



# Species that Cause Change in the Environment: Beneficial vs. Harmful



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Questions to be answered

- What are some native species that are beneficial to the environment?
- What are some introduced species that are beneficial to the environment?
- What are some native species that are harmful to the environment?
- What are some introduced species that are harmful to the environment?



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*



# Vocabulary

- Species
- Native species
- Introduced species
- Invasive species
- Pests
- Biological control agents
- Predators
- Parasitoids
- Organic matter



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Native species that are beneficial



Sycamore leaf and fruit

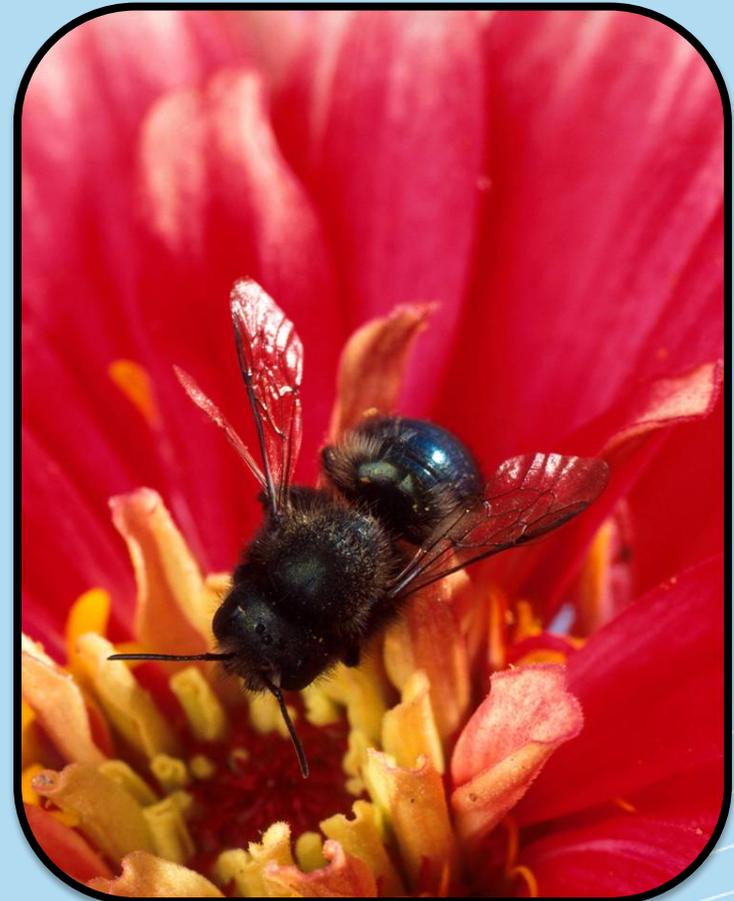
Fungi on a dead log



# Native species that are beneficial



**Buckeye butterfly**



**Blue orchard bee**

Photo Credits:

Buckeye - William M. Ciesla, Forest Health Management International, [www.bugwood.org](http://www.bugwood.org), #5347009

BOB - Scott Bauer, USDA Agricultural Research Service, [www.bugwood.org](http://www.bugwood.org), #1323039



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Introduced species that are beneficial

Night crawler



European honeybee

Photo Credits:  
Earthworm - Joseph Berger, [www.bugwood.org](http://www.bugwood.org), #5439087  
Honeybee- David Cappaert, Michigan State University, [www.bugwood.org](http://www.bugwood.org), #2116051



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Introduced species that are beneficial

Asian ladybird beetle



Parasitoid wasp



Photo Credits:  
Ladybird beetles - Gyorgy Csoka, Hungary Forest Research Institute, [www.bugwood.org](http://www.bugwood.org), #5410810  
Bald eagle - David Cappaert, Michigan State University, [www.bugwood.org](http://www.bugwood.org), #2133029

# Native species that are harmful



Eastern tent caterpillars in their tent

Eastern tent caterpillar



Damage caused by southern pine beetles



Southern pine beetle

Photo Credits:  
Tent caterpillars - Lacy L. Hyche, Auburn University, [www.bugwood.org](http://www.bugwood.org), #1540417 and Robert L. Anderson, USDA Forest Service, [www.bugwood.org](http://www.bugwood.org), #0590064  
Southern pine beetle - Ronald F. Billings, Texas Forest Service, [www.bugwood.org](http://www.bugwood.org), #1546017 and Erich G. Vallery, USDA Forest Service - SRS-4552, [www.bugwood.org](http://www.bugwood.org), #5289035



**protect u.s.**  
community invasive species network

First Detectors Protecting U.S. from Pests

# Introduced species that are harmful

Damage caused by emerald ash borer



Emerald ash borer adult and larva



Galleries left by the larva



**protect u.s.**  
community invasive species network

First Detectors Protecting U.S. from Pests

Photo Credit:

Damaged ash trees: Daniel Herms, The Ohio State University, [www.bugwood.org](http://www.bugwood.org), #5171038

Beetle: David Cappaert, Michigan State University, [www.bugwood.org](http://www.bugwood.org), #2106098

Larvae: David Cappaert, Michigan State University, [www.bugwood.org](http://www.bugwood.org), # 1460071

Tunnels: Art Wagner, USDA APHIS PPQ, [www.bugwood.org](http://www.bugwood.org), #5147090

# Introduced species that are harmful

Destruction of trees infested by Asian  
longhorned beetle



Asian  
longhorned  
beetle adult  
and larva



Larva inside  
the wood



Photo Credit:  
Chipping trees: Larry R. Barber, USDA Forest Service, [www.bugwood.org](http://www.bugwood.org), #3047034  
Beetle: Michael Bohne, [www.bugwood.org](http://www.bugwood.org), #1262001  
Larvae: Thomas B. Denholm, New Jersey Department of Agriculture, [www.bugwood.org](http://www.bugwood.org), #1253027  
Tunnels: Steven Katovich, USDA Forest Service, [www.bugwood.org](http://www.bugwood.org), #1398111



**protect u.s.**  
community invasive species network

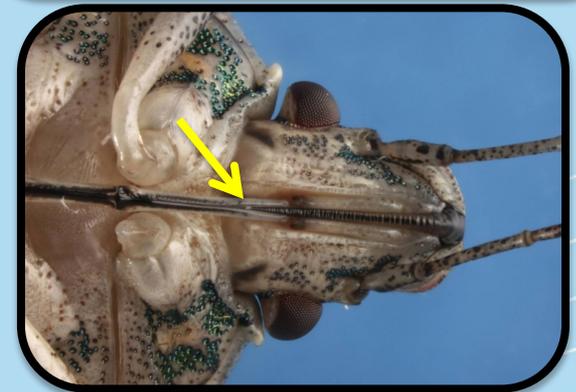
First Detectors Protecting U.S. from Pests

# Introduced species that are harmful

Brown marmorated stink bug on fruit



Brown marmorated stink bug adult



Piercing, sucking mouthpart

Photo credit:  
adult: Susan Ellis, [www.bugwood.org](http://www.bugwood.org), #5369380 and #5443477  
On fruit: Gary Bernon, USDA APHIS, [www.bugwood.org](http://www.bugwood.org), #1113016



**protect u.s.**  
community invasive species network

First Detectors Protecting U.S. from Pests

# Introduced species that are harmful

Damage caused by laurel wilt disease



Redbay ambrosia beetle  
adult



Photo credits:

Damage: CL Harmon, University of Florida

Adult and tunneling: Lyle Buss, University of Florida



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Summary

- There are many native species that are beneficial to the environment.
  - trees, fungi, and pollinators
- There are many introduced species that are beneficial to the environment.
  - Honeybees, night crawlers, Asian ladybird beetles, and parasitoid wasps
- There are many native species that are harmful to the environment.
  - Eastern tent caterpillars and southern pine beetle
- There are many introduced species that are harmful to the environment.
  - Asian longhorned beetle, emerald ash borer, brown marmorated stink bug, and laurel wilt



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Activity #1

- Research Project (follow along in your handout).
- You will provide an example of:
  - A native species that is beneficial to the environment
  - An introduced species that is beneficial to the environment
  - A native species that is harmful to the environment
  - An introduced species that is harmful to the environment



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Activity #1

- Answer the following questions for each of your examples:
  - What does it look like?
  - Is it from the U.S. and if so where is it found?
  - Did it come from another country and if so which country?
  - If it came from another country, where can we find it in the United States?
  - Why is it beneficial or harmful to the environment?  
Be specific in your explanation.
- Write a report on what you found
  - Include title page and works cited.



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Activity #2

- Beneficial and Harmful Species Workbook
  - Go through the workbook and complete the exercises to further explore species that are beneficial to the environment and species that are harmful to the environment.



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Activity #3

- Computer Lab
  - Answer the questions in the handout on beneficial and harmful species as you complete the online exercises.
  - Turn in the handout to your teacher when you are done with it.



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# References

- Alabama Forestry Commission. “Laurel Wilt Disease”. accessed June 5, 2012 –
  - <http://www.forestry.alabama.gov/LaurelWilt.aspx?bv=3>
- Allaby, M., editor. 1998. Concise Oxford Dictionary of Ecology.
- Asian Longhorned Beetle website – accessed June 5, 2012 –
  - <http://www.uvm.edu/albeetle/management/treeremoval.html>
- British Columbia Ministry of Agriculture. “Blue Orchard Bee”. accessed June 6, 2012 –
  - [http://www.agf.gov.bc.ca/apiculture/factsheets/506\\_osmia.htm](http://www.agf.gov.bc.ca/apiculture/factsheets/506_osmia.htm)
- Cafferty, S., editor. 2005. Firefly Encyclopedia of Trees. Firefly Books, New York.
- Campbell, N.A. 1990. Biology. Benjamin/Cummings Publishing Company, New York.
- Emerald ash borer website. accessed June 5, 2012 –
  - <http://www.emeraldashborer.info/>



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# References

- EPPO Data Sheets on Quarantine Pests. “*Anoplophora glabripennis*”. accessed June 6, 2012 –
  - [http://www.eppo.int/QUARANTINE/insects/Anoplophora\\_glabripennis/ANOLGL\\_ds.pdf](http://www.eppo.int/QUARANTINE/insects/Anoplophora_glabripennis/ANOLGL_ds.pdf)
- Florida Department of Agriculture and Consumer Service, Division of Forestry. 1999. Forest Trees of Florida. Published in house.
- Florida Forest Service. accessed June 5, 2012 –
  - [http://www.floridaforestservice.com/publications/fh\\_pdfs/Laurel\\_Wilt.pdf](http://www.floridaforestservice.com/publications/fh_pdfs/Laurel_Wilt.pdf)
- Florida Whitefly scripted presentation – Invasive Whitefly pests of Florida. accessed June 6, 2012 –
  - <http://www.flwhitefly.org>
- Fraedrich, S.W., T.C. Harrington, R.J. Rabaglia, M.D. Ulyshen, A.E. Mayfield, III, J.L. Hanula, J.M. Eickwort, and D. R. Miller. 2008. “A Fungal Symbiont of the Redbay Ambrosia Beetle Causes a Lethal Wilt in Redbay and Other Lauraceae in the Southeastern United States”. Plant Disease, Volume 92, No. 2.



# References

- Global Invasive Species Database. “*Lumbricus terrestris*”. accessed June 6, 2012 –
  - <http://www.issg.org/database/species/ecology.asp?si=1555&fr=1&sts=&lang=EN>
- Greer, L. 1999. “Alternative Pollinators: Native Bees”. accessed June 6, 2012 –
  - <http://www.jswcd.org/Files/ATTR%20native%20pollinators.pdf>
- Hale, W. G. and J.P. Margham. 1991. The Harper Collins Dictionary of Biology. Harper Perennial, New York.
- Kellar, B. “Honeybees across America”. accessed June 5, 2012 –
  - <http://www.orsba.org/htdocs/download/Honey%20Bees%20Across%20America.html>
- National Invasive Species Council. accessed June 4, 2012 –
  - <http://www.invasivespecies.gov/>



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# References

- NPDN First Detector Modules - Introduction to the Emerald Ash Borer and Identification and Hosts. accessed June 5, 2012 –
  - <http://www.firstdetector.org>
- Penn State Entomology. “Brown Marmorated Stink Bug”. accessed June 6, 2012 –
  - <http://ento.psu.edu/extension/factsheets/brown-marmorated-stink-bug>
- Protect U.S. scripted presentation - Citrus Greening and the Asian Citrus Psyllid. accessed June 5, 2012 –
  - <http://www.protectingusnow.org>
- Protect U.S. e-learning module – Laurel wilt and the Redbay Ambrosia Beetle. accessed June 5, 2012 –
  - [www.protectingusnow.org](http://www.protectingusnow.org)
- University of Florida Featured creatures – “Brown Marmorated Stink Bug”. accessed June 6, 2012 –
  - [http://entnemdept.ufl.edu/creatures/veg/bean/brown\\_marmorated\\_stink\\_bug.htm](http://entnemdept.ufl.edu/creatures/veg/bean/brown_marmorated_stink_bug.htm)



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# References

- University of Florida Featured Creatures. “Common Buckeye”. accessed June 6, 2012 –
  - [http://entnemdept.ufl.edu/creatures/bfly/common\\_buckeye.htm](http://entnemdept.ufl.edu/creatures/bfly/common_buckeye.htm)
- University of Florida – Featured Creatures. “Southern Pine Beetle”. accessed June 7, 2012 –
  - [http://entnemdept.ufl.edu/creatures/trees/southern\\_pine\\_beetle.htm](http://entnemdept.ufl.edu/creatures/trees/southern_pine_beetle.htm)
- University of Missouri Extension – “Aphids, Scales and Mites On Home Garden and Landscape Plants”. accessed June 6, 2012 –
  - <http://extension.missouri.edu/p/g7274>
- University of Rhode Island Landscape Horticulture Program. “Honeybees”. accessed June 6, 2012 –
  - <http://www.uri.edu/ce/factsheets/sheets/honeybee.html>
- USDA Forest Service. “The Eastern Tent Caterpillar”. accessed June 7, 2012 –
  - [http://na.fs.fed.us/spfo/pubs/pest\\_al/etc/etc.htm](http://na.fs.fed.us/spfo/pubs/pest_al/etc/etc.htm)



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# References

- USDA Natural Resources Conservation Service. “Native Pollinators”. accessed June 6, 2012 –
  - [http://plants.usda.gov/pollinators/Native\\_Pollinators.pdf](http://plants.usda.gov/pollinators/Native_Pollinators.pdf)
- USDA Natural Resources Conservation Service – Plant Database. “*Acer*”, “*Betula*”, “*Aesculus*”, “*Ulmus*”, “*Salix*”. accessed June 6, 2012 –
  - <http://plants.usda.gov/>
- USDA Natural Resources Conservation Service – Plant Database. “*Fraxinus*”. accessed June 6, 2012 –
  - <http://plants.usda.gov/>
- USDA Natural Resources Conservation Service. 1996. Soil Quality Indicators: Organic Matter. accessed June 28, 2012 –
  - [http://soils.usda.gov/sqi/publications/files/sq\\_fou\\_1.pdf](http://soils.usda.gov/sqi/publications/files/sq_fou_1.pdf)



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# References

- USDA News and Events. “Combating the Brown Marmorated Stink Bug: A New Threat for Agriculture, a Nuisance for Homeowners”. accessed June 5, 2012 –
  - <http://www.ars.usda.gov/is/AR/archive/jul09/bug0709.htm>
- USDA Pest Alert. “Asian Longhorned beetle”. accessed June 5, 2012 –
  - [http://www.na.fs.fed.us/pubs/palerts/alb/alb\\_pa.pdf](http://www.na.fs.fed.us/pubs/palerts/alb/alb_pa.pdf)
- USDA Pest Alert. “Emerald Ash Borer”. accessed June 5, 2012 –
  - [http://www.na.fs.fed.us/spfo/pubs/pest\\_al/eab/eab04.htm](http://www.na.fs.fed.us/spfo/pubs/pest_al/eab/eab04.htm)
- Wagner, D.A. 2005. Caterpillars of Eastern North America. Princeton University Press, Princeton.



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Author Credits and Date of Publication

- Stephanie D. Stocks, Protect U.S. Coordinator, University of Florida
- June 2012



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*

# Reviewers Credits

- Amanda Hodges, PhD, Department of Entomology and Nematology, University of Florida
- Dana Mitchell, 4<sup>th</sup> grade teacher, Newberry Elementary School , Newberry Florida
- Jennifer Weeks, PhD, Department of Entomology and Nematology, University of Florida



**protect u.s.**  
community invasive species network

*First Detectors Protecting U.S. from Pests*