

Non-native Invasive Plant Management within Southern Appalachian Bog Communities containing Rare Species



MountainTrue has contributed non-native invasive plant management to over 200 acres of riparian forest and wetlands, including more than 28 acres within Southern Appalachian bogs

* All photos exhibited in this presentation were taken by Lauren Reker, unless otherwise indicated

MountainTrue has managed over 30 species of non-native invasive plants within Southern Appalachian bog communities

Project Partners



Carolina Mountain Land Conservancy
Hyder Pasture Bog & Ochlawaha Bog



The Nature Conservancy
McClure's Bog



Kanuga Conferences, Inc.
Kanuga Bog

| Non-native Invasive Plant Species | Southern Appalachian Bog Project Sites | | | |
|--|--|-----------------------|--------------------------|--------------------------|
| | Hyder Pasture 2013 - 2015 | Kanuga 2013 - 2015 | McClure's 2014 - 2015 | Ochlawaha 2010 - 2012 |
| Autumn-Olive (<i>Elaeagnus umbellata</i>) | ■ | | | |
| Bush Honeysuckle (<i>Lonicera</i> sp.) | ■ | | | |
| Callery/Bradford Pear (<i>Pyrus calleryana</i>) | ■ | | | |
| Chinese/European Privet (<i>Ligustrum sinense/vulgare</i>) | ■ | | | |
| Chinese/Japanese Wisteria (<i>W. sinensis/floribunda</i>) | ■ | | | |
| Chinese Lespedeza (<i>Lespedeza cuneata</i>) | ■ | | | |
| Chinese Silvergrass (<i>Miscanthus sinensis</i>) | ■ | ■ | | |
| Chinese Yam (<i>Dioscorea polystachya</i>) | | ■ | | |
| Climbing Nightshade (<i>Solanum dulcamara</i>) | ■ | | | |
| English Ivy (<i>Hedera helix</i>) | | | | ■ |
| Forsythia (<i>Forsythia viridissima</i>) | ■ | ■ | | |
| Goat Willow (<i>Salix caprea</i>) | ■ | | | ■ |
| Hosta (<i>Hosta ventricosa</i>) | | ■ | | |
| Japanese Barberry (<i>Berberis thunbergii</i>) | ■ | ■ | ■ | ■ |
| Japanese Holly (<i>Ilex crenata</i>) | ■ | ■ | | ■ |
| Japanese Honeysuckle (<i>Lonicera japonica</i>) | ■ | ■ | ■ | ■ |
| Japanese Knotweed (<i>Reynoutria japonica</i>) | ■ | ■ | | |
| Japanese Spiraea (<i>Spiraea japonica</i>) | | ■ | | |
| Japanese Spurge (<i>Pachysandra terminalis</i>) | ■ | | | ■ |
| Japanese Stiltgrass (<i>Microstegium vimineum</i>) | ■ | ■ | ■ | |
| Leatherleaf Mahonia (<i>Mahonia bealei</i>) | ■ | ■ | ■ | |
| Marsh Dewflower (<i>Murdannia keisak</i>) | | ■ | ■ | |
| Mimosa/Silktree (<i>Albizia julibrissin</i>) | ■ | ■ | | |
| Multiflora Rose (<i>Rosa multiflora</i>) | ■ | ■ | ■ | ■ |
| Oriental Bittersweet (<i>Celastrus orbiculatus</i>) | ■ | ■ | ■ | ■ |
| Princesstree (<i>Paulownia tomentosa</i>) | ■ | ■ | | |
| Sweet Autumn Clematis (<i>Clematis terniflora</i>) | ■ | ■ | | |
| Tree-of-Heaven (<i>Ailanthus altissima</i>) | ■ | ■ | | |
| Wineberry (<i>Rubus phoenicolasius</i>) | ■ | ■ | | |
| Winged Burning Bush (<i>Euonymus alatus</i>) | ■ | ■ | ■ | ■ |
| Yellow Flag Iris (<i>Iris pseudacorus</i>) | | ■ | | |

■ Species managed per site

Southern Appalachian Bog Communities



Ochlawaha Bog

- ◆ Among rarest natural communities in North Carolina & in Southern Appalachians
- ◆ Support disproportionate number of plant and animal species



Hyder Pasture Bog



Seven of MountainTrue's project sites encompass lands identified by the North Carolina Natural Heritage Program as having special biodiversity significance

McClure's Bog



Mountain Sweet
Pitcherplant

Sarracenia jonesii



Credit: JK Marlow

North Carolina At-Risk Species (2015)



Credit:
A. Krings

Southern Appalachian Purple Pitcherplant

Sarracenia purpurea var. *montana*

Credit: A. Cressler



Rare Species Occurrences

Five of MountainTrue's project sites comprise numerous occurrences of federally endangered or threatened species

Bunched Arrowhead *Sagittaria fasciculata*



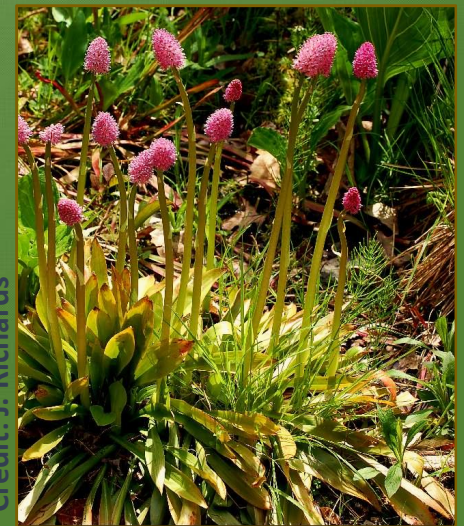
Credit: JK Marlow

Bog Turtle *Glyptemys muhlenbergii*



Credit: USEWS

Swamp Pink *Helonias bullata*



Credit: J. Richards

Non-native Invasive Plant Control in Sensitive Ecosystems

- ◆ **Environmentally sound operating procedures**
 - Weather-related parameters; aquatic-use herbicides
- ◆ **Conservation measures**
 - Rare plant buffering; boot & tool decontamination
- ◆ **Precise techniques**
 - The “1-1 rule”; drift guards
- ◆ **Non-chemical or integrated control methods where applicable**



Control Crew Reviewing Results
of Strategic Foliar Applications
McClure's Bog: November 11, 2015

Chinese Silvergrass Photo Point at Hyder Pasture Bog



September 26, 2013



November 24, 2014

Native Plants Growing Where
Chinese Silvergrass Was Treated



Hyder Pasture Bog: July 20, 2015

McClure's Bog Preserve

2014-15 Non-Native Invasive Plant Management



- ◆ 14.87-acre preserve
- ◆ Eleven non-native invasive plant species targeted within three project areas

| Target Species | Herbicide Treatment Methods | | | Non-Herbicide Control Methods | |
|---|--|--------------------------------------|----------------------------------|-------------------------------|--------------|
| | Cut Stump Application Garlon 3A @ 50% | Foliar Application Garlon 3A @ 4% | Foliar Application Rodeo @ 5% | String Trimming | Hand Pulling |
| Autumn-Olive (<i>Elaeagnus umbellata</i>) | X | | | | |
| Callery Pear (<i>Pyrus calleryana</i>) | X | | | | |
| Chinese Privet (<i>Ligustrum sinense</i>) | X | | | | |
| Japanese Barberry (<i>Berberis thunbergii</i>) | X | | | | |
| Japanese Honeysuckle (<i>Lonicera japonica</i>) | X | X | | | |
| Japanese Stiltgrass (<i>Microstegium vimineum</i>) | | | X | X | X |
| Leatherleaf Mahonia (<i>Mahonia bealei</i>) | X | | | | |
| Marsh Dewflower (<i>Murdannia keisak</i>) | | | X | | X |
| Multiflora Rose (<i>Rosa multiflora</i>) | X | X | | | |
| Oriental Bittersweet (<i>Celastrus orbiculatus</i>) | X | X | | | |
| Winged Burning Bush (<i>Euonymus alatus</i>) | X | | | | |



Japanese Stiltgrass Photo Point



August 14, 2014

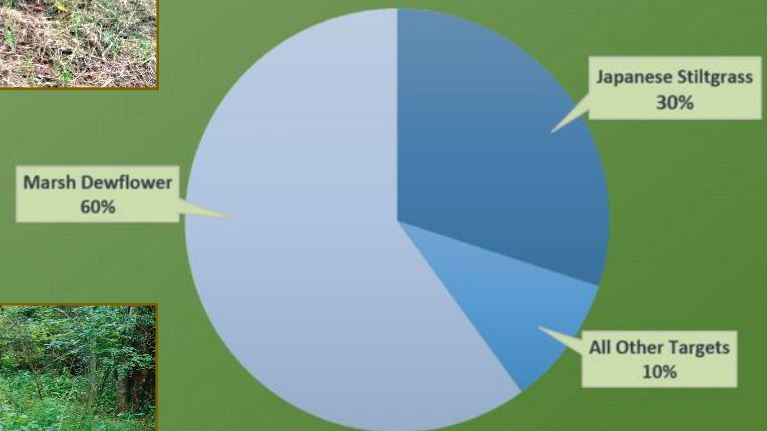


August 20, 2014

Management Prioritization

- ◆ Targets in greatest abundance and seed-producing age classes
- ◆ Occurrences near rare species
- ◆ Stormwater flooding vectors

Project Time Expenditure



Marsh Dewflower Treatment Monitoring Photos



May 15, 2015



July 03, 2015

Control Outcomes

- ◆ ≥ 95% of target species present within project areas in spring, 2014
- ◆ ≥ 98% of new occurrences resulting from reinvasion in interim

- ◆ 1.8 acres
- ◆ Fifteen non-native invasive plant species targeted
- ◆ Overall abundance of target species reduced by $\geq 98\%$

| Target Species | Herbicide Treatment Methods | | | | Non-Herbicide Control Methods | | |
|---|-----------------------------|-------------|--------------------|------------|-------------------------------|--------------|--------------------|
| | Cut Stump Application | | Foliar Application | | String Trimming | Hand Pulling | Rhizome Extraction |
| | Garlon 3A @ 50% | Rodeo @ 50% | Garlon 3A @ 4% | Rodeo @ 5% | | | |
| Chinese Privet (<i>Ligustrum sinense</i>) | X | | | | | | |
| Chinese Silvergrass (<i>Miscanthus sinensis</i>) | | X | | X | | | |
| Chinese Yam (<i>Dioscorea polystachya</i>) | | X | | X | | | |
| Greenstem Forsythia (<i>Forsythia viridissima</i>) | X | | | | | | |
| Hosta (<i>Hosta ventricosa</i>) | | X | | X | | | X |
| Japanese Barberry (<i>Berberis thunbergii</i>) | X | | | | | | |
| Japanese Honeysuckle (<i>Lonicera japonica</i>) | X | | X | | | | |
| Japanese Spiraea (<i>Spiraea japonica</i>) | X | | X | | | | |
| Japanese Stiltgrass (<i>Microstegium vimineum</i>) | | | | | X | X | |
| Marsh Dewflower (<i>Murdannia keisak</i>) | | | | | | X | X |
| Mimosa/Silktree (<i>Albizia julibrissin</i>) | X | | | | | | |
| Multiflora Rose (<i>Rosa multiflora</i>) | X | | X | | | | |
| Oriental Bittersweet (<i>Celastrus orbiculatus</i>) | X | | X | | | | |
| Winged Burning Bush (<i>Euonymus alatus</i>) | X | | | | | | |
| Yellow Flag Iris (<i>Iris pseudacorus</i>) | | X | | X | | | X |



April 10, 2013
Multiflora rose infestation



May 10, 2013
Multiflora rose after treatment



August 21, 2014
Native plants in place of multiflora rose



For More Information, Please Contact:

Lauren Reker

Non-native Invasive Species Project Coordinator

lauren@mountaintrue.org

Bob Gale

Ecologist & Public Lands Director

bob@mountaintrue.org

29 North Market Street, Suite 610 Asheville, NC 28801 828.258.8737

611 N. Church Street Hendersonville, NC 28792 828.692.0385

16 Stewart Street Franklin, NC 28734 828.349.3899

mountaintrue.org

WATERKEEPER ALLIANCE MEMBER