# Biomass Harvest v2.3 LANDIS-II Extension User Guide

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# 1  Introduction

This document describes the Biomass Harvest Extension for the LANDIS-II model. Users should read the LANDIS-II Model User's Guide prior to reading this document.

The Biomass Harvest Extension for LANDIS-II is derived from the Base Harvest extension and therefore generally behaves the same as Base Harvest. The largest change is that Biomass Harvest supports partial thinning of cohorts; other changes are listed below. Consult the user guide for Base Harvest for further information.

**Note:**  The Biomass Harvest Extension is *only compatible* with succession extensions that use the same cohort type, in this case cohorts with species, age, and aboveground biomass data.  Currently, only the Biomass Succession extension meets this criterion.  Therefore, Biomass Harvest is *not compatible* with either the Age-only or Century succession extensions.

## 1.1 What's new in version 2.3

Biomass Harvest v2.3 is compatible with Biomass Succession v3.2 and newer.  This version of Biomass Harvest is compatible with all other succession extensions with cohort libraries the inherit from Biomass Cohorts and implements the Biomass Library.

## 1.2 Major Releases

### 1.2.1 Version 2.0

Biomass Harvest version 2.0 is compatible with LANDIS-II version 6.0.

## 1.3 Minor Releases

### 1.3.1 Version 2.2

March 30, 2014

The metadata library was incorporated.  All outputs are now recorded in designated xml files with units, etc.

### 1.3.2 Version 2.1

March 5, 2013

Fixed a bug with partial harvesting when percentages < 100% were specified (issue #23).

### 1.3.3 Version 2.0.4

Bug fixed regarding ages, age ranges, and partial removal percentages in the species list for cohort removals.  In some cases the first or last species listed was not properly assigned to the prescription.

### 1.3.4 Version 2.0.3

Compatible with Base Harvest 2.1.2, which added capability for selecting a percentage of stands as the harvest target, and add potential for interaction with the Base BDA extension to allow presalvage prescriptions.

### 1.3.5 Version 2.0.2

Bug fixed that caused improper simulation of repeat harvests.

### 1.3.6 Version 1.3.1

The log files were changed to be more explicit about the biomass removed units, both in the output maps and the event log file.  Output maps units are now **kg ha$^{-1}$**.  Event log units are now **Mg biomass** removed and **Mg ha$^{-1}$** biomass removed per damaged site.

### 1.3.7 Version 1.3

Version 1.3 incorporated the numerous fixes that were applied to the Base Harvest version 1.3.

## 1.4 Acknowledgements

Funding for the development of LANDIS-II has been provided by the Northern Research Station (Rhinelander, Wisconsin) of the U.S. Forest Service.

# 2  Input Files

The inputs for this extension are identical to those listed in the Base Harvest User Guide with the exceptions listed below. The text file must comply with the general format requirements described in section 3.1 Text Input Files in the LANDIS-II Model User Guide.

## 2.1 LandisData

This parameter's value must be `"Biomass Harvest"`.

## 2.2 PreventEstablishment

The user can use the PreventEstablishment keyword after the SiteSelection choice to indicate that no new cohorts can establish after this prescription has been applied to a site.

Example:

```
Prescription SmallDevelopments
    StandRanking    Random
    MinimumTimeSinceLastHarvest 0
    SiteSelection   PartialStandSpread   1 1
    PreventEstablishment
```

## 2.3 Species List for Cohort Removal

When `SpeciesList` is specified for the `CohortsRemoved` parameter in a prescription, the user may specify a percentage after any individual age or range of ages. The percentage indicates what proportion of a cohort(s) will be removed. For example:

```
CohortsRemoved SpeciesList

acersacc 1-40(50%) 50(65%) 65-70 71-107(15%)
```

The default percentage is 100%. If no parenthetical biomass removal values are given, the Biomass Harvest extension will behave identically to the Base Harvest extension.

## 2.4 Biomass Maps

The new `BiomassMaps` parameter comes after the `PrescriptionMaps` parameter.

The parameter specifies the template for the names of output maps of biomass removed from harvested sites. Like the `PrescriptionMaps` parameter, the `BiomassMaps` parameter requires that the timestep variable be used in its value:

```
BiomassMaps harvest/biomass-removed-{timestep}.img
```

This parameter is optional. If it is not present, then no output maps are created.