

# Mitigation Plan

To accompany a Notice of Intent

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57 Perkins Row  
Topsfield Massachusetts

July 1, 2015

Prepared for:

New Meadows Development, LLC

Design Team:

The Morin-Cameron Group, Inc.  
447 Boston Street, Topsfield, MA 01983

DeRosa Environmental Consulting, Inc.  
167 Main Street, Rowley MA 01969



June 29, 2015

**BY ELECTRONIC MAIL & HAND DELIVERY**

Topsfield Conservation Commission  
Topsfield Town Hall  
8 West Common Street  
Topsfield, MA 01983

Ms. Lana Spillman, Conservation Agent  
978-887-1510  
[ls pillman@topsfield-ma.gov](mailto:ls spillman@topsfield-ma.gov)

**RE: Supplemental Information | Invasive Species  
Management & Wetland Restoration Plans**

**57 Perkins Row  
Topsfield, Massachusetts**

Dear Ms. Spillman and Members of the Commission:

This report summarizes the mitigation and restoration elements of the proposed 57 Perkins Row Subdivision project filed with the Commission by the Morin-Cameron Group, Inc., in Topsfield Massachusetts. The following restoration plans include native species planting plans that intend to restore and substantially improve the function and value of the wetland resource areas and their buffer zones at the subject property. We were authorized to prepare this report by New Meadows Development, LLC, the owner of the 57 Perkins Row property.

The restoration elements of the project include the following:

1. A planting plan for the pocket wetland designed by Morin-Cameron to treat runoff waters from the proposed roadway construction. The planting plan intends to process runoff water before discharge to the downgradient wetland resource areas as well as substantially improve local wildlife habitat quality.
2. The wetland replication plan will convert approximately 1300 square feet of existing upland to bordering vegetated wetland adjacent to the existing pond. This wetland area proposes to mitigate for the 470 square feet of permanent alteration resulting from the construction of the proposed roadway.

3. The invasive species management plan proposes to remove invasive woody plant species including honeysuckle, Asiatic bittersweet, and glossy buckthorn from the wetland and buffer zone areas adjacent to the intermittent stream which flows across the property (Figure 2a).
4. The native species planting plan identifies areas that will be planted to fill the voided spaces created by removal of the invasive species within the restoration area.

The following narrative and attached plans provide the detail of the proposed mitigation and restoration planting plans for the project.

## Pocket Wetland

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We have prepared a planting plan for the pocket wetland designed by Morin-Cameron that will treat runoff waters from the proposed roadway surfaces. The planting plan intends to process runoff water before discharge to the downgradient wetland resource areas as well as substantially improve local wildlife habitat quality.

The pocket wetland is designed with a pre-treatment forebay to remove sediment and suspended solids from incoming road water runoff. The proposed plantings were selected to tolerate fluctuations in water level as well as the ability to process runoff water constituents (Figure 2b). All plant species are native and will substantially improve wildlife habitat quality and ecological services. Details of the plantings are discussed below.

The proposed pocket wetland will result in a total alteration of approximately 5,300 square feet of the buffer zone to the resource area. The pocket wetland was designed to minimize the loss of native trees. The primary canopy tree species to be removed is black locust, a non-native invasive plant.



*Swamp milkweed (Asclepias incarnata) is one of several plants proposed to be installed as part of the pocket wetland planting plan. Milkweed species are an important host plant for the monarch butterfly, which is in serious decline nationally.*

## Pocket Wetland Planting Plan

The pocket wetland will be planted with a diversity of canopy, shrub and herbaceous plantings including Tupelo and Red Maple in the over-story along with winterberry and red-osier dogwood in the shrub layer. The herbaceous species have been selected to tolerate fluctuations in water inundation and soil saturation and include woolgrass, tussock sedge and soft rush. The plant community selected will create habitat value as well as increase plant and insect diversity within the general area (Figures 2b).

### *Canopy Plantings*

Two dominant tree species have been selected for the wet basin planting plan including tupelo and red maple (Figure 2b). These species will provide aesthetic interest as well as ecological services in the form of nest sites, cover, food and overwintering areas for wildlife.

### *Shrub Plantings*

During several site visits, we observed high-bush blueberries volunteering near the wooded wetland area on the south western portion of the site. We will plant additional high-bush blueberry shrubs in the disturbed areas after removal is complete. Additional shrub plant stock will include red-osier dogwood and winterberry. Winterberry provides cover and nesting sites for birds. Red-osier dogwood also provides nest sites and cover for wildlife as well as aesthetic interest for the residents; particularly in the winter months. All the shrub species will provide natural forage for wildlife species, especially native birds. All shrubs will be installed by hand.

### *Herbaceous Plantings*

The herbaceous community will include the dense planting of native species consisting of sensitive fern, woolgrass and soft rush. These species provide shelter for macro-invertebrates including salamanders and frogs, as well as cover for ground foraging birds. These species will be installed as bare-root stock or one gallon containerized plant material. All species to be introduced are native to this region and are adapted to the surrounding soils and hydrology.

## Wetland Replication Area | Road Crossing

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The construction of the proposed five (5) lot subdivision at 57 Perkins Row by New Meadows Development LLC, results in the permanent alteration of approximately 470 square feet of bordering vegetated wetland. The applicant proposes the conversion of approximately 1300 square feet of bordering vegetated wetland to mitigate for the loss of wetland resulting from the construction of the roadway (Figure 2c).

### Replication Area Planting Plan

The wetland replication area is located along the western edge of the existing pond (Figure 2a and Figure 2c). The design forms a linear wetland to reduce the amount of cutting and removal of canopy trees to allow construction of the mitigation area.

A wetlands restoration specialist will be onsite during the construction of the wetland mitigation area to ensure that proper elevations are achieved to connect the bottom of the mitigation area to the water table. This will ensure that the created wetland will sustainably function as a wetland resource area. During construction the wetland specialist will ensure that the "groundwater and surface elevation of the replacement area shall be approximately equal to that of the lost area" (310 CMR 10.55(4)(b)(2)).

## Shrub Plantings

The planting plan has included a diversity of wetland adapted species that will occupy the mitigation area and substantially improve the function and value of this area. The plantings selected include a dominance of shrub and herbaceous species, as the canopy is well established in this area. Species like high bush blueberry, winterberry, and red osier dogwood, will spread and dominate the shrub layer here. These species will provide important nesting, shelter and food services for our native species, principally our North American songbirds.

## Herbaceous Species

The herbaceous community will include a diversity of flowering plants including joe-pye weed, swamp milkweed, water iris and boneset, along with other species that intend to provide cover and food services for wildlife including woolgrass, tussock sedge soft rush and sensitive fern (Figure 2c).

## Aftercare and Maintenance

The aftercare and maintenance of the wetland mitigation area will follow the protocols outlined below in the invasive species management plan including two (2) years of aftercare and maintenance required as part of 310 CMR 10.55 et seq.

# Invasive Species Management Plan

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## Targeted Invasive Species

We have identified six (6) dominant invasive species within the restoration areas and have mapped their approximate distribution on the landscape (Figure 2d) including Asiatic bittersweet (*Celastrus orbiculatus*), glossy buckthorn (*Frangula alnus*), multiflora rose (*Rosa multiflora*), burning bush (*Euonymus sp.*), privet (*Ligustrum sp.*), and honeysuckle (*Lonicera japonica*). These six species will be the targeted plants for our invasive species removal portion of the project.

Two (2) distinct areas have been identified for invasive plant species removal:

- an area of approximately 6,400 square feet located on the Perkins Row side of the wetland crossing (Figure 2d), and
- an area of approximately 16,800 square feet located on the subdivision side of the wetland crossing (Figure 2d).

The Invasive Species Management and Restoration Plan described in detail below, includes the methodology to remove several known invasive plant species. The removal of woody invasive plant material will be conducted using whole plant removal techniques, which avoids the use of chemicals. The combined restoration areas equal approximately 23,200 square feet, or approximately one-half acre. The detailed strategies for the removal of these species are described below as part of this narrative.

## Materials and Methods

### *Whole Plant Removal*

The techniques of whole plant removal intend to remove the entire invasive plant including standing plant material, as well as, roots and rhizomes of the invasive species. In this way, the entire plant is removed and re-colonization of the treatment area is substantially reduced. Simply cutting the standing vegetation will only stimulate coppice reproduction and a dense re-growth of the very invasive species intended to be removed.

That said, 100% removal is rarely achievable, even in an excavation effort with machinery and labor. Accordingly, professional judgment is necessary to determine when “enough is enough.” Typically this work is conducted in the fall and winter, or early spring, before the ground freezes and requires additional hand pulling of newly sprouted seed material during the following spring and summer months.

### *Initial removal with equipment or weed wrench*

Standing vegetation will be cut, removed, and stockpiled for burning or chipping for compost. A mini-excavator will be used to remove the root balls of the targeted species. This will leave the exposed roots and stumps of the invasive species accessible for removal. The area can be cut with a machine as well during this phase of work. The entire restoration area will be cleared of the invasive woody species and maintained from the re-invasion of the targeted invasive plant species, specifically: glossy buckthorn, Asiatic bittersweet, and Japanese honeysuckle.

### *Removal of root ball and trailing roots and rhizomes*

Care must be used in pulling the root balls of invasive shrub species. The use of a mini-excavator, described above, as well as weed wrenches, will facilitate the removal of most root balls. Carefully lifting and shaking the root ball as it is extracted from the soil facilitates the removal of the trailing roots and rhizomes. The soil is then released from the root ball by vigorous shaking by the machine operator. These root balls can be stockpiled and burned during the burning season. Ashes are a good amendment for fields and planting areas as they contain phosphorous and other nutrients. Alternatively, the root balls can be transported to an offsite facility for grinding and



*Whole plant removal techniques, using an excavator, being implemented at a site in Ipswich, Massachusetts.*

chipping, and/or, composting. Standing plant material is chipped separately for wood chips and is usually completed on site to reduce the volume of material that will need to be transported from the site.

### *Hand clearing and grubbing of broken roots and rhizomes*

Hand clearing and removal of broken root parts is important for invasive species management, as these shoots will re-sprout if any viable rootlets remain at the site. These collected roots can be stockpiled and burned during the local brush burning season or composted offsite for later use as a soil amendment. Our staff will follow the excavator operator and clear the restoration area of root fragments and rhizomes by hand. All collected roots are removed along with the collected root balls for offsite composting.



### *Existing Native Species*

Throughout the property, we observed several native shrub species in the areas where we are proposing whole plant removal for invasive species management. These native plants have become entwined in honeysuckle, Asiatic bittersweet, and buckthorn. Due to the locations of several of these plants, their initial removal is important to the success of the restoration plan. It is our intent to minimize the removal of the native species.

Although native plant removal is not ideal, in order for this plan to be successful, these plants will be removed employing the same technique used for the removal of the invasive plants. Native shrubs that are able to be extracted in their entirety will be healed in and replanted after the initial removal is completed.

### *Final disposition of removed plant material*

Once the invasive plant material is harvested, we plan to either burn the material onsite or chip and remove it from the site for composting. If the harvest occurs during the burning season there are several reasons to burn the majority of the material on site. Firstly, burning on site reduces costs of chipping and offsite transport of harvested material. Second, the burning of woody material returns valuable nutrients to the soil structure, principally phosphorous, which in many systems has been depleted by plant growth and microbial activity. If possible, we prefer to burn the harvested material in small manageable brush piles to facilitate these benefits to the local ecosystem.

If the work is conducted out of the burning season the harvested material will be chipped on site and removed to an offsite composting operation for composting and subsequent use as a soil amendment. Chipping the plant material before it develops seeds or flowers renders the plant unviable, especially once the material has completely dried. Then, composting the chipped woody plants becomes a sustainable use for the harvested material. Once composted, this material will return valuable nutrients to the soil, which will eventually be used by other plants for growth.

### *Soil augmentation, grading, seeding and hay mulch*

Cleared areas will be augmented with compost and duff (decaying leaf mold) as needed, then re-graded to the surrounding contours. Of most importance is establishing a native plant community within the



*Once invasive woody material is harvested and chipped on site it is moved to an offsite composting operation to be converted to a compost soil for use as cover in landscape applications.*



treated area. Accordingly, any disturbed soils will be seeded with a native sedge, rush and hydrophilic grass mix including rough bent grass (FAC), fowl bent grass (FACW), Virginia wildrye (FACW-), riverbank wild rye (FACW), soft rush (OBL), and sensitive fern (FACW), then hay mulched with salt marsh hay within the wetland area.

An upland soil mix will be used to stabilize areas that are not within the wetland, which includes indian grass (UPL), switchgrass (FAC), upland bentgrass (FACU), ticklegrass (FAC), little bluestem (FACU-), big bluestem (FAC), and sand dropseed (UPL). The areas will be watered as needed and maintained until native species have established.

## Native Species Planting Plan

To facilitate the restoration of the wetland and buffer zone habitats and provide mitigation for the construction of the roadway, we also provide a planting plan as a portion of this proposed project. In order to produce a diverse landscape that will be ecologically productive, we intend to install only native plant within the restored areas. In this way, a native plant community can be established to substantially improve buffer zone and resource area function and value.

The planting palette consists of a diverse collection of both wetland and upland species to facilitate the restoration of both the wetland and buffer zone, as well as increase the habitat value of the pocket wetland.

Planting of various species adapted to the local habitat will be installed according to the “Proposed Plant Lists” found in the Figures included with this plan (Figure 2b and 2c). Specific locations of these plantings will be chosen on site at the time of installation, but all will be within the designated restoration areas. All plantings are to be installed by hand unless otherwise noted.

Plantings will be interspersed across the restoration area and not in a uniform “on center” planting schedule. The intent of the proposed planting plan is to provide greater species diversity as well as structural diversity within the restoration areas.

### *Notes on Nursery Stock*

The nursery stock proposed is common plant stock found in most perennial nurseries and should be planted according to instructions provided by the nursery. The timing of the planting of this plant material is less exacting and can happen anytime during the project that occurs within the growing season. Early spring and autumn are the preferred times for transplanting shrubs and small trees.

Canopy species will be sourced at 1.5" caliper trees. Shrub species will be containerized in 3-gallon sizes and be at least 12 to 24 inches in height, with the exception of lowbush blueberry, which will be sourced in 1-gallon containers. Herbaceous material will consist of seed as well as one (1) gallon containerized stock material. In this way, the area will be planted with vigorously growing plant material, which will assist in the success of the enhancement effort. (See Planting Plans).

## Aftercare and Maintenance

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After the initial removal of the woody shrub species, the restoration areas will be surveyed monthly to remove sprouting invasive species (e.g., seed material is still present in the thatch and surface soils of the disturbed areas). Some of these seeds will germinate and sprout. It is very important to conduct these monthly surveys and to harvest by hand any sprouting invasive materials. During the first growing season the majority of this material is hand-picked. We use our summer interns for this work and each will carry a 5 gallon pail and fill it with new invasive seedlings for disposal. Each month there are fewer and fewer seedlings to harvest and by the end of the first season the seeded area has become dense with new growth of desirable native species and the invasive seedlings are practically eliminated. The second growing season will typically only require three (3) surveys, one in the early spring, then mid-summer and mid fall.



*Summer interns conducting routine invasive plant removal at a site located in Gloucester, MA.*

The proposed treatment and restoration efforts will follow the requirements under 310 CMR 10.55 for the restoration of vegetated wetlands and will include follow-up and aftercare reports for two years or until the area becomes successfully vegetated.

## Construction Oversight, Follow-up Observations, & Maintenance Plantings

Construction oversight, follow-up observations, and all plant installation work will be overseen by a competent professional in the field of landscape ecology, landscape architecture, a qualified engineer, or other qualified professional. It is proposed that the restoration areas be reviewed prior to the issuance of a Certificate of Compliance and within the two (2) year regulatory provision to ensure that wetland plant material has established itself as required under the Act and the Bylaw.

Any plant material that has failed to establish itself and has impaired the restoration area from providing the necessary plant species functions will be replaced in kind or substituted for a species that is establishing more efficiently. These species will be made based on the judgment of the restoration professional and success of other plantings installed in the restoration areas.

Observations over the two-year period will be summarized in a final written report, which will be submitted before or as part of the request for a Certificate of Compliance for the project. This report will summarize the restoration effort and function and value of the created area. Interim reports (written and/or oral) during the two-year period can be requested at the discretion of the Commission.

### *Irrigation During Establishment*

Given that the proposed plantings are to occur within a wetland, it is unlikely that irrigation will be necessary for plants to successfully establish. That being said, the area will be irrigated, as needed, by the project developer or the homeowners representative or landscape service. If necessary, irrigation is to be provided by the homeowner, or their designee, for up to two years or until plantings become established.

### *Physical Removal of Individual Plants*

Although invasive plants, roots and rootlets will be removed as part of the initial removal effort, there will still be seed material within the soil that could not feasibly be removed. Accordingly, the following spring and summer is a time to attend to this “mop up” effort. We typically use 5 gallon plastic pails and wait until the seedlings emerge and are about 4 to 6 inches in height. This makes for an easy job of pulling and then composting the seedlings. They are easily extracted, as the root has not had time to become well anchored. Additionally, spring is a good time to harvest any rootlets that may be trying to send up shoots. We typically will check monthly during the first growing season for seedlings and sprouting rootlets (see protocol described in Aftercare and Maintenance on Page 13, above). Each month involves less and less labor as the native species become established and occupy the area and less and less invasive plant biomass is present.



# Erosion & Sedimentation Control Plan

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## Seeding of Exposed Soils

After the invasive plants are removed from the restoration area, all exposed soils will be seeded with the grass seed mix and/or the wildflower seed mix, then hay mulched. This will establish a dense herbaceous material, which will function to filter silts and sediments from stormwater runoff at the site. Native canopy, shrub and herbaceous plantings will be installed at this time, as well.

## Protection of stripped and cleared areas during extended shutdown

In the unlikely event of an extended shutdown of the project all exposed soils will be seeded with winter rye and the drought tolerant seed mix, then hay mulched. This will provide a rapid germination of seed and the hay mulch will dissipate erosion and or sedimentation to downgradient wetland resource areas and/or drainage elements.

## Summary

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By improving the diversity of plant species, as well as, structural diversity of the plant material introduced to any area, greater wildlife habitat value can be realized. Greater diversity in plant species composition and structure creates additional niches for wildlife to occupy, thereby, increasing the local function and value of that area for wildlife. The intent of this restoration plan is to substantially improve the function and value of the buffer zone to the bordering vegetated wetland at the site and re-establish a native plant community adapted to this wetland environment.

We hope that the proposed plan meets the expectations of the Commission and will be approved as part of the Order of Conditions issued for this property.

Should you have any questions or comments, please call anytime at (978) 948-7717.

Respectfully submitted,

**DeRosa Environmental Consulting, Inc.**



Laura Krause, BA  
Environmental Chemist



Michael J. DeRosa, Principal  
LSP, LEED AP, PWS

MJD/LK

# Figures

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FIGURE 1: USGS LOCUS MAP

FIGURE 2A: PROJECT ELEMENTS PLAN, BY DEROSA ENVIRONMENTAL

FIGURE 2B: POCKET WETLAND PLANTING PLAN

FIGURE 2C: WETLAND REPLICATION PLANTING PLAN

FIGURE 2D: INVASIVE SPECIES MANAGEMENT PLAN

FIGURE 2E: UPLAND RESTORATION PLANTING PLAN

# Restoration Plan

57 Perkins Row, Topsfield, MA



Figure 1. Topographic Map

USGS Topographic Maps



**DEROSA**  
Environmental  
CONSULTING, INC.

167 Main Street, PO Box 716, Rowley Massachusetts 01969 USA  
978 948-7717 Office - 978 948-7718 Fax



1. PROPOSED GRADING ON THE LOTS SHOULD BE CONSIDERED APPROXIMATE AND SUBJECT TO CHANGE BASED ON THE FINAL DWELLING BUILDING PLANS, SEPTIC SYSTEM DESIGN AND THE LIKE ASSOCIATED WITH SINGLE-FAMILY HOME DEVELOPMENT.
2. ROOF DRYWELLS SHALL BE ADJUSTED BY THE LOT DEVELOPERS BASED ON THE FINAL DWELLING DESIGN.
3. SUBDRAINS SHALL BE INSTALLED WITHIN CUT AREAS AT THE LOCATIONS SHOWN.
4. REAR ROADWAY, EASEMENT AND PROFILE FOR PROPOSED UTILITIES INCLUDING WATER SYSTEM, STORM SEWER SYSTEM, CULVERTS AND UNDERGROUND ELECTRIC, TELEPHONE AND COMMUNICATION CONDUITS.

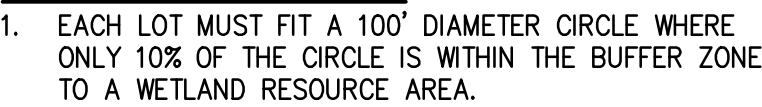




Figure 2a. Mitigation Elements Plan  
57 Perkins Row | Topsfield, MA

LK/mjd 6/19/2015

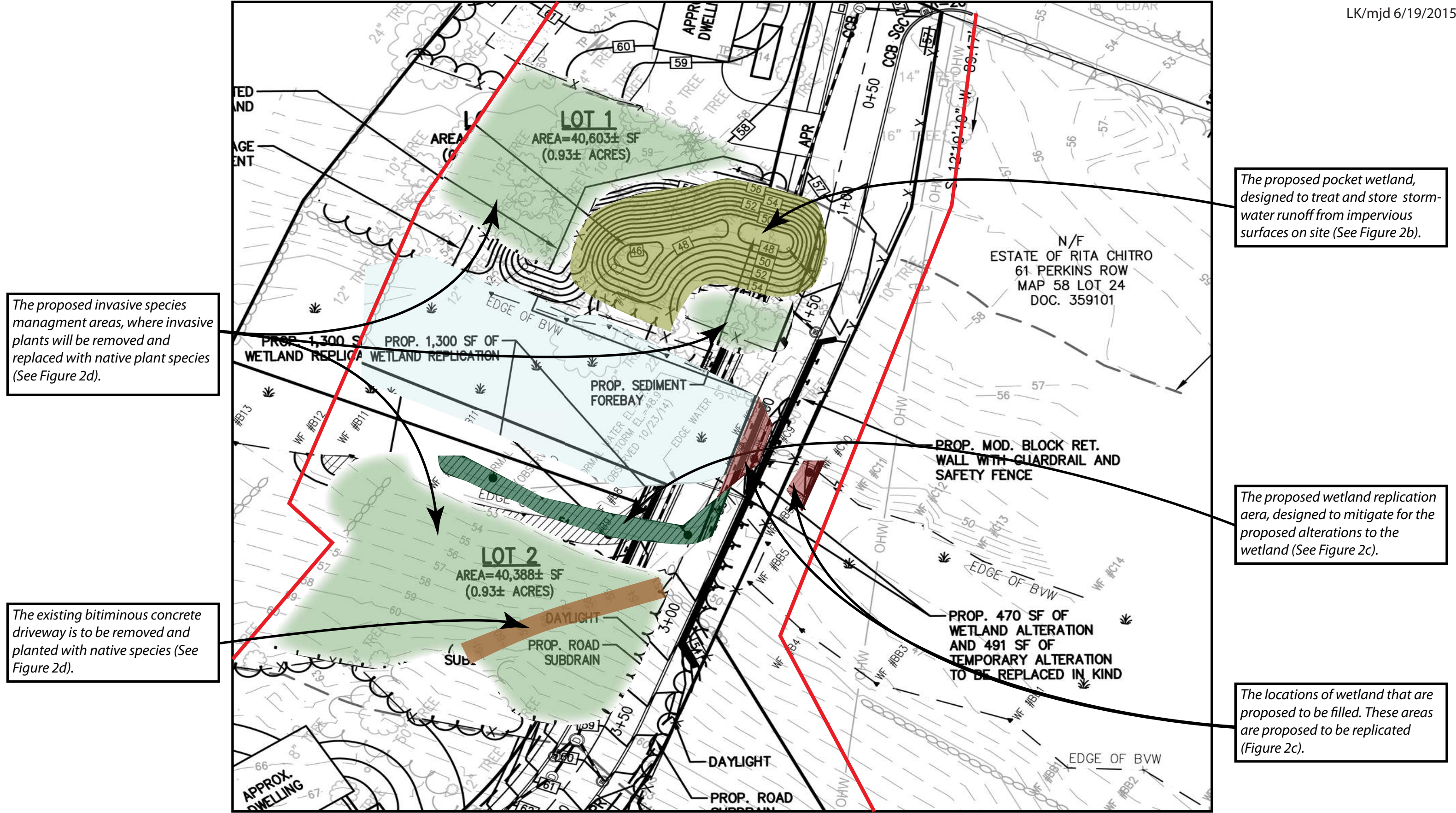
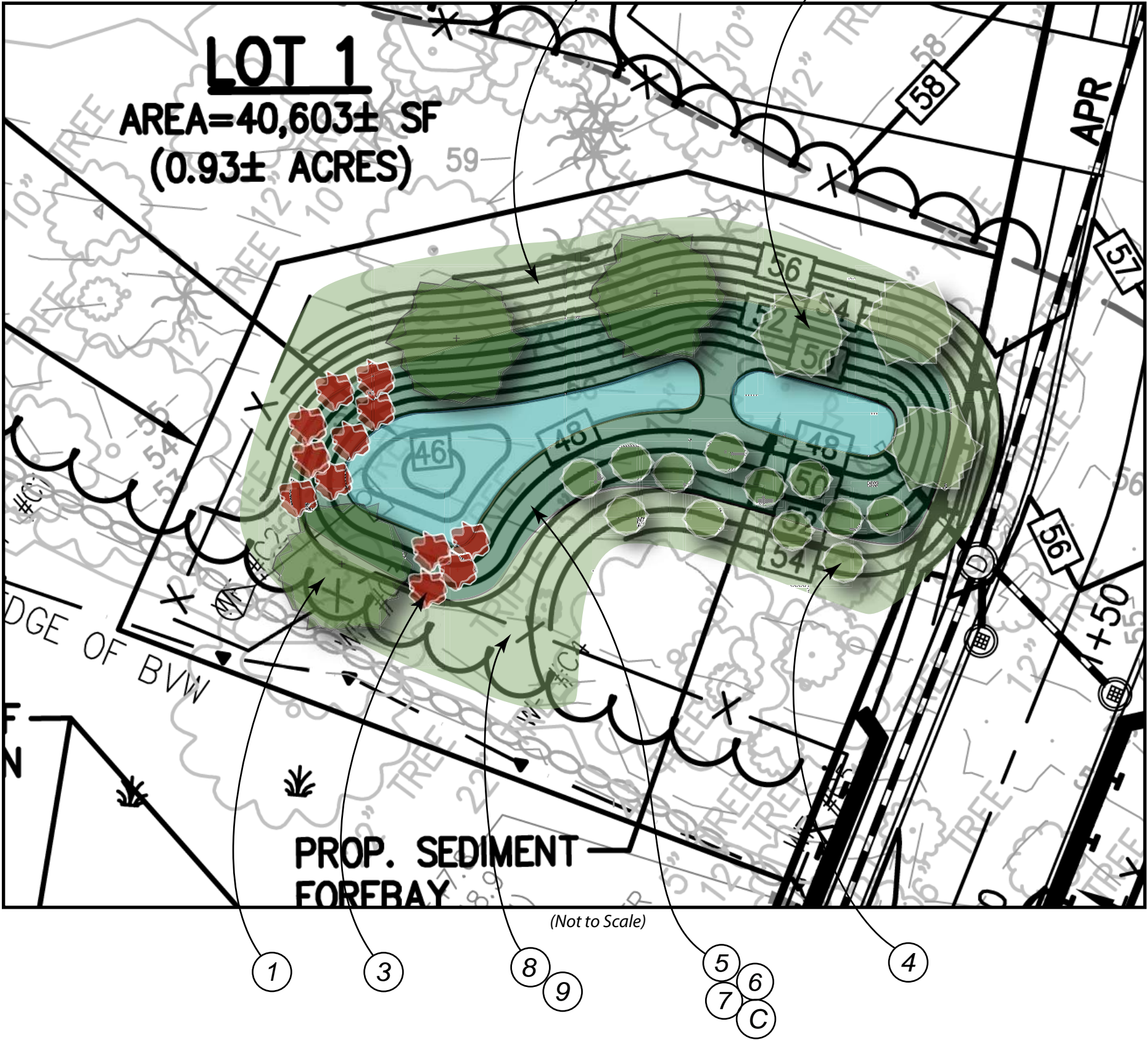




Figure 2b. Pocket Wetland Planting Plan  
57 Perkins Row | Topsfield, MA

LK/mjd 6/19/2015



POCKET WETLAND PLANT LIST | 57 PERKINS ROW | TOPSFIELD MA

Common Name	Botanical Name	Indicator	Size	Quantity
① Tupelo	<i>Nyssa biflora</i>	OBL	1.5" cal	3
② Red Maple	<i>Acer rubrum</i>	FAC	1.5" cal	3
③ Winterberry	<i>Ilex verticillata</i>	FACW	3 gallon	12
④ Redosier Dogwood	<i>Cornus sericea</i>	FACW	3 gallon	12
⑤ Woolgrass	<i>Scirpus cyperinus</i>	OBL	1 gallon	25
⑥ Tussock Sedge	<i>Carex stricta</i>	OBL	1 gallon	50
⑦ Soft Rush	<i>Juncus effusus</i>	OBL	1 gallon	25

UPLAND SLOPE PLANT LIST | 57 PERKINS ROW | TOPSFIELD MA

⑧ Coneflower	<i>Rudbeckia lacinata</i>	UPL	1 gallon	50
⑨ Sundial Lupine	<i>Lupinus perennis</i>	UPL	1 gallon	50

General Notes:

1. Base plan prepared by The Morin-Cameron Group, Inc., Topsfield, Massachusetts, dated June 10, 2015.
2. Planting notes added by DeRosa Environmental Consulting, dated June 19, 2015.
3. Soils to be augmented with 10 to 12 inches of a custom soil mix consisting of 1:1:1, sand:compost:loam.
4. Pocket wetland to be graded 1 foot below proposed grade and infill with custom soil mix to ensure saturation of planting media and contact with water table
5. Plants to be installed by a restoration specialist.
6. Locations of individual plants are approximate and subject to change based on site specific conditions at the time of planting.
7. Installation of plantings are to be done by hand, but for larger ball and burlapped stock and trees. A small backhoe or mini-excavator may be used for this material.
8. Irrigation shall be provided by owner, as needed, during the first two (2) growing seasons, or until plants have established.

Michael J. DeRosa  
PWS No. 2250



SEED MIX SPECIFICATIONS

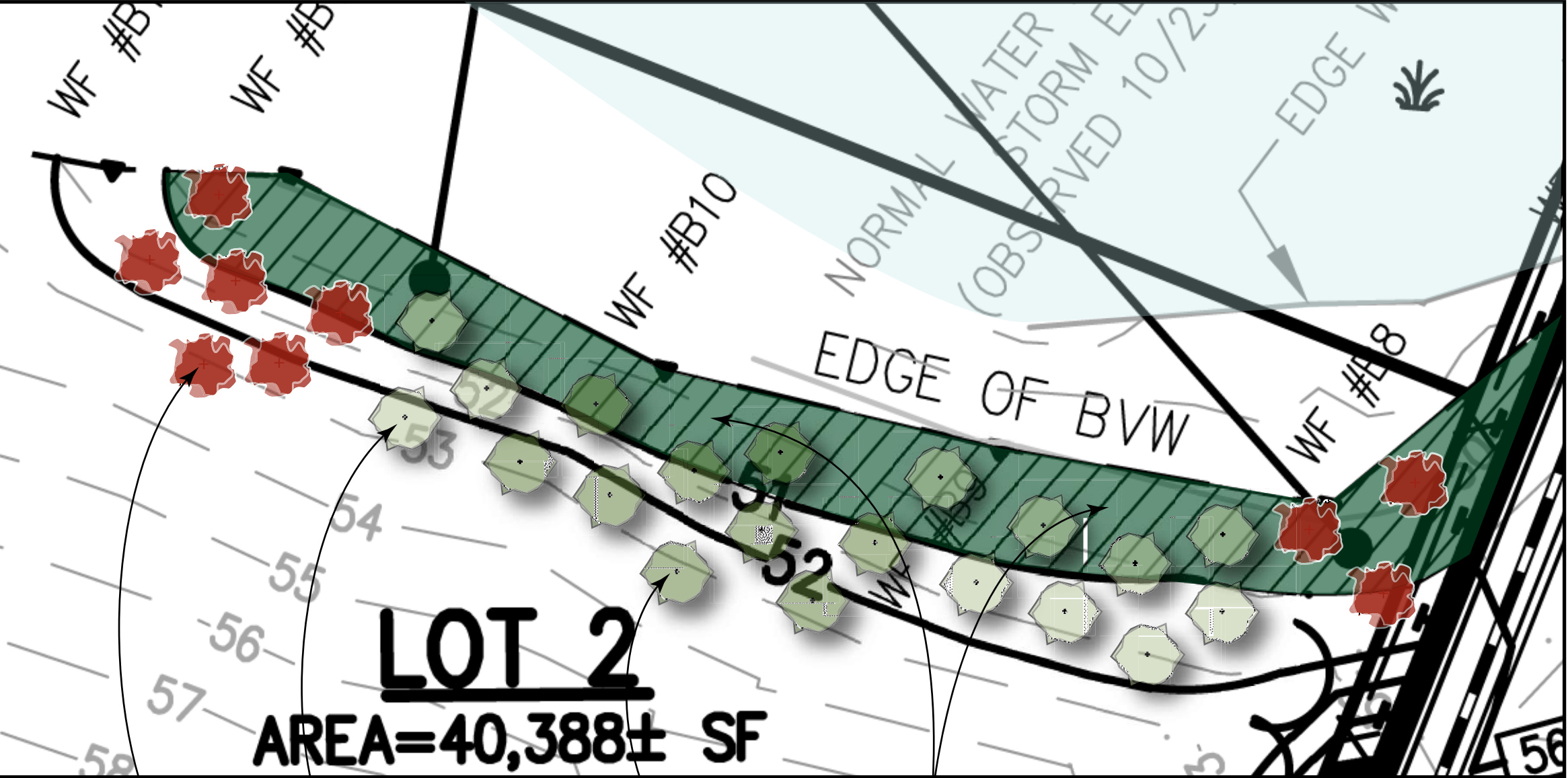
- Ⓐ Custom Upland Seed Mix includes: Indian grass (UPL), switchgrass (FAC), upland bentgrass (FACU), ticklegrass (FAC), little bluestem (FACU-), big bluestem (FAC), and sand dropseed (UPL) (10 lbs)
- Ⓑ Custom Wetland Seed Mix includes: soft rush (OBL), sensitive fern (FACW), riverbank wildrye (FACW), rough bentgrass (FACW), fowl bluegrass (FACW), Virginia wildrye (FACW-) (5 lbs)
- Ⓒ Corliss North Shore Shady Mixture includes: creeping red fescue (FACU), tall fescue (FACU), perennial ryegrass (FACU), chewings fescue (UPL), rough bentgrass (FACW) (10 lbs)



Figure 2c. Wetland Replication Planting Plan

57 Perkins Row | Topsfield, MA

LK/mjd 6/19/2015



- General Notes:**
1. Base plan prepared by The Morin-Cameron Group, Inc., Topsfield, Massachusetts, dated June 10, 2015.
  2. Planting notes added by DeRosa Environmental Consulting, dated June 19, 2015.
  3. Soils to be augmented with 10 to 12 inches of a custom soil mix consisting of 1:1:1, sand:compost:loam.
  4. Replication area to be graded 1 foot below proposed grade and infill with custom soil mix to ensure saturation of planting media and contact with water table.
  5. Plants to be installed by a restoration specialist.
  6. Locations of individual plants are approximate and subject to change based on site specific conditions at the time of planting.
  7. Plant symbols do not necessarily indicate single plants and may indicate groupings of plants
  8. Installation of plantings are to be done by hand, but for larger ball and burlapped stock and trees. A small backhoe or mini-excavator may be used for this material.
  9. Irrigation shall be provided by owner, as needed, during the first two (2) growing seasons, or until plants have established.

Michael J. DeRosa  
PWS No. 2250

*[Signature]*



WETLAND REPLICATION AREAS PLANT LIST | 57 PERKINS ROW | TOPSFIELD MA

Common Name	Botanical Name	Indicator	Size	Quantity
① Winterberry	<i>Ilex verticillata</i>	FACW	3 gallon	9
② Redosier Dogwood	<i>Cornus sericea</i>	FACW	3 gallon	9
③ High-bush Blueberry	<i>Vaccinium corymbosum</i>	FACW	1 gallon	9
④ Woolgrass	<i>Scirpus cyperinus</i>	OBL	1 gallon	12
⑤ Tussock Sedge	<i>Carex stricta</i>	OBL	1 gallon	12
⑥ Soft Rush	<i>Juncus effusus</i>	OBL	1 gallon	12
⑦ Sensitive Fern	<i>Onoclea sensibilis</i>	FACW	1 gallon	12
⑧ Joe Pye Weed	<i>Eutrochium maculatum</i>	OBL	1 gallon	12
⑨ Swamp Milkweed	<i>Asclepias incarnata</i>	OBL	1 gallon	12
⑩ Water Iris	<i>Iris versicolor</i>	OBL	1 gallon	12
⑪ Bonset	<i>Eupatorium perfoliatum</i>	FACW	1 gallon	12

SEED MIX SPECIFICATIONS

Ⓐ Custom Wetland Seed Mix includes: soft rush (OBL), sensitive fern (FACW), riverbank wildrye (FACW), rough bentgrass (FACW), fowl bluegrass (FACW), Virginia wildrye (FACW-) (5 lbs)



Figure 2d. Invasive Species Management Plan  
57 Perkins Row | Topsfield, MA



Asiatic Bittersweet  
Common Privet  
Multiflora Rose

Common Privet  
Glossy Buckthorn  
Burning Bush  
Multiflora Rose  
Common Privet

**General Notes:**

1. Base plan prepared by The Morin-Cameron Group, Inc., Topsfield, Massachusetts, dated June 10, 2015.
2. Planting notes added by DeRosa Environmental Consulting, dated June 19, 2015.
3. Soils to be augmented, as necessary, with a custom soil mix consisting of 1:1:1, sand:compost:loam.
4. Understory removal of invasive species will be conducted using whole plant removal techniques.
5. If invasive species are identified that are not located on this plan, they will be removed using whole plant removal. Identification of invasives is to be conducted by a restoration specialist.
6. Native plant material will be installed in the locations where invasive species have been removed. The plants will be chosen from the plant list found on this plan and locations will be determined on site based on site conditions at the time of planting.
7. Installation of plantings are to be done by hand, but for larger ball and burlapped stock and trees. A small backhoe or mini-excavator may be used for this material.
8. Irrigation shall be provided, as needed, during the first two (2) growing seasons, or until plants have established.

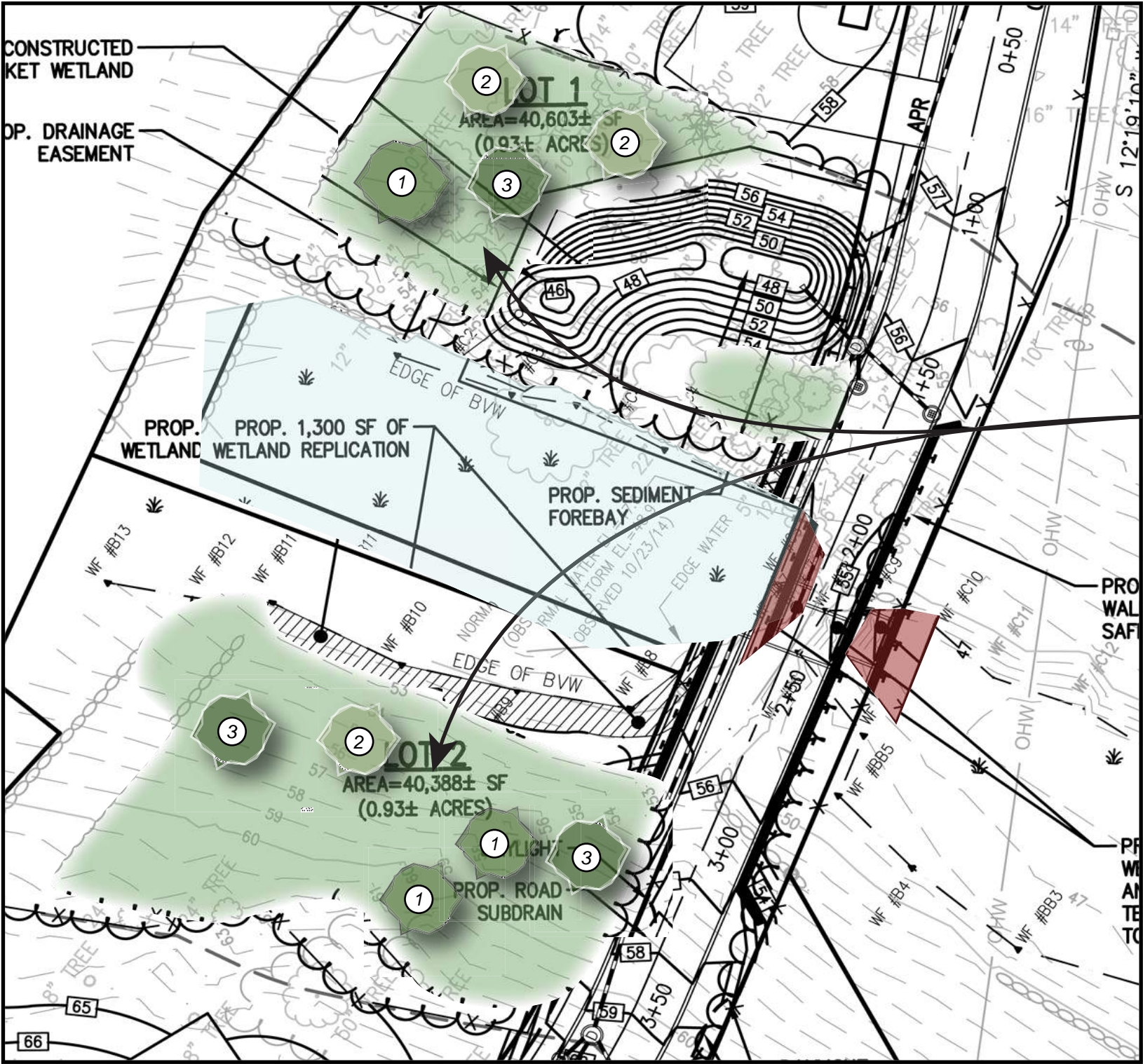
Michael J. DeRosa  
PWS No. 2250





Figure 2e. Upland Restoration Planting Plan  
57 Perkins Row | Topsfield, MA

LK/mjd 6/19/2015



UPLAND RESTORATION PLANT LIST | 57 PERKINS ROW | TOPSFIELD MA

Common Name	Botanical Name	Indicator	Size	Quantity
① Red Oak	<i>Quercus rubra</i>	FACU	1.5" cal	3
② American Beech	<i>Fagus grandifolia</i>	FACU	1.5" cal	3
③ Shagbark Hickory	<i>Carya ovata</i>	FACU	1.5" cal	3
④ Witch Hazel	<i>Hamamelis virginiana</i>	FACU	3 gallon	25
⑤ Low-Bush Blueberry	<i>Vaccinium angustifolium</i>	FACU	1 gallon	50
⑥ Little Bluestem	<i>Schizachyrium scoparium</i>	FACU	1 gallon	50

④  
⑤  
⑥  
A (Note: to be installed in areas where invasive plants have been removed.)

General Notes:

1. Base plan prepared by The Morin-Cameron Group, Inc., Topsfield, Massachusetts, dated June 10, 2015.
2. Planting notes added by DeRosa Environmental Consulting, dated June 19, 2015.
3. Soils to be augmented, as necessary, with a custom soil mix consisting of 1:1:1, sand:compost:loam.
4. Understory removal of invasive species will be conducted using whole plant removal techniques.
5. If invasive species are identified that are not located on this plan, they will be removed using whole plant removal. Identification of invasives is to be conducted by a restoration specialist.
6. Native plant material will be installed in the locations where invasive species have been removed. The plants will be chosen from the plant list found on this plan and locations will be determined on site based on site conditions at the time of planting.
7. Installation of plantings are to be done by hand, but for larger ball and burlapped stock and trees. A small backhoe or mini-excavator may be used for this material.
8. Irrigation shall be provided, as needed, during the first two (2) growing seasons, or until plants have established.

SEED MIX SPECIFICATIONS

- ① Corliss North Shore Shady Mixture includes: creeping red fescue (FACU), tall fescue (FACU), perennial ryegrass (FACU), chewings fescue (UPL), rough bentgrass (FACW) (10 lbs)

Michael J. DeRosa  
PWS No. 2250





# Appendix B

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## PLANT FACT SHEETS

# Plant Fact Sheet

## SWAMP TUPELO

*Nyssa biflora* Walt.

Plant Symbol = NYBI

Contributed by: USDA NRCS Plant Materials Program



Robert H. Mohlenbrock  
USDA NRCS 1991  
Southern Wetland Flora  
@ USDA NRCS PLANTS

### Alternate Names

*Nyssa sylvatica* Marsh. var. *biflora* (Walt.) Sarg., blackgum, swamp blackgum

### Uses

**Wildlife:** Its foliage and twigs are widely browsed by white-tailed deer. Fruits are highly nutritional and eaten by a variety of birds and small mammals. Additionally, provides cavity and nesting sites for a wide variety of birds and mammals. Its flowers are a source of nectar for bees kept by commercial honey producers.

**Timber:** Used mainly for lumber, veneer, paper pulp, and to some extent railroad ties. It is also used for flooring, rollers in glass factories, blocks, gunstocks, and pistol grips.

**Recreation and Beautification:** Excellent ornamental plant for its straight bole, shapely crown and attractive autumn foliage.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

### Description

*Nyssa biflora* (Walt.), swamp tupelo, is limited to Coastal Plain swamps and estuaries from Maryland and southeastern Virginia south to southern Florida. It grows on the east side of the Mississippi River to western and southern Tennessee. A moderately large tree, it can grow to over 100 feet in height and 3 to 4 feet in diameter; it has a narrow, oblong crown and spreading root system which commonly produces vigorous sprouts. Bark is light brown, deeply furrowed with scaly longitudinal ridges. Leaves are alternate, simple, dark green and shiny above, paler and often hairy below.

### Adaptation and Distribution

Swamp tupelo grows well on a variety of wet bottomland soils including organic mucks, heavy clays, and wet sands. Best growth is achieved on sites where the soil is continuously saturated with very shallow moving water such as banks of swamps, ponds, and estuaries of the Coastal Plain, and in low coves and seepages which remain wet year-round.

Swamp tupelo is distributed throughout the Southeast. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

### Establishment

Stump sprouting is common following logging. It is classed as intolerant to shade and will not develop unless released.

Swamp tupelo is a prolific seed producer. Seed viability averages 60 percent, increasing as the season progresses. Seeds are disseminated primarily by gravity and birds, others generally fall to the ground and remain dormant in the litter or are carried by water.

Seed overwinters on cool, damp soil and germinates the following spring. It requires nearly full sunlight for optimum early growth. Seedlings tolerate more competition but are much less adaptable than black tupelo. Prechilled seeds must be sown in spring. Seeds are drilled at the rate of 15 per foot of row and covered with ½ - 1 inch of soil. A mulch of pine needles is recommended. Beds must be kept moist.

It sprouts from the stump following disturbance. Sprouts arise from suppressed buds and are

concentrated near the top of the stump. Stump sprouts can produce seeds at 2 years of age.

### **Management**

Seedling establishment is best accomplished by shelterwood method. Regeneration can also be accomplished by clear-cutting if prior to a good seed fall or if advanced regeneration already exist. Due to the high palatability of seedlings and sprouts, swamp tupelo must be protected by controlling deer populations. It often competes with loblolly and shortleaf pine for water and light, reducing its growth and development. Basal tree injections with approved herbicides are effective control methods for crown kill.

### **Pests and Potential Problems**

The forest tent caterpillar (*Malacosoma disstria*) defoliates swamp tupelo causing growth loss and mortality. Tupelo lesion caused by *Fusarium solani* results in swelling and roughened bark. *Fomes spp.*, *Polyporus spp.*, *Daedalea ambigua*, *Hydnum erinaceum*, *Lentinus tigrinus*, and *Pleurotus ostreatus* fungi cause heartrot. It is highly susceptible to sapsucker and easily damaged by salt spray and sulfate-enriched water.

### **Cultivars, Improved, and Selected Materials (and area of origin)**

No cultivars are recommended at this time. Seeds are extracted from ripe fruits picked from the ground, from standing or felled trees.

### **Prepared By & Species Coordinator:**

*USDA NRCS Plant Materials Program*

Edited: 05Feb2002 JLK; 060802 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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# Plant Fact Sheet

## RED MAPLE

*Acer rubrum* L.

Plant Symbol = ACRU

Contributed by: USDA NRCS New York State Office



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### Alternative Names

swamp maple

### Uses

**Erosion control:** Red maple is available in quantity for revegetation work and landscaping. It is a valuable riparian buffer plant due mostly to its tolerance of wetter soils.

**Wildlife:** Red maple seeds provide food for squirrels and some birds. The species is not preferred by deer as a browse source, so in heavy deer pressure this species is over abundant in forest regeneration.

**Wood:** The wood is not desirable for lumber or veneer.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

### Weediness

This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed. Please consult

with your local NRCS Field Office, Cooperative Extension Service office, or state natural resource or agriculture department regarding its status and use. Weed information is also available from the PLANTS Web site at [plants.usda.gov](http://plants.usda.gov).

### Description

*Acer rubrum* L., red maple, is a wide-ranging native tree that is very well adapted to most soil and site conditions. This species is one of the early harbingers of fall as it turns color well in advance of other eastern deciduous trees, especially when it is located in wet sites. The fiery colors of fall are typically a brilliant red. Conversely, it is also one of the earliest flowering trees in the spring. Red maple has the smallest winged seeds (samaras) of all native maples, about 5/8-3/4 inches long. Also, the samaras ripen in the spring- a trait shared only with silver maple which has much larger samaras. This maple is a medium sized tree with fairly rapid growth (2-5 ft/yr), but not as fast as the much larger growing silver maple.

### Adaptation and Distribution

Red maple is adapted to wet sites where it associates with black ash, cottonwood, and black gum. Some forested wetlands are referred to as maple swamps due to their stands of red maple. However, red maple is also well adapted to well drained but moist soils of upland sites where its companions are sugar maple, beech, black cherry and the birches. This capability makes this species a common tree in home landscapes where the fall colors can be displayed. The range of red maple extends from Florida to the Maritimes and west to Texas and Minnesota. Red maple is shade tolerant.

For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

### Establishment

Red maple seed is easily germinated in nature or in nurseries. The seed can be direct planted with no pre-treatment. The seedlings have moderately fast growth and are usually outplanted as 1 year old or 2 year old bareroot stock.

### Management

Red maple seedlings must be protected from fire and livestock, and are greatly aided where weed and grass

competition is controlled. This is particularly true in any plantings where grass sod is the cover between trees. Weed control mulch or fabric, or herbicide treatments are recommended for the first three years or longer.

### **Pests and Potential Problems**

Few pests seriously bother red maple, although the Asian long-horned beetle is a dire threat to the species if eradication efforts fail.

### **Cultivars, Improved, and Selected Materials (and area of origin)**

There are many selections in the horticultural trade that have mostly been selected for a growth form oddity. These are not recommended for riparian buffer use, rather the typical growth form is preferred. Purchasing stock of known origin will aid in assuring adaptation, and nurseries should be willing to provide this information.

### **Prepared By & Species Coordinator:**

*John Dickerson*, retired  
USDA NRCS New York State Office  
Syracuse, New York

Edited: 31Jan2002 JLK; 24may06jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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## COMMON WINTERBERRY *Ilex verticillata* (L.) Gray Plant Symbol = ILVE

Contributed by: USDA NRCS Plant Materials Program



Robert H. Mohlenbrock  
 USDA NRCS 1989  
 Midwestern Wetland Flora  
 @ USDA NRCS PLANTS

**Warning:** Although this shrub species is a good provider of wildlife food, its fruits are poisonous to humans.

### Uses

The attractive bright red fruit of winterberry is eaten by small mammals and more than 48 species of birds. The leaves and stems of winterberry are not a preferred source of browse, but moose, whitetail deer, cottontail rabbits, and snowshoe hare do utilize this plant. The persistent bright red fruit of this shrub make it very popular for landscaping. It is recommended for planting in shady moist areas, even though its growth and form are best under open grown conditions.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

### Description

Winterberry is an erect moderate sized shrub, growing to heights of 5 to 15 feet tall. The smooth bark of winterberry is gray to blackish, with knobby lenticels. The dense branches of this shrub grow in a zigzag pattern with an upright spreading crown. The twigs are slender, with gray to gray-brown color and small buds.

The simple, smooth, obovate to oblong-ovate foliage is sharply double toothed, with medium fine texture. The deciduous leaves are arranged alternately along the stems. Each leaf is 1 1/2 to 4 inches long, with dark green summer color turning yellow in fall, then drop off by mid-October.

Small, inconspicuous, axillary, greenish to yellowish-white flowers bloom from April to July, after leaves have emerged. Like most others in the holly genus, winterberry is dioecious. Three years after planting, pistillate flowers begin to emerge in small clusters plants and staminate flowers develop on male plants with up to twelve flowers in a cluster; only now can plant gender be determined. Scarlet red to orange, globular fruit mature by late summer, often remaining on the plant into mid-winter. The berry-like fruit is about 1/4 inch in diameter, occurring singly or in pairs, each containing 3 to 5 small nutlets. There are an average of 92,000 seeds per pound.

### Adaptation and Distribution

Winterberry is found throughout the eastern United States. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

### Establishment

Planting units of winterberry are propagated by seed, rooted stem divisions, and stem cuttings alike. The germination is usually hindered by hard seed coats and embryo dormancy. Utilizing proper after ripening and cold moist stratification procedures, germination can be stimulated. Seed should be covered with at least 1/8 to 1/2 inch of soil on nursery beds. Fall seedlings should be mulched for winter protection.

When seedlings are acquired, the sex of the plant is typically indeterminable, in contrast to those propagated vegetatively. In late fall root suckers can be directly dug and transplanted, while actively



growing softwood cuttings are taken from late spring to mid-summer. The cuttings are first placed under glass or plastic, but once roots form and begin to grow, they can be transplanted into containers or nursery beds for further development.

Utilize standard tree and shrub planting procedures to plant bare rooted transplants, containerized, or balled and burlapped stock.

### **Management**

It is important to plant both male and females within 40 feet of one another for adequate pollination. For wildlife plantings, it is advantageous to plant higher numbers of females. Weed control by mowing or chemical application is necessary to keep competing vegetation from over-topping winterberries.

### **Cultivars, Improved, and Selected Materials (and area of origin)**

There are a number of ornamental varieties, selected for berry and leaf color, available from commercial nurseries. Local and regionally collected materials are available from native plant nurseries.

### **Prepared By & Species Coordinator:**

*USDA NRCS Northeast Plant Materials Program*

Edited: 05Feb2002 JLK; 060801 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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## REDOSIER DOGWOOD

*Cornus sericea* L.

Plant Symbol = COSE16

Contributed By: USDA NRCS National Plant Data Center & Carlinville (IL) Field Office



Robert H. Mohlenbrook  
 USDA, NRCS, Wetland Science Institute  
 @ PLANTS

### Alternative Names

American dogwood, red willow, redstem dogwood, *Cornus sericea* ssp. *sericea*; *Cornus stolonifera* var. *nevadensis* Jepson and *Cornus stolonifera* Michaux (Hickman 1993). A subspecies, *Cornus sericea* ssp. *occidentalis* (Torr. & Gray) Fosberg is known as western dogwood.

### Uses

**Ethnobotanic:** Native Americans smoke the inner bark of redosier dogwood in tobacco mixtures used in the sacred pipe ceremony. Dreamcatchers, originating with the Potawatomi, are made with the stems of the sacred redosier dogwood. Some tribes ate the white, sour berries, while others used the branches for arrow-making, stakes, or other tools. In California, peeled twigs were used as toothbrushes for their whitening effect on teeth (Strike 1994). Bows and arrows were made from *Cornus* shoots. The inner bark is used for tanning or drying animal hides.

The Apache, Cheyenne, Dakota, Montana Indians, Ojibwa, Potawatomi, Omaha, Ponca, and Thompson Indians all use the inner bark in a tobacco mixture for

smoking the sacred pipe (Moerman 1986). The leaves and/or inner bark of redosier dogwood are also used as a smoking mixture by the Okanagan-Colville,

the Flathead, the Kootenay, and the Blackfeet peoples in the western United States and Canada (Hellson 1974, Hart 1976, Turner 1978, Turner et al. 1980, Johnston 1987). The Navaho-Kayentaf and Navaho-Ramah used the plant ceremonially as a Mountain-top-way emetic (Moerman 1986). An infusion of redosier dogwood bark was used as an anti-diarrheal by the Chippewa and the Potawatomi, an antidote for weak kidneys by the Shuswap, and a pediatric aid for children who wet the bed by the Shuswap. The Chippewa used an infusion of the bark for eruptions caused by poison ivy. The Chippewa and the Micmac used a decoction of redosier dogwood root for sore eyes and catarrh. The Okanagan and the Thompson Indians took a decoction of the leaves. Other remedies treated by redosier dogwood included headaches, sore throats, a wash for ulcers, a substitute for "larb", and a decoction of bark was taken as an antidote for weakness.

The Maidu of Northern California used redosier dogwood as a tonic, a laxative, emetic, and cathartic (Strike 1994). Maidu women took a dogwood decoction after childbirth.

The Indians of the Missouri region (Densmore 1974) ate the fruits. The berries are known to be tart and bitter, but were nonetheless eaten by all of the southern Interior peoples of British Columbia, including the Nlaka'pamux, Lillooet, Okanagan-Colville, Shuswap, Kootenay, Blackfeet, and the Flathead of Alberta and Montana (Kuhnlein and Turner 1991). The fruits were gathered from August to October and eaten fresh, a few at a time, or, more commonly, were pounded and mixed with other fruits, such as chokecherries (*Prunus virginiana*) or Saskatoons (*Amelanchier alnifolia*). Some people mashed the berries and dried them in cakes; others dried and stored them. Eating a few raw fruits was considered to be a good tonic among the Nlaka'pamux and the Okanagan-Colville, who ate them raw as a kind of "relish" (Turner 1978; Turner et al. 1990).

Redosier dogwood is used for basketweaving. Sometimes called red willow, both *Salix* species and *Cornus sericea* are used interchangeably. Differences in stem color create a multi-hued design

element. Indian people from the mid-Columbia River used redosier dogwood to make “ribbons” for basket decorations (Schlick 1994). If gathered in the early spring, the bark will retain its deep red color when dried and could be mistaken for cherry. The Hidatsa, Arikara, and Mandan made twill plaited burden baskets with two-toned dark and light designs; these baskets were made of willow (*Salix nigra*), redosier dogwood, and boxelder (*Acer negundo*) splints (Turnbaugh et al. 1986, Hart 1976). Willow and redosier dogwood were used by the Cheyenne, Arapaho, Kiowa, Pawnee, and Teton Sioux to make a coarsely coiled gambling basket for dice.

The Ojibwa and the Chippewa used redosier dogwood bark as a dye. The inner bark was mixed with other plants or minerals and used to make a red dye, a light red dye, a black dye, and an ecru or “khaki” colored dye (Densmore 1974).

**Wildlife:** The fleshy fruits of dogwoods are very valuable to wildlife, particularly in the Northeast (Martin et al. 1951). The fruit ripens in late summer, and besides being available through the fall, some of the berries may persist on the plants into the winter months. Wildlife browse the twigs, foliage, and fruits. Birds known to eat the fruit include: wood ducks, eastern bluebirds, cardinals, catbirds, long-tailed chats, crows, purple finches, yellow-shafted flickers, crested flycatchers, grosbeaks, kingbirds, American magpies, mockingbirds, crested mynah birds, orioles, robins, yellow-bellied sapsuckers, European starlings, tree swallows, scarlet tanagers, brown thrashers, thrushes, vireos, pine warblers, cedar waxwings, and woodpeckers. Game birds who eat both the fruits and buds include grouse, ring-necked pheasants, band-tailed pigeons, greater prairie chickens, bobwhite quail, and wild turkeys. The shrubs provide excellent nesting habitat for songbirds. Mammals that eat the fruit and foliage include black bear, beaver, mountain beaver, cottontail rabbits, raccoons, eastern skunks, squirrels, chipmunks, mice, and rats. Deer, elk, Mountain goat, and moose browse the twigs and foliage.

**Landscaping & ornamental:** Redosier dogwood is often planted as an ornamental, both to beautify the landscape and to attract birds. Dogwood is often used for landscaping and as a secondary plant in windbreaks.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant’s

current status, such as, state noxious status, and wetland indicator values.

### Description

**General:** Dogwood Family (Cornaceae). Redosier dogwood is a woody deciduous shrub generally 1.4-6 m (4.6-20 ft) tall. The bark and twigs are reddish to purple and fairly smooth from autumn to late spring; after the leaves have fallen, the deep burgundy branches add color to the winter landscape. The bark, twigs, and leaves are bright green in spring through summer. The simple, opposite leaves are 5-10 cm (2-4 in) long, dark green above and hairy and lighter-colored below, with smooth margins, rounded bases, pointed tips, and falsely parallel veins. Flowering occurs from June to August. The inflorescence is a cyme, with 2-3 mm (0.08-0.12 in) white to cream-colored flowers. The white berries are smooth on the faces, furrowed on the sides.

### Distribution

For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site. Redosier dogwood has a wide distribution from California north to Alaska and throughout the country to the eastern United States south to Mexico. It generally grows at elevations below 2500 m.

### Establishment

**Adaptation:** Redosier dogwood grows in soils that are saturated for at least a portion of the growing season. Redosier dogwood is common on the edges of lakes, ponds, within wetlands, and along streams. Not as tolerant of long-term root saturation as are some other shrubs, dogwood seems to prefer wetland margins where soils are nitrogen-rich, saturated, and shallowly inundated in the spring, and may be completely dry by late summer. It is tolerant of fluctuating water tables. The “osier” in redosier dogwood is derived from French, meaning “willow-like”; it is often called red willow because of its red stems.

**Propagation from cuttings:** Redosier dogwood can be started easily by division, french layering, and hardwood cuttings. To propagate suckers by division:

- Lift a root with suckers on it without disturbing the parent plant. Check that there are fibrous roots at the base of the suckers.
- Remove the suckering roots by cutting it off close to the parent plant. Firm the soil around the parent plant.
- Cut the main root back to the fibrous roots, then divide the suckers so that each has its own roots. Cut back the top-growth by about half.

- Treat each sucker or hardwood cutting at the base with IBA at 20,000 ppm liquid formulation to promote rooting. Alternatively, treatment with 2 percent IBA talc; this will promote rooting on both suckers and stem cuttings.
- Replant the suckers in open ground in prepared holes with good potting soil. Firm the soil around the suckers and water.
- Before growth starts in the spring, lift the plant. Break the clump into sections, retaining those with vigorous shoots and well-developed roots.
- Prune any damaged roots, and cut back the top-growth by one-third to a half to reduce water loss. Replant the divisions in the open and water in dry weather.
- Ultimately, simply lift a suckering root, sever it from the parent plant, and then replant it in the open.

To ensure survival of cuttings or suckers through the following winter in cold climates, the potted cuttings should be kept in heated cold frames or poly-houses to hold the temperature between 0-7°C (32-45°F). Rooted cuttings that had shoot growth in the fall, but were not given nitrogen, had the best over-winter survival in a cold frame with microfoam.

*French layering:* Layering is a method where a stem is encouraged to develop roots before being removed from the parent plant.

- In spring, plant a rooted layer or young plant, label it, and grow it for a season. Then, in the dormant season, cut back the stem to within 3 inches (8 cm) of the ground.
- In the following spring, apply a balanced fertilizer at the rate of 2-4-oz/sq yd (60-110 g/sq m). Space the stems evenly again; dropping each into a 2-inch (5-cm) deep trench. Peg down each stem and cover with soil, leaving the shoot tips exposed. Hill up all but 2-3 inches (5-8 cm) of the new shoots as they develop, until the mound is 6 inches (15 cm) high. Water as needed.
- After leaf fall, carefully fork away the soil from around the new shoots until the stems that were laid horizontally are exposed. Cut these flush with the basal area of the stems. Then cut the stems to separate the rooted sections. Pot these or plant them out in the open garden, and label them. The same redosier dogwood basal area may be used to propagate further layers.

*Propagation by seed:* Redosier dogwood is established easily from seed. The best germination is obtained if the seeds are gathered as soon as the fruit starts to color or ripen, from August to October. If

the seeds are allowed to dry out, it is best to remove seeds from the fruit and soak in water.

The best results are obtained from fall sowing of freshly harvested seeds. Fruits collected too late to sow in the fall should be stored, pre-chilled until the next season, and sown outdoors the following fall. To effectively condition the seed for germination, store for two months in moist sand at 5°C for 90 days. After pre-chilling, expose the seeds to fluctuating temperatures from 12/72°C for 10 days (Young and Young 1992). With some species, the warm stratification period may be replaced by mechanical scarification or soaking in sulfuric acid. Seeds sown in nursery beds should be covered with 0.25-0.5 in (0.6-1.25 cm) of soil. Fall-sown beds should be mulched during the winter.

### Management

Redosier dogwood is often coppiced in late fall after the leaves turn brown and fall off the stem. Cut all stems to approximately 2-3 in (5-8 cm) from the base before growth begins in spring. Apply fertilizer around the shrub to promote new growth, then apply mulch around the base. Coppicing stimulates the growth of new, vigorous stems whose deep burgundy color is especially vivid.

*Traditional resource management:* Redosier dogwood was traditionally tended by pruning or burning to produce long straight stems.

- Often basket weavers will prune many redosier dogwood stems, sometimes replanting the stems, so there will be nice straight basketry material the following year.
- Before gathering, offerings of thanks and prayers for permission to gather are given. Often tobacco or sage or other offerings are given before beginning to gather.
- Basket weavers process materials with their hands and mouths. Herbicides sprayed along streams have a much higher health risk for humans when they are processed and used for traditional materials.

Overgrazing, especially by livestock and big game, frequently changes plant species composition and growth form, density of stands, vigor, seed production of plants, and insect production. Livestock grazing can cause the replacement of bird and mammal species requiring the vertical vegetation structure of riparian habitat to species, which are ubiquitous in their habitat preferences. Previous heavy cattle grazing changed the bird and small mammal community composition in riparian areas through reduction of shrub and herbaceous cover.



### **Cultivars, Improved and Selected Materials (and area of origin)**

*Cultivars:* 'Alman's Compacta', 'Allamans', 'Bailey', 'Cardinal', 'Coloradensis', 'Flaviromea', 'Isanti', 'Kelsey', 'Lutea', 'Ruby', 'Silver' and 'Gold', and 'White Gold' have been planted in the growing range of redosier dogwood.

Consult your local nurseries to choose the right cultivar for your specific landscape.

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Edited: 19jun02 jsp; 01may03 ahv; 24may06jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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Read about Civil Rights at the Natural Resources Conservation Service.

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## WOOLGRASS

### *Scirpus cyperinus* (L.) Kunth

Plant Symbol = SCCY

Contributed by: USDA NRCS National Plant Data Center



R. Mohlenbrock  
USDA, NRCS, Wetlands Institute  
@ PLANTS

#### Alternative Names

cotton grass bulrush, common wool-grass

#### Uses

**Ethnobotanic:** Woolgrass stems were woven to make matting and ropes. The fruiting tops of the plant were used as a resilient material for stuffing and making pillows (Moerman 1998). The small rushes were used in making woven mats and storage bags (Ibid.).

#### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.

#### Description

**General:** Sedge family (Cyperaceae). Woolgrass (*Scirpus cyperinus*) is a tall perennial with slender culms. This species is an erect grasslike plant that commonly grows four to five feet (Tiner 1987). The leaves are smooth, flat, elongated, and up to ½ inch wide. The flowers occur in dense rounded clusters of greenish-brown spiklets arising from the top of the culm. The fruits are yellow-gray to white achenes surpassed by long red-brown bristles at maturity.

**Distribution:** *Scirpus cyperinus* ranges from New England and New York westward across Ohio to

Iowa, and southward to North Carolina and Oklahoma. It is also found from Newfoundland to Minnesota south to Florida and Louisiana (Tiner 1987). For current distribution, please consult the Plant profile page for this species on the PLANTS Web site.

#### Adaptation

Woolgrass is found in irregularly flooded tidal fresh marshes, inland marshes, wet meadows, and swamps. This species grows best in areas with wet soil moisture content and is seldom found in more than a few inches of water (Voss 1972). It prefers peat or sandy soil types in full to partially sunny locations.

#### Establishment

**Propagation by Seed:** *Scirpus cyperinus* seeds should be sown in a cold frame as soon as they are ripe in a pot standing in three centimeters of water. The seeds germinate quickly. When they are large enough to handle, plant them into their permanent positions in early summer.

Large divisions can be planted directly into their permanent positions. It is best to pot smaller divisions and grow them in a cold frame, out-planting when they are well established in the summer.

#### Management

After seed planting, water level over *Scirpus cyperinus* seeds should be maintained at one foot for two weeks. Periodic flooding up to three feet should occur until the seeds are established.

#### Cultivars, Improved and Selected Materials (and area of origin)

Available through wetland plant nurseries. Contact your local Natural Resources Conservation Service office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

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Edited: 19jun02 jsp; 03jun03 ahv; 060816 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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## Carex stricta

Carex stricta Lam.

Upright sedge, Upright sedge, Tussock sedge

Cyperaceae (Sedge Family)

Synonym(s): Carex stricta var. strictior, Carex strictior

USDA Symbol: CAST8

USDA Native Status: L48 (N), CAN (N)

A slender, 1-3 ft. grass-like plant with a cluster of brown seed capsules clinging high on the stem. Stems bearing greenish or brownish spikes of inconspicuous flow above dense tufts of grass-like leaves. Green leaves are exceeded by the stem in height. Forms large tufts or hummocks to 3 ft. wide.

The easiest way to recognize this sedge is by its distinctive, elevated tussocks (dense tufts) in open wet areas. It grows abundantly, often in seasonally flooded site

### FROM THE IMAGE GALLERY

1 photo(s) available in the Image Gallery

### PLANT CHARACTERISTICS

Duration: Perennial

Habit: Grass/Grass-like

Root Type: Fibrous

Leaf Arrangement: Alternate

Leaf Complexity: Simple

Leaf Shape: Linear

Leaf Venation: Parallel

Leaf Pubescence: Scabrous

Breeding System: Flowers Unisexual , Monoecious

Inflorescence: Spike

Leaf: Green

Flower:

Fruit:

Size Class: 1-3 ft.

### BLOOM INFORMATION

Bloom Color: Not Applicable

Bloom Time: May , Jun

Bloom Notes: Perianth absent. Bloom time refers to fruiting period for Carex spp.

### DISTRIBUTION

USA: AR , CT , DC , DE , GA , IA , IL , IN , KS , KY , MA , MD , ME , MI , MN , MO , MS , NC , ND , NE , NH , NJ , NY , OH , PA , RI , SC , SD , TN , TX , VA , VT , WI

Canada: MB , NB , NS , ON , PE , QC

Native Distribution: N.B. to Ont., s. to NC, TN & KS

Native Habitat: Acid or neutral swamps; swales; low woods

### GROWING CONDITIONS

Water Use: Medium

Light Requirement: Sun

Soil Moisture: Moist , Wet

CaCO3 Tolerance: Medium

Soil Description: Wet soil to standing water.

Conditions Comments: Not Available

### BENEFIT

Use Wildlife: Excellent nesting habitat for rails and snipes.

Use Other: Harvested for insulation in ice packing houses and used for rug making. (Kershaw)

Attracts: Birds , Butterflies

Larval Host: Mulberry Wing butterfly (Poanes massasoit)

### BUTTERFLIES AND MOTHS OF NORTH AMERICA (BAMONA)

Eyed Brown  
(*Saturaea auridica*)

Mulberry Wing  
(*Poanes massasoit*)

Black Dash  
(*Euphyes connexa*)



Larval Host  
[Learn more at BAMONA](#)



Larval Host  
[Learn more at BAMONA](#)



Larval Host  
[Learn more at BAMONA](#)

## PROPAGATION

Description: Not Available  
 Seed Collection: Not Available  
 Seed Treatment: Not Available  
 Commercially Avail: yes

## NATIONAL WETLAND INDICATOR STATUS

Region: AGCP AK AW CB EMP GP HI MW NCNE WMVE

Status: OBL OBL OBL OBL OBL

This information is derived from the U.S. Army Corps of Engineers [National Wetland Plant List, Version 3.1](#) (Lichvar, R.W. 2013. The National Wetland Plant List: 2013 wetland ratings. Phytoneuron 2013-49: 1-241). [Click here](#) for map of regions.

## FROM THE NATIONAL SUPPLIERS DIRECTORY

According to the inventory provided by Associate Suppliers, this plant is available at the following locations:

[Edge of the Woods Native Plant Nursery](#) - Orefield, PA  
[Sunshine Farm & Gardens](#) - Renick, WV  
[Ohio Prairie Nursery](#) - Hiram, OH

## FROM THE NATIONAL ORGANIZATIONS DIRECTORY

According to the species list provided by Affiliate Organizations, this plant is on display at the following locations:

[Mt. Cuba Center](#) - Hockessin, DE

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[Search More Titles in Bibliography](#)

## ADDITIONAL RESOURCES

USDA: Find [Carex stricta](#) in USDA Plants  
 FNA: Find [Carex stricta](#) in the Flora of North America (if available)  
 Google: Search Google for [Carex stricta](#)

## METADATA

Record Modified: 2012-07-03  
 Research By: TWC Staff

# Plant Fact Sheet

## COMMON RUSH

*Juncus effusus* L.

Plant Symbol = JUEF

Contributed by: USDA NRCS Plant Materials Program



Robert H. Mohlenbrock  
 USDA NRCS 1989  
 Midwestern Wetland Flora  
 @USDA NRCS PLANTS

### Alternate Names

Soft rush

### Uses

The dense stands that soft rush form have deep fibrous root systems, which provide very good shoreline protection, filter suspended solids, up-take nutrients, and facilitate substrate oxidation. With its low pH and metal tolerances, soft rush often survives polluted conditions. The seed and vegetative parts of soft rush are utilized by waterfowl, muskrats, non-game birds, moose and domestic livestock for food or cover. The stems of this grass-like plant have been traditionally used for making floor mats, and chair seats.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

### Description

*Juncus effusus* is a slow spreading, clump forming, grass-like perennial which emerges from a stout branching rootstock. The short, finely divided rhizomes are 6 to 10 inches long, growing from 1/4 to 2 inches beneath the soil surface. The culms are smooth, erect, bright green and hollow, with reduced basal leaves. New shoots emerge and develop in late summer, reaching up to 4 feet tall at maturity the following spring.

The flowers are inconspicuous in compact clusters to 4 inches long. The flowers emerge and mature from March to September, peaking in July. Pollination typically occurs by wind, but occasionally it is by insects. A three celled obovoid capsule develops after fertilization, which contains many small (.02 to .025 inch long) straw colored seeds. There are an estimated 18,000,000 seeds per pound. Due to the small size and tacky outer coating, the seed of *Juncus effusus* can be disseminated by wind, water or animals. After shatter, seeds may remain viable for greater than 60 years if over-topped with sediments.

### Adaptation and Distribution

Soft rush is naturally found throughout the temperate and sub-tropical areas of North America, Europe, and Asia, with the exception of the arid and high altitude regions. It inhabits fresh to brackish marshes, swamps, ditches, and moist seasonal wetlands and meadows. Soft rush is tolerant of diverse site conditions, but thrives in direct sun, finely textured soils, salinity less than 14ppt., pH from 4.0 to 6.0, and shallow water (less than 6 inches).

Common rush is distributed throughout most of the United States. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

### Establishment

*Juncus effusus* can be easily grown from seed or vegetative divisions, but seed dispersal is the primary means of natural reproduction. For germination to occur seed must be in contact with moist soil, receive direct sunlight, and over-winter on the soil surface. As long as moist conditions can be sustained and early competition reduced, seedlings will develop the following spring.

Nursery and greenhouse production are effectively accomplished with seed or vegetative divisions. High seedling emergence can be expected under the controlled environment of the greenhouse. Moist stratification improves germination of soft rush. Stem divisions (bare root and containerized) are reliable when planted on adequate sites before mid-June. Greenhouse produced containerized stock can be ready for field planting 6 weeks after transplanting. Two year old clumps of soft rush will yield an average of 80 planting units. A planting unit should contain 3 to 5 culms. They can be planted by hand or mechanically.

### **Management**

Soils with low content of organics or fines will have good production if 300 to 500 lbs per acre per year of 10-10-10 commercial fertilizer is applied. Annual draw down periods must be scheduled to maintain vegetative parts and encourage seedling establishment of soft rush.

### **Cultivars, Improved, and Selected Materials (and area of origin)**

Sumter Germplasm soft rush was released as source identified material by the Jimmy Carter Plant Materials Center (GA) in 2008. It can be used in small constructed wetlands, wetland restoration and riparian buffers.

### **Prepared By & Species Coordinator:** *USDA NRCS Plant Materials Program*

Edited: 05Feb2002 JLK; 060801 jsp; 080122 mo & jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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## SUNDIAL

*Lupinus perennis* L.

Plant Symbol = LUPE3

Contributed by: USDA NRCS National Plant Data Center



© Kenneth Sytsma  
University of Wisconsin  
© Atlas of Florida Vascular Plants

### Alternate Names

wild lupine, lupine

### Uses

**Ethnobotanic:** The Menomini fed this plant to horses to make them spirited and full of fire. They also rubbed the plant on their own hands or other parts of the body in order to control horses. The Cherokee made a cold infusion from the plant and used it as a wash to check hemorrhage and vomiting.

**Wildlife:** Sundial is the only food for the larvae of the Karner Blue butterfly (*Lycaeides melissa samuelis*). Both fire suppression and habitat loss have contributed to the decline of the lupine and the butterfly. The Karner Blue is nearly extinct over much of its range.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status, and wetland indicator values.

### Description

**General:** Bean Family (Fabaceae). This herbaceous perennial has erect stems that are 2-6 dm, that are thinly pubescent. The petioles are 2-6 cm. The leaves are palmately compound. The leaflets are 7-11, oblanceolate, and are from 2-6 cm. The flowers occur in terminal racemes, arising above the leaves. They are numerous, ranging from blue to pink or white. The fruits are pubescent pods that are oblong, flattened, and with 2-several seeds. They are 3-5 cm.

### Distribution

For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site. This plant is found in dry, open woods and clearings from southern Maine to Florida, west to Minnesota and Indiana. The plant grows in Pine Barrens and sandy prairies in the east.

### Establishment

**Propagation by seeds:** This lupine grows in areas that have been burned. Scarify the seed coat of each seed with sandpaper to make a gentle scratch. The seeds can then be soaked overnight in tepid water. Treat the seeds with a rhizobium inoculant before sowing them. Plant the seeds into cells or flats in a greenhouse and cover them with a quarter inch of soil over the top. Lupines succumb to root rot very easily in pots, so it is best to transplant them to the garden when they have two to three leaves. Seeds can also be cleaned and stored dry at 40° F for several months and then planted directly in the garden in the following spring (after scarification). Seed can be sown with a yard roller or by walking the site. Plant in full sun with good air circulation, in loose, well-drained soil. The plants can tolerate poor, sandy, or gravelly soil, preferably acid. If no lupines have been present for many years on the site, wet the seeds and roll them in an inoculant for nitrogen-fixing bacteria before planting. They should germinate in about one week. The roots are strong and deep, making the moving of older established plants difficult.



### **Cultivars, Improved and Selected Materials (and area of origin)**

LUPE3 is available through native plant nurseries within its range. Contact your local Natural Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

### **References**

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Edited 17jan01 jsp; 21may03 ahv; 060802 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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## *Rudbeckia laciniata*

*Rudbeckia laciniata* L.

Green-headed coneflower, Greenhead coneflower, Cutleaf coneflower, Wild goldenglow, Sochan

Asteraceae (Aster Family)

Synonym(s):

USDA Symbol: RULA3

USDA Native Status: L48 (N), CAN (N)

A sunflower-like perennial, green-head coneflower's branched, leafy stalk grows 3-12 ft. tall. The stemmed flowers are at the apex of the stalk. Each flowers is 3-4 in. across, with cone back-tilted golden rays. The center cones elongate and become brownish as the seeds ripen. Attractive leaves are pinnately dissected and emerge early in spring.

Blackeyed Susan (R. hirta), an eastern species introduced many places in the West, has a dark brown or brown-maroon hemispheric disk surrounded by orange-yellow, somewhat drooping sometimes have teeth, and there is no crown or ring of scales on the fruit.

### FROM THE IMAGE GALLERY



15 photo(s) available in the Image Gallery

### PLANT CHARACTERISTICS

Duration: Perennial

Habit: Herb

Leaf: Gray-Green

Flower:

Fruit:

Size Class: 3-6 ft.

### BLOOM INFORMATION

Bloom Color: Yellow

Bloom Time: Jul , Aug , Sep , Oct

### DISTRIBUTION

USA: AL , AR , AZ , CO , CT , DC , DE , FL , GA , IA , ID , IL , IN , KS , KY , LA , MA , MD , ME , MI , MN , MO , MS , MT , NC , ND , NE , NH , NJ , NM , NY , OH , OK , PA , RI , SC , SD , TN

Canada: BC , MB , NB , NS , ON , PE , QC

Native Distribution: Que. to n. FL, w. to JD & AZ

Native Habitat: Low, rich woods; wet fields; alluvial thickets

### GROWING CONDITIONS

Water Use: Low

Light Requirement: Sun , Part Shade , Shade

Soil Moisture: Moist

Soil pH: Acidic (pH<6.8)

CaCO3 Tolerance: Medium

Soil Description: Moist, slightly acid soil.

Conditions Comments: Because it spreads rampantly by underground stems, cut-leaf coneflower is only appropriate for large sites. May need staking in garden situations but otherwise very hardy. (Ontario Native Plants 2002)

### BENEFIT

Use Food: Early spring leaves boiled for greens by Cherokees and other Southeastern peoples.

Conspicuous Flowers: yes

Attracts: Birds

### VALUE TO BENEFICIAL INSECTS

Special Value to Native Bees

Special Value to Honey Bees

This information was provided by the Pollinator Program at The Xerces Society for Invertebrate Conservation.

### PROPAGATION

Description: Untreated seed.

Seed Collection: Not Available

## FIND SEED OR PLANTS

[Find seed sources](#) for this species at the Native Seed Network.

View [propagation protocol](#) from Native Plants Network.

## NATIONAL WETLAND INDICATOR STATUS

Region: AGCP AK AW CB EMP GP HI MW NCNE WMVE

Status: [FACW](#) [FAC](#) [FACW](#) [FAC](#) [FACW](#) [FACW](#) [FAC](#)

This information is derived from the U.S. Army Corps of Engineers [National Wetland Plant List, Version 3.1](#) (Lichvar, R.W. 2013. The National Wetland Plant List: 2013 wetland ratings. Phytoneuron 2013-49: 1-241). [Click here](#) for map of regions.

## FROM THE NATIONAL SUPPLIERS DIRECTORY

According to the inventory provided by Associate Suppliers, this plant is available at the following locations:

[Edge of the Woods Native Plant Nursery](#) - Orefield, PA

[Amandas Garden](#) - Springwater, NY

[Sunshine Farm & Gardens](#) - Renick, WV

[American Native Nursery](#) - Quakertown, PA

[Toadshade Wildflower Farm](#) - Frenchtown, NJ

## FROM THE NATIONAL ORGANIZATIONS DIRECTORY

According to the species list provided by Affiliate Organizations, this plant is on display at the following locations:

[Texas Discovery Gardens](#) - Dallas, TX

[Native Seed Network](#) - Corvallis, OR

[Mt. Cuba Center](#) - Hockessin, DE

## BIBLIOGRAPHY

Bibref 1620 - [Gardening with Native Plants of the South \(Reprint Edition\)](#) (2009) Wasowski, S. with A. Wasowski

Bibref 1294 - [The Midwestern Native Garden: Native Alternatives to Nonnative Flowers and Plants An Illustrated Guide](#) (2011) Adelman, Charlotte and Schwartz, Bernard L.

[Search More Titles in Bibliography](#)

## ADDITIONAL RESOURCES

**USDA:** Find [Rudbeckia laciniata](#) in USDA Plants

**FNA:** Find [Rudbeckia laciniata](#) in the Flora of North America (if available)

**Google:** Search Google for [Rudbeckia laciniata](#)

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## METADATA

**Record Modified:** 2015-01-28

**Research By:** TWC Staff

# Plant Fact Sheet

## HIGHBUSH BLUEBERRY

*Vaccinium corymbosum* L.

Plant Symbol = VACO

Contributed by: USDA NRCS National Plant Data Center & the Biota of North America Program



Botany Dept., NMNH, Smithsonian Institution  
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### Alternate Names

Northern highbush blueberry, southeastern highbush blueberry, Maryland highbush blueberry, black highbush blueberry, American blueberry, New Jersey blueberry, rabbiteye blueberry, swamp blueberry, tall huckleberry, mayberry, whortleberry

### Uses

**Fruit production:** *V. corymbosum*, highbush blueberry, a native North American shrub cultivated throughout the country, is the major blueberry-producing species in commerce. More than 50 cultivars have been developed, primarily for commercially valuable fruit characteristics and seasonality.

**Landscaping:** A few selections are used in landscaping, especially as plantings in wet areas or to attract wildlife.

**Food:** Highbush blueberries are eaten raw, smoke-dried, sun-dried, boiled, and baked in a wide variety of culinary settings. They have one of the highest concentrations of iron of the temperate fruits.

**Wildlife:** Blueberries provide important summer and early fall food for numerous species of game birds, songbirds, and mammals.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, and wetland indicator values).

### Description

Highbush blueberry is a native, upright, 6-12 feet tall, crown-forming shrub. The common name refers to the relatively tall stature of these plants. Twigs are yellow-green (reddish in winter) and covered with small wart-like dots. Leaves are deciduous, alternate, simple, elliptic or ovate, 1 to 3½ inches long and slightly waxy above with pubescence (hairs) at least on the veins beneath. The white or pink-tinged flowers are small and urn-shaped with 5 petals, and occur 8 to 10 per cluster. Flowering occurs February to June, sporadically in the southern portion of its range; fruiting occurs April to October, about 62 days after flowering. Fruits are ¼ - ½" blue-black berries with many seeds.

In the PLANTS database, plants known as "highbush" blueberries are actually a group of interrelated species. Hybrids are often used in commercial fruit production.

### Adaptation and Distribution

Widespread in eastern North America, the highbush blueberry has been introduced outside of its natural range for commercial berry production. The most common native habitat is in moist or wet peat of moderate to high acidity – in and around marshes, swamps, lakes and flood-prone areas. *V. corymbosum* also occurs in drier areas such as dunes and barrier beaches, rocky hillsides, oak woods, and pinewoods.

For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

### Establishment

Highbush blueberry produces abundant fruit every year. Highbush blueberry (*V. corymbosum*) is self-fertile, but cross-pollination increases fruit set and results in larger, earlier berries with more seeds (Agriculture Western Australia 2000). Other species



of the complex are partially or completely self-incompatible. Bees are the primary pollinators. The seeds may be widely dispersed by birds and mammals, but germination can be reduced up to 15% after passing through an animal gut. In the southern portion of its range, highbush blueberry seeds have thick seed coats and require cold stratification before germination. Those from northern regions produce thinner seed coats and germinate in the autumn after dispersal.

Plants of highbush blueberry can be propagated by seeds or cuttings.

Occasionally sprouting has occurred from root-crowns after top kill by fire or disturbance. Plants have also been noted to produce root sprouts that emerge 1-2 meters away from the parent plant.

### **Management**

Ideal soil for cultivation is moist, high in organic matter, highly acidic (4.5-5.5), and well-drained. The plants grow in full sun to partial shade, but those in open sites produce more flowers and have brighter fall foliage color.

### **Pests and Potential Problems**

Insects, diseases and wildlife pests need to be controlled in commercial production.

### **Cultivars, Improved, and Selected Materials (and area of origin)**

Improved varieties for commercial berry production are readily available. Non-selected materials for conservation use are also available from nurseries.

### **Prepared By:**

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PLANTS Web site<<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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*Read about Civil Rights at the Natural Resources Conservation Service.*

Edited: 26Jul2002 JLK; 060818 jsp

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### *Onoclea sensibilis*—Sensitive Fern

Strongly dimorphic. Sterile leaf deltoid-ovate, yellow-green to green, coarsely segmented, 12 to 30 inches long. Fertile leaf erect, persisting, 12 to 15 inches long.

Also known as the Bead Fern. The narrow, fertile "bead-stick" and broad sterile leaf make an unusual combination. Because of its prevalence and tendency to spread, this fern has at times been called the weed of the fern family. When carefully controlled, it will cause no more trouble than other spreading varieties. The leaves are not sensitive to the touch but are affected by climatic conditions, particularly cold weather. Often the sterile leaves turn brown after a very cool spring or fall night.

The sterile leaf is composed of several pairs of opposite pinna-like segments, all joined by a rachis-wing which widens toward the apex. The network venation is unlike many ferns; it can be studied by placing a small flashlight in back of the segments.

The bead-sticks or fertile leaves at first seem to have little relation to a fern, for the beads appear like small, distorted green balls with embossed brown lines. Actually, each green ball is a pinnule that has formed around several sori, and the brown line is a continuation of the vascular system. Thus the bead covering is not a capsule containing spores but a modified pinnule serving as a protective covering.

**SORI:** Composed of sporangia in cup-like indusia. Several sori enclosed in bead-like, closely spaced pinnules along numerous branches of fertile leaf. Beads first appear green, later changing to deep brown. Fertile leaf remains standing far into the second year.

**CULTURE:** Suggested only for the larger garden or where growth can be controlled. Grows in wet, marshy, subacid soil. Tolerates full sunlight where moisture is abundant.

**RANGE:** Newfoundland to Saskatchewan, south to northern Florida and Texas.

1, Leaf silhouettes, (left) sterile, (right) fertile. 2, Leaf segments with typical venation. 3, Branching bead-stick (fertile pinnae). 4, Fertile pinnule showing veins. 5, Enlarged section through fertile pinnule showing sporangia within indusia.

# Plant Fact Sheet

## SPOTTED JOE-PYE WEED

*Eupatoriadelphus maculatus*  
(L.) King and H.E. Robins  
**var. *maculatus***

Plant Symbol = EUMAM3

Contributed by: USDA NRCS National Plant  
Materials Center, Beltsville, MD



William S. Justice @ USDA-NRCS PLANTS Database

### Alternate Names

Spotted trumpetweed, *Eupatorium maculatum* L.

### Uses

**Ethnobotanical:** Native Americans used a tea of the whole herb as a diuretic. A tea of the roots has been used to treat fevers, colds, chills, sore womb after childbirth, diarrhea, and liver and kidney ailments. A wash of the root tea was used for rheumatism and as a diaphoretic.

**Landscaping and wildlife:** The nectar from the flowers is very attractive to butterflies, skippers, and long-tongued bees. The Swamp Sparrow supplements its diet with the seeds of *E. maculatus*. Various caterpillars, such as *Schinia trifascia* (Three-lined Flower Moth), *Papaipema eupatorii* and

*Haploa clymene* (Clymene Moth) eat various portions of *Eupatoriadelphus* spp.

### Status

Spotted Joe-Pye Weed is listed as a historical plant in Kentucky and as endangered/extirpated in Maryland. Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

### Description and Adaptation

Spotted Joe-Pye Weed is a native perennial wildflower that grows from 2 - 6 feet tall. The central stem is hairy and purple or purple-spotted, as are the flowering stalks. Fragrant purple flowers, in flat-topped clusters of 9 or more florets per head, appear in mid- to late summer (July-September). The florets produce wind-dispersed small dry seed with hair-like bristles. Plants are mostly unbranched, except for flower-bearing stalks near the apex of the plant. The ovate (egg-shaped) leaves have conspicuous veins, grow up to 8 inches long and 2.5 inches across, and usually appear in whorls of 4 or 5. The fibrous root system sometimes produces rhizomes (horizontal stem with shoots above and roots below), which create colonies.

**Distribution:** Spotted Joe-Pye Weed prefers moist conditions and populates a variety of wetland habitats from Nova Scotia south to the mountains of North Carolina and from Nebraska to British Columbia (USDA cold hardiness zones 2-9). It is rarely found on disturbed sites.

### Establishment

#### *Seed propagation*

Seeds ripen about a month after flowering and should be collected when the heads dry, split and the fluffy seed begins to float away. If collected earlier, dry the seed heads for 1 - 2 weeks in open paper bags. If seeds are sown directly, sow in the fall and sow thickly as germination rates are typically low. For container production, a cold-moist pretreatment at 40 degrees Fahrenheit for 3 weeks to 3 months will increase germination percentages. After pretreatment, sow seeds in a fine germination mix containing milled sphagnum moss. Transplant to potting mix after seeds have germinated. Seeds germinate at 70 - 85 degrees Fahrenheit and in the presence of light. Use a greenhouse with alternating temperatures (day temperatures 70 - 85 degrees

Fahrenheit, night temperatures 65 - 68 degrees Fahrenheit). Seeds will last up to 3 years if stored in a cold (40 degrees Fahrenheit) and dry (30% relative humidity) environment.

#### *Vegetative propagation*

Spotted Joe-Pye Weed can be propagated by division or two-node softwood tip cuttings taken in late spring. Divide the plants in the fall as they go dormant or in the spring just as shoots first appear.

#### **Management**

Spotted Joe-Pye Weed typically only reaches full height in moist, rich soils, but it will also grow in gravelly or sandy soils if there is sufficient moisture. This plant prefers partial shade and neutral to slightly acidic soils, although it flowers best and seeds ripen best in full sun. Livestock will eat the leaves of Spotted Joe-Pye Weed, but it is not a preferred grazing plant.

#### **Pests and Potential Problems**

It is not drought-tolerant. The leaves are favored by grasshoppers, flea beetles and saw flies, which can leave them looking bedraggled by midsummer.

#### **Environmental Concerns**

No concerns at this time.

#### **Cultivars, Improved, and Selected Materials (and area of origin)**

There are no recommended cultivars or selected materials at this time, although 'Gateway' is popular in some nurseries. Spotted Joe-Pye Weed seeds are available from commercial nurseries specializing in native and unusual plants.

#### **Prepared By:**

Samantha Kirk (Horticultural Volunteer) and Shawn Belt (Horticulturist), USDA NRCS National Plant Materials Center, Beltsville, MD.

#### **Species Coordinator:**

Shawn Belt, USDA NRCS National Plant Materials Center, Beltsville, MD

Edited: 090112.jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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## SWAMP MILKWEED

*Asclepias incarnata* L.

Plant Symbol = ASIN

Contributed by: USDA NRCS, Norman A. Berg National Plant Materials Center, Beltsville, MD



Jennifer Anderson. IA, Scott Co., Davenport, Nahant Marsh. January 2, 2002

### Alternate Names

Rose milkweed  
 Pleurisy Root  
 White Indian hemp

**Warning:** Swamp milkweed may be toxic when taken internally without sufficient preparation.

### Uses

**Conservation:** Swamp milkweed is a native, colonizing, perennial wildflower useful for wetland rehabilitation. It is a good component of a wildlife seed mixture when seeded with native grasses and wildflowers. It prefers moisture retentive to damp soils in full sun to partial shade.

**Wildlife:** Swamp milkweed is a favored food of monarch butterfly (*Danaus plexippus*) larva (shown in the picture above). Swamp milkweed is also an important food source for the queen butterfly (*Danaus glippus*) larva. Various other butterflies and hummingbirds consume nectar from the flowers.

**Ethnobotanical:** The Chippewa and Iroquois have used an infusion of the roots externally to strengthen the body and heal babies' navels. The Iroquois and Meskwaki have also used a decoction of the roots and/or aerial portions of the plant as an emetic, diuretic, and anthelmintic (de-worming agent). The common name, Pleurisy Root, comes from its once common use to treat lung problems. Swamp milkweed is toxic when taken in large doses. The tough stringy stem fibers have been used to make twine, rope and rough textiles.

The downy parachutes (comas) that are attached to each seed are six times more buoyant than cork and five times warmer than wool. Large quantities of milkweed were grown for use as stuffing in pillows and lifejackets during World War II.

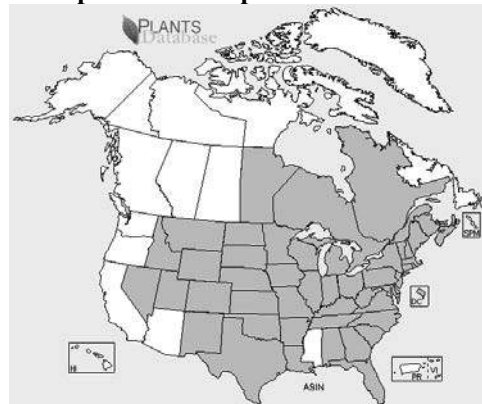
**Landscape:** Swamp milkweed is a tall plant with fragrant, showy clusters of pink and light purple flowers. It does well in landscape plantings with moist soil and in plantings near bodies of water. Unlike many ornamentals, swamp milkweed tolerates heavy clay soils and is very deer-resistant. It is a more cultivated alternative to common milkweed that is also attractive to egg-laying Monarchs.

**Livestock:** The bitter leaves of swamp milkweed do not appeal to livestock; sheep are especially susceptible to the poisonous compounds in swamp milkweed, and sheep fatalities have been reported after consuming the plant.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

### Description and Adaptation



Swamp milkweed distribution from USDA-NRCS PLANTS Database.

*Description:* Swamp milkweed is a native, perennial, wildflower growing three to six feet tall. It gets its common name from its white sap, although it has less sap than many of its relatives. The genus was named in honor of Aesculapius, Greek god of medicine, undoubtedly because some species have long been used to treat a variety of ailments. The Latin species name means flesh-colored. It has long, narrow, lance-shaped leaves that progress in pairs up the stem. Bright pink, white and purple clusters of flowers appear in summer at the tops of the stems. In the fall, blooms give way to distinctive tear-shaped five-inch seed pods that are green when unripe, but harden to brown. The individual seeds are attached to fluffy hairs that allow the seeds to drift on the wind. Swamp milkweed also spreads through rhizomes (roots that grow horizontally from the original plant).

*Adaptation and distribution:* Swamp milkweed is widely distributed across the U.S. and Canada from Quebec and Maine south to Florida and Texas and west to Nevada and Idaho. It prefers neutral to slightly acidic soil, although it will tolerate a pH up to 8.0. Its moisture requirements are high, and it is primarily found in moist habitats such as wet meadows, floodplains, riverbanks, pond shores, stream banks, wet woods, swamps, and marshes, although it will also grow in drier areas such as prairies, fields, and roadsides. Swamp milkweed needs full sun or partial shade to flourish. It is insect-pollinated and self-fertilizing.

### **Establishment**

*Propagation by seeds:* Collect seeds in the fall, when the brown pods are dry and have begun to split. Crack the pods open completely allowing the seeds to dry for one to two weeks in paper bags. Several weevil larvae prey on developing seeds, so look for signs of damage including small entry holes in the pod exuding latex. Once they are dry, place the seeds into plastic bags filled with moist perlite or vermiculite and store them in a cold place, approximately 35 to 38 degrees Fahrenheit, for at least 4 to 12 weeks (stratification). Good germination results have been reported without stratification by soaking the seed. Soak the seed in hot water (190 degrees Fahrenheit) for 12 hours. Repeat this process two additional times for expected seed germination of 50%. Seed can be placed in cold storage for up to three years.

To grow plants, use germination trays with cells two inches wide and four inches deep. Fill the cells with a commercial seedling mixture or a mix of sphagnum peat moss and vermiculite and moisten well. Press the seed gently into the soil, three seed per cell, and cover with a very thin layer of soil. Keep the soil moist during

germination by spraying or misting. Ambient temperatures should remain between 65 and 75 degrees Fahrenheit. Swamp milkweed seed requires light for germination. Germination is poor at temperatures higher than 85 degrees Fahrenheit. Seedlings should not be transplanted until they have at least one set of true leaves. Allow 4 to 8 weeks inside growing time for seedlings before moving to a cold frame or transplanting outside. Plants can be moved outside once the danger of frost has passed.

### **Management**

Swamp milkweed spreads through rhizomes; established plants can be divided in late spring. Swamp milkweed is a relatively long-lived (and slow-growing) herbaceous perennial.

### **Pests and Potential Problems**

Swamp milkweed attracts the orange milkweed aphid. If plants begin to look unhealthy, spray them with a soap solution or high-pressure blasts of water.

### **Environmental Concerns**

None at this time.

### **Cultivars, Improved, and Selected Materials**

The cultivars 'Ice Ballet' and 'Cinderella' can be found at many native plant nurseries.

### **Prepared By**

Samantha Kirk and Shawn Belt, USDA-NRCS, Norman A. Berg National Plant Materials Center, Beltsville, MD.

### **Citation**

Kirk, S. and Belt, S. 2011. Plant fact sheet for swamp milkweed (*Asclepias incarnata*). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center. Beltsville, MD 20705.

Published April, 2011

Edited: 07Feb2011 SMK, 15Feb2011 SVB, 21Apr JW, 25Apr RG

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# Plant Fact Sheet

## BLUE FLAG

*Iris versicolor* L.

Plant Symbol = IRVE2

Contributed by: USDA NRCS Plant Materials  
Program



© Jim Stasz  
MD-National Capital Park &  
Planning Commission  
@ USDA NRCS PLANTS

### Uses

This species is primarily utilized for its brightly colored floral display. The root mass of established colonies provides good shoreline protection. Although the seed is large and kernel-like, there is no documentation of wildlife consumption; the root stock is fed upon by aquatic rodents.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

### Description

Blueflag's sword-like leaves emerge from thick horizontal root stock (corm) which are covered with fibrous roots. This emergent will grow to heights of four feet in spreading clumps. The individual leaves are somewhat shorter than the entire plant. This species will radially grow less than 2 feet per year.

From the nearly straight flowering stems emerge large blue to violet-blue showy flowers. They bloom

from May to July. The three petaled flowers are often finely variegated with yellow, green, and white. The flower develops a three celled capsule which is about 1 1/2 inches long and 3/4 of an inch in diameter. Within each cell, two rows of flattened round seeds form. There are an average of 18,000 seeds per pound.

### Adaptation and Distribution

The native distribution of blue flag spans from Newfoundland to Manitoba, south to Florida and Arkansas. It is typically encountered in marshes, swamps, wet meadows, along shorelines, and in forested wetlands. It performs best on sites with unconsolidated soils high in organic content, in direct sunlight. It will tolerate moderately brackish water, partial shade, and permanent inundation up to 6 inches deep.

For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

### Establishment

Like many wetland species, this perennial emergent can be effectively established using vegetative and seed techniques. To propagate wild iris by vegetative means, single corms or bulbs can be divided or cut from the parent root system. These propagules are then potted or directly field planted before the end of July. Plant along the water line.

To field or nursery grow seedlings, the seeds should be stratified in moist peat moss for at least three months at 36 to 0 degrees Fahrenheit. Naturally the seed will shatter from their pods in fall; wash on land at the soil/water interface and over winter at that location; then, germinate in spring. Fall seeding can be considered, but is often met with less success than with nursery transplants.

This plant is easily established and increased under nursery conditions. With organic soils, minimal fertilization, and good water depth control, this perennial will thrive.

### Management

Under proper hydric environment and soil organic levels, this flowering plant thrives without the addition of commercial fertilizers. There are no known insects or diseases which negatively impact this species, but muskrats will eat the root. Blueflag

is easily over-topped by aggressive rhizomatous emergents.

**Cultivars, Improved, and Selected Materials (and area of origin)**

This wild iris has been utilized to develop certain ornamental bulbs that are commercially available. Seedlings or divisions of locally or regionally collected ecotypes are available from wetland plant nurseries.

**Prepared By & Species Coordinator:**  
*USDA NRCS Northeast Plant Materials Program*

Edited: 05Feb2002 JLK; 060801.jsp

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# Plant Fact Sheet

## COMMON BONESET

*Eupatorium perfoliatum* L.

Plant Symbol = EUPE3

Contributed by: USDA NRCS National Plant Materials Center, Beltsville, MD



Robert H. Mohlenbrock @ USDA-NRCS PLANTS Database / USDA SCS. 1989. *Midwest wetland flora: Field office illustrated guide to plant species*. Midwest National Technical Center, Lincoln, Nebraska

### Alternate Names

Common boneset, Thoroughwort

### Uses

**Ethnobotanical:** The leaves have been used to treat dengue fever. Modern German research suggests that Common Boneset may act as a general immune system stimulant. It has also been used as a diaphoretic and weak anti-inflammatory. **Caution:** Common Boneset is emetic and laxative in large doses, and it may contain pyrrolizidine alkaloids that are potentially harmful to the liver.

**Landscaping and wildlife:** The nectar from the flowers of Common Boneset is very attractive to a variety of pollinators, including bees, wasps, and butterflies. The Swamp Sparrow supplements its diet with Common Boneset seeds. Various caterpillars, such as *Phragmatobia lineate* (Lined Ruby Tiger Moth), *Papaipema cataphracta* (Burdock Borer Moth), *Schinia trifascia* (Three-lined Flower Moth), *Chlorochlamys*

*chloroleucaria* (blackberry looper), *Semiothisa continuata* (Geometrid Moth sp.) and *Haploa clymene* (Clymene Moth) eat various portions of the plant.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

### Description and Adaptation

Common Boneset is a native perennial wildflower that grows from 2 - 4 feet tall. The central stem is covered in long white hairs and is unbranched with the exception of a few flowering side stems near the apex of the plant. The narrow, lanceolate (tapering), opposite leaves grow up to 8 inches long and 2 inches across. The bases of the leaves tend to grow together, making it appear as if the central stem perforates the leaves. Two- to eight-inch clusters of fragrant white flowers (with approximately 15 florets per flower head) appear in late summer or early fall. The florets produce wind-dispersed small dry seed with hair-like bristles. The fibrous root system frequently produces rhizomes (subterranean horizontal stems with shoots above and roots below), which create small colonies.

**Distribution:** Common Boneset prefers moist or wet conditions, soil with a significant amount of organic matter, and full to partial sun. It populates a variety of wetland habitats across eastern North America from Quebec south to Florida and west to Texas and Manitoba (USDA cold hardiness zones 2 - 10).

### Establishment

#### Seed Propagation

Seeds ripen about a month after flowering and should be collected when the heads dry, split and the fluffy seed begins to float away. If collected earlier, dry the seed heads for 1 - 2 weeks in open paper bags. If seeds are sown directly, sow in the fall and sow thickly as germination rates are typically low. For container production, a cold-moist pretreatment at 40 degrees Fahrenheit for 3 weeks to 3 months will increase germination percentages. After pretreatment, sow seeds in a fine germination mix containing milled sphagnum moss. Transplant to potting mix after seeds have germinated. Seeds germinate at 70 - 85 degrees Fahrenheit and in the presence of light. Use a greenhouse with alternating temperatures (day temperatures 70 - 85 degrees Fahrenheit, night temperatures 65 - 68 degrees Fahrenheit). Seeds will last up to 3 years if stored in a cold (40 degrees Fahrenheit) and dry (30% relative humidity) environment.



### *Vegetative Propagation*

Common Boneset can be propagated by division or two-node softwood tip cuttings taken in late spring. Divide the plants in the fall as they go dormant or in the spring just as shoots first appear.

### **Management**

Common Boneset prefers moist to wet soil and full or partial sun. Livestock generally find the foliage of Common Boneset too bitter for grazing.

### **Pests and Potential Problems**

The leaves of Common Boneset are favored by grasshoppers, flea beetles and saw flies, which can leave them looking bedraggled by midsummer. It is not drought-tolerant.

### **Environmental Concerns**

No concerns at this time.

### **Cultivars, Improved, and Selected Materials (and area of origin)**

There are no recommended cultivars or selected materials at this time.

### **Prepared By:**

Samantha Kirk (Horticultural Volunteer) and Shawn Belt (Horticulturist), USDA NRCS National Plant Materials Center, Beltsville, MD.

### **Species Coordinator:**

Shawn Belt, USDA NRCS National Plant Materials Center, Beltsville, MD

### **Citation**

Belt, S. 2009. Plant fact sheet for common boneset (*Eupatorium perfoliatum* L.). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center, Beltsville, MD 20705.

Published September 2009

Edited: 03-Nov-2008 SMK; 090112.jsp

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## NORTHERN RED OAK

*Quercus rubra* L.

Plant Symbol = QURU

Contributed by: USDA NRCS National Plant Data Center and the Biota of North America Program



© Mike Hogan  
Trees of Alabama and the Southeast  
Auburn University

### Alternate Names

Red oak, common red oak, eastern red oak, mountain red oak, gray oak

### Uses

**Industry:** Northern red oak is an important source of hardwood lumber. The wood is close-grained, heavy, and hard; it machines well and accepts a variety of finishes. It is used for furniture, veneer, interior finishing, cabinets, paneling, and flooring as well as for agricultural implements, posts, and railway ties.

**Wildlife:** Northern red oak provides good cover and nesting sites (including cavities) for a wide variety of birds and mammals. Deer, elk, moose, and rabbits commonly browse leaves and young seedlings and the acorns are eaten by a wide variety of large and small mammals and birds.

**Ethnobotanic:** The acorns of red oak (and other oak species) were an important food source for Native Americans. To remove bitter tannins, they were boiled, leached with ashes, soaked for days in water, or buried over winter. Some tribes used red oak bark as a medicine for heart troubles and bronchial infections or as an astringent, disinfectant, and cleanser.

**Conservation:** Northern red oak is commonly planted as a landscape tree in eastern North America and Europe -- used as a shade tree on lawns, parks, campuses, golf courses, etc, where space is sufficient. It is fast growing, easy to transplant, tolerant of urban conditions (including dry and acidic soil and air pollution), the abundant nuts attract wildlife, and the leaves develop a brick-red fall color. It has been used in various rehabilitation projects, including revegetation of coal mine spoils in states of the east central United States (Ohio, Indiana, Illinois, Kentucky, and Pennsylvania).

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.

### Description

**General:** Beech Family (Fagaceae). Native trees often reaching 20–30 m tall, less commonly up to 50 m; bark dark gray or black, shallowly furrowed into broad hard scaly ridges, inner bark reddish to pink; generally developing a strong taproot and network of deep, spreading laterals. Leaves are deciduous, alternate, elliptic, 10–25 cm long and 8–15 cm wide, divided less than halfway to midvein into 7–11 shallow wavy lobes with a few irregular bristle-tipped teeth, sinuses usually extending less than 1/2 distance to midrib, glabrous and dull green above, light dull green below with tufts of hairs in vein angles. Male and female flowers are borne in separate catkins on the same tree (the species monoecious), the staminate catkins in leaf axils of the previous year's growth, the pistillate in 2–many-flowered spikes in the leaf axils. Acorns maturing in the second year, about 15–30 cm long, with a broad usually shallow cup, borne singly or in clusters of 2–5. The common name is in reference to the red fall foliage color, red petioles, and reddish interior wood. This is a different species from “southern red oak” (*Q. falcata*).

Northern red oak is a member of the red oak subgroup (subg. *Erythrobalanus* = sect. *Lobatae*). It hybridizes with related species, including scarlet oak (*Q. coccinea*), northern pin oak (*Q. ellipsoidalis*), shingle oak (*Q. imbricata*), scrub oak (*Q. ilicifolia*), blackjack oak (*Q. marilandica*), swamp oak (*Q. palustris*), willow oak (*Q. phellos*), Shumard oak (*Q. shumardii*), and black oak (*Q. velutina*).

*Variation within the species:* There are different interpretations of variation patterns among trees of northern red oak. A single species without formally variants is sometimes recognized, or two varieties may be recognized.

*Quercus rubra* var. *ambigua* (A. Gray) Fernald  
SY= *Q. borealis* Michx. f.  
SY= *Q. rubra* var. *borealis* (Michx. f.) Farw.

*Quercus rubra* var. *rubra*  
SY= *Q. maxima* (Marsh.) Ashe  
SY= *Q. borealis* var. *maxima* (Marsh.) Ashe

Var. *rubra* has a shallow cup, to 3 cm wide, enclosing 1/4–1/5 of the nut. Var. *ambigua* has a deeper cup, to 2 cm wide, enclosing 1/3 of the nut. McDougal and Parks (1984, 1986) found evidence of correspondence between morphological types and flavonoid chemotypes but the evolutionary status and geographic distribution of these have not been worked out in detail.

### Distribution

Northern red oak is widely distributed throughout much of the eastern United States and southeastern Canada. It grows from Quebec, Ontario, Nova Scotia, and New Brunswick southward to southwestern Georgia, Alabama, northern Mississippi, northern Arkansas, and eastern Oklahoma. Northern red oak extends westward through Minnesota and Iowa, south through eastern Nebraska and Kansas to eastern Oklahoma. It occurs locally in eastern and southwestern Louisiana and western Mississippi. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

### Establishment

*Adaptation:* Northern red oak commonly grows on mesic slopes and well-drained uplands, less commonly on dry slopes or poorly drained uplands, at (0-) 150–1800 meters in elevation. It typically grows on lower and middle slopes, in coves, ravines, and on valley floors, most commonly on N- and E-facing slopes and on clay, loam, and sandy or gravelly soils. Best growth is in full sun and well drained, slightly acidic, sandy loam. It occurs as a dominant in many natural communities, including mixed mesophytic and pine-oak.

Northern red oak is intermediate in shade tolerance but generally unable to establish beneath its own canopy. Seedlings usually do not reach sapling or pole size unless gaps are created in the canopy.

Northern red oak is often replaced by more shade-tolerant species such as sugar maple and American basswood.

Flowering occurs in April–May, during or before leaf development, while fruiting (August–) September–October.

*General:* Northern red oak generally first bears fruit at about 20–25 years, although most trees do not produce acorns in abundance until 40–50 years. Good crops are produced every 2–5 years. In most years, birds, mammals, and insects commonly destroy up to 80% of the crop and nearly the entire crop can be eliminated in poor years. Seeds on the soil surface are particularly vulnerable to rodent predation, and germination frequencies are much higher when a layer of leaf litter covers acorns. Under natural conditions, acorns generally germinate in the spring after over-wintering breaks dormancy.

Germination and seedling establishment may be successful in full and partial shade, but early growth is reduced by shade, poor soil, and competing herbaceous vegetation. Seedlings in mature stands may be present in large number, but few survive more than a few years or grow to more than 15–20 cm in height. Under optimal conditions, northern red oak is fast growing and trees may live up to 500 years.

Seedlings, saplings, and small poles of northern red oak can sprout if cut or burned. Although young oaks typically stump sprout readily, older and larger individuals also may sprout.

### Management

The tight, relatively thin bark of northern red oak makes the trees more susceptible to fire damage than in species of oak with rougher, corkier bark. Apart from immediate mortality, damaged basal cambial tissue permits the entry of insects and heart-rot decay that may ultimately kill the tree. Even so, northern red oak is adapted to periodic fire, which is integrally associated with oak forests. Older, larger individuals often survive fire and seedlings, saplings, and pole-sized individuals commonly sprout vigorously from the stumps or root collar after being top-killed by fire. Increased fire suppression has favored more shade-tolerant hardwoods and resulted in a decrease in oaks.

Acorns can maintain viability in controlled storage for up to 2–3 years. They should be stratified at 1–3° C for several months; those from northern populations require the longer period. Growth is best

when sown as soon as ripe into permanent position or in an outdoor seedbed protected from predation. Cuttings obtained from young trees can be rooted if treated with hormones. Transplants of bare root stock are best done in spring. Because of its usefulness and popularity, northern red oak is commonly available in ball-and-burlap and in containers.

The gypsy moth and numerous other insects can attack northern red oak, occasionally causing serious damage. Numerous caterpillars enjoy oak foliage, but feeding damage is usually not severe. Oak decline is a serious disease of northern red oak and has affected the species throughout much of the central Appalachian region.

#### *Oak wilt*

Northern red oak is susceptible to oak wilt, a fungal disease that invades the water-conducting vessels and plugs them. As water movement is slowed, the leaves wilt and rapidly drop off the tree. The disease begins with a crinkling and paling of the leaves, followed by wilting and browning from the margins inward. Necrosis may be strongest along the veins or between them. The symptoms move down branches toward the center of the tree and the tree may die within 1–3 months, although some diseased trees may survive up to a year. The disease may be spread by insects (primarily beetles) or pruning tools, but most of the tree loss in oak wilt centers results from transmission through root spread between adjoining trees. A trench (dug and then immediately filled) between neighboring trees severs the roots and prevents fungus spread. Dead and infected trees must be destroyed – once a tree has become infected, there is little chance to save it. The wood may be used for firewood provided it is debarked or covered and sealed during the spring and summer (Johnson and Appel 2000; Roberts 2000; Wisconsin Dept. of Natural Resources 2000; City of Austin 2000).

This disease most seriously infects species of the red oak group (including black and live oaks). Overcup oak, bur oak, white oak, and other members of the white oak group are not as susceptible and can be planted in oak wilt centers. Oak wilt has reached epidemic proportions in Texas and in the mid-West from Iowa and Minnesota through Michigan and Wisconsin into Ohio, West Virginia, and Pennsylvania.

#### **Cultivars, Improved and Selected Materials (and area of origin)**

These plant materials are somewhat available from commercial sources. Contact your local Natural

Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

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Revised: 19jun02 jsp; 29may03 ahv; 060809 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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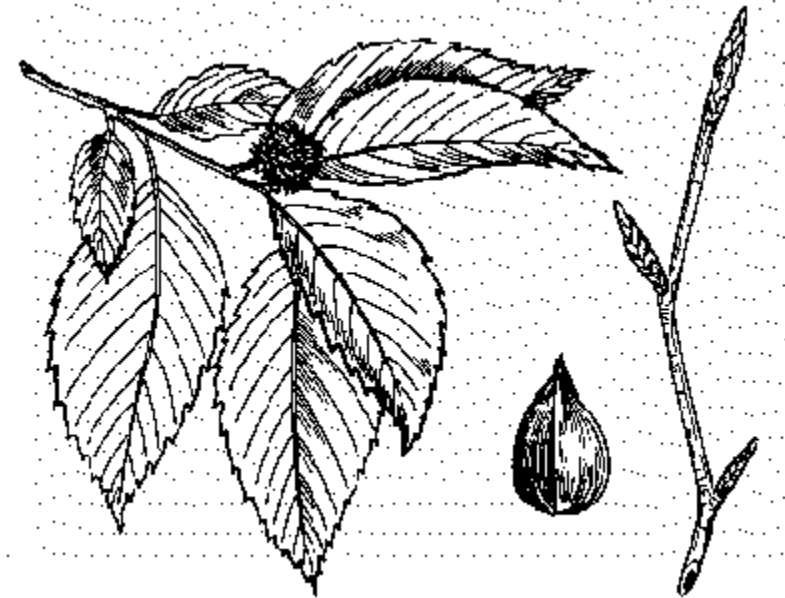
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# American Beech

(*Fagus grandifolia* Ehrh.)



**LEAVES:** Alternate, simple, 3"-4" long, stiff leathery texture, with a tapered tip and sharply toothed margins, light green and glossy above, yellow green below.

**TWIGS:** Slender, dark yellow to gray, at first hairy, later smooth, zigzag. Buds very long slender sharp-pointed, covered by 10-20 reddish-brown scales.

**FRUIT:** A stalked, prickly 4-valved bur containing triangular, pale brown, shining nuts.

**BARK:** Smooth, light gray mottled with dark spots.

**GENERAL:** Found on moist rich soils throughout the Commonwealth but more abundant in the north. An important timber species typically reaching 50'-60' high but can be higher. The beechnuts are very important food for wildlife including bears, squirrels, turkeys, and grouse. Beech is a handsome shade tree for large open areas in parks and golf courses.

## SHAGBARK HICKORY

*Carya ovata* (Mill.) K. Koch  
JUGLANDACEAE

**Description.** This is probably the best-known hickory because of the distinctive bark on the clear, straight trunk. It grows 70 to 80 feet tall.

**Bark.** Smooth on young stems, breaking up and peeling away from trunk in vertical strips on older trees, giving them a shaggy appearance.

**Twigs.** Stout, grayish-brown to reddish-brown with large terminal buds  $\frac{1}{2}$ - to  $\frac{3}{4}$ -inch long.

**Leaves.** Alternate, compound with 5 (sometimes 7) leaflets, leaf length 10 to 14 inches, surfaces without hairs. Autumn colors: yellow to gold.

**Flowers.** Inconspicuous on male catkins and female spikes.

**Fruits.** Sweet, edible nuts,  $1\frac{1}{8}$  to 3 inches long, covered with a thick yellowish husk which splits to the base. Trees begin to fruit heavily when about forty years old (U.S. Forest Service 1965). Good crops occur at one- to three-year intervals.

**Flowering period.** April to June.

**Fruiting period.** September to October, persistent to December.

**Habitat.** Prefers light, well-drained loams of alluvial origin that are deep and moist, but often grows on dry upland slopes in the Northeast in association with oaks. Prefers full or partial sunlight.

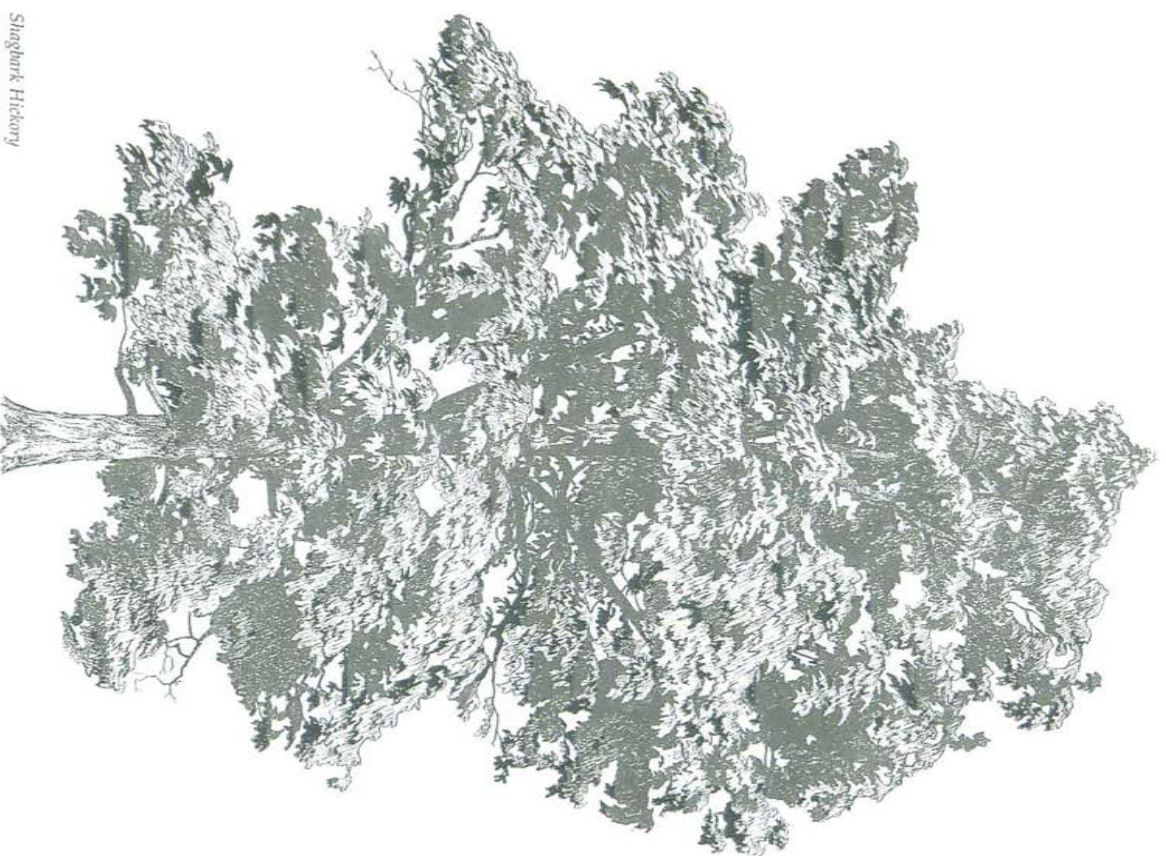
**Range.** Quebec south to northwestern Florida, west to Texas and Minnesota.

**Hardiness zone.** 5.

**Landscape notes.** This is a handsome yard, park, and woodland tree. Varieties have been developed for high nut production. Trees usually produce large crops of seeds every other year. Yields from open-grown trees may exceed two bushels per tree (Harlow and Harrar 1969). Trees are hardy and grow at a moderate rate—about 12 feet in ten years. Trees are long-lived, surviving for 250 to 300 years.

**Propagation.** Trees may be grown stratified in sand or peat for 90 to 35°–45° F. If seeds have been stored in containers at 41° F. for one year, germination period may be reduced to 3 weeks with good results (U.S. Forest Service 1965). Trees may be transplanted when young, but before the taproot becomes too large. Maximum pollination and fruiting are obtained when several trees together so that when they will form a grove.

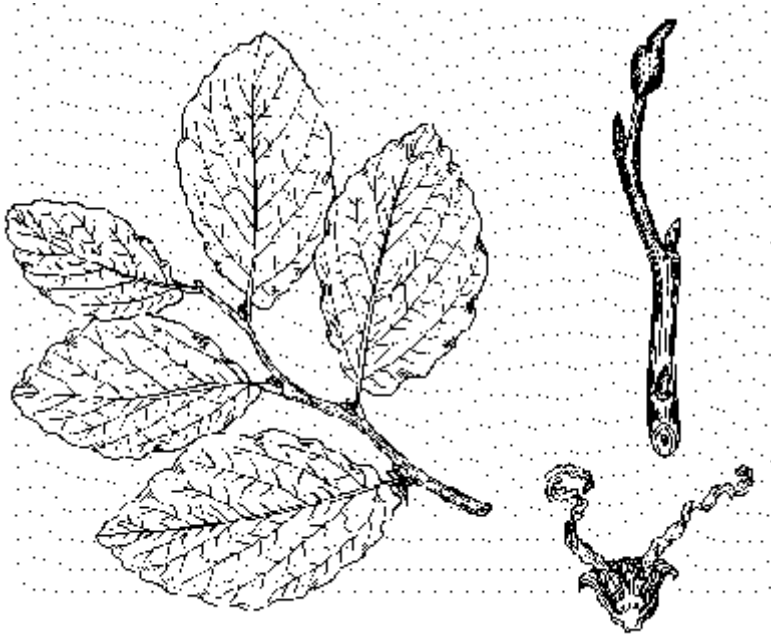
**Bird uses.** See Hickories.



Shagbark Hickory

# Witch Hazel

(*Hamamelis virginiana* L.)



**LEAVES:** Alternate, simple, oval, 4"-6" long, rounded to acute at the tips, oblique at the base; margins dentate; dark green above, paler beneath midrib and primary veins prominent.

**TWIGS:** Zigzag, light-brown with small light green pith, rather slender, often downy or scaly especially near the end, but sometimes smooth and shiny, with a few scattered, white lenticels.

**FRUIT:** A yellowish-brown woody pod holding two shiny black seeds, ripens in October-November of the year following fertilization, at the same time as the current year's blossoms appear. Flowers with bright yellow strap-shaped petals. Ripe pods burst open throwing the seed five feet or more.

**BARK:** Light brown somewhat mottled, when young smooth, later scaly. Inner bark reddish purple.

**GENERAL:** A small tree or large shrub, to 25' high, tolerant of shade. Found in moist, rocky locations throughout the Commonwealth, occasionally ascending slopes to rather dry sites. A medicinal extract is distilled from the bark.

## LOWBUSH BLUEBERRY

*Vaccinium angustifolium* Ait.

ERICACEAE

**Description.** Lowbush blueberry is a common species in the Northeast, and produces fruits favored by many birds. It grows 1/2- to 2 feet tall and is common in upland sites. Other common names are dwarf blueberry, sugar blueberry, and late low blueberry.

**Bark.** Reddish-purple on stems, light green on angular branches.

**Leaves.** Alternate, simple, 1/4- to 1 1/8 inches long, ovate to lanceolate and finely toothed, dull green above, lighter green beneath. Autumn colors: scarlet, crimson, and bronze.

**Flowers.** White, bell shaped, forming in loose racemes

**Fruits.** Round, bluish-white or shiny black berry, very sweet, edible.

**Flowering period.** April to June.

**Fruiting period.** July to September.

**Habitat.** Grows in dry, sandy, well-drained soils of open meadows and woodlands at all elevations. Does poorly on moist, rich soils. Often spreads profusely, forming thick carpets of green in summer, changing to brilliant red in autumn. Likes partial shade or full sunlight.

**Range.** Common in the Northeast from Newfoundland south to Virginia, west to Michigan.

**Hardiness zone.** 2.

**Landscape notes.** This shrub has little ornamental value except in autumn when its foliage turns red. It is useful as a ground cover in places where plants can spread rapidly and reach optimum growth. Plants are hardy and slow growing.

**Propagation.** Lowbush blueberry reproduces naturally from seeds, sprouts, underground stems, and suckers. Seed and stock are not usually available from nurseries so they must be collected in the wild. To collect seeds, gather fruits when ripe, and chill them at 50° F. for several days. Then place them in a

blender partially filled with water for about 30 seconds to separate seed from pulp (Morrow et al. 1954). Sow seeds in a mixture of sand and peat and wait at least one month for germination to occur. Transplant six- to seven-week-old seedlings to another bed to permit uncrowded growth. Soils should be light and well drained with a pH of 4.3 to 4.8 for best results (Kender and Brightwell 1966).

### Birds That Use Lowbush Blueberry

(See Blueberries)

	Food	Cover	Nesting
Ruffed grouse*	F, L	X	
Bobwhite	F	X	
Eastern kingbird*	F		
Tufted titmouse	F		
Gray catbird*	F		
Brown thrasher*	F		
American robin*	F		
Rufous-sided towhee	F	X	

Note: \*preferred food; F, fruit; L, leaves.

Sources: McKenny 1939; Petrides 1972.

## HIGHBUSH BLUEBERRY

*Vaccinium corymbosum* L.

ERICACEAE

**Description.** Highbush blueberry grows at low to medium elevations. Open-grown highbush blueberry forms a dense crown and is a common nest site. It is 6 to 15 feet tall. Other common names are tall blueberry and swamp blueberry.

**Bark.** Gray, copper, or bronze on older stems, yellowish-gray on younger stems and branches.

**Leaves.** Alternate, simple, 1 1/8 to 3 1/4 inches long, elliptic, usually without teeth, dark green above, paler beneath. Autumn colors: bronze and crimson.

**Flowers.** Small, pale pink, bell-shaped blossoms borne on drooping racemes.

**Fruits.** Small, bluish-white or shiny black

berry,  $\frac{1}{4}$ -inch in diameter, sweet, edible.

*Flowering period.* May to June.

*Fruiting period.* June to September.

*Habitat.* Prefers moist, well-drained, slightly acidic soils bordering swamps, in open meadows, and woodland clearings. Highbush blueberry requires a minimum growing season of 160 days (Chandler 1943). This factor, coupled with its sensitivity to winter cold, restricts its growth to lower elevations north of the Canadian border.

*Range.* Along the east coast of North America from Nova Scotia and Quebec to Florida, and inland from New England west to Wisconsin.

*Hardiness zone.* 4.

*Landscape notes.* The flowers, fruits, and foliage of this shrub are highly ornamental. The branches become dense and compact when plants are cultivated and pruned. Plants are easily transplanted to any good garden soil having a slightly acid pH and a partially or totally sunny exposure. These hardy, slow-growing shrubs are useful in borders or in small clumps.

*Propagation.* Highbush blueberry usually bears fruit when eight to ten years old, but may occasionally fruit in as early as three years (Taylor 1962). The yield depends largely on honeybees, which are the main pollinating agents (Marucci 1966). Plants reproduce naturally from seeds, sprouts, underground stems and



*Highbush Blueberry*



# Plant Fact Sheet

## LITTLE BLUESTEM

*Schizachyrium scoparium*

(Michx.) Nash

Plant Symbol = SCSC

Contributed by: USDA NRCS National Plant  
Materials Center



L. Glasscock  
USDA NRCS 1991  
Southern Wetland Flora  
@ USDA NRCS PLANTS

### Alternative Names

*Andropogon scoparius*

### Uses

**Pasture/range/hayland:** Little bluestem is a fair forage species and is readily grazed by livestock, deer, and elk. It is also suitable for hay.

**Erosion control:** Because of its growth habit and adaptability to a wide range of soil conditions, little bluestem is useful as a component of revegetation mixes. It is especially well-suited for use on thin upland range sites.

**Wildlife:** Little bluestem seed is eaten by songbirds and upland gamebirds. The plant provides cover for ground birds and small mammals.

**Landscaping:** With its blue-green leaves during the growing season and attractive rusty color with white fluffy seedheads in the fall, little bluestem is useful in ornamental plantings.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

### Description

Little bluestem is a medium height grass with coarse stems and basal leaves. As a warm season grass it begins growth in late spring and continues through the hot summer period until the first killing frost. It is easily mistaken for common broomsedge. Little bluestem has very flat bluish basal shoots. Plants are green, but often purplish at base of stem and the entire plant has a reddish cast after frost. Leaves are smooth, but frequently are covered with hair at the base next to the sheath. Leaves tend to fold with maturity. Seed head clusters about three inches long. The cluster stems are hairy. Plant height varies from 18 inches on droughty sites to 3 feet on deep, fertile soils. There are 255,000 seeds per pound.

Broomsedge (*Andropogon virginicus*) has a straight awn and has two or more stalked seed clusters per branch. Little bluestem has a twisted, bent awn and a single cluster of seeds per branch. Seacoast bluestem (*Schizachyrium scoparium* var. *littorale*) occurs only in the coastal plain region. It is very similar to little bluestem but can be distinguished by the bent stems at the base, whereas little bluestem stems are erect.

### Adaptation and Distribution

Little bluestem is one of the most widely distributed native grasses in North America. It will grow on a wide variety of soils but is very well adapted to well-drained, medium to dry, infertile soils. The plant has excellent drought and fair shade tolerance, and fair to poor flood tolerance. It grows preferentially on sites with pH 7.0 and slightly higher.

Little bluestem is distributed throughout the United States. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

## **Establishment**

Little bluestem should be seeded as early in the spring as possible. Where no-till is used due to slope, stoniness, or other reasons, sod control should be performed in the fall to permit early spring planting. The seeding rate for establishing a pure stand with broadcast or no-till methods should be 7 to 12 pounds PLS per acre. When drills are used to plant, debearded seed must be utilized unless the drill has a chaffy seed box. When the seed is broadcast, a packer should be utilized to firm the seedbed and incorporate the seed 1/4 to 1/2 inch (3/4 inch on very droughty sites). No nitrogen fertilizer should be applied during the establishment year unless no weed competition is expected. If pH is below 5.5, lime is recommended during site preparation or the fall prior to no-till plantings.

For critical area seeding, the preferred method of planting is drilling, but if this is not possible, an acceptable alternative method is broadcasting the seed (typically in a mix with other warm season grasses) and 'tracking' it in with a bulldozer. The dozer moves up and down slope, off-setting each pass until the entire area is covered with tracks. Seedings should be made as early as possible in the spring on sands and gravels, without mulching. Moderate levels of N, P, and K are sufficient for establishment, and soil pH should be 5.5 to 6.0. Cultipacker-type planters are not suitable for this species.

## **Management**

Control of competition is necessary for successful stand establishment. High mowing (above the bluestem seedlings) is a common method of weed control. Once established, poor stands can be rehabilitated by using proper management practices, such as controlled grazing, application of recommended rates of herbicides and fertilizer, and prescribed spring burning, where permitted.

Do not graze a forage planting during the year of establishment. During subsequent growing seasons, harvesting by controlled grazing or haying is possible on good stands. Do not remove more than 50% of the current year's growth from plants. No cropping should occur below 8 inches or within 1 month of anticipated frosts. Grazing of competing cool season grasses after frost in the fall and before the little bluestem is 1 inch tall in the spring is desirable.

## **Pests and Potential Problems**

There are no serious pests of little bluestem.

## **Cultivars, Improved, and Selected Materials (and area of origin)**

'Aldous' (Kansas), 'Camper' (Nebraska, Kansas), 'Cimmaron' (Kansas, Oklahoma), 'Pastura' (New Mexico) and 'Blaze' (Nebraska, Kansas) are cultivars that have been developed. There are also local ecotypes of little bluestem available from seed companies.

## **Prepared By & Species Coordinator:**

USDA NRCS National Plant Materials Center  
Beltsville, Maryland

Edited: 05Feb2002 JLK; 060817 jsp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

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# Appendix C

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## PROFESSIONAL QUALIFICATIONS

**Tyler Ferrick**

**Laura Krause**

**Michael DeRosa**



**Tyler Ferrick, BS**

*Environmental Scientist*

Tyler graduated with a bachelor's degree in Conservation Law Enforcement from Unity College located in Unity, Maine. Tyler is also a graduate from the Schoodic Point Seasonal Law Enforcement Program for the National Park Service. His study prepares him for issues dealing with the management and protection of wildlife, natural resources, and environmental laws and regulations. He is working towards becoming an Environmental Police Officer in his future.

Tyler began working with DeRosa Environmental Consulting in the fall of 2012. He is currently working at DeRosa Environmental as an Environmental Scientist. Tyler has been involved in a variety of projects at DeRosa related to MGL Ch. 21e and the Massachusetts Contingency Plan (MCP). He has lead remedial action operations, conducted oversight, and has prepared MCP documents. Furthermore, Tyler has worked with local and state environmental agencies to permit wetland projects. He has experience delineating, designing, and restoring wetland resource areas. Tyler is interested in the natural resources that Massachusetts coast has to offer and is driven by the protection and health needed for these resources in order for future generations to experience.

Prior to immersing himself in the world of science, Tyler worked as an intern with the US Environmental Protection Agency in Boston. Here he began to learn about Brownfield's and the extent and severity of soil and groundwater pollution in our local areas. He also learned about stormwater runoff and successful management and treatment methods. During Tyler's summer working for the EPA he helped with the EPA's food bank canned food drive.

Tyler's love for the outdoors started when he was young. He has many hobbies which include fishing, hunting, skiing, hiking, and just being in the woods. He likes to fish for salt and freshwater fish. He even does some commercial fishing for stripers when he gets a chance.

**REPRESENTATIVE PROJECTS**

**Lead Abatement and Wetland Restoration Project**  
Burlington, MA

**Private Residence | Wetland Restoration**  
Gloucester, MA

**Phase 1 ESA**  
Salem, MA

**Commercial Property | Phase 2 ESA**  
Plaistow, NH

**MWRA RAM Completion Report**  
Charlestown Wind Turbine Site

**Commercial Property | Wetland Delineation**  
Ipswich, MA

**Wetland Permitting | Notice of Intent**  
Hamilton, MA

**Hazardous Waste Clean-Up | Kerosene and Fuel Oil Remediation**  
Rowley, MA

**Wetland Design | Restoration Project**  
Beverly, MA

**EDUCATION**

**BS, Conservation Law Enforcement | 2012**

Unity College, Unity, Maine

## **PROFESSIONAL EXPERIENCE**

Environmental Scientist

DeRosa Environmental Consulting Inc | 2012 – Present

Landscaper

Chickadee Hill Farm | 2010, 2012

Intern (Environmental Protection Assistant)

US Environmental Protection Agency | Summer 2011

## **Professional Memberships/Affiliations**

LSPA | Licensed Site Professional Association

## **Certification**

40 Hour Hazardous Waste Site Worker (OSHA)

Pesticide Applicators License | CORE MDAR

Railway Worker Protection (RWP) | MBCR



**Laura Krause, BA**

Environmental Chemist

Laura Krause joined DeRosa Consulting in 2013 as an environmental chemist. She is interested in remediation, site assessment, and wetland resource restoration. Laura is currently working at DeRosa as a project manager and has worked on a variety of projects.

Laura received her Bachelor's Degree in Chemistry at Reed College in 2013. While at Reed, her studies were centered on environmental chemistry, which eventually led to the development of her undergraduate thesis topic: Air Quality in the Columbia River Gorge. It was this study, along with work done at a previous internship, which solidified Laura's interest in analysis of environmental quality, hazardous waste removal, and preserving our natural resources.

Before applying to schools, Laura worked for Nover-Armstrong Associates, Inc. in Massachusetts as an intern. Her experience there sparked an interest in environmental consulting and prompted her future studies in the physical sciences. While in school, Laura worked as a research assistant for two different labs, an air quality lab (Dr. Fry, Environmental Chemistry) and a biochemistry lab (Dr. McClard, Biochemistry). As a member of the Fry group she became familiar with analytical techniques as they pertain to air quality and developed a technique to be used in quantifying organic functional groups collected in Total Suspended Particle (TSP) samples. As a member of the McClard Group Laura worked towards the synthesis of a transition state mimic for later use as an inhibitor to a key reaction in cell growth. Prior to working with DeRosa Environmental, Laura worked as an American Chemical Society Educator for the Portland chapter.

At DeRosa, Laura has been involved in projects associated with MGL Ch. 21E and the Massachusetts Contingency Plan (MCP), in both remedial action oversight and preparation of MCP documents. Laura has also permitted wetland projects with local and state environmental agencies, and has experience in wetland design and restoration. Laura's passion is the environment and finding ways to preserve our resources in a sustainable way.

**REPRESENTATIVE PROJECTS**

**American Chemical Society Educator**  
Portland, OR

**A quantitative analysis of ambient organic aerosol composition with meteorological and gas phase oxidant characterization in the Columbia River Gorge**  
Senior Thesis, Reed College Portland, OR

**Wet Meadow |  
Landscape Design**  
Peabody, MA

**Hazardous Waste Clean-Up |  
Heavy Metal and Gasoline Remediation**  
Manchester-by-the-Sea, MA

**Commercial Building |  
Phase I Environmental Site Assessment**  
Greenfield, MA

**Wetland Permitting |  
Notice of Intent Preparation**  
Swampscott, MA

**Wetland Delineation |  
Bordering Vegetated Wetland**  
Ipswich, MA

**Saint Joseph's School |  
Remediation Oversight**  
Salem MA

**Private Residence |  
Wetland Restoration**  
Wellesley, MA

**EDUCATION**

B.A., Chemistry | 2013  
Reed College, Portland Oregon

**PROFESSIONAL EXPERIENCES**

Environmental Chemist, Project Manager  
DeRosa Environmental Consulting, Inc. | 2013-Present  
Intern  
Cooper Environmental Services. | 2013  
Research Assistant  
Reed College Chemistry Department | 2011-2013  
Teaching Assistant  
Reed College Chemistry Department | 2011-2013  
Intern  
Nover-Armstrong Associates | 2008



## **PROFESSIONAL MEMBERSHIPS/AFFILIATIONS**

LSPA | Licensed Site Professional Association

PBK | Phi Beta Kappa Society

ACS | The American Chemical Society

## **CERTIFICATIONS AND SPECIAL TRAINING**

CERCLA 40 Hour Hazardous Materials Safety Training |

OSHA 29 CFR 1910.120

Pesticide Applicators License | CORE MDAR

Groundwater Flow & Contaminant Migration | LSPA Course 1212

Site Assessment & Remediation Concepts | LSPA Course 1213

ISCO (In-Situ Chemical Oxidation) | LSPA Course 1424



## **Michael J. DeRosa**

Principal, LSP, LEED AP BC&D

Michael J. DeRosa, Principal and project manager specializing in habitat restoration and wetland restoration projects. He has more than 24 years experience working with ecological systems focused on restoration and rehabilitation of damaged landscapes. Ecological principles inform his design and restoration practices.

### **REPRESENTATIVE PROJECTS**

**Ipswich River Watershed Association**  
Ipswich MA

**Miles River Task Force |**  
**Watershed Restoration**  
Beverly Wenham Hamilton Ipswich MA

**Paumier Residence |**  
**Dune Restoration**  
Manchester MA

**Matignon High School Athletic Fields |**  
**Landfill Cap Remediation**  
Cambridge/Somerville MA

**Turner Hill Golf Course |**  
**Wetland Mitigation & Pond Design**  
Ipswich MA

**Saint Aidan's Church |**  
**UST Remediation**  
Brookline MA

**Saint Kevin's School |**  
**AST Remediation**  
Dorchester MA

**Saint Joseph's School |**  
**UST Remediation**  
Salem MA

**Ipswich Country Club |**  
**Wetland Restoration**  
Ipswich MA

**Ould Newbury Golf Club |**  
**LID Runoff Design**  
Newbury MA

**Ferncroft Country Club |**  
**Pond Restoration**  
Topsfield/Middleton MA

Mike was the principal wetland permitting leader for the Turner Hill Resort Center in Ipswich Massachusetts. He has consulted with the Archdiocese of Boston since 1989 in all environmental areas. His firm is known for their expertise in wetland and wildlife habitat restoration and rehabilitation and invasive species control and management.

Mike incorporated DeRosa Environmental Consulting, Inc., in May 1994 after spending 8 years working in the environmental consulting industry as technical director and project manager. Prior to his consulting career he was a researcher at the Harvard School of Tropical Public Health working with infectious diseases and tick transmitted Lyme disease, in particular.

Mike has been involved with many projects associated with MGL Ch. 21e and Massachusetts Contingency Plan (MCP) projects. He received his Licensed Site Professional (LSP Lic. 3452) registration in 1993. Mike is uniquely credentialed in hazardous waste site assessment and remediation and has over 24 years experience in wetland permitting, habitat restoration and mitigation. Mike has permitted projects with all federal, state and local environmental agencies. Mike is on the Practice Faculty at The Boston Architectural College. His new passion is the incorporation of urban agriculture and food justice initiatives in mixed use community based projects.

### **EDUCATION**

MA, Boston University, 1993  
North Carolina State University, 1986  
Harvard University, 1985  
BA, University of Denver, 1982

## **PROFESSIONAL EXPERIENCES**

Principal, LSP, LEED AP BC&D

DeRosa Environmental Consulting, Inc. | 1994-Present

Technical director, Environmental Engineering Division

Web Engineering Associates, Inc. | 1990-1994

Project manager/Environmental Scientist,

Dennison Environmental, Inc. | 1988-1989

Population Ecologist & Wetlands Specialist,

Lelito Environmental Consultants, LLC | 1987-1988

Research Assistant,

North Carolina State University | 1985-1987

Air Pollution Analyst

Entropy Environmentalists, Inc. | 1985-1987

Senior Research Assistant

Harvard University | 1983-1985

Naturalist

The Trustees of Reservations | 1983-1985

## **PROFESSIONAL MEMBERSHIPS/AFFILIATIONS**

New England Wildflower Society

USGBC | United States Green Building Council

NGWA | National Ground Water Association

AMWS | Association of Massachusetts Wetland Scientists

LSPA | Licensed Site Professional Association

SWS | Society of Wetland Scientists

MACC | Massachusetts Association of Conversation Commissioners

## **CERTIFICATIONS AND SPECIAL TRAINING**

Licensed Site Professional (LSP), Lic. No. 3452

LEED Accredited Professional | 10342989

Certified Ecologist, The Ecological Society of America |

June 2002 – May 2007

CERCLA 40 Hour Hazardous Materials Safety Training |

OSHA 29 CFR 1910.120

Confined Space Entry Training | OSHA 29 CFR 1910.146

Management Training Workshop | Dun and Bradstreet

Hazardous Materials Chemistry Seminar | University of Toledo