Principles of Wildlife Ecology & Management

Maryland Woodland Stewards Training Workshop

October 3, 2014
The Diversity of Wildlife in Maryland

- 97 Mammals
- 410 Birds
- 49 Reptiles
- 42 Amphibians
- 635 Fishes
- >20,000 Invertebrates
- ~3000 Vascular Plants
What We’ll Cover Today

• Fundamentals of wildlife ecology & management
• Examples of different habitats
• Examples of different management practices and the impact they have on wildlife habitat
Questions to Ask Yourself About Managing Your Property

What is important to me?

- Recreation: Hunting, Fishing, Hiking, Birding
- Income: Primary vs. Supplemental
- Aesthetics/Spiritual
- Conservation: Doing My Part

Can I Accomplish Anything Meaningful?
Identify the Natural Features of Your Property

*Use Google earth of map in forest stewardship plan*

- **Forests:** hardwoods vs. conifers, age, acreage, landscape context
- **Wetlands:** type (emergent, scrub-shrub, forested), permanent or seasonal), size, landscape context
- **Fields:** crop, pasture, hay, idle, acreage, landscape context
- **Other:** rivers, streams, seeps, rock outcrops, sand ridges, hedgerows, etc.
Some Ideas…

• Conduct a species inventory (make a list)
  – What species or natural communities occur or could occur on my property?
  – On adjacent or nearby properties?
  – Can I create or restore habitat?
  – What will I need to control invasive species?
• What existing laws/regulations could affect my project?
  – Do I need a permit?
• Develop a timeline?
Understand Size Requirements

- Grassland and forest interior species need BIG habitat blocks (10’s to 1000’s of ac)

- Smaller properties can provide connectivity and buffering for interior species
The Basics
Understand Size Requirements

- Woodland, edge and ‘successional’ species can use smaller, more diverse habitat blocks.

- Migratory birds use any good habitat as ‘stopover’ habitat.

[Map showing habitat distribution with labels: Year Round, Summer (breeding), Winter (non-breeding), Migration. Map by Cornell Lab of Ornithology, Range data by NatureServe.]
# Abundance & Home Range of Common Eastern Wildlife

<table>
<thead>
<tr>
<th>Animal</th>
<th>Abundance</th>
<th>Home Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robin</td>
<td>1320’ around nest</td>
<td></td>
</tr>
<tr>
<td>Black Bear</td>
<td>~70 per 100 sq mi</td>
<td>Female: 6-19 sq mi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Male: 60-100 sq mi</td>
</tr>
<tr>
<td>Chipmunk</td>
<td>2-4 per acre</td>
<td>0.5 acre</td>
</tr>
<tr>
<td>Rabbit</td>
<td>Several per acre</td>
<td>10-25 acres</td>
</tr>
<tr>
<td>Raccoon</td>
<td>~1 per 10 acres</td>
<td>380-1150 acres</td>
</tr>
<tr>
<td>Red fox</td>
<td>~1 per 100 acres</td>
<td>640-1280 acres</td>
</tr>
<tr>
<td>Skunk</td>
<td>Up to 31 per sq mi</td>
<td>160-320 acres</td>
</tr>
<tr>
<td>Squirrel</td>
<td>1-5 per acre</td>
<td>Up to 10 acres</td>
</tr>
<tr>
<td>Turkey</td>
<td>10-100 per 1000 acres</td>
<td>600-1000 acres</td>
</tr>
</tbody>
</table>
Wildlife Habitat Triangle

Each must be of good quality, in ample supply, and properly situated in relation to each other.
Habitat Management Strategies

- Protection
- Enhancement
- Alteration
- Restoration
- Creation
Understand Habitat Requirements

Non-breeding

Breeding
Focus on Wildlife Habitat Elements

*What is limiting?*

- **Cover** – caves & ledges; cavity trees; snags, tree tops; dense vegetation
- **Food** – hard & soft mast; wolf trees; apple trees; food plots
- **Water** – wetlands; riparian zones; spring seeps
- **Space** – all elements in home range; landscape features present;
Habitat Changes with the Season!
Providing and Enhancing Habitat Elements

- **Mast trees** (produce edible fruits/nuts)
- **Rocks** (cliffs, outcroppings, piles)
- **Snags** (dead standing trees)
- **Water** (stream, pond, wetland, spring)
- **Wolf trees** (large, spreading, in the open)
Other Important Resources

- Vernal Pools
- Coarse Woody Debris
- Snags
Rock Outcrops
Cliffs
Talus Slopes

Maintain Forested Buffers around these unique features of your property
Protect Unique or Sensitive Habitat

Shale Barren

Fen or Wet Sedge Meadow
Multiple or Species Group Management

• Manage for quality habitat
• Guiding principles
  – Regional priorities
  – State species of greatest concern
  – Rare species or special habitats
  – Landowner objectives
Forest Interior Dwelling Species (FIDS)

- Suite of 25 breeding bird species that are forest area sensitive
- Most associated with pole-stage or older forest conditions
- Minimum habitat criteria:
  - 50+ acre forest tract with ≥10 acres of forest interior (300 ft from edge) or
  - 50+ acre riparian forest with width ≥ 300 ft
- FIDS conservation serves as “umbrella” for other forest species and forest processes
FIDS Habitat

> 80% Forest Closure

Large Contiguous Forest

Diverse Vertical Structure
Delmarva Bays & Vernal Pools are Seasonally Flooded Nontidal Wetlands

- **January**
- **June**

No Fish = Amphibian Breeding Pond

- Eastern Pond Hawk
- Spotted Turtle
Grassland Birds

- Decline Greatest Among ALL Bird Species
- Generally Require Minimum of 10 acres
- Habitat Shape Important – Minimize Edge (circles or squares vs. narrow rectangles)
- Suite of 15 Species

Bobolink
Meadowlark
Henslow’s Sparrow
Young Forest Birds
(*Scrub, shrub dependent species*)

- 56% decline in number of American woodcock heard in singing ground survey. Due to loss of habitat.
Bathtub Concept of Wildlife Populations

- Carrying capacity of a habitat is similar to water-holding capacity of a bathtub
- Population is balanced when animals entering the habitat equal those leaving
Potential population growth of robins without limiting factors. Losses to death and migration are important.

From: Benson, 1999
Population curve. Each population annually produces more young than can survive to reproduce.
Death is Part of Nature

When carrying capacity of the habitat is approached, reached, or exceeded, one or more mortality factors will occur…

- disease
- severe weather
- hunting
- starvation
- predators
- accidents
Identify & Manage for the Limiting Habitat Factor

Food

Space Arrangement

Cover

Water

Limiting factor will change depending on the species or species group of interest.
Habitat changes with stage of succession. Diverse habitat good.
Messy is Okay!

- Natural areas will increase diversity of habitat
- New natural areas will attract wildlife that will increase wildlife-human conflicts (i.e. deer)
Attracting Wildlife
Understand Edge Effect

- Interface between two or more cover types
- Zones of high wildlife activity
Attracting Wildlife – Stay on Top of Invasives

• Always control invasives first
• Fill in behind with natives or encourage natives to grow
• Requires ongoing maintenance
• Why?

Japanese Honeysuckle

English Ivy
Insects and Invasive Plants

All plants do not support wildlife equally.
Most insects can develop and reproduce only on the plants with which they share an evolutionary history.

(Ehrlich & Raven, 1964)
<table>
<thead>
<tr>
<th>Family</th>
<th>Common Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyrannidae</td>
<td>Tyrant flycatchers</td>
</tr>
<tr>
<td>Laniidae</td>
<td>Shrikes</td>
</tr>
<tr>
<td>Vireonidae</td>
<td>Vireos</td>
</tr>
<tr>
<td>Corvidae</td>
<td>Crows &amp; jays</td>
</tr>
<tr>
<td>Alaudidae</td>
<td>Larks</td>
</tr>
<tr>
<td>Hirundinidae</td>
<td>Swallows</td>
</tr>
<tr>
<td>Paridae</td>
<td>Titmice</td>
</tr>
<tr>
<td>Remizidae</td>
<td>Verdins</td>
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<tr>
<td>Aegithalidae</td>
<td>Bushtit</td>
</tr>
<tr>
<td>Sittidae</td>
<td>Nuthatches</td>
</tr>
<tr>
<td>Certhiidae</td>
<td>Creeper</td>
</tr>
<tr>
<td>Troglodytidae</td>
<td>Wrens</td>
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<tr>
<td>Pycnonotidae</td>
<td>Bulbul</td>
</tr>
<tr>
<td>Regulidae</td>
<td>Kinglets</td>
</tr>
<tr>
<td>Sylviliidae</td>
<td>Old World warblers</td>
</tr>
<tr>
<td>Muscicapidae</td>
<td>Old World flycatchers</td>
</tr>
<tr>
<td>Timaliidae</td>
<td>Babblers</td>
</tr>
<tr>
<td>Turdidae</td>
<td>Thrushes</td>
</tr>
<tr>
<td>Mimidae</td>
<td>Mockingbirds &amp; thrashers</td>
</tr>
<tr>
<td>Sturnidae</td>
<td>Starlings</td>
</tr>
<tr>
<td>Prunellidae</td>
<td>Accentors</td>
</tr>
<tr>
<td>Motacillidae</td>
<td>Pipits &amp; wagtails</td>
</tr>
<tr>
<td>Bombicillidae</td>
<td>Waxwings</td>
</tr>
<tr>
<td>Ptilogonatidae</td>
<td>Silky-flycatcher</td>
</tr>
<tr>
<td>Peucedramidae</td>
<td>Olive warbler</td>
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<tr>
<td>Parulidae</td>
<td>Wood warblers</td>
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<tr>
<td>Coerebidae</td>
<td>Bananaquaks</td>
</tr>
<tr>
<td>Thraupidae</td>
<td>Tanagers</td>
</tr>
<tr>
<td>Emberizidae</td>
<td>Sparrows &amp; buntings</td>
</tr>
<tr>
<td>Cardinalidae</td>
<td>Cardinals &amp; grosbeaks</td>
</tr>
<tr>
<td>Icteridae</td>
<td>Blackbirds &amp; orioles</td>
</tr>
<tr>
<td>Fringillidae</td>
<td>Finches</td>
</tr>
<tr>
<td>Ploceidae</td>
<td>Weaver finches</td>
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<tr>
<td>Passeridae</td>
<td>Old World Sparrows</td>
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<td>Podicipedidae</td>
<td>Grebes</td>
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<td>Herons</td>
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<td>Threskiornithidae</td>
<td>Ibises &amp; spoonbills</td>
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<tr>
<td>Anatidae</td>
<td>Ducks, geese &amp; swans</td>
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<tr>
<td>Accipitridae</td>
<td>Hawks, kites &amp; eagles</td>
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<tr>
<td>Falconidae</td>
<td>Falcons</td>
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<tr>
<td>Phasianidae</td>
<td>Turkeys &amp; grouse</td>
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<tr>
<td>Odontophoridae</td>
<td>New world quail</td>
</tr>
<tr>
<td>Rallidae</td>
<td>Rails, gallinules &amp; coots</td>
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<tr>
<td>Aramidae</td>
<td>Limpkins</td>
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<tr>
<td>Gruidae</td>
<td>Cranes</td>
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<tr>
<td>Charadriidae</td>
<td>Plovers</td>
</tr>
<tr>
<td>Recurvirostridae</td>
<td>Avocets &amp; stilts</td>
</tr>
<tr>
<td>Jacanidae</td>
<td>Jacana</td>
</tr>
<tr>
<td>Scolopacidae</td>
<td>Sandpipers &amp; phalaropes</td>
</tr>
<tr>
<td>Laridae</td>
<td>Gulls &amp; terns</td>
</tr>
<tr>
<td>Columbidae</td>
<td>Pigeons &amp; doves</td>
</tr>
<tr>
<td>Cuculidae</td>
<td>Cuckoos &amp; roadrunners</td>
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<tr>
<td>Tytonidae</td>
<td>Barn owls</td>
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<tr>
<td>Strigidae</td>
<td>Owls</td>
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<tr>
<td>Caprimulgidae</td>
<td>Goatsuckers</td>
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<tr>
<td>Apodidae</td>
<td>Swifts</td>
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<td>Trochilidae</td>
<td>Hummingbirds</td>
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<td>Trogonidae</td>
<td>Trogons</td>
</tr>
<tr>
<td>Alcedinidae</td>
<td>Kingfishers</td>
</tr>
<tr>
<td>Picidae</td>
<td>Woodpeckers</td>
</tr>
</tbody>
</table>
A chickadee pair brings at least 300 (390-570) caterpillars to the nest per day (Brewer 1961);

Chickadees feed their young for 16 days before they fledge.

So to rear one clutch they must catch at least

48000 caterpillars!
Number of insects supported by different trees

<table>
<thead>
<tr>
<th>Tree Name</th>
<th>Number of Insects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quercus</td>
<td>534</td>
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<tr>
<td>Prunus</td>
<td>456</td>
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<tr>
<td>Salix</td>
<td>455</td>
</tr>
<tr>
<td>Betula</td>
<td>411</td>
</tr>
<tr>
<td>Populus</td>
<td>357</td>
</tr>
<tr>
<td>Malus</td>
<td>308</td>
</tr>
<tr>
<td>Acer</td>
<td>297</td>
</tr>
<tr>
<td>Vaccinium</td>
<td>294</td>
</tr>
<tr>
<td>Alnus</td>
<td>255</td>
</tr>
<tr>
<td>Carya</td>
<td>235</td>
</tr>
<tr>
<td>Ulmus</td>
<td>215</td>
</tr>
<tr>
<td>Pinus</td>
<td>201</td>
</tr>
<tr>
<td>Crataegus</td>
<td>168</td>
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<tr>
<td>Rubus</td>
<td>163</td>
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<tr>
<td>Picea</td>
<td>150</td>
</tr>
<tr>
<td>Fraxinus</td>
<td>149</td>
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<tr>
<td>Tilia</td>
<td>149</td>
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<tr>
<td>Pyrus</td>
<td>138</td>
</tr>
<tr>
<td>Rosa</td>
<td>135</td>
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<tr>
<td>Corylus</td>
<td>131</td>
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<tr>
<td>Juglans</td>
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<tr>
<td>Castanea</td>
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<td>Fagus</td>
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<td>Amelanchier</td>
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<td>Liriodendron</td>
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<td>Cornus</td>
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<td>Abies</td>
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<tr>
<td>Myrica</td>
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<td>Viburnum</td>
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<td>Ribes</td>
<td>99</td>
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<tr>
<td>Ostrya</td>
<td>94</td>
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<tr>
<td>Tsuga</td>
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<td>Spiraea</td>
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<td>Vitis</td>
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<td>Pseudotsuga</td>
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<td>Sorbus</td>
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<td>Compstonia</td>
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<td>Hamamelis</td>
<td>63</td>
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<tr>
<td>Rhus</td>
<td>58</td>
</tr>
<tr>
<td>Rhododendron</td>
<td>51</td>
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</table>

- Euonymus 11
- Sideroxylon 4
- Dirca 1
- Leipolygium 1
- Menispermum 1
- Nemophila 1
- Osmanthus 1
- Stewartia 1
- Metasequoia 0
- Vitex 0
- Ceratonia 0
- Cercidiphyllum 0
- Exochorda 0
- Firmiana 0
- Grevia 0
- Kalopanax 0
- Kerria 0
- Koikwitzia 0
- Nandina 0
- Pheolidodendron 0
- Pseudosasa 0
- Rhodotypos 0
- Stephanandra 0
- Styrpholobium 0
- Tetradium 0
- Toonia 0
- Zeikova 0
- Adilumia 0
- Arcueobium 0
- Bercemia 0
- Borricha 0
- Camellia 1
- Cladrastis 0
- Empetrum 0
- Eubotrys 0
- Itea 0
- Liseleuria 0
- Nestria 0
- Styx 0
- Xanthorhiza 0
- Zenobia 0
To share suburbia with wildlife, we need to:

- Create corridors connecting natural areas
- Reduce the area now in lawn
- Begin the transition from alien ornamentals to native ornamentals
Attracting Wildlife – Think Connectivity

- Wildlife need connected habitats to safely disperse, breed, forage, maintain genetic diversity - survive
- Stream corridors are ideal
- Small properties can buffer larger blocks of habitat
Attracting Wildlife - Create New Habitat

• Plant native trees that are good for wildlife – think flowers, berries, fruits or nuts
  • Dogwoods
  • Hollies
  • Spicebush
  • Sumac
  • Serviceberry (early spring berries for migrant birds!)
  • Viburnums (deer resistant!)
  • Oaks, Hickories, Walnuts
  • Black Gum

Build onto existing forest and stream corridors
Attracting Wildlife - Field Borders

- 50’-100’ border strips provide cover & food
  - Between normal crop production or lawn and forest
  - Create on forest side or field side
  - Little reduction in productivity
  - Can easily be returned to production
Managing & Creating Edge
Attracting Wildlife – Mast Trees

- Oak, hickory, walnut, beech
- Cherry, crabapple, hackberry,
Attracting Wildlife – Habitat Features

Wildlife Love Dead Wood!

- Standing Snag
- Dead Branches
- Den Tree
- Deadfall
Keep or Create Snags

• Most woodlots have them – 2-4 per acre
• Can create snags if they are under-represented:
  – Mechanical girdling – at least ½” groove for small trees, 1-1.5” groove for larger trees; or
  – Herbicides
Attracting Wildlife – Habitat Elements

Brush Piles
• Cover
• Nest Sites
• Loafing
Building a Brush Pile

- Base - logs, rocks, fence posts – anything you have around
- 6” openings
- Top - finer brush and branches
- Near water and other habitat features
- The bigger the better
Attracting Wildlife – Habitat Features

Water is a Huge Draw – especially running water
Attracting Wildlife – Habitat Elements

Create dense thickets
- Allow brush to develop in understory
- Only mow those areas that you need
What should you Manage for?

- Landscape perspective + your own interests will help you determine what types of wildlife to manage for
- Easier to manage for habitat than individual species
- Cannot manage for everything
- Avoid attracting deer!
Manage Deer Population
They will eliminate other wildlife

# of Songbirds

Deer Density per Square Mile

% Groundcover

Deer Density per Square Mile
Planning for your Property

Think at the landscape level – act at the property level
Use Google Earth or Maps
Cooperate with your Neighbors

Together you can provide more habitat niches, larger blocks of habitat and increased connectivity
Keep cats indoors!
outdoor and feral
cats kill 100’s of millions of
birds and billions of small
mammals each year

They are NOT a natural
predator

For more information: www.abcbirds.org
Keeping Wildlife Safe

Beware the Edge Effect
Keeping Wildlife Safe

Softening edges provides greater cover, more niches and more nest site opportunities while reducing edge effect.
Keeping Wildlife Safe

- Mow open habitats outside of the breeding/flowering season –April-August
- Mow only a portion each year or every 2-4 years to maintain habitat ‘patchiness’ and diversity
Some Habitat Management Techniques for Forest Stands
Timber Stand Improvement

- Thin out overstory
- Allow light to forest floor
- Promote growth of better trees – Mast Trees!
- Save trees being used by wildlife
Border cut

Thick edge along border cut

White Pine Thinning after 1 year-4 years
Seed Log Landings for Wildlife

Grasses established

Seeded, fertilized & covered with straw
Use of Full Canopy Removal

5 acre clearcut

Road daylight

< 1 acre wildlife openings
Field Habitat

Mow in strips every 3 years

Food plots
Den Trees

Artificial habitat

Snags

Keep wolf trees?
Questions?

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