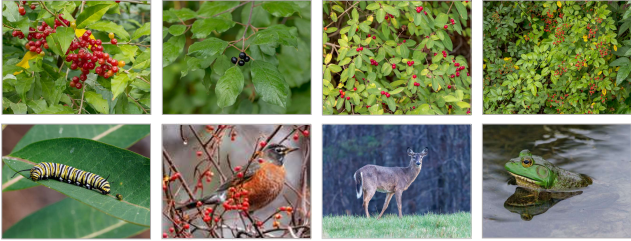


How Upland Invasive Plants Function as Habitat for Wildlife



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1

Purpose of this presentation



Help you understand:
How do invasive plants function
as habitat for wildlife?

Help you make good decisions:
Will controlling invasive plants
help or harm wildlife?

2

This presentation summarizes
over 200 peer-reviewed studies



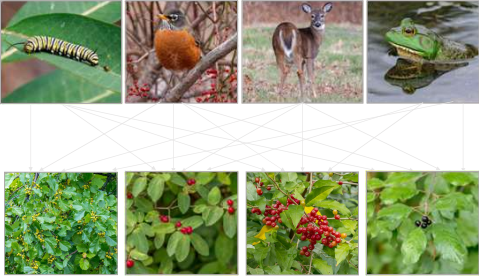
Effects of Non-native Shrubs on Caterpillars and Shrubland- Dependent Passerines Within Three Transmission Line Rights-of-Way in Southeastern New Hampshire



Northeastern Naturalist, Volume 29, Monograph 20, 2022

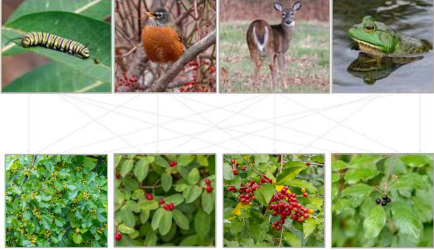
3

Interactions among different invasive plants & different wildlife...



Incredibly Complex!

4

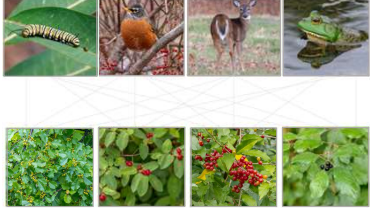


Effects of invasive plants on wildlife can be:

- Positive
- Negative
- Neutral

5

Incorrect to generalize:
"Native plants, GOOD! Invasive plants, BAD!"
 for "wildlife"



6

Take Home Messages from this presentation:



ALL plants have value as wildlife habitat

Some invasive plants provide COMPARABLE or BETTER habitat than native plants

Removing invasive plants can REDUCE habitat quality for Wildlife

7

Take Home Messages from this presentation:



The best way to:
 Encourage & Maintain Wildlife Diversity

is to

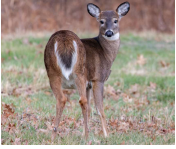
Encourage & Maintain PLANT DIVERSITY

and we

Want the plant community to be Dominated by Native Plants

8

Invasive Non-native Plants & Wildlife

<u>Section I</u> Insects		<u>Section II</u> Birds
<u>Section III</u> Mammals		<u>Section IV</u> Reptiles & Amphibians
		

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SECTION I – Invasive Plants & Insects



10

Herbivorous insects
are most sensitive
to changes in
plant species composition

“Host plants”






11

Most herbivorous insects
are host-specialists

Eat a limited number of closely-related
plants in the same family or genus

Host-specialization
controlled by plant chemicals:

behavioral deterrents or attractants

poisons that kill insects

reduce insect growth

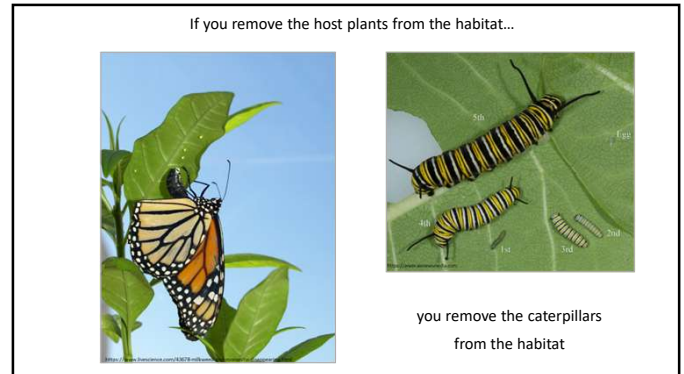
Most insects won't eat plants
they aren't adapted to eat



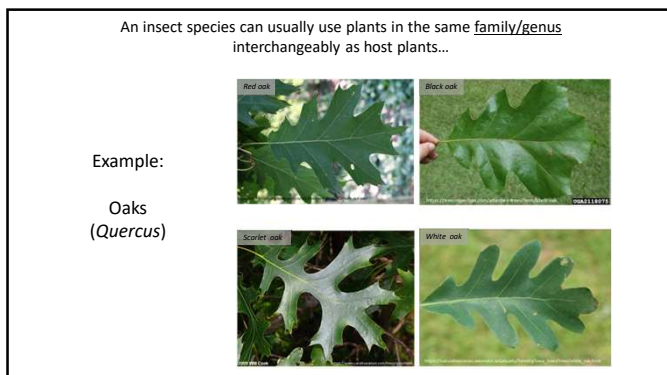

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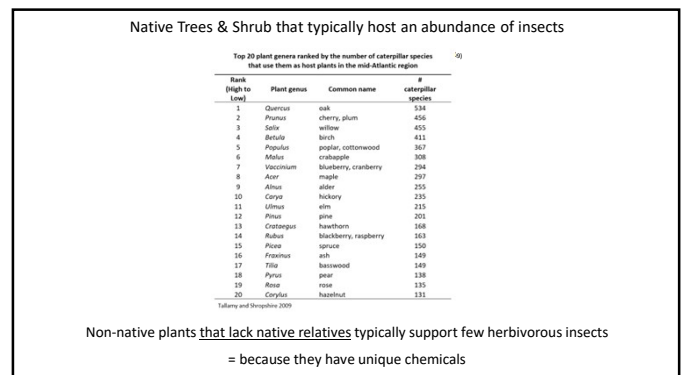
13



14



15



16

These non-native invasive shrubs typically support very few caterpillars:



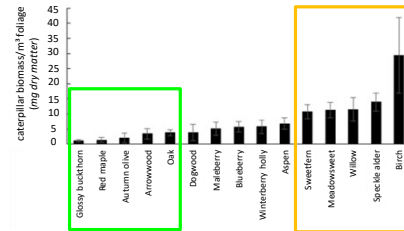
HOWEVER:

Invasive multiflora rose can support as many or more caterpillars than native shrubs in New England



17

Native plants don't always support more caterpillars than the "worst" invasives:

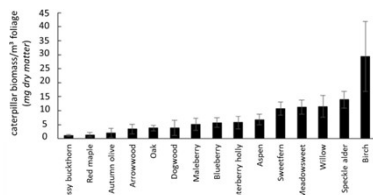


Caterpillar biomass estimated on the 15 most common shrub species comprising three transmission line rights-of-way in southeastern New Hampshire, June-July 2013. (Tarr 2017)

- Very few caterpillars on invasive shrubs AND native red maple, arrowwood, oak
- Most caterpillars on native birch, alder, willow, meadowsweet, sweetfern

18

IMPORTANT:



Caterpillar biomass estimated on the 15 most common shrub species comprising three transmission line rights-of-way in southeastern New Hampshire, June-July 2013. (Tarr 2017)

These are average patterns observed on each plant:

- In southeastern NH
- In 2013

Expect these patterns to differ:

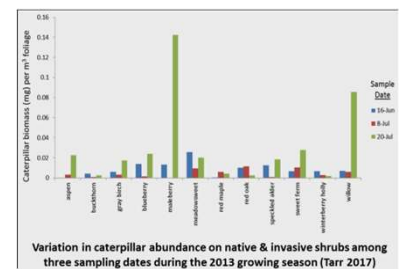
- Among locations
- Among years
- During the same year

19

Caterpillar abundance on each plant usually varies tremendously!

Plants that support LOTS of caterpillars today...

often support FEW caterpillars earlier or later



Variation in caterpillar abundance on native & invasive shrubs among three sampling dates during the 2013 growing season (Tarr 2017)

20

Realistic Goal:

Get & keep NATIVE plants the *dominant* plants in the habitat



A realistic way to keep caterpillar abundance high in invaded habitats

25

Plants that support few caterpillars are often great nectar sources for pollinators!



Japanese knotweed



Autumn olive



Buckthorn



Honeysuckle

HOWEVER:

61 species of native bees in the Northeast are pollen specialists...

Plants supporting the most pollen specialists:

Goldenrods

Willows

American asters

Blueberries



26

Encourage pollinator diversity & abundance

by encouraging & maintaining

a diversity of woody & herbaceous plant species!



Birch

Blueberry

Dogwood

Aspen



Oak

Holly

Aster

Jewelweed

Want our habitats dominated by native plants

27

SECTION II – Invasive Plants & Birds

Eastern bluebird



Autumn olive



Study Area 2



Common for similar studies to find conflicting results

Study Result =

~~"A"~~

~~"B"~~

~~"C"~~

"D"

28



Invasive plants can affect habitat quality for birds by altering:
Habitat structure
&
Plant species composition



Plant structure & species affect where birds breed & find food

29

Do birds nesting in invasive shrubs experience greater nest predation?

Effects of invasive shrubs on bird nesting success:

- **POSITIVE** for birds
(Stoklosa and Finch 2002, Hecksher 2004, Schmitt et al. 2005, Schlossberg and King 2009, Giedrich and Carlo 2014)
- **NEGATIVE** for birds
(Schmitt and Whelan 1995, Stoklosa and Finch 2002, Bergman and Rodewald 2004, McChesney and Anderson 2015)
- **NEUTRAL** for birds
(Mathison and Madenjian 2001, Ortega et al. 2006, Schlossberg and King 2009, Giedrich and Carlo 2014)



30



American robin

Less nest predation in native hawthorn than in invasive honeysuckle & common buckthorn...

hawthorn thorns thought to protect nests from predators

BUT...



American robin Northern cardinal

Greater nest predation in heavily-thorned multiflora rose than in shrubs without thorns

31



Gray catbird



Chestnut-sided warbler

No difference in nesting success in shrubs with/without thorns



Thimble native stage



Heavily-thorned invasive Multiflora rose

32

Examples of common nest predators

The most common nest predators in NH shrublands:



Blue Jay, American crow, Eastern chipmunk, Red squirrel, Skunk, Weasel

33

When eastern chipmunk and white-footed mouse populations are high...



Eastern chipmunk, White-footed mouse

Less predation of veery nests in Japanese barberry than of nests in thornless native shrubs or on the ground

10% higher reproductive success in Japanese barberry in years when predator density was high

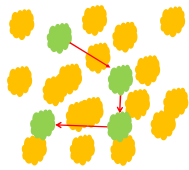


Veery

34

Birds locate nests among plant species so predators can't form a search image for nests in a given shrub type:

Abundant invasives can increase predation by limiting bird options & improving predator efficiency

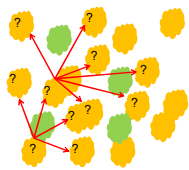



invasive shrub type
preferred native shrub type

35

Birds locate nests among plant species so predators can't form a search image for nests in a given shrub type:

Abundant invasives can reduce predation by forcing predators to search more potential nest sites

preferred invasive shrub type
other shrub type

36

Don't rush to remove invasives if they provide the only nesting habitat!



In mid-Atlantic forests,
increasing veery populations
attributed to
increasing invasive shrub abundance
that improved nest site availability

37

Invasive plants can influence food availability & quality for birds



Availability of Insects
Required for Raising Young



Nutritional Value &
Seasonal Availability of Fruit

38

Large caterpillars
the primary food that most songbirds feed their young



In invaded habitats where
caterpillar abundance is low:

- Fewer breeding bird species?
- Reduced bird productivity?



39



Fewer species of breeding birds
in neighborhoods composed of non-native plants

Carolina chickadees
less likely to breed in yards
as % non-native plants increase

Low caterpillar abundance in
suburban neighborhoods
composed of non-native plants



40

Do birds in invaded habitats produce fewer young?

Carolina chickadees
in suburban neighborhoods
with $\geq 30\%$ non-native plants

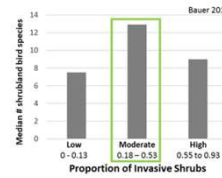
Fed their nestlings more
spiders than caterpillars



Produced fewer young
than birds in neighborhoods with fewer non-native plants

41

In New England shrubland habitats,
bird diversity greatest
with a mixture of native & invasive shrubs
(Bauer 2018, Holm unpublished data, Tarr 2022)



*Invasives likely enhance foraging & nesting opportunities
(But only until invasives reduce plant diversity)*

42



Most shrubland birds avoid habitats
where invasive shrubs are dominant ($\geq 55\%$ of shrub cover)
(especially where invasives form near-monocultures)

43

Do birds in invaded habitats produce fewer young?



Common yellowthroats
in NH shrublands:

No difference in # of young
based on % invasives

BUT:

Where invasive shrub cover was $\geq 55\%$:
Adults fed nestlings more spiders, dragonflies, & flies
Adults increased foraging activity to feed young

44

Do birds in invaded habitats produce fewer young?

Gray catbirds
nesting in territories
dominated by invasive honeysuckle

produced larger nestlings
than birds in territories
with less honeysuckle



BUT:

Catbirds in invaded territories increased their foraging activity to feed young

45

Do birds in invaded habitats produce fewer young?



Produced fewer young



No difference



Same # of young & nestlings larger

46

The best way to support bird nesting success...



Encourage & maintain diverse plant communities
dominated by Native Plants!

47

Comparing Fruits of:

Invasive plants

vs

Native plants



48

Birds readily eat invasive plant fruits



Seed dispersal *by birds*
allows many plant to spread across the landscape!

49

INACCURATE statements about invasive plant fruits...



"Fruits of invasive plants are poor-quality food for birds"

50

Plants that produce fruits with high fat content:

Native plant species

- Silky dogwood
- Gray dogwood
- Flowering dogwood
- Spicebush
- Northern bayberry
- Poison ivy
- Poison sumac
- Northern arrowwood
- Sassafras
- Blackgum
- Red elderberry
- Virginia creeper

Some birds prefer
high-fat fruits

Invasive plant species

- Burning bush
- Common ivy
- Privet



51



Birds that prefer high-fat fruits:

- Primarily insectivores
- Species adapted to digest high-fat foods

Many insectivores
eat high-fat fruit
during migration

High-sugar fruits are *NOT* junk-food for birds...

52

Sugar-rich fruits eaten by birds adapted to digest low-fat fruits

- small-bodied omnivores
- cedar waxwings



A variety of fruit types necessary
to meet the nutritional needs of all bird species

These fruits can come from native or invasive plants



Management Goal:

Encourage & maintain a diversity fruit-producing plants!

53

54

INACCURATE statements about invasive plant fruits...



"Fruits of invasive plants are poor-quality food for birds"

"Invasive fruits have chemicals that make birds sick"

ALL plants deposit chemicals in their fruits



Chemicals greatest in UNRIPE fruits
to protect immature seeds from:

Fruit eaters
Microbes
Fungi

55

56

Wildlife avoid eating UNRIPE fruit!
Chemical concentration in RIPE fruits = LOW



Birds don't get diarrhea & don't get sick
from natural chemicals in invasive plant fruits

57

The season that plants provide ripe fruit determines their food value for wildlife

Serviceberry early summer <i>Breeding season</i>			Winterberry holly fall through winter <i>Migration & Winter</i>
Silky dogwood late-summer & fall <i>Breeding season & Migration</i>			Crabapple winter into spring <i>Winter & Early spring migrants</i>

58

Plants with fruits that persist into winter or spring:

Native plant species:	Invasive plant species:
- American holly - Greenbriar - Highbush cranberry - Red chokeberry - Sumac - Winterberry holly	- Chinese privet - English ivy - European barberry - Japanese barberry - Multiflora rose - Oriental bittersweet



Highbush cranberry



Oriental bittersweet

59

Plants with fruits that persist into winter or spring:

Native plant species:

- American holly
- Greenbriar
- Highbush cranberry
- Red chokeberry
- Sumac
- Winterberry holly

Encourage & maintain these native plants whenever possible!



American robin eating staghorn sumac fruit

60

fruits that persist into winter or spring



American robin eating multiflora rose fruit

Invasive

ONLY

Don't remove the only winter fruit before establishing natives!

61

SECTION III - Invasive Plants & Mammals






62



Forest understory dominated by dense invasive honeysuckle

Dense honeysuckle understory enhances food & cover for forest small mammals



Southern red-backed vole

Abundant small mammals eat native tree seedlings, enhancing honeysuckle invasion

63

Invasive Multiflora rose



Invasive Autumn olive



New England cottontail



Dense tangles of Multiflora rose & Autumn olive provide cottontails ideal cover from predators

64

Multiflora rose
provides cottontails
excellent winter cover

Invasive Multiflora rose

New England cottontail





65

Although:

Invasives are
poor-quality
browse

Greater tick
populations in
Japanese barberry

Removing invasive shrubs
likely to effect
New England cottontails
Negatively





66

Deer avoid browsing
these invasives
unless other foods are scarce:

Autumn olive
Barberries
Bittersweet
Buckthorns
Burning bush
Garlic mustard
Honeysuckles
Multiflora rose
Privet
Stilt grass



67

Invasives may be the ONLY woody plants able to grow
in areas subject to heavy deer browsing.

Selective browsing by deer
gives invasive plants a competitive advantage



68

Selective browsing by deer gives invasive plants a competitive advantage



Facilitates invasion by garlic mustard & stilt grass by reducing cover, height, reproduction of native plants



Deer browsing facilitates stilt grass invasion, leads to decline in understory forest songbirds



Deer pellets may contain invasive plant seeds with 80% germination rate

69

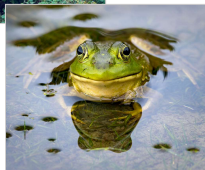
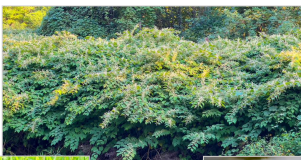
Beavers usually avoid browsing invasive plants



Edges of many beaver wetlands invaded by Glossy buckthorn

70

SECTION IV – Invasive Plants, Reptiles & Amphibians



71



Japanese knotweed monocultures reduce invertebrate diversity & abundance



Reduces food availability in autumn habitats used by Green frogs

72

Invasive Honeysuckle can exude secondary chemicals into ephemeral wetlands






Reduces survival & respiration of American toad tadpoles

No negative effects on Spotted salamander or other frogs

73




Japanese knotweed might reduce nesting habitat for wood turtles (?)

74

SECTION IV – Invasive Plants, Reptiles & Amphibians

SUMMARY




Encourage native plant dominance within wetland & wetland edges

Minimize disturbances that allow Japanese knotweed monocultures

75

Some parting thoughts....










76

Invasive plants
AREN'T invasive everywhere



When a plant becomes invasive it's almost always
a symptom that natural growing conditions have been altered

77

The most common disturbances
that reduce a site's ability to support native plants:



Soil disturbance



Excess nutrients



Selective browsing

78

In habitats subject to these disturbances...



Soil disturbance



Excess nutrients



Selective browsing



Invasive plants may be
the only plants
that CAN grow in these habitats

79



*Forest understory dominated by invasive honeysuckle caused by
soil disturbance from historic livestock grazing & repeated over-browsing by deer*

80



Typical invasive plant "control":

Removes the plants providing habitat

Doesn't improve site's ability to grow native plants

Makes sites vulnerable to future invasion by:

same plant species
or
a more invasive species

81

Removing invasive plants without first assessing their current role in a landscape
CAN REDUCE HABITAT QUALITY



Fruit

Nectar & Pollen

Nesting cover

Nutrient cycling

Cover from predators

Human use

Autumn olive (Elaeagnus umbellata) can be very invasive on some sites, but it provides multiple functions that should be considered before removing it

82

If our Goal is to Maintain & Improve Wildlife Habitat:

We must choose invasive plant battles carefully...



We must understand how invasive plants function as habitat!

83

Primary Take Home Message:



The best way to:
Encourage & Maintain
Wildlife Diversity

is to

Encourage & Maintain
PLANT DIVERSITY

and we

Want the plant community
to be
Dominated by Native Plants

84

Questions or Comments?







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