

# Invasive Plants Found in North Carolina's Forests, 2010

## Introduction

This publication provides an overview of invasive plants found in forests of the State of North Carolina based on an annual inventory conducted by the Forest Inventory and Analysis (FIA) Program at the Southern Research Station (SRS) of the Forest Service, U.S. Department of Agriculture in cooperation with the North Carolina Forest Service. These estimates and coverage maps will be updated on a periodic basis. For more information regarding past inventory reports for this State, inventory program information, field sampling methodology, and estimation procedures, please refer to the citations at the end of this report.

Foresters and ecologists have noted the spread of invasive species onto U.S. forest land for decades. Despite soaring costs and inestimable environmental impacts, invasive species continue to spread across managed and natural forests. This

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update describes current results from data collected in North Carolina between 2003 and 2010 and provides graphic illustrations of where invasive plants are being observed in forests across the State of North Carolina. Observations of invasive plants include only those plants on the southern FIA invasive plants "watch list" which in this case contains 33 plant species (or groups of related species) regionally recognized as problem invasive plants.

## Findings

Invasive plants were detected on 1,836 plots across the State, or 51 percent of all forested plots measured (fig. 1). The maximum number of the surveyed invasive plant species detected on an individual plot was 10, which occurred on <1 percent (1 plot) of forested plots (table 1). Approximately 41 percent of invaded plots

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Chinese privet (*Ligustrum sinense*). (photo courtesy of James H. Miller and Ted Bodner, Southern Weed Science Society, Bugwood.org)



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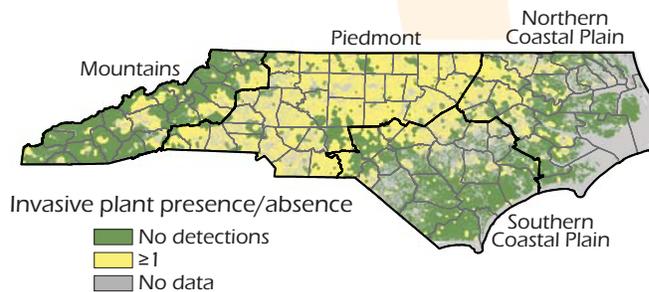


Figure 1—Presence/absence of invasive plant species on forest land statewide, North Carolina, 2010.

**Table 1—Invasive species on North Carolina forest land—number of species detections and the number and percent of plots on which they occur, 2010**

Number of unique species detected <sup>a</sup>	number of plots				Total of invaded plots	Invaded plots <sup>b</sup> percent
	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains		
1	191	152	304	101	748	21
2	142	121	245	65	573	16
3	40	37	163	45	285	8
4	11	16	100	17	144	4
5	4	3	40	7	54	1
6	—	1	20	3	24	1
7	—	—	4	2	6	<1
8	—	—	1	—	1	<1
9	—	—	—	—	—	—
10	—	—	—	1	1	<1
Total invaded plots (all species)	388	330	877	241	1,836	
Percent of all sampled plots	39	45	78	31	51	
Total number of sampled plots	1,004	738	1,121	769	3,632	

— = no data for the cell.

<sup>a</sup> Up to 4 unique species may be noted per subplot, for a total possibility of 16 unique species per complete plot.

<sup>b</sup> Percent of survey plots with the listed number of unique species, out of 3,024.

contained only one invasive plant from the SRS FIA “watch list,” while 72 percent of invaded plots contained only one or two invasive plants (table 1). Forests in the Piedmont unit exhibited the highest frequency of invasion, with 78 percent of sampled plots containing at least one invasive plant. Forested plots in the Mountains unit were less likely to contain invasive plants, with only 31 percent of plots containing at least one invasive plant.

The distribution of invasive plants in the Piedmont unit is considerably greater than observed in the Mountains unit (fig. 1). While Japanese honeysuckle (*Lonicera japonica*) is primarily culpable for this dichotomy as the most frequently observed plant invader, many of the invasive plants monitored by FIA exhibit a similar pattern. Additionally, this pattern is visible in other States (such as Virginia – see Oswald and Oswald 2013) with both piedmont and mountain physiography. These differences may be due to land use of the site or surrounding sites, differences in overall species richness, site productivity, length of growing season, forest type characteristics or other environmental differences (e.g., soil, moisture, temperature, precipitation, elevation, aspect).

Japanese honeysuckle was the most frequently detected invasive plant species in North Carolina (table 2). The seemingly ubiquitous invasive vine was found on 41 percent of all forested plots surveyed, and 82 percent of all plots containing an invasive species. On average, Japanese honeysuckle foliage covered 19 percent of the

subplots on which it was found. The Chinese/European privet (*Ligustrum sinense*/*L. vulgare*), as a group, was the second most frequently detected species, and was noted on 20 percent of measured plots, with an average percent cover of approximately 16 percent on subplots where it was detected. Nonnative roses (*Rosa* spp.) and Nepalese browntop (*Microstegium vimineum*) were the third and fourth most frequently observed invasive plant in forests of North Carolina, respectively. Nepalese browntop covered approximately 25 percent of subplots where found. Chinese lespedeza (*Lespedeza cuneata*) was the fifth most frequently detected species, and was noted on only 6 percent of measured plots, with an average percent cover of approximately 10 percent on subplots where it was detected. The above mentioned species along with tall fescue (*Lolium arundinaceum*), Tree-of-heaven (*Ailanthus altissima*), Japanese/glossy privet (*Ligustrum japonicum*/*L. lucidum*), shrubby lespedeza (*Lespedeza bicolor*), and autumn olive (*Elaeagnus umbellata*), comprise the top 10 most frequently detected invasive plants surveyed for on forested plots in North Carolina (table 2).

Invasive vines, primarily Japanese honeysuckle, was the most frequently detected invasive plant life form (table 3) and was found on 45 percent of all forested plots. Invasive shrubs were found on 35 percent of all forested plots, while invasive grasses were observed on 13 percent, invasive forbs were found on 7 percent, and invasive trees were observed on only 5 percent of all forested plots.

**Table 2—Invasive species detected on North Carolina forest land with frequency of plot detections and mean percent subplot cover, 2010**

Common name	Scientific name	Plot detections	Mean percent subplot cover
Japanese honeysuckle	<i>Lonicera japonica</i>	1,501	19
Chinese/European privet	<i>Ligustrum sinense</i> / <i>L. vulgare</i>	733	16
Nonnative roses	<i>Rosa</i> spp.	371	13
Nepalese browntop	<i>Microstegium vimineum</i>	324	25
Chinese lespedeza	<i>Lespedeza cuneata</i>	211	10
Tall fescue	<i>Lolium arundinaceum</i>	124	17
Tree-of-heaven	<i>Ailanthus altissima</i>	108	14
Japanese/glossy privet	<i>Ligustrum japonicum</i> / <i>L. lucidum</i>	61	12
Shrubby lespedeza	<i>Lespedeza bicolor</i>	55	7
Autumn olive	<i>Elaeagnus umbellata</i>	44	14
Nonnative vincas, Periwinkles	<i>Vinca minor</i> / <i>V. major</i>	41	12
Silktree, Mimosa	<i>Albizia julibrissin</i>	33	10
Bush honeysuckles	<i>Lonicera</i> spp.	32	13
Oriental bittersweet	<i>Celastrus orbiculatus</i>	23	23
Princesstree, Royal paulownia	<i>Paulownia tomentosa</i>	22	15
Kudzu	<i>Pueraria Montana</i> var. <i>lobata</i>	20	23
English ivy	<i>Hedera helix</i>	18	17
Nonnative climbing yams-air yam/Chinese yam	<i>Dioscorea bulbifera</i> / <i>D. oppositifolia</i>	17	4
Chinese/Japanese wisteria	<i>Wisteria sinensis</i> / <i>W. floribunda</i>	13	18
Chinaberry	<i>Melia azedarach</i>	10	15
Nandina	<i>Nandina domestica</i>	8	3
Russian olive	<i>Elaeagnus angustifolia</i>	7	30
Silverthorn	<i>Elaeagnus pungens</i>	7	10
Nonnative bamboos	<i>Phyllostachys</i> spp., <i>Bambus</i> spp.	7	11
Garlic mustard	<i>Alliaria petiolata</i>	4	2
Winged burning bush	<i>Euonymus alatus</i>	2	37
Chinese silvergrass	<i>Miscanthus sinensis</i>	2	<1
Tallowtree	<i>Triadica sebifera</i> , <i>Sapium sebiferum</i>	1	2

**Table 3—Invasive species detected on North Carolina forest land by FIA unit and invasive plant life form, 2010**

Life form	Southern Coastal Plain	Northern Coastal Plain	Piedmont	Mountains	Total
	number of plots				
Trees	19	13	117	32	181
Shrubs	224	157	662	215	1,258
Vines	309	299	863	162	1,633
Grasses	44	57	279	77	457
Forbs	63	64	118	25	270

Invasive trees were noted throughout the State (fig. 2). However 65 percent of the observed invasive trees were located in the Piedmont Unit (table 3). Tree-of-heaven was the most frequently detected invasive tree across the State and found on a significantly higher number of plots than any other invasive tree monitored (Tree-of-heaven found on 108 plots, mimosa (*Albizia julibrissin*) found on 33 plots, and paulownia (*Paulownia tomentosa*) found on 22 plots). Japanese honeysuckle was the most commonly detected vine (fig. 3) and was recorded on 29, 39, 72, and 15 percent of forested plots in the Southern Coastal Plain, Northern Coastal Plain, Piedmont, and Mountains, respectively. Observations of Japanese honeysuckle were considerably lower in the mountains of North Carolina. No other invasive vine was detected on more than 2 percent of plots in any region. Chinese/European privet, as a group, were clearly the most frequently detected shrubs (fig. 4) on North Carolina forest land and

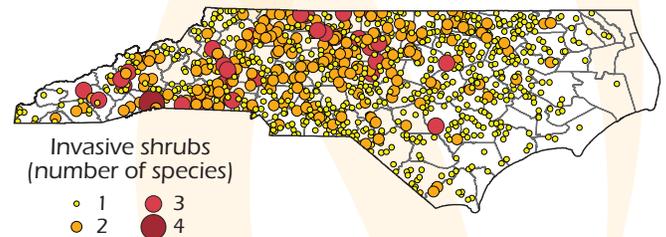


Figure 4—Number of invasive shrub species on plots, North Carolina, 2010.

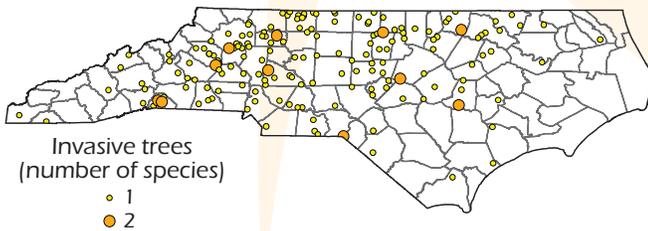


Figure 2—Number of invasive tree species on plots, North Carolina, 2010.

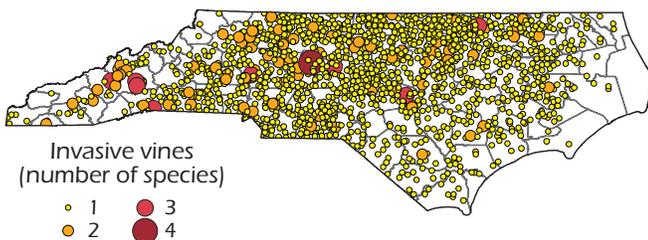


Figure 3—Number of invasive vine species on plots, North Carolina, 2010.

were detected on 20 percent of all forested plots across the State. Chinese/European privet occupied more plots in each region than any other invasive shrub on the “watch list.”

While invasive grasses were not observed on forest lands within the State with the same frequency as other plant life forms, Nepalese browntop was observed in each unit of the State with enough frequency to warrant attention. Nepalese browntop was most frequently noted in the Piedmont unit, being found on 17 percent of forested plots within the unit. Many grasses are intolerant of the shade that closed-canopy forests generally produce. Nepalese browntop is an exception and can tolerate shade which may help explain the higher frequency in which it is found over other invasive grasses.

### Conclusions

Invasive species are common on forested plots across the State of North Carolina. The prevalence of invasive plants on North Carolina forest land illustrates the need for public education regarding the ecological and economic costs of invasive plants, and the need for concentrated control and management efforts for invasive plants.

## FIA Program Information

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## Additional North Carolina Information

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Tree-of-heaven (*Ailanthus altissima*). (photo by David J. Moorhead,  
University of Georgia, Bugwood.org)

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