



INTRODUCTION

Land managers are often faced with the problem of describing the impact of ungulates on browse plants. A manager might ask the following questions:

1. How should I describe the current level of browsing?
2. Will trees and shrubs grow tall? Will they attain their typical stature?
3. Is the current situation unusual compared to the situation that prevailed historically?
4. If browsing currently prevents young plants from growing to their typical stature, how long will it be before the older, tall trees and shrubs die?

There are several existing methods of browse evaluation. This book describes a new method, one that is based on the effect that browsing has on the architecture—that is, the shape—of trees and shrubs.

Why is a new method warranted? In part, because previous methods are time consuming. Also, it is often difficult to interpret the results of surveys using previous methods.

An architecture-based survey can be conducted in as little as an hour. The interpretation of an architecture-based survey is straight forward. The focus: Will trees and shrubs grow to their typical stature?

Why is growth to typical stature important? Given the complexity of ecological systems, it would be impossible to foresee all of the implications of heavy ungulate use. But we can assume that full-statured trees and shrubs are fundamentally important to the ecosystem.

In Chapter 2 we describe the history of measuring browse utilization. Some of these methods describe certain aspects of browse-use more precisely than does the architecture-based method. But as we point out, it is often difficult to relate those measurements to specific ecologic impacts.

In Chapter 3 we present the general concepts. First we describe how woody plants grow in the absence of browsing. We then describe how browsing may alter a plant's architecture, and present four basic types of architecture that are produced by browsing:

1. Uninterrupted-growth type (produced by light-to-moderate browsing),
2. Arrested-type (produced by intense browsing),
3. Retrogressed-type (produced by a change from light-to-moderate browsing to intense browsing), and
4. Released-type (produced by a change from intense browsing to light-to-moderate browsing).

These architectures are produced during the time that the terminal leader grows within the browse zone. The effect of browsing on the terminal leader is retained in the architecture of the lower stem throughout the life of

the plant. By examining plants of different age, one can reconstruct the history of browsing that occurred at a site.

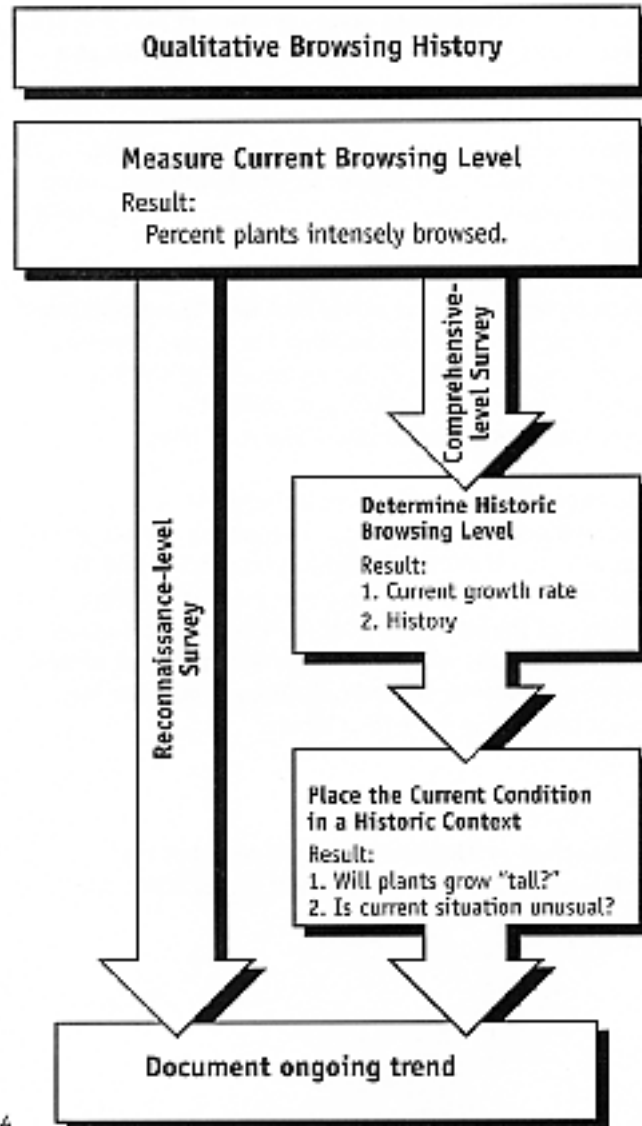
The remainder of the book, from Chapter 4 onward, describes how to conduct an architecture-based survey. Two levels of survey are described: reconnaissance-level and comprehensive-level.

A reconnaissance-level survey includes: 1) a qualitative browsing history, 2) determining the current browsing level, and potentially 3) the monitoring of short-term trends. It should be possible to conduct a reconnaissance-level survey in about an hour.

A comprehensive-level survey includes: 1) a reconnaissance level survey, 2) determining the net annual growth rate of some selected browse species, and 3) reconstructing the long-term year-by-year browsing history of the site. This additional information allows one to place the current situation in a historical context. As in the reconnaissance-level survey, a manager may elect to monitor short-term trends.

A flowchart on the following page describes the relationship between the different survey elements.

BROWSE SURVEY SEQUENCE



Suitable Browse Species

Most methods described in this book are suitable for browse species with relatively straight-growing primary stems. Some examples include aspen, pine, Douglas fir, spruce, willows, chokecherry, serviceberry, alder, and birch. The current browsing level can be classified for all such species.

Some methods of history reconstruction are based on the cluster of twigs that form in response to browsing in some species. Such clusters form in willow, aspen, chokecherry, serviceberry, alder and birch. Because conifer branches do not form similar twig clusters, the dating method cannot be applied to conifer species.

The methods are not appropriate for plants, such as sagebrush, that have a contorted growth habit.

The method works best for those species that typically grow taller than 2.5 m. We use growth to that height as a classification criterion. If the species does not typically grow to 2.5 m, the effect of browsing cannot be fully classified.

Recommended: aspen, tall willows, chokecherry, serviceberry, birch, and alder.

The long-term history reconstruction described in Chapter 6 could be based on aspen or conifers.

How To Use This Book

We assume that the reader has become familiar with the general architecture concepts described in Chapter 3 and has been assigned to conduct a comprehensive-level survey of some given area. As examples, we use a series of case studies that were conducted from the Wisdom District of the Beaverhead-Deerlodge National Forest.

We describe in Chapter 4 how to begin a survey with a qualitative browsing history. The history is described by placing symbols of the architecture-types along an approximate timeline. Suggested symbols are described in Appendix II.

The qualitative history provides an overview of the conditions that occur throughout the area. Based on those observations, the manager is better able to decide where to locate individual study sites.

Chapter 5 describes how to establish sample sites and classify the current level of browsing for a given species within the site. Twenty plants are classified as being either: 1) intensely browsed, or 2) light-to-moderately browsed. The data are recorded on the sample site's data sheet.

If one were conducting a reconnaissance-level survey, this is the only information that would be recorded on the site's data sheet. When conducting a comprehensive-level survey, stems from each of the 20 plants are classified and measured. In addition, sections are cut to determine age. For the sake of clarity, the height and age data are omitted from the data sheet presented in Chapter 5.

At this point a person conducting a reconnaissance-level survey would proceed to Chapter 8: Monitoring Short-term Trends. A person conducting a comprehensive-level survey would proceed to Chapter 6: Quantitative Browsing History.

In the beginning of Chapter 6 we focus on the situation that usually prompts the initiation of a survey: browsing was suspected to be intense. We describe methods of determining when the intense browsing might have begun and methods of determining the net annual growth rate over that period. This can be accomplished with browse species that produce a cluster of twigs in response to browsing. The data are collected at the same time that the plants are classified and on the Site Data Sheet.

In the latter part of Chapter 6 we describe how to reconstruct the long-term history of browsing at the site.

In Chapter 7, we describe how to determine the probability that the plants will grow to their typical stature. We use growth to 2.5 m as a criterion. If one wishes to incorporate this aspect into the survey, one must have selected a browse species that typically grows taller than 2.5 m.

We address the issue: Is the current situation unusual compared with the situation that prevailed historically. The answer to this question may provide guidance for long-range planning. We also address methods of assessing the rate of decline in structural diversity. The rate of decline may indicate how urgent it is to change management.

In Chapter 8 we describe a method of monitoring short-term trends. These measurement should provide feedback to managers who want to know as soon as possible the result of changes in management.

This book presents a method for evaluating condition and trend. A second volume on distinguishing between wildlife and livestock use is in progress.