with the target hydrology for the site
  - 350 stems per acre or more of Atlantic White Cedar
  - 70% of mature canopy should be Atlantic White Cedar or there should be a clear trend towards that coverage
  - Basal area should be 245 ft² per acre or show a clear trend towards that coverage.
  - Evidence of positive growth of root collars and height of seedling established Cedar
  - Evidence of natural regeneration and establishment of seedlings or a minimum of five years post seedling establishment
  - Shrub layer should be no greater than 50% coverage
  - <1% cover by exotics and no seed bearing plants