

BIODIVERSITY GUIDE FOR MONTANA FOREST AND WOODLOT OWNERS

Sustainable forestry is the practice of land stewardship that integrates growing and harvesting of trees while protecting soil, water, biodiversity and aesthetics.

Biodiversity is defined as the variety of organisms in an ecosystem and the processes that support them.



Clark's Nutcracker - *Nucifraga columbiana*

Many factors influence biodiversity. Landowners can enhance biodiversity by providing diverse habitat. Habitat is a place that provides plant and animal species with the specific food, water, and shelter they need. A diversity of habitat types to help ensure all native plants and animals continue to thrive. Habitat diversity can be enhanced and maintained through specific management practices tailored to each site. Conserving biodiversity also may include protection of rare plants, animals and communities as well as special features and unique sites.



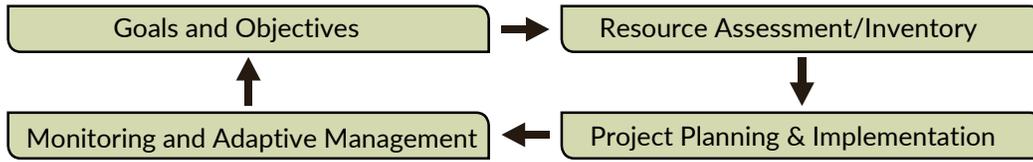
Elk - *Cervus canadensis*



Long-toed Salamander - *Ambystoma macrodactylum*

FOREST PLANNING

The successful creation of conservation of biodiversity takes planning. Forest plans are constantly changing and must be reviewed and updated periodically to account for management accomplishments and changing conditions. The following are critical elements of the planning process:



Organizations such as the American Tree Farm System®, the Department of Natural Resources and Conservation Service Foresters and Montana Forest Stewardship Program provide templates to help guide you through the planning process. It is important to consider not only the trees in your forest plan, but also wildlife and human needs. The most successful land managers design projects to meet multiple objectives and provide multiple benefits. This diagram shows how traditional forest management activities can also enhance biodiversity.



Multi Tasker View of a Forest

Exhibit	Object	Management Activity	Silviculture Objective	Wildlife Objective
A	Truck Road	Grass seeding/weed control. Controlled access.	Erosion control, invasive species control. Protection of investment in the road.	Food source for deer and elk. Provide habitat security through access management.
B	Permanent Landing	Grass seeding/weed control, retain piles of large woody debris.	Confine impact of landing disturbance from repeated management use.	Provide forage, create an edge effect. Provide hunting opportunities for predators.
C	Stream	Apply Streamside Management Zone laws and Best Management Practices.	Regulate water temperature. Control erosion. Limit sedimentation.	Aquatic/fish habitat protection. Wood recruitment in streams. Wildlife travel corridor. Nesting habitat. Invertebrate and amphibian species habitat.
D	Mature Timber	Salvage of dead and dying trees. Retain snags and downed wood.	Retain timber value, create small openings to promote regeneration.	Habitat diversity, security, and winter cover for small and big game species. Denning and cavity nesting habitat. Openings provide forage areas and promote edge effects.
E	Young stand of dense regeneration	Thin trees to appropriate spacing. Retain thickets. Pile some slash.	Improve tree health and vigor by providing adequate space for growth and reduce fuel hazard.	Dense regeneration supports snowshoe hares used by lynx. Slash piles provide den sites for mammal species like pine martens.
F	Multi-Age Class Stand	Commercial thin or do a selection harvest to retain trees of multiple size, age and species on variable spacing. Retain snags and downed wood.	Improve individual tree growth, provide some regeneration, maintain aesthetics and diversity of crop tree species.	Promote habitat diversity. Provide cover, foraging, and nesting habitats. Vertical structure diversity. Promote avian habitat and nesting.
G	Regeneration Harvest	Seed tree/shelter wood harvest, retain clumps, snags and downed wood.	Recover value of mature timber, provide for regeneration.	Forage areas. Early successional habitat types that support deer, elk, bears and ground nesting birds.
H	Habitat Hot Spot - Conifer Swamp	Seasonal timing, site protection, and equipment exclusion zones.	Compliance with laws, regulations and standards.	Protection of Forests of Exceptional Conservation Value to conserve biodiversity.

ELEMENTS OF HABITAT TO CONSIDER IN FOREST MANAGEMENT ACTIVITIES

The four essential elements of habitat are:



FOOD



COVER



WATER



SPACE

Forestland habitat can be affected either positively or negatively by management activities. Knowing how wildlife use specific habitats will help guide development of management activities to meet your goals for the property.

Vegetation Layers

The presence and arrangement of vegetation from the ground to the top of the canopy (See Exhibit A).

Habitat Elements Provided



Grass, forbs, & berry producing shrub



Dense brush, advanced regeneration, slash piles



Areas of connectivity linking patches of cover or adjacent blocks of similar habitat

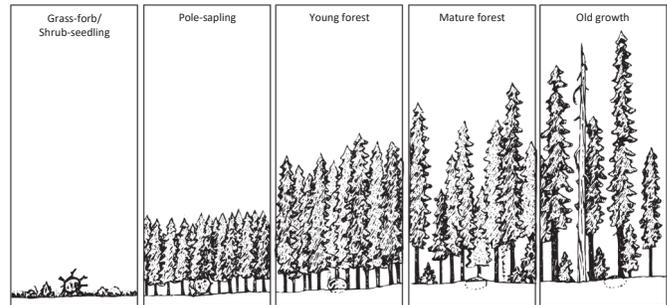


Exhibit A. Stages of Forest Succession

Management Recommendations

- Retain berry producing trees and shrubs to provide forage for bears and neotropical birds such as the cedar waxwing. Increase structural diversity by promoting a variety of tree sizes and canopy structures.
- Create openings in older stands (1/4 to 1 acre in size) to promote browse and age class diversity as well as increase “edge effect” habitat that benefit elk, deer, grouse, and raptors.
- Selective harvests that retain a variety of age classes and species of trees can open closed canopies and provide opportunities for regeneration.

Riparian Areas and Wetlands

More than any other habitat, riparian areas and wetlands provide for the majority of wildlife species, especially songbirds, reptiles and amphibians concentrated in relatively small areas. Water howellia and spruce/skunk cabbage bogs are examples of the many rare plants and plant communities found in riparian areas and wetlands.

Habitat Elements Provided



Insects, special vegetation types, aquatic invertebrates and fish



Dense vegetation, downed logs, resting areas



Seeps, springs, lakes, ponds and streams



Connective travel corridors through the landscape

Management Recommendations

- Follow [State Streamside Management Zone laws \(SMZs\)](#) and [Best Management Practices \(BMPs\)](#) to protect water quality and wetlands. Use trained professionals who understand SMZ laws and BMPs.
- Favor bank trees leaning towards riparian areas, snags, and downed wood; these can fall across streams to create resting and feeding areas for fish.
- Fish species such as bull trout and cutthroat trout require clean, cold, complex and connected streams.
- Promote hardwood tree species such as cottonwood, willow, and aspen in riparian areas and wetlands.
- Recognize that riparian areas and wetlands provide connective travel corridors for migrating species.
- Manage grazing activity in riparian areas to limit water quality problems and prevent stream bank degradation. Consider developing off-stream livestock watering sites and management fencing to protect riparian habitats.

Snags and Downed Wood

Dead trees and decaying wood are important features for wildlife, providing foraging sites as well as nesting or denning locations for many reptiles, amphibians, birds and mammals. Snags are important because they provide a portion of the life support system for many wildlife species, especially by supplying cavities. A snag undergoes a series of changes from the time a tree dies until its final collapse, when it becomes downed wood. Over 60 species of wildlife in Montana use snags as nest, denning or feeding sites (Exhibit B).

Habitat Elements Provided



Insect larvae, fungi, invertebrates



Cavity denning habitat for birds and mammals. Downed wood debris provides moist shelter for salamanders and rare animals like the magnum mantleslug.

Management Recommendations

- “Parked out” and tidy may not meet your habitat objectives. Snags of various sizes that do not present a safety hazard and larger downed wood should be retained.
- Some species excavate their own cavities while others occupy existing cavities. Snags are classified as “hard” or “soft”, depending on the soundness of the wood. Soft snags are easier to excavate, but remain standing for shorter periods of time.
- Snags can be clumped to enhance nesting habitat for some colonial nesting species like tree swallows while dispersed snags help meet the territorial requirements of other species like pileated woodpeckers.
- Unburned small slash piles can provide denning habitat for a variety of animals. Retain cull logs in the woods for downed wood.

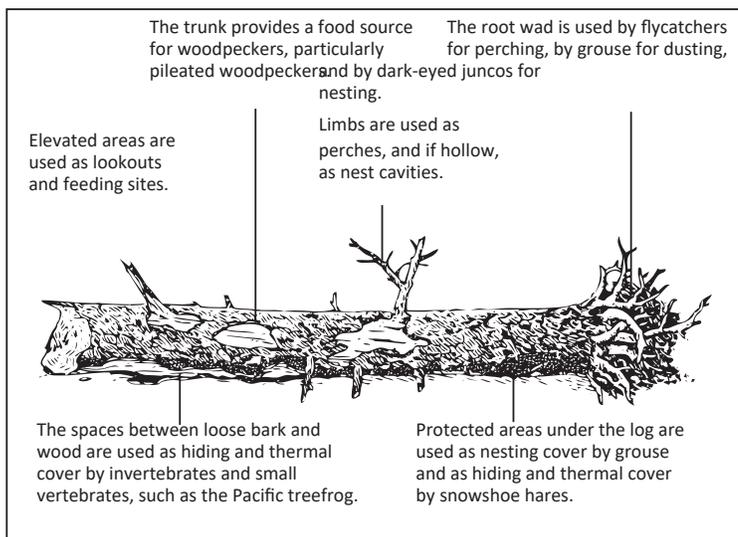


Exhibit B. How downed wood provides habitat.

Landscape Influences and Changes Over Time

Consider how management of one property influences and is impacted by surrounding areas and how habitat changes over time. Size, shape and distribution of management activities and natural events affect biodiversity across the landscape.

Habitat Elements Provided



The “edge effect” is where contrasting habitats meet, providing access to both cover and forage in close proximity.



Connected travel corridors and distance to security are extremely important to consider for some species such as deer and grizzly bear.

Management Recommendations

- Use Google Earth or aerial photography to get a larger image of habitat diversity across the landscape. Consider the condition of surrounding ownerships and the variety of habitats available across property lines.
- Connectivity features, such as stream buffers and retention areas, should be designed and managed to link blocks of similar areas. These allow wide-ranging species to access patches of suitable habitats.

HABITAT HOTSPOTS

Areas of ecological, geological, cultural or historic importance can be termed “Habitat Hotspots”. Habitat Hotspots present valuable contributions to biodiversity because they support rare plant or animal communities. Some of these Habitat Hotspots are also termed **Forests of Exceptional Conservation Value (FECV)**. The Montana Natural Heritage Program maintains databases on land ownership, ecological systems and plant and animal species of conservation concern across Montana. Landowners can create reports of plants and animal species of conservation concern for their property using the Natural Heritage web applications found at www.mtnhp.org. FECVs often deserve special consideration when implementing management activities. Certification programs such as the Sustainable Forestry Initiative® (SFI) and American Tree Farm System® encourage landowners to address habitat needs of federally classified threatened and endangered species that are in your area as well as species that are globally ranked G1 and G2 by the Natural Heritage Program indicating extremely limited or rapidly declining populations.



Examples of Habitat Hotspots

Black cottonwood/snowberry forest type

Englemann spruce/skunk cabbage forest type

These FECV plant communities along with riparian zones, pot holes, and wet meadows provide important habitats for wildlife such as great blue heron rookeries.

Rocky outcrops, cliffs and talus slopes, caves

These areas provide year round cover and micro climates for sensitive species such as the carinate mountainsnail, northern alligator lizard, and Townsend’s big-eared bat.



Conifer swamps such as this Englemann spruce/skunk cabbage forest are recognized as an FECV in Montana because they are limited in occurrence and threatened by drought and climate change. This habitat is also globally ranked as G1 because it occurs only in the Northern Rocky Mountains.
Photo courtesy of Brian Sugden

FINDING HELP

The following landowner education and outreach organizations provide support to landowners for conservation of biodiversity and wildlife habitat in their management activities:

Montana Tree Farm System -
<https://www.treefarmssystem.org/montana>

Conservation Districts and
 Natural Resources Conservation Service -
<https://macdnet.org/conservation-district-map/>
<https://nracs.usda.gov/montana>

Montana Department of Natural Resources
 and Conservation Service Forestry -
<https://dnrc.mt.gov/serviceforestry>

Montana State University
 Extension Forestry -
<https://www.montana.edu/extension/forestry/>



Clockwise from top left: pileated woodpecker, carinate mountainsnail, marbled jumping slug, Townsend's big-eared bat.
 Photos courtesy of the Montana Natural Heritage Program, Kristi DuBois, Paul Hendricks, and Kent Nelson

Additional resources include:

Sustainable Forestry Initiative -
<http://forests.org>

Montana Fish, Wildlife, and Parks -
<http://fwp.mt.gov>

Montana Natural Heritage Program -
<http://mtnhp.org>

American Tree Farm System -
<http://treefarmssystem.org>

NatureServe -
<http://www.natureserve.org>

US Fish and Wildlife Service -
<http://www.fws.gov>

US Forest Service -
<http://www.fs.usda.gov>

USDA Natural Resources Conservation Service -
<http://www.nrcs.usda.gov/montana>

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