

# Chapter Five

## Trail and Preserve Maintenance: Pruning of Woody Plants

*This chapter provides information about the basics of pruning and trail trimming that are appropriate to nature preserves. Use and care of cutting tools is covered. Many excellent references about pruning woody plants exist, a few of which are mentioned at the end of the chapter.*



Pignut hickory (*Carya glabra*)  
by Cindie Brunner

## **Acknowledgements**

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|                    |                                |
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As preserve stewards, our objective in selective trail pruning and trimming is to be as unobtrusive as possible. A basic objective to keep in mind for trail maintenance is to cut out only what must be removed to provide a safe trail and to leave the area looking natural. Only rarely might we prune trees and shrubs for structural improvement, crown or deadwood reduction, or shrub rejuvenation. (We prefer to leave those decisions to nature). Nonetheless, it is important to know how to prune trees and shrubs correctly, to minimize injury and damage to the plants we are trying to preserve.

## INTRODUCTION

This chapter provides information about the basics of pruning and trail trimming that are appropriate to nature preserves. Its intent is to help you develop an awareness of fundamental concepts and approaches, although a short chapter like this one is no substitute for more extensive readings and hands-on experience. The proper care and maintenance of hand tools used for trail maintenance is briefly discussed here. Many excellent references about pruning woody plants exist, a few of which are mentioned at the end of the chapter. In addition, TNC volunteers who are knowledgeable about pruning may be available to provide coaching at sites where pruning is necessary.

Proper pruning benefits trees, shrubs and vines, and the associates of woody plants. Pruning consists of **selectively** removing branches and stem parts (living and dead) from woody plants, ranging from pinching off a bud at the end of a twig to removing large limbs.

Most tree species evolved in competitive forest communities. Consequently, trees developed efficient branching systems to capture the energy of available light for photosynthesis. Woody plants also evolved the ability to get rid of inefficient energy resources by **shedding** shaded branches (cladaptosis). A branch is naturally shed from its base. As natural shedding occurs, the wood tissue around the branch core within the stem protects against decay. TNC limb removal cuts, when necessary, imitate natural branch shedding (natural target pruning).

## REASONS FOR PRUNING

The first rule in pruning is **DO NOT CUT WITHOUT A REASON**. Proper pruning is an effort to **direct** new growth rather than “control” growth of living wood. Most pruning cuts on TNC preserves are of a **preventive** or a **corrective** nature as abatement of hazards to human safety. Our cuts need to have a safety or ecological

reason, not merely an aesthetic reason. Actions we might undertake include

- ◆ clearing trails, access roads, and gateways by removing interfering limbs (crown reduction and/or crown raising),
- ◆ removing potentially hazardous limbs, stems, and deadwood (hazard reduction pruning), or
- ◆ providing access to more light for desirable understory plants (crown thinning).

## PLANT PHYSIOLOGY AS IT RELATES TO PRUNING

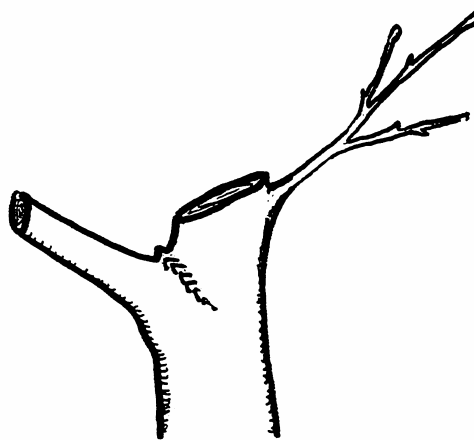
### *—How Branches Are Attached To Stems—*

New branch tissues generated by the vascular cambium usually start growth before trunk tissues. As current-year branch tissue develops from branch ends toward the trunk, it turns abruptly downward at the branch base to form a **collar**.

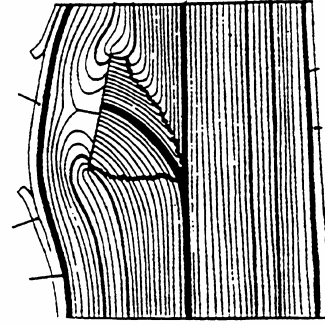
Trunk branch tissues grow later and form a trunk collar over the branch collar. Trunk collars and branch collars are called collectively the **branch collar**.

The collar is where wood and bark of the branch and the trunk come together, like an overlapping tissue “switching zone.” All true branches on woody plants have branch collars.

The **branch bark ridge** is raised bark developing in the branch crotch that shows the angle of the branch core in the tree.



If a branch dies or is removed, the trunk collar continues to grow over the thin belt of branch tissue below the collar junction. The wood core of the branch is walled off (compartmentalized) in the trunk.



—*Callus and Woundwood*—

**Callus** is undifferentiated meristematic tissue that forms at wound margins from the cambium. Callus differentiates into **woundwood** over time. Woundwood is “new wood” and has the different cell components of periderm, cambium, phloem, and xylem. A **complete** ring of callus and subsequent woundwood will develop around and eventually over proper cuts. On improper cuts (such as flush cuts), woundwood forms only to the sides, which means the collar and branch protection zone are damaged and the trunk is wounded.

A proper pruning cut results in smaller wound area, and more rapid callus and woundwood movement over the wound. Cuts on dead limbs that have trunk collars moving up the dead branch wood must also be made just outside of the evident collar.

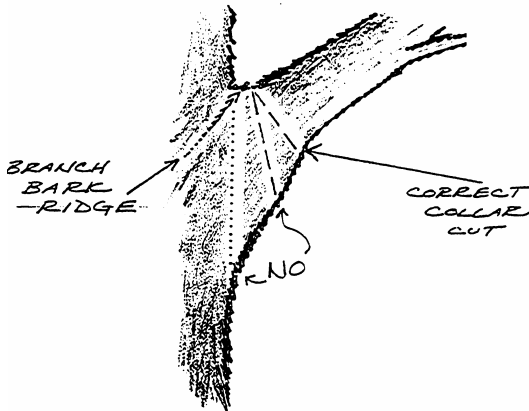
## **PRUNING METHODS AND TECHNIQUES**

—*Proper Pruning Cuts (Natural Target Pruning)*—

The location of **branch bark ridge** and **branch collar** determines the location of a pruning cut. Cuts must be made **outside** of the branch bark ridge, angling away from the trunk outward as close as possible to the collar.

- ◆ There is no set or standard angle for a proper collar cut.
- ◆ The proper angle depends on the shape of the collar.
- ◆ Conifers often have flat collars where a straight cut close to the collar is correct.
- ◆ Sometimes the angle of the cut will necessitate an **upstroke** cut with the saw.

Do not cut into the collar to stimulate callus production and rapid closure; such a cut promotes decay and future hazards. **Never put a pruning tool behind the branch bark ridge.**

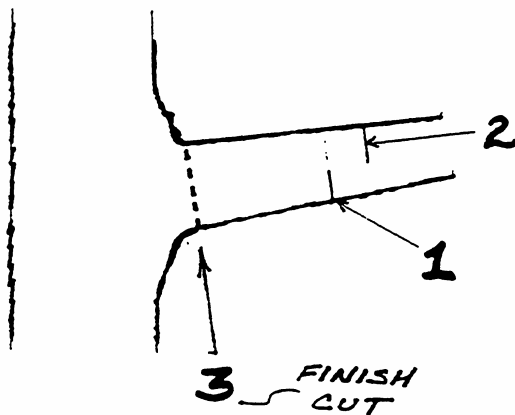


the stem.

Whether a branch collar is obvious or not, the position of the final or finish cut should

- ◆ minimize the branch stub, which is an entryway for decay fungi;
- ◆ retain the natural decay protection present in the branch core (the intact branch collar is the first line of defense in preventing decay within the trunk); and
- ◆ minimize the overall size of the pruning wound and direct damage to

For safety's sake on TNC preserves, some pruning cuts are best left to professional arborists. This is especially true in the case of large, hazardous limbs. Always **stub cut** the branch first. Limbs that cannot be controlled must be removed using at least **three** cuts. Roping of limbs may be necessary to prevent damage to other parts of the tree if they cannot be controlled by hand.



1. The first cut **undercuts** the limb 1 or 2 feet out from the parent branch or trunk. A properly made undercut will eliminate the chance of the branch's "peeling" or tearing bark as it is removed.

2. The second cut is the **top cut**, which is usually made slightly further out on the limb than the undercut. This allows the limb to drop smoothly when the weight is released.

3. The third cut or **finish cut** is to remove the stub.

Each finish cut should be made carefully, outside of the branch bark ridge and the evident collar, leaving a smooth surface with no jagged edges or torn bark.

There are some situations where the cambium dies back beneath a branch collar even though a correct cut has been made:

- ◆ the trunk collar did not join the branch collar directly below the branch (sunken spots under branches are a sign of this condition), or
- ◆ winter cuts may result in undercollar dieback.

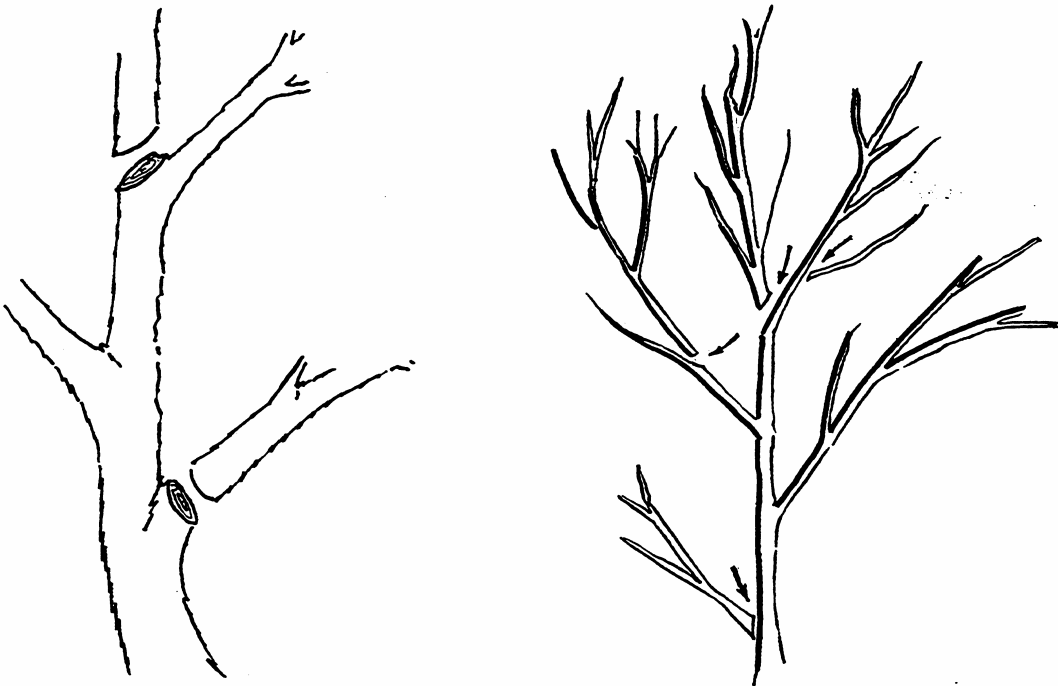
The die-back problem tends to increase as the size of branches removed increases.

—*Types of Pruning Cuts (Natural Target Pruning)*—

Two basic cuts, **thinning** cuts and **heading** cuts, direct shape and growth.

**Thinning (Thinning-Out)**

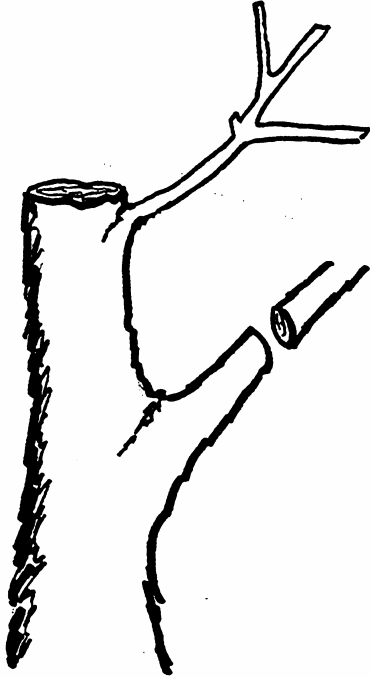
**A proper thinning cut removes a branch at its point of attachment, or back to a lateral branch large enough to assume a terminal role.** Learn to foresee the need for removing live branches while they are small. Avoid large cuts. Direction can be influenced by removal of short portions of growth or even by removal of individual buds.



Thinning of lower branches can “raise” a limb. If (after raising) the remaining leaf material is insufficient for limb size, consider complete removal. Never perform excessive thinning, which is stressful, especially on thin-barked or young trees prone

to sunscald. **Any and all woody plants on TNC preserves should have an absolute minimum of living branches removed.**

### Heading-Back (Heading)



Heading is appropriate only for small woody plants or one to two-year old branches (twigs, branchlets) on trees. Heading consists of cutting branches back to buds, bud nodes or a lateral branch too small to assume terminal role. Cut back to a bud (lateral bud) or lateral branchlet, slanting at a 45° angle above the bud **node** on alternately-arranged branches and stems. Two or more buds at a node (opposite, whorled) require a **transverse** cut just above the bud tips, or, a 45° angle cut removing one of the buds and leaving the other(s) to elongate in a desired direction.

Resulting new growth from repeated heading-cuts at the same site can collectively form “witch-brooms” or a “high” shrub. Avoid tip-pruning and “hair-cut” heading. Always thin larger stems to varying heights within a headed shrub canopy.

Cut 1/8" higher above the bud tips when pruning in cold weather to prevent winter injury to the bud. (Tissue around a winter cut can be vulnerable to desiccation.)

### —*Painting of Cuts*—

Painting of pruning cuts with wound dressings is, in general, a questionable practice, and it is unjustified if proper cuts have been made. Wound dressings will not **prevent** decay; in fact, wound dressings have been found to often **promote** wood decay or cause cambium damage.

### —*Proper Times for Pruning*—

The ideal or optimal times to prune most woody plants are either late in the dormant season or well into the growing season, after leaves are fully formed and

expanded. Cuts or wounds in certain species during the growing season may attract insects that carry diseases or allow fungus invasion. For example, native oaks or elms should be pruned during dormant periods in regions where wilt disease conditions are known to exist. Dead, broken or weak limbs may be removed at any time with little effect, except in wilt-susceptible oaks and elms.

Stimulated growth and rapid wound closure can be enhanced by pruning **before** the spring leaf bud-break period. Pruning during the period **after** leaf expansion will result in suppressed growth and maximum “dwarfing.” Avoid pruning woody plants undergoing bud break and early leaf expansion.

Remember that on TNC preserves, we generally prune only for trail maintenance, not for flower or fruit production. Nonetheless, thoughtful trail maintenance will ensure that we are not diminishing the reproductive capability of the trees or shrubs along our trails.

### “Spring-Flowering” Shrubs and Small Trees

Generally, those woody plants flowering before early summer do so from flower buds produced the **previous** growing season. These species will set new flower buds for **next** year on **this** year's wood. Pruning should follow petal-fall as soon as possible ("summer pruning") to maximize flowering for the next year if this is desired for reproductive criteria.

*Amelanchier* spp. - shadblow, serviceberry, Juneberry

*Aronia (Pyrus)* spp. - chokeberry

*Cercis canadensis* - redbud

*Cornus* spp. - dogwoods

*Corylus americana* - filbert, hazelnut

*Euonymus* spp. - burningbush, wahoo

*Ilex* spp. - hollies

*Kalmia latifolia* - mountain-laurel

*Lindera benzoin* - spicebush

*Lonicera* spp. - honeysuckles

*Magnolia* spp. - magnolia

*Physocarpus opulifolius* - ninebark

*Prunus* spp. - flowering cherry, plum

*Rhododendron* spp. - rhododendrons and azaleas

*Ribes* spp. - currant

*Sambucus* spp. - elderberry

*Spiraea* spp. - steeplebush

*Vaccinium* spp. - blueberry

*Viburnum* spp. - arrowwood, black haw, etc.

### “Summer-Flowering” Woody Plants

Woody plants flowering after late spring usually do so on shoots grown the **same** year. Prune these late in the dormant season or early spring before new shoot growth begins ("winter-pruning")

*Hamamelis virginiana* - Witch-hazel

*Hypericum* spp. - St. Johnswort

*Potentilla fruticosa* - Shrubby cinquefoil

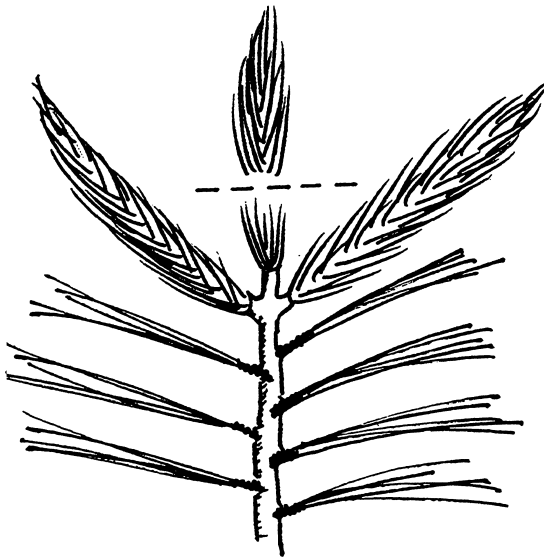
*Rhus* spp. - Sumacs

### Conifers

In pruning the “random-branching” conifer species *Thuja occidentalis* (arborvitae, northern white cedar) and *Tsuga canadensis* (hemlock), remember the following:

- ◆ The non-green area is a “dead zone.” Do not cut into this wood!
- ◆ Most *Thuja* species are not capable of developing viable growth from latent buds.
- ◆ For *Juniperus virginiana* (red cedar):
  - Inner laterals, side shoots - do not cut branches back to the same length.

In pruning the whorl-branching conifers *Larix laricina* (tamarack, larch) and *Pinus* spp. (pines), remember the following:



- ◆ Prune in late spring when new growth (“candles”) elongate. Don’t prune beyond current season’s growth into older wood if you don’t have to.
- ◆ A strong central **candle** grows in line with the branch and is surrounded by up to six secondary candles. Cut these candles to one-half their length to direct growth. Pinch by hand or cut with hand pruners before needles unfold. If pruned too late (after tissues in new stem have hardened off), considerable dieback can occur.

### Evergreen Broad-Leaved Shrubs

In pruning *Rhododendron* spp. and *Kalmia latifolia* (rhododendrons, mountain-laurel) that have become overgrown, unnaturally leggy, or extremely

densely clumped, do the following:

- ◆ Cut to laterals or buds to stimulate new growth.
- ◆ Pinch or tip-cut to direct growth.
- ◆ Be aware that rhododendrons tolerate light pruning before leaf buds open. Make cuts above bud scale scars so latent buds release.

—*Tools for Pruning and Cutting*—

For ease of work, the health of the tree or shrub being cut, and your personal safety, use pruning and cutting tools only for their prescribed purposes, and keep them sharp and otherwise in good condition. In particular, all working joints or parts should be kept **well oiled**. A drop of oil in the right place will do much to reduce physical effort. All tools that are meant for cutting (including soil tools such as shovels) should be kept **sharp** enough to cut with a minimum of effort, whatever material they are intended for. The following are just a few comments about particular tools.

### *Axe*

**Proper use:** An axe is not a sledge, an anvil, or a wedge, and it should not be used for any of these purposes. Such use springs the eye of the axe, making it impossible to fit the handle securely.

**Sharpening and other care:** Always have the axe in a secure position so that it cannot move or twist. Lock the handle in a vise if possible. Sharpen the axe with a file equipped with a guard and file handle. File toward the handle from the sharp edge; file one way only, lifting the file from the work surface on the back stroke. Try to maintain the original angle on the cutting edge, to avoid thinning of the edge and the possibility of a broken blade. Finish the job by honing with an oil stone, if necessary.

### *Pruning Shears (One-Hand Shears)*

**Proper use:** Pruning shears are useful for removing branches and stems up to 1/2 inch in diameter. The anvil type (straight blade) is good for soft-tissued wood only and will crush harder wood. The bypass type (hook and blade, scissors, drop-forge, curve blade) makes closer cuts than the anvil type and can be used on most types of wood.

**Sharpening and other care:** Use a fine-toothed file to sharpen. File only the beveled edge, maintaining the original angle, stroking from the edge back toward the thicker part of the blade. If pitch builds up on the blades when working on conifers,

wipe the blades with a cloth dampened with kerosene; dry the blades before using. Finish the job by honing with an oil stone, if necessary.

### ***Lopping Shears (Two-Hand Shears)***

**Proper use:** Lopping shears can remove stems and branches up to 1 3/4 inches in diameter. Lopping shears have a variety of blade types, much like pruning shears; the comments made above about pruning-shear blade types apply equally to lopping shears.

**Sharpening and other care:** Same as for pruning shears.

### ***Pole Pruners***

**Proper use:** Mounted on wood or insulated poles, these shears cut like bypass shears. The pruner head is hooked around the branch being cut with the blade side against the lateral branch or stem to remain. To prevent damage to the branch collar, the cut is made at the outer side of the branch bark ridge at a slightly outward angle. The tool should be positioned such that the user has a straight pull on the rope and that the lever arm swings its full range so as to complete the cut. For safety, the user should not cut off limbs that are directly overhead.

**Sharpening and other care:** Same as for pruning shears. If the blade appears to be sprung, take the pruner apart and clean the surfaces of the blade and anvil. Oil and put back together.

### ***Saws***

**Proper use:** Saws for pruning are of various types and sizes. The principal admonition is to be aware of whether the teeth are set to cut on the pull or push stroke. Pole saws are used to cut high branches from ground level, but it is difficult to make clean, accurate cuts.

**Sharpening and other care:** Saw sharpening is tricky and is best left to a hardware store or sharpening service. Blades of certain types of saws are removable and basically disposable.

## **RECOMMENDED REFERENCES FOR PRUNING OF WOODY PLANTS**

Brown, G.E. 1972. The pruning of trees, shrubs and conifers. Timber Press: Portland, Oregon.

Chevron Chemical Co. 1989. All about pruning. Ortho Books: San Ramon, California.

Coombs, D., P. Blackburne-Maze, M. Cracknell and R. Bentley. 1992. The complete book of pruning. Ward Lock Ltd.: London, England.

International Society of Arboriculture. 1995. Tree-pruning guidelines. International Society of Arboriculture: Savoy, Illinois.

Harris, R.W. 1994. Clarifying certain pruning terminology: thinning, heading, pollarding. *Journal of Arboriculture* 20(1): 50-54.

Joyce, D. 1992. The complete guide to pruning and training plants. Simon & Schuster: New York.

Rakow, D.A. and R. Weir III. 1993. Pruning. Cornell Cooperative Extension Information Bulletin 23: Ithaca, New York.

Shigo, A.L. 1986. A new tree biology. Shigo and Trees, Associates: Durham, New Hampshire.

Shigo, A.L. 1991. Modern arboriculture. Shigo and Trees, Associates: Durham, New Hampshire.

Shigo, A.L. 1989. Tree pruning: a worldwide photo guide. Shigo and Trees, Associates: Durham, New Hampshire.

Sunset Books. 1983. Pruning handbook. Lane Publishing: Menlo Park, California.

U.S. Forest Service. 1995. How to prune trees. NESPF Publication NA-FR-01-95: Radnor, Pennsylvania.