

Plants, ticks, bugs and worms

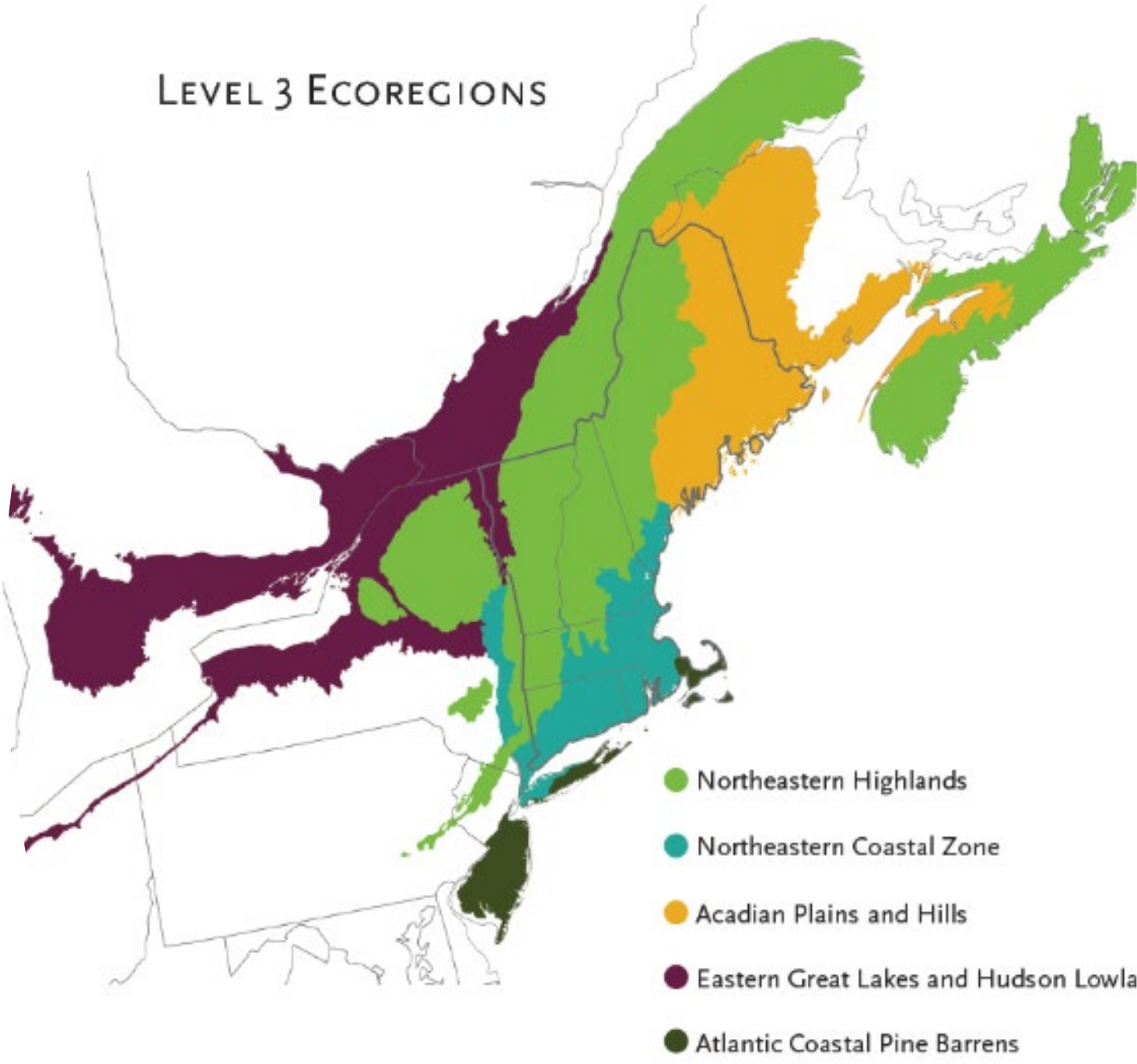
Slowing the spread of invasive species?

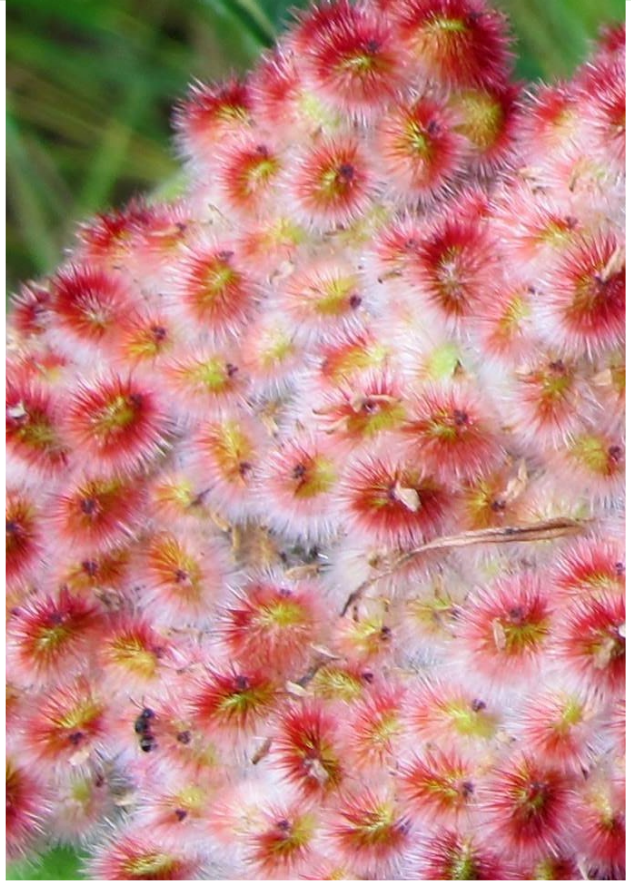
Dedicated to my Mom,
Elaine Beal Wiley
1/23/31 – 07/12/2022

We are in the homeland of the Wabanaki, the People of the Dawn. We extend our respect and gratitude to the many Indigenous people and their ancestors whose rich histories and vibrant communities include the Abenaki, Maliseet, Micmac, Passamaquoddy, and Penobscot Nations and all of the Native communities who have lived here for thousands of generations in what is known today as Maine.

Definition

An "invasive species" is defined as a species that is non-native to the ecoregion; and, whose introduction causes or is likely to cause economic or environmental harm or harm to human health.



Native plants are NOT invasive

Why be concerned about invasive species?

Because we love Maine!

Invasive species don’t fit into Maine’s ecological puzzle

No xenophobia here

Invasion ecologists, biologists and other scientists are trying to be careful about language

Trees & Forests

Accident caused by falling ash in Hudson, NH Image: WMUR

Emerald ash borer – A reason for concern?

Over 100 million ash trees killed

Recognizing EAB

Up close

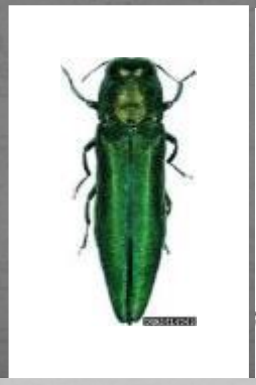
Bark splitting

Michigan Dept. of Agriculture, Bugwood.org

S-shaped galleries under bark

John Obermeyer, Purdue

EAB



NOT EAB

Pennsylvania Dept. of Conservation an Natural Resources

D-shaped exit holes

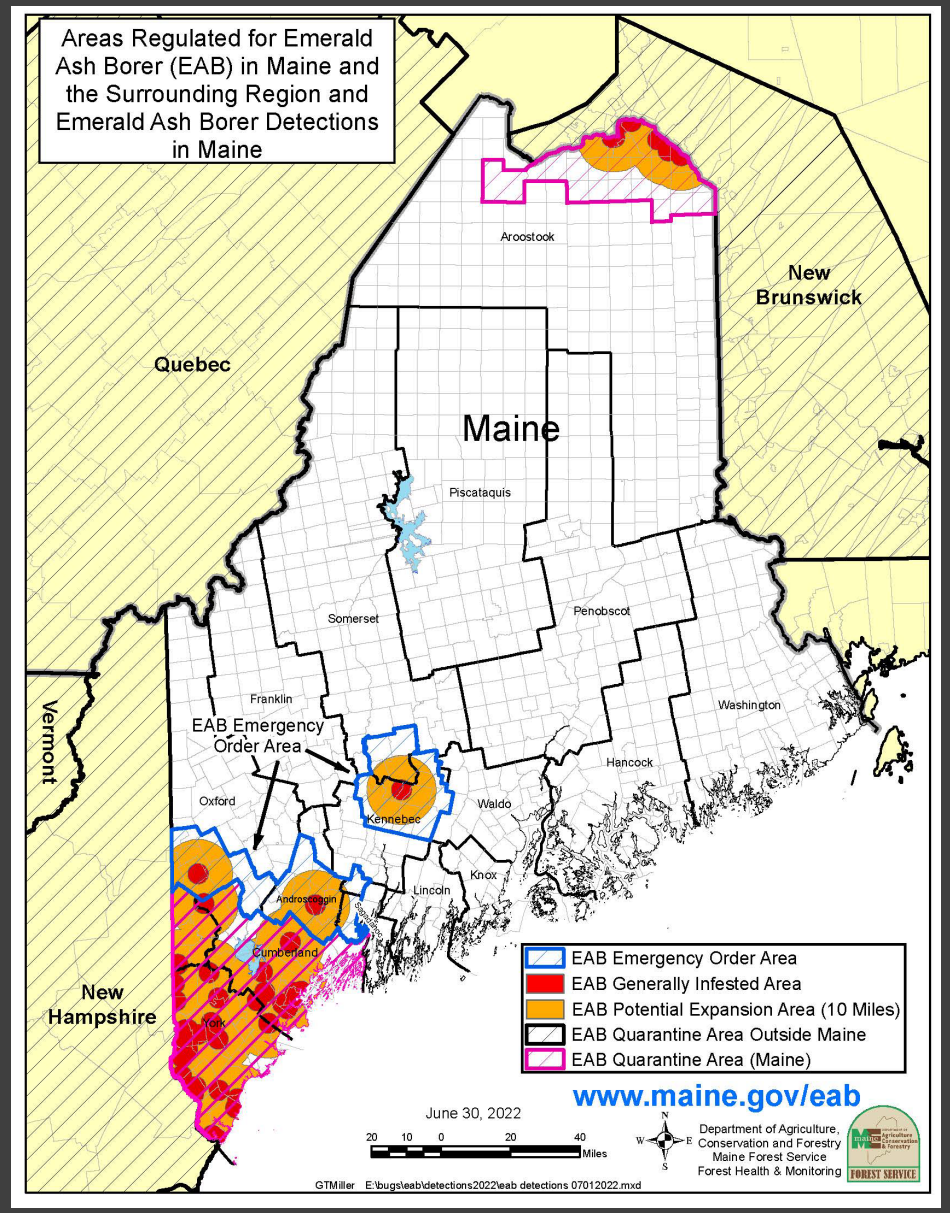
Recognizing EAB

From afar

Woodpecker activity!!!

Crown dieback

Epicormic shoots



Quarantines & Emergency Orders

Beech Leaf Disease – a new concern

BEECH LEAF DISEASE

- First reported in OH, 2012
- American, European, and Oriental beech are susceptible

- Perhaps caused by a foliar nematode, *litylenchus crenatae*

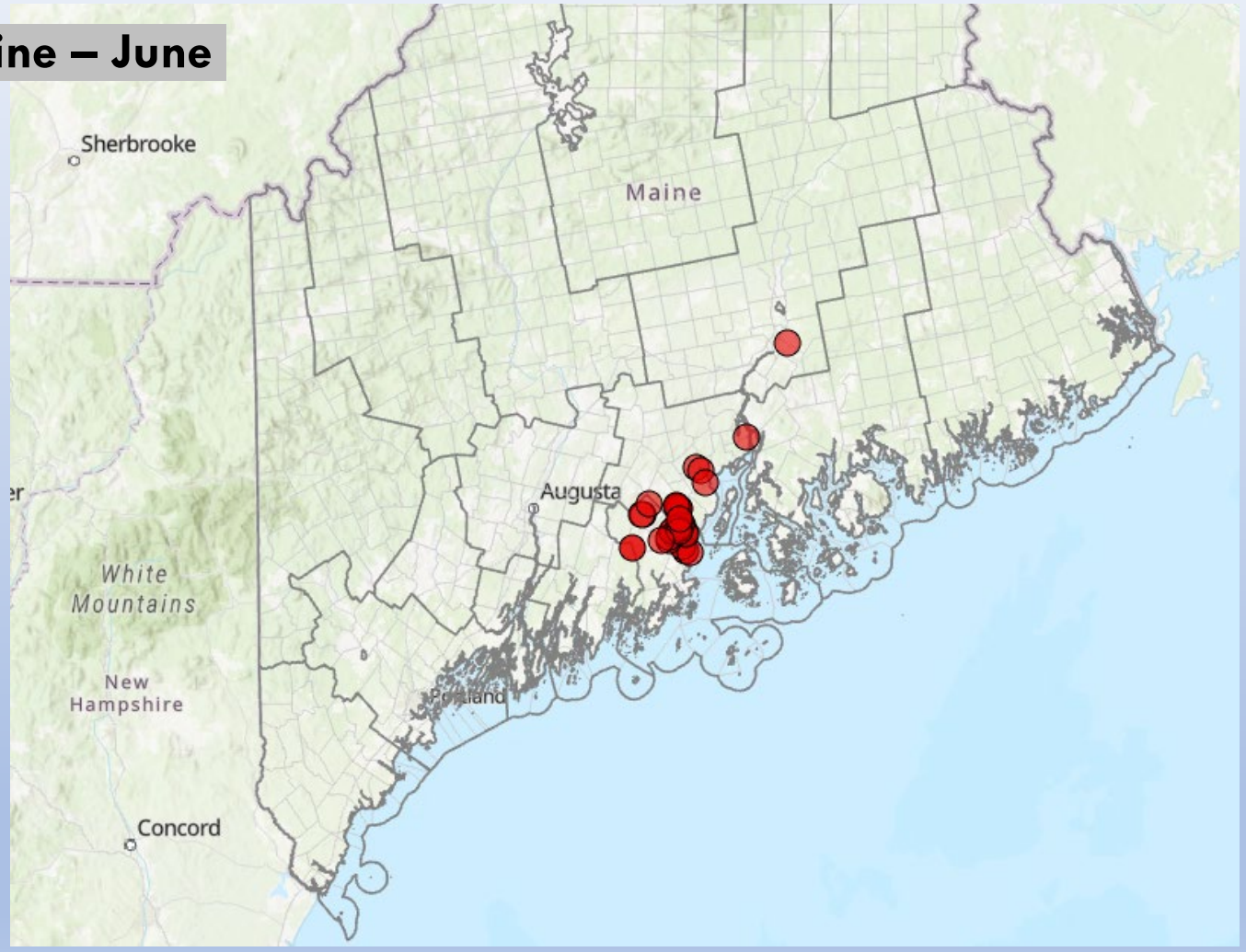
BLD SYMPTOMS

- Early symptoms - dark bands between lateral veins of leaves
  - Evident when leaves emerge (spring)
- Later stages – leaves become thickened, shriveled and curled
- Reduced bud and leaf production
- Mortality
  - 2-5 years – saplings
  - ~6 years – mature trees

May be 2 years in Maine for both

First reported in Maine – June 2021

- Waldo Co.
- Knox Co.



Midcoast Maine – symptoms observed in early June

Fish & Aquatic Invertebrates

Already many impacts

Why the fuss about bass

Rock bass is a new introduction in the Androscoggin River watershed

About this group

This group is for people that enjoy Bass, Pike, and Muskie fishing but don't want to deal with the drama of other groups.

Maine Bass, Pike, And Muskie Fishing

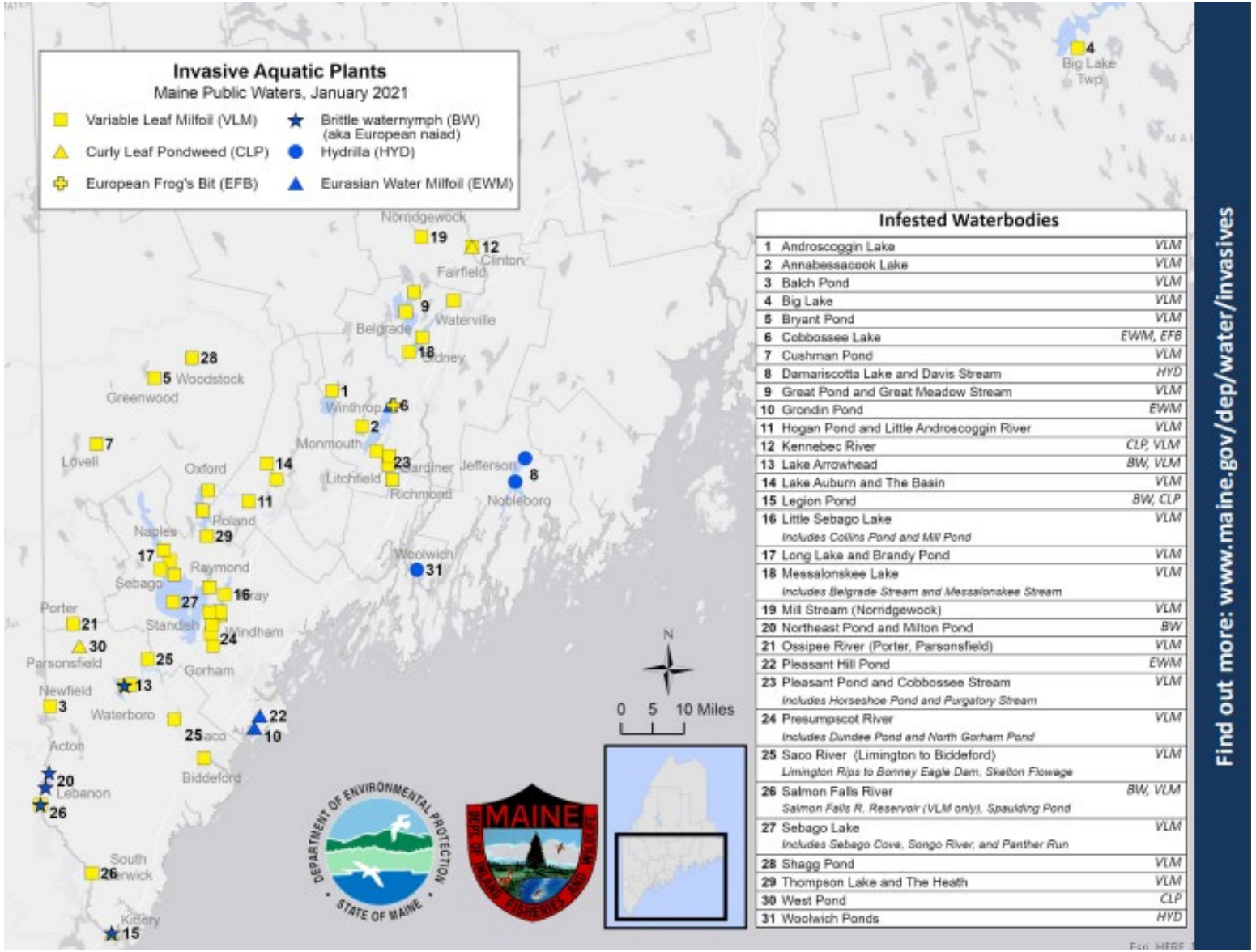
Private group · 2.1K members

Join group

The rare Wyoming Croc

Was only in the water 3 months

Aquatic plants



Infested Waterbodies

1	Androscoggin Lake	*VLM*
2	Annabessacook Lake	*VLM*
3	Balch Pond	*VLM*
4	Big Lake	*VLM*
5	Bryant Pond	*VLM*
6	Cobbossee Lake	*EWM, EFB*
7	Cushman Pond	*VLM*
8	Damariscotta Lake and Davis Stream	*HYD*
9	Great Pond and Great Meadow Stream	*VLM*
10	Grondin Pond	*EWM*
11	Hogan Pond and Little Androscoggin River	*VLM*
12	Kennebec River	*CLP, VLM*
13	Lake Arrowhead	*BW, VLM*
14	Lake Auburn and The Basin	*VLM*
15	Legion Pond	*BW, CLP*
16	Little Sebago Lake *Includes Collins Pond and MW Pond*	*VLM*
17	Long Lake and Brandy Pond	*VLM*
18	Messalonskee Lake *Includes Belgrade Stream and Messalonskee Stream*	*VLM*
19	Mill Stream (Norridgewock)	*VLM*
20	Northeast Pond and Milton Pond	*BW*
21	Ossipee River (Porter, Parsonsfield)	*VLM*
22	Pleasant Hill Pond	*EWM*
23	Pleasant Pond and Cobbossee Stream *Includes Horseshoe Pond and Purgatory Stream*	*VLM*
24	Presumpscot River *Includes Dundee Pond and North Gorham Pond*	*VLM*
25	Saco River (Limington to Biddeford) *Limington Rips to Bonney Eagle Dam, Skelton Flowage*	*VLM*
26	Salmon Falls River *Salmon Falls R. Reservoir (VLM only), Spaulding Pond*	*BW, VLM*
27	Sebago Lake *Includes Sebago Cove, Songo River, and Panther Run*	*VLM*
28	Shagg Pond	*VLM*
29	Thompson Lake and The Heath	*VLM*
30	West Pond	*CLP*
31	Woolwich Ponds	*HYD*

Find out more: www.maine.gov/dep/water/invasives


2002


2011

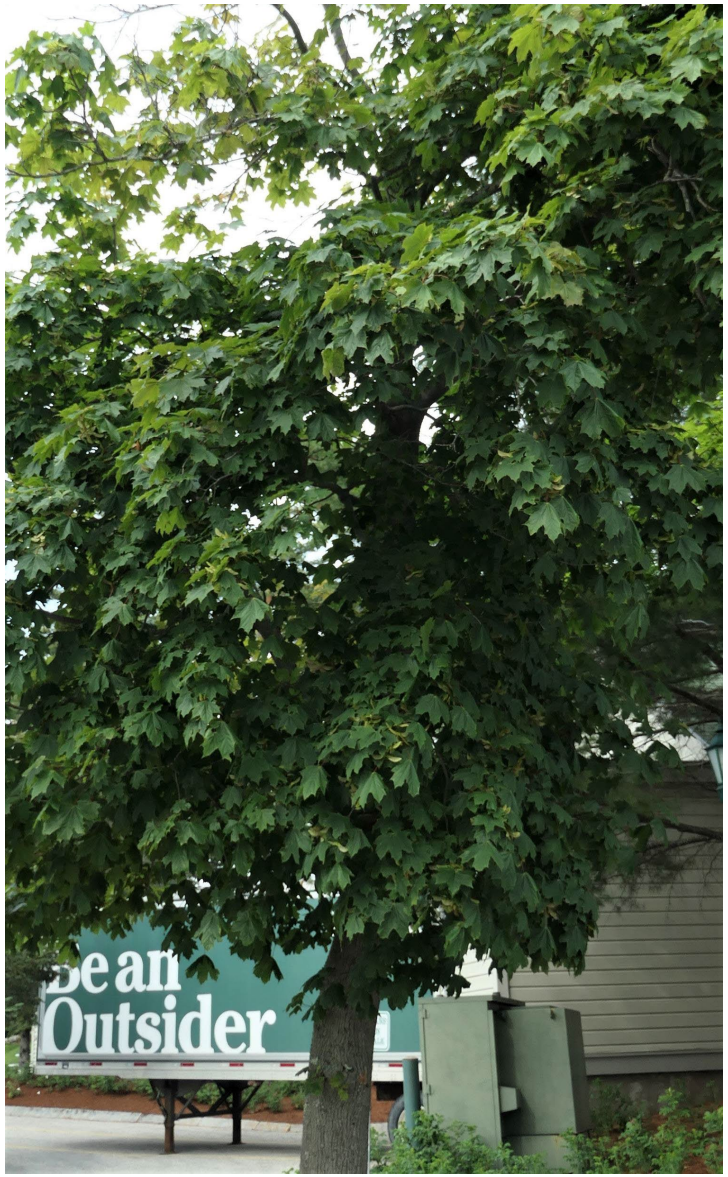
Terrestrial plants


L.L.Bean
THE FINAL CHARGE


HAWKS

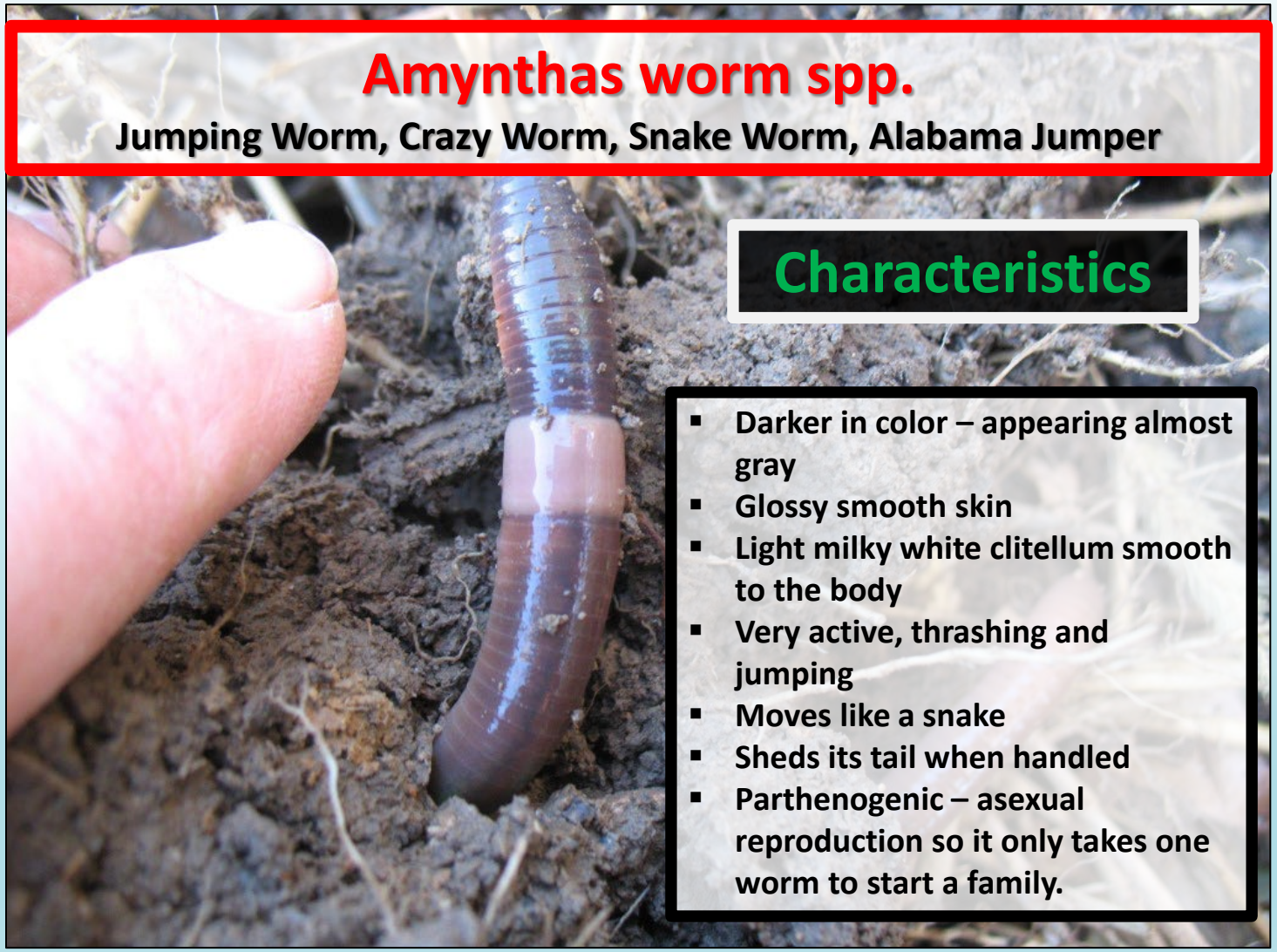

Griffin Dill


Griffi


Be an
Outsider

Amynthas worm spp.

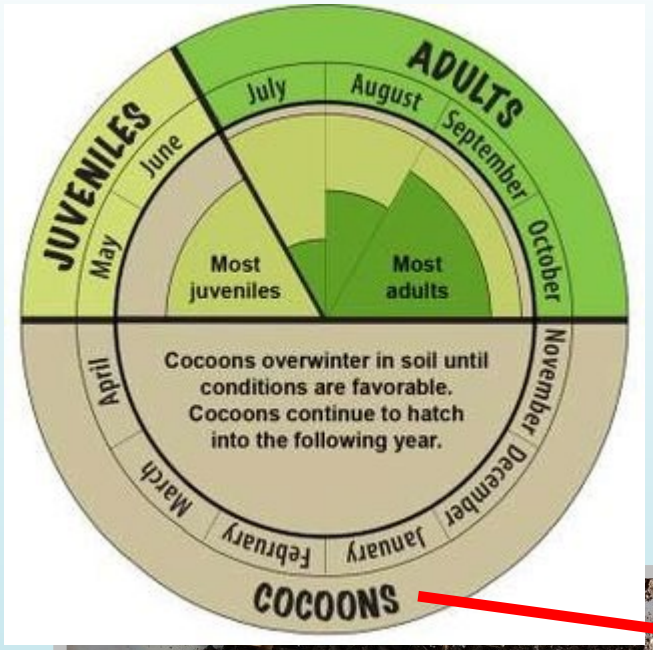
Jumping Worm, Crazy Worm, Snake Worm, Alabama Jumper



Characteristics

- Darker in color – appearing almost gray
- Glossy smooth skin
- Light milky white clitellum smooth to the body
- Very active, thrashing and jumping
- Moves like a snake
- Sheds its tail when handled
- Parthenogenic – asexual reproduction so it only takes one worm to start a family.


Amynthas tokioensis
Amynthas agrestis


ADULTS
July
August
September
October
JUVENILES
June
May
Most juveniles
Most adults
Cocoons overwinter in soil until conditions are favorable. Cocoons continue to hatch into the following year.
April
March
February
January
December
November
COCOONS

Life Cycle

HOW ARE THEY SPREADING?

Earthworms in the genus Amynthas soil amendments many which may be used in landscaping and horticulture.

What you can do!

Report invasive species

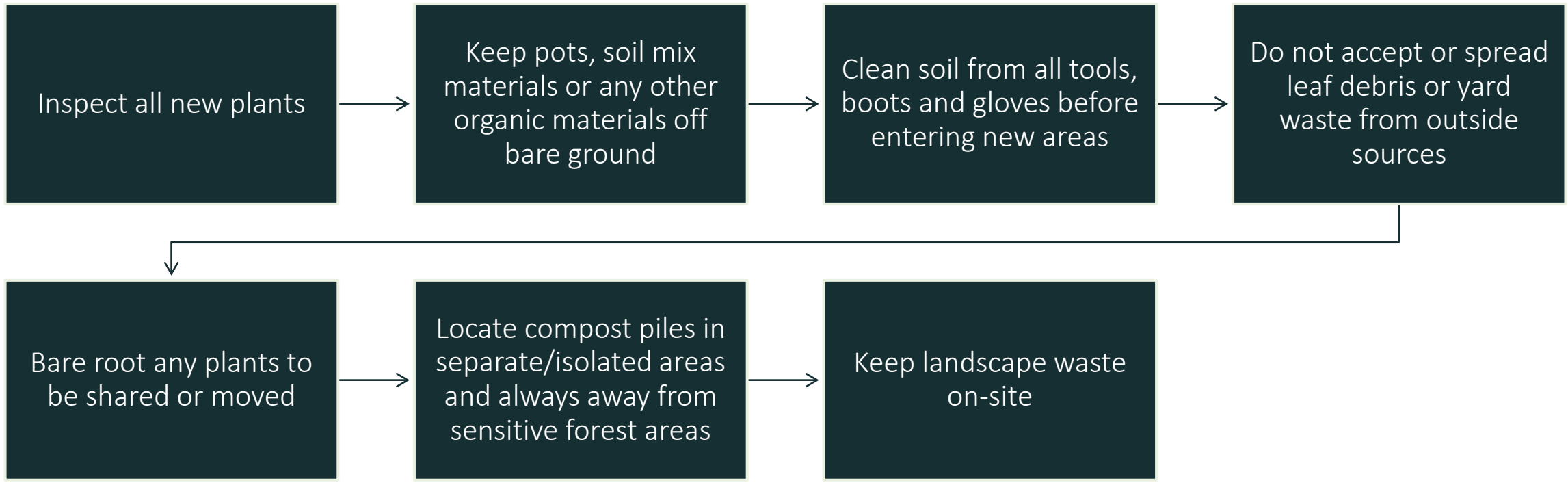
- bugwatch@maine.gov
- https://appengine.egov.com/apps/me/dacf/mfs-tree-ailment
- invasives.mnap@maine.gov
- milfoil@maine.gov
- https://www.maineogt.org/

Firewood is a major source of deadly forest insects

Don't Move Firewood!

Signs at border crossings & visitor centers

CLEAN + DRAIN + DRY YOUR GEAR



BMPs to slow the spread of *Amynthas* worms


I pledge to protect our waters
from invasive species
Never Release Bait
I will always DISPOSE
of unwanted bait
in the trash.
EWR_0039_22

Support new breeding techniques

applied sciences

MDPI

Review

Myths and Realities about Genetically Modified Food: A Risk-Benefit Analysis

Angelo Vega Rodríguez [1], Cristina Rodríguez-Oramas [1], Esther Sanjuán Velázquez [1], Arturo Hardisson de la Torre [2], Carmen Rubio Armendáriz [2] and Conrado Carrascosa Iruzubieta [1,*]

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[2] Department of Obstetrics and Gynecology, Pediatrics, Preventive Medicine and Public Health, Toxicology, Legal and Forensic Medicine and Parasitology, Pharmacy Faculty, University of La Laguna, 38200 San Cristóbal de La Laguna, Spain; atorre@ull.edu.es (A.H.d.l.T.); crubio@ull.edu.es (C.R.A.)

* Correspondence: conrado.carrascosa@ulpgc.es

Abstract: The development and consumption of genetically modified (GM) crops are surrounded by controversy. According to proponents, only molecular biology approaches and genetic engineering tools are realistic food shortage solutions for the world's ever-growing population. The main purpose of this study is to review the impact of GM products on human, animal, and environmental health. People still reject GM crops not only because of safety concerns, but also for moral reasons. Toxicity, allergies, and possible horizontal gene transfer (HGT) to the environment or to other species have been associated with the marketing of GM products. Moreover, the scarce data available about the long-term implications of using GM crops is another opponent concern. Nevertheless, science has evidenced no harm from GM crops use to date but has, instead, reported several benefits that result from their commercialization, such as economic, environmental, and health benefits for the general public. Legislation and policies about GM product labeling standards are being discussed. To overcome emerging food security challenges, considering quality scientific information is essential rather than leaving the issue and merely moving toward moral discussion. Hence, a risk–benefit analysis is necessary.

Citation: Vega Rodríguez, A.; Rodríguez-Oramas, C.; Sanjuán Velázquez, E.; Hardisson de la Torre, A.; Rubio Armendáriz, C.; Carrascosa Iruzubieta, C. Myths and Realities about Genetically Modified Food: A Risk-Benefit Analysis. *Appl. Sci.* **2022**, *12*, 2861. https://doi.org/10.3390/

https://www.mdpi.com/2076-3417/12/6/2861/pdf

Need more than coexistence

usda.gov/topics/farming/coexistence

What are State Agencies doing?

SPATHIUS GALINAE

SPATHIUS AGRILI

OOBIUS AGRILI

TETRASTICHUS PLANIPENNISI

You can read the documents and public comments by visiting https://www.regulations.gov/docket?D=APHIS2014-0094

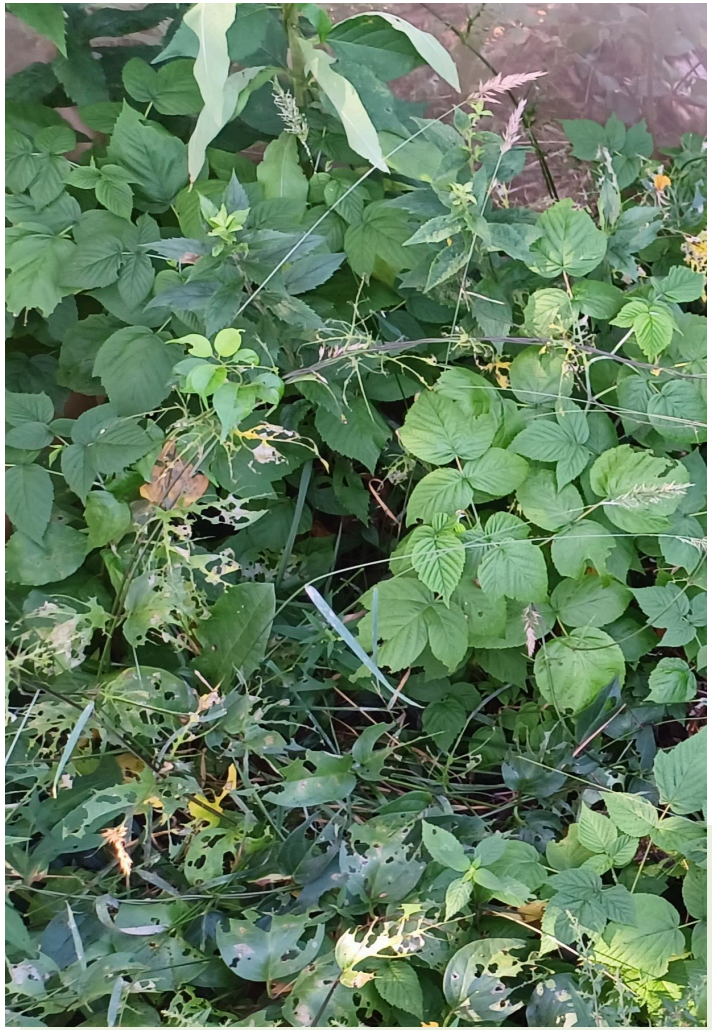
Biological controls may save our ash

Is it safe to release wasps since they are non-native insects?

Before the wasps were released, research in China and in the United States revealed that the wasps prefer EAB over other insects

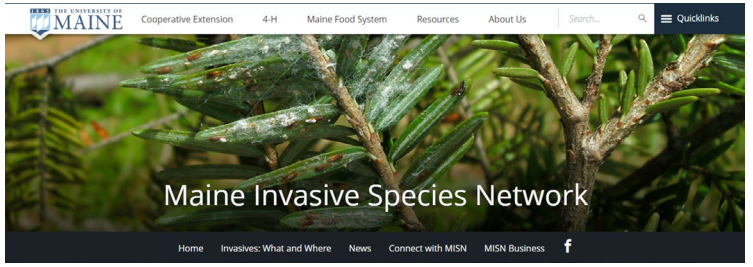
No adverse effects were found or raised through the environmental assessment process

Biological control may tame black swallowwort



APHIS

Lake Stewards of Maine
Volunteer Lake Monitoring Program
Keeping a watchful eye on the health of Maine lakes since 1971



MLTN
MAINE LAND TRUST NETWORK

The Nature Conservancy
Maine

What are partner organizations doing?


RULES FOR CONDUCT AT BOAT LAUNCHING FACILITIES
COURTESY INSPECTOR
MAINE
WARNING
Remove all plants
from boat, trailer, prop,
anchor & lines...It's the law!
Drain all water
from boat and live well on land
Don't release live bait
For more information
800-452-1942
STOP AQUATIC HITCHHIKERS!

Eight things you can do to restore the ecosystem in your yard –

Doug Tallamy

- Cut your lawn in half
- Avoid senseless mowing
- Remove invasive species from your property
- Use keystone plants
- Build a landscaped layered with plants
- Put motion sensors on your security lights
- Minimize reliance on pesticide use
- Share these ideas with your neighbors

Minimize lawn areas

Mow or bush hog 1/2 or 1/3 of the meadow each year

Invasive plants

https://www.maine.gov/dacf/php/horticulture/invasiveplants.shtml

33 Invasive Plants Prohibited from Sale or Import in Maine What you need to Know

DEPARTMENT OF Agriculture Conservation & Forestry

In January 2017 changes were adopted to CMR 01-001 Chapter 273: Criteria for Listing Invasive Terrestrial Plants. These changes make it illegal to sell, import, export, buy or intentionally propagate for sale the 33 plant species listed below.

- *Acer ginnala* (amur maple)
- *Acer platanoides* (Norway maple)
- *Aegopodium podagraria* (bishop's weed)
- *Ailanthus altissima* (tree of heaven)
- *Alliaria petiolata* (garlic mustard)
- *Amorpha fruticosa* (false indigo bush)
- *Ampelopsis glandulosa* (porcelain berry)
- *Artemisia vulgaris* (common mugwort)
- *Berberis thunbergii* (Japanese barberry)
- *Berberis vulgaris* (common barberry)
- *Celastrus orbiculatus* (Asiatic bittersweet)
- *Elaeagnus umbellata* (Autumn olive)
- *Euonymus alatus* (winged euonymus)
- *Euphorbia cyparissas* (cypress spurge)
- *Fallopia baldschuanica* (Chinese bindweed)
- *Fallopia japonica* (Japanese knotweed)
- *Frangula alnus* (glossy buckthorn)
- *Hesperis matronalis* (dame's rocket)
- *Impatiens glandulifera* (ornamental jewelweed)
- *Iris pseudacorus* (yellow iris)
- *Ligustrum vulgare* (common privet)
- *Lonicera japonica* (Japanese honeysuckle)
- *Lonicera maackii* (amur or bush honeysuckle)
- *Lonicera morrowii* (Morrow's honeysuckle)
- *Lonicera tatarica* (Tatarian honeysuckle)
- *Lythrum salicaria* (purple loosestrife)
- *Microstegium vimineum* (Japanese stilt grass)
- *Paulownia tomentosa* (paulownia, princess tree)
- *Persicaria perfoliata* (mile-a-minute)
- *Phellodendron amurense* (amur cork tree)
- *Populus alba* (white cottonwood)
- *Robinia pseudoacacia* (black locust)
- *Rosa multiflora* (multiflora rose)

Top Keystone Plant Genera in Eastern Temperate Forests - Ecoregion 8

A genus is a taxonomic category of plants that contains one or more species of plants with similar characteristics. Species within each genus have adapted to local conditions and are the appropriate native species or varieties suited to a specific ecoregion.

Plant Type	Plant Genus	Sample of Common Species (not all encompassing)	# Caterpillar Species that Use this as a Host Plant	# of Pollen Specialist Bee species that Rely on this Plant
Trees	*Quercus*	White oak *(Quercus alba)*, Black oak *(Quercus velutina)*	436	
	Prunus	American plum *(Prunus americana)*, Black cherry *(Prunus serotina)*, Chokecherry *(Prunus virginiana)*	390	
	Betula	River birch *(Betula nigra)*, Sweet birch *(Betula lenta)*	289	
	Populus	Eastern cottonwood *(Populus deltoides)*	249	
	Acer	Box elder *(Acer negundo)*, Silver maple *(Acer saccharinum)*, Sugar maple *(Acer saccharum)*	238	
	Malus	Southern crabapple *(Malus angustifolia)*, Sweet crabapple *(Malus coronaria)*	237	
	Carya	Bitternut hickory *(Carya cordiformis)*, Pignut hickory *(Carya glabra)*, Mockernut hickory *(Carya tomentosa)*	213	
	Pinus	Pitch pine *(Pinus rigida)*, Eastern white pine *(Pinus strobus)*, Virginia pine *(Pinus virginiana)*	200	
Shrubs	*Vaccinium*	Northern highbush blueberry *(Vaccinium corymbosum)*, Black highbush blueberry *(Vaccinium fuscatum)*, Hillside blueberry *(Vaccinium pallidum)*	217	14
	Salix	Prairie willow *(Salix humilis)*, Black willow *(Salix nigra)*	289	14
Flowering Perennials	*Solidago*	Stiff leaf goldenrod *(Solidago rigida)*, Atlantic goldenrod *(Solidago arguta)*	109	42
	Symphyotrichum	Blue wood aster *(Symphyotrichum cordifolium)*, Smooth aster *(Symphyotrichum laeve)*	100	33
	Helianthus	Woodland sunflower *(Helianthus divaricatus)*, Small woodland sunflower *(Helianthus microcephalus)*	66	50

Keystone plants

https://www.nwf.org/Garden-for-Wildlife/About/Native-Plants/keystone-plants-by-ecoregion

Plant in layers

Turn off the lights

Spare the Sprays. Even Organic Ones

PESTICIDE	NON-TOXIC	LOW TOXICITY	HIGHLY TOXIC
Insecticides/Repellants/Pest Barriers			
Bacillus thuringiensis (Bt)			
Beauveria bassiana			
Cydia pomonella granulosis			
Diatomaceous Earth			
Garlic			
Insecticidal Soap			
Kaolin Clay			
Neem			
Horticultural Oil			
Pyrethrins			
Rotenone			
Sabadilla			
Spinosad			
Herbicides/Plant Growth Regulators/Adjuvants			
Adjuvants			
Corn Gluten			
Gibberellic Acid			
Horticultural Vinegar			
Fungicides			
Copper			
Copper Sulfate			
Lime Sulfur			
Sulfur			

Toxicity of Common Organic Pesticides to Pollinators

Soaps and Oils, only when directly sprayed upon the pollinator

Pass It On!

Resources

INVASIVE SPECIES

What is an invasive species?

An invasive species is a non-native species (including seeds, eggs, spores, or other propagules) whose introduction causes or is likely to cause economic harm, environmental harm, or harm to human health. The term "invasive" is used for the most aggressive non-native species. These species grow and reproduce rapidly,

https://www.audubon.org/native-plants

American Witch-Hazel

Hamamelis virginiana

Also known as Common Witch-Hazel, Snapping Hazelnut, Striped or Spotted Alder, and Winterbloom, this perennial, fall-blooming, deciduous shrub or small tree grows 15 to 20 feet tall. It grows in full sun and partial shade, in dry to moist soil, but prefers rich, acidic, well-drained soil. American Witch-Hazel produces fragrant, yellow flowers with petals that resemble crumpled strips from October to December and greenish seed capsules that mature to light brown.

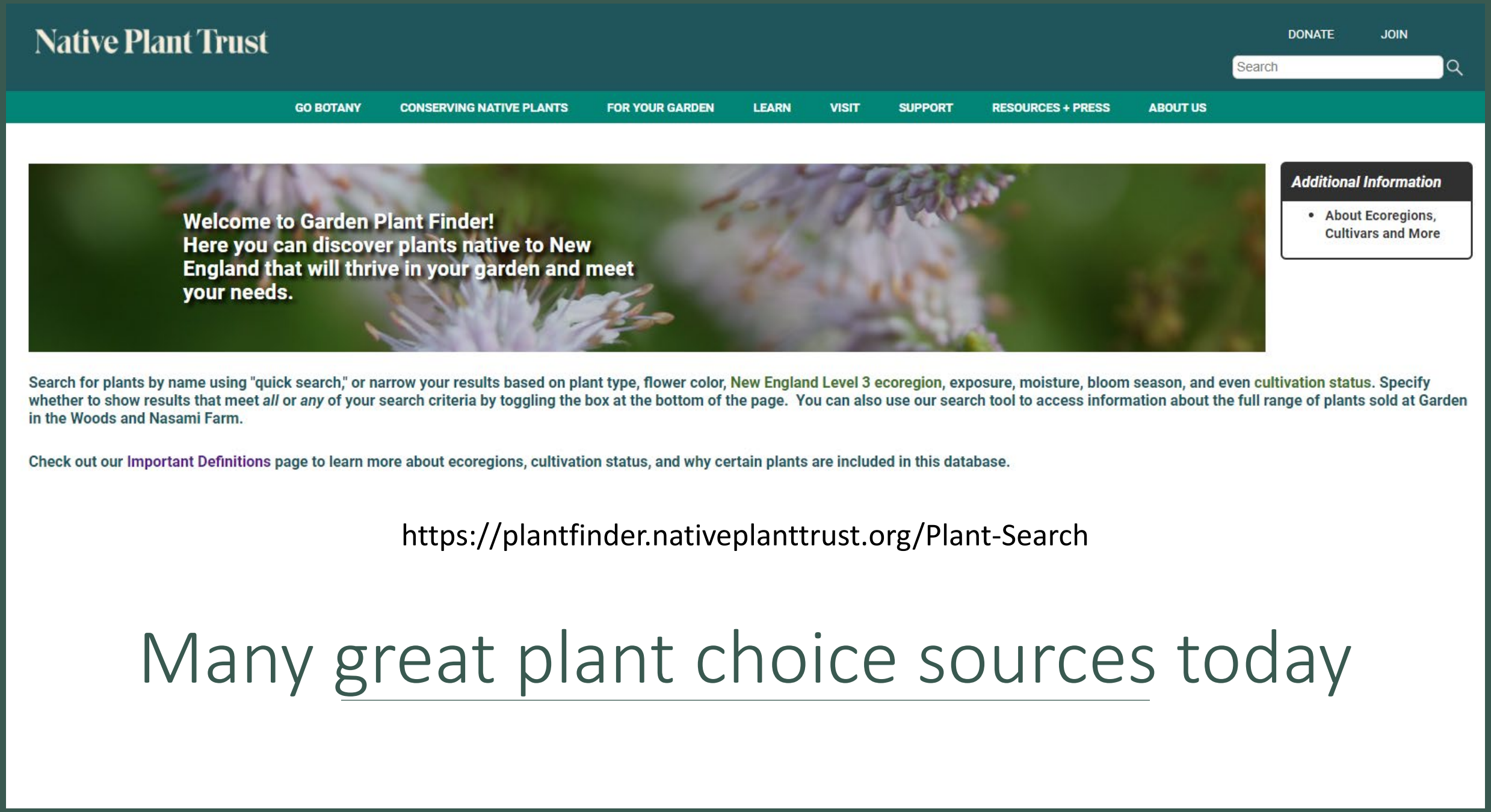
Attributes Shrubs, Trees, Fruit, Butterflies, Caterpillars, Nuts

☐ Add to your plant list

Buy Now

May attract

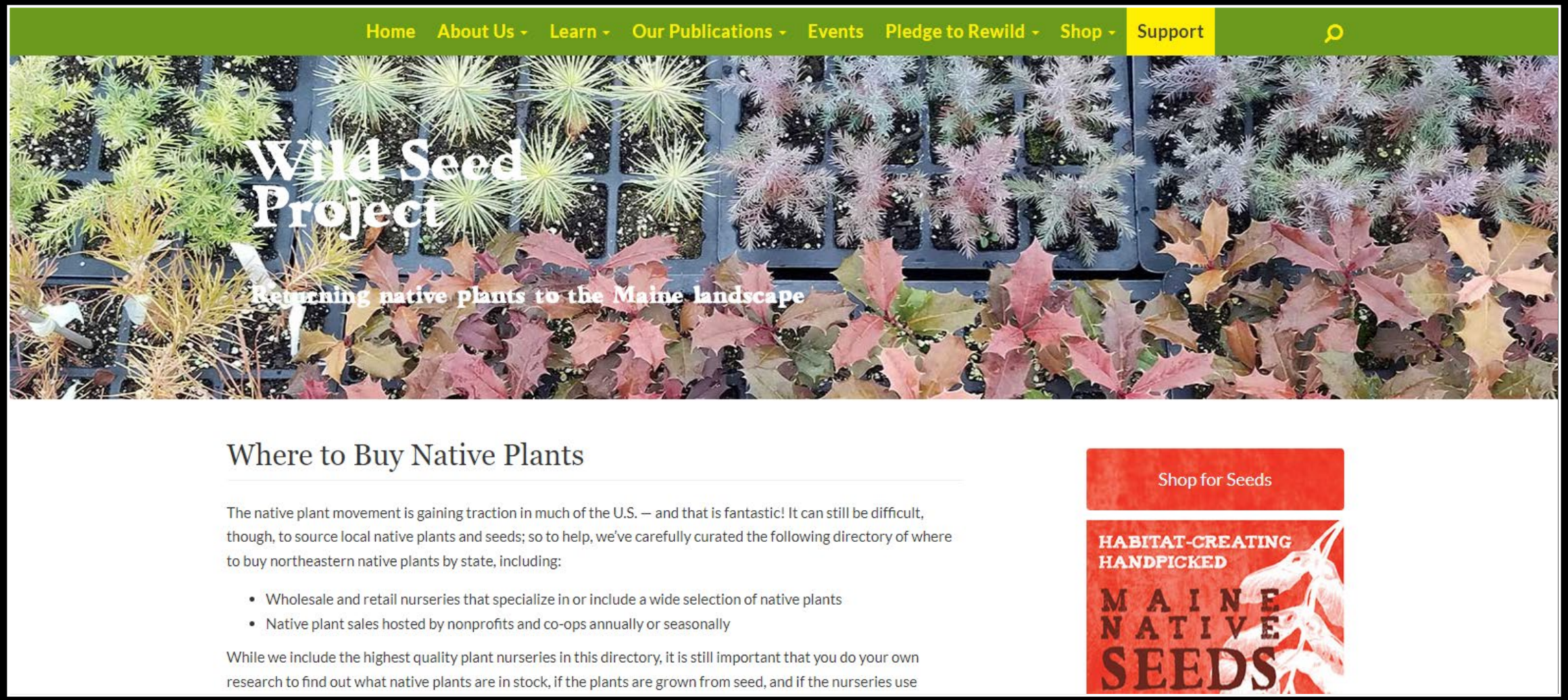
Many great plant choice sources today



https://plantfinder.nativeplanttrust.org/Plant-Search

Many great plant choice sources today

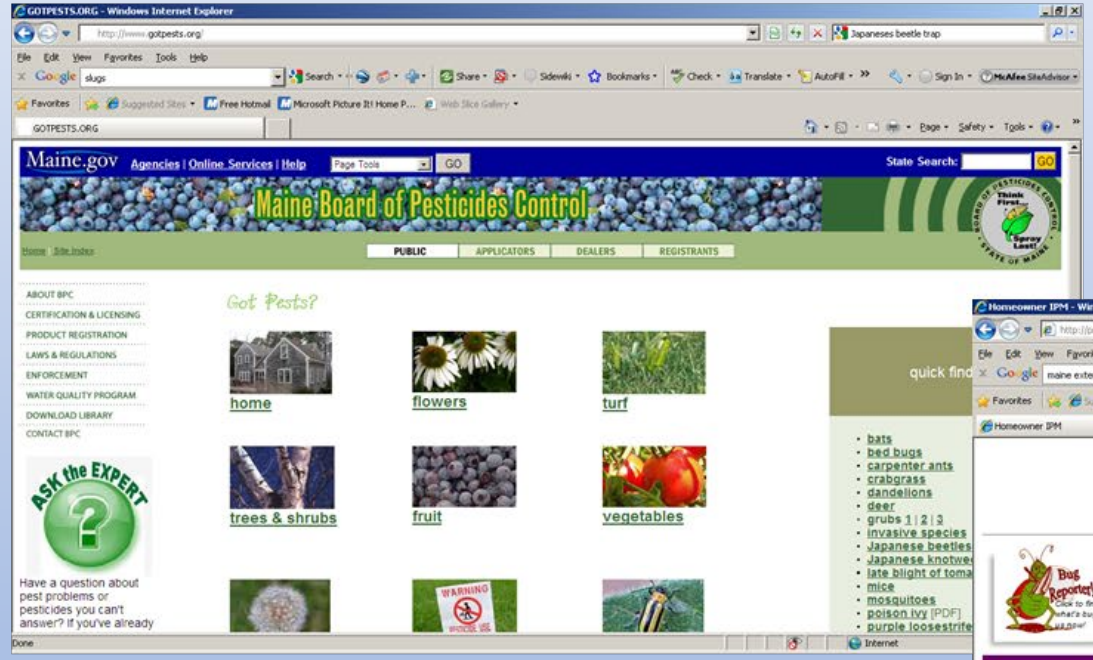
https://wildseedproject.net/buy-native-plants/



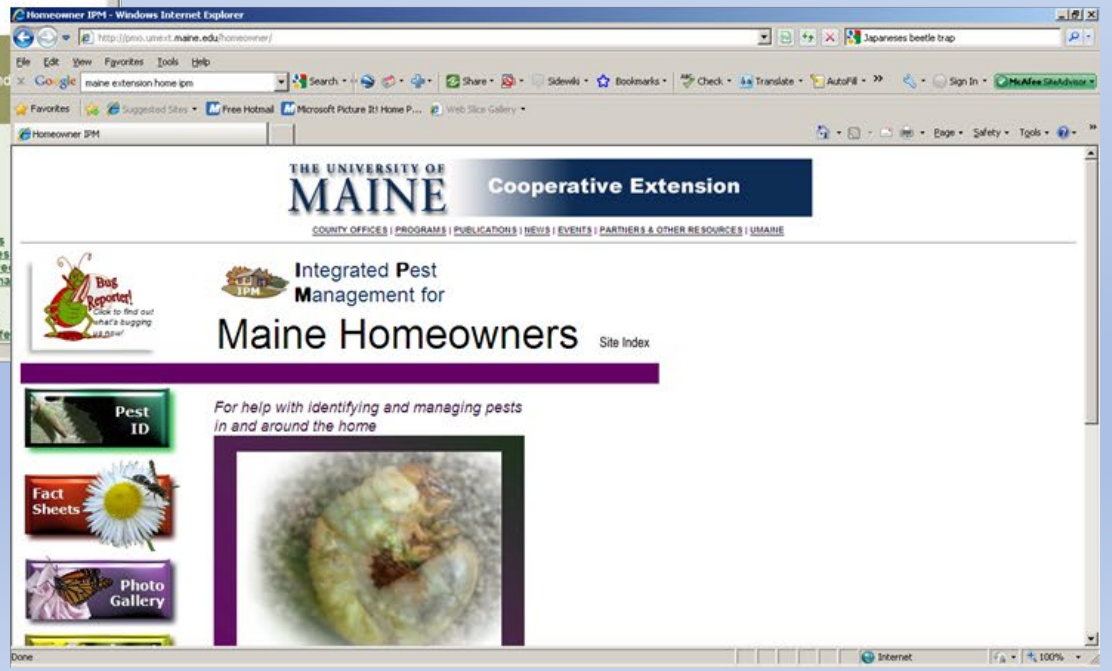
Where to buy native plants

Pest management resources

Maine Dept Agriculture: Gotpests.org



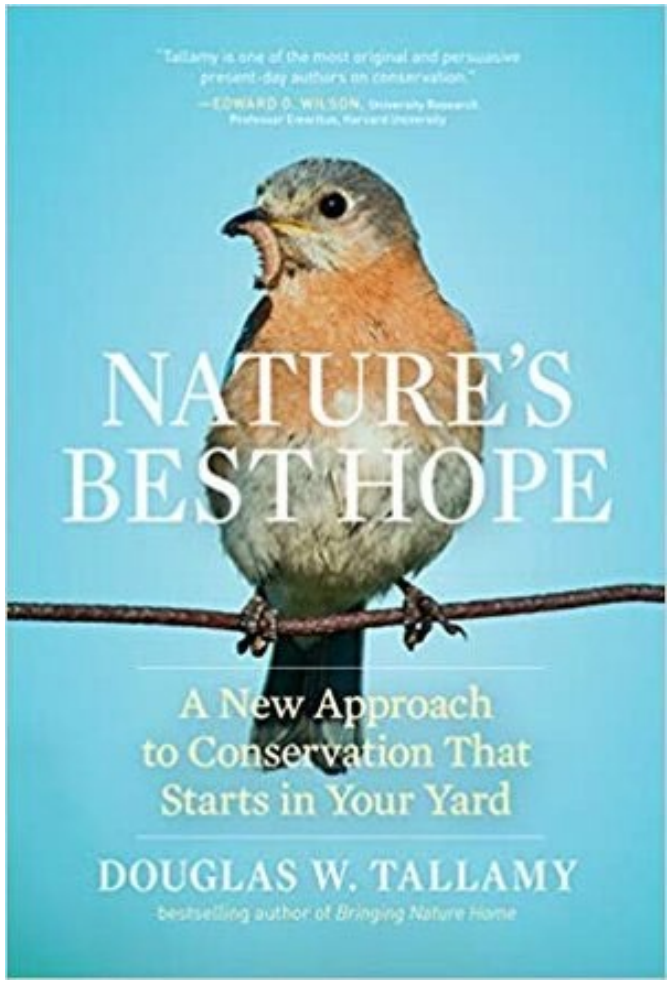
UMaine Extension: http://pmo.umext.maine.edu/homeowner/

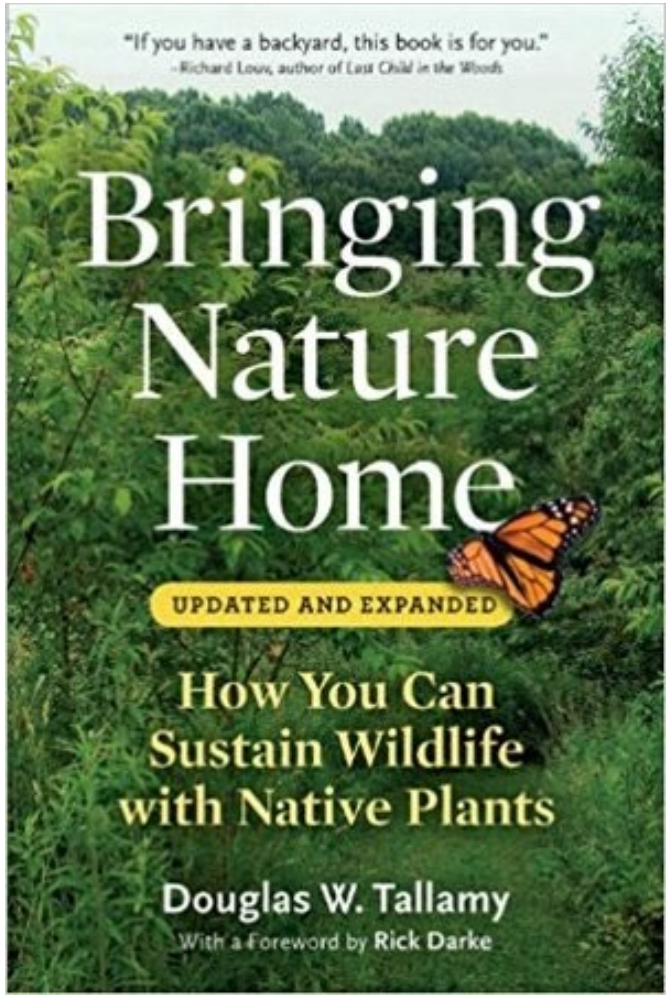


Resources

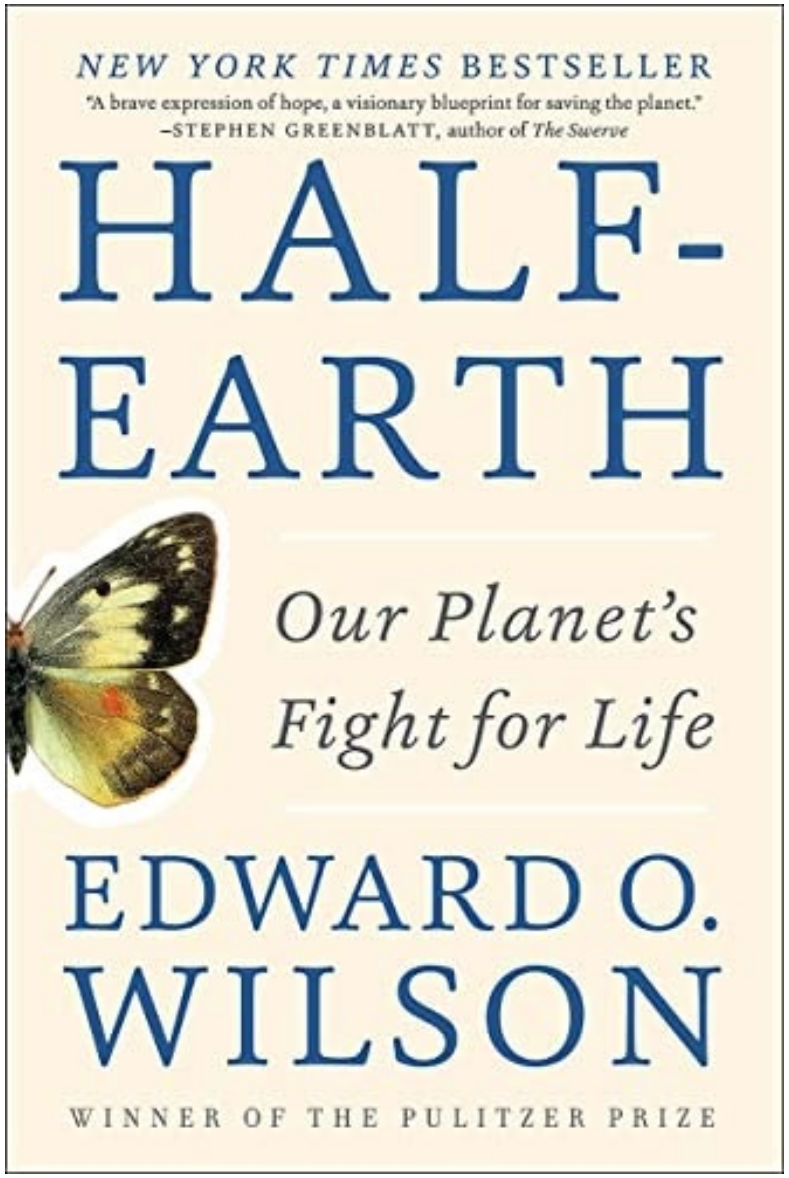
https://homegrownnationalpark.org/tallamys-hub-1

Resources


NATURE'S BEST HOPE
A New Approach to Conservation That Starts in Your Yard
DOUGLAS W. TALLAMY


"If you have a backyard, this book is for you."
Bringing Nature Home
UPDATED AND EXPANDED
How You Can Sustain Wildlife with Native Plants
Douglas W. Tallamy
With a Foreword by Rick Darke

Resources



- https://www.half-earthproject.org/

Questions?

gary.fish@maine.gov
207-287-7545