

REFORESTATION AFTER HARVEST

You will be harvesting some timber. Do you need to plan to reforest the area?

The purpose of the reforestation rules is to establish standards to ensure the timely replacement and maintenance of free-to-grow forest tree cover following forest operations.

Each year, millions of new seedlings are planted in Oregon to replace harvested trees. Harvest areas that require reforestation must be replanted within two years. Within six years, those seedlings must be free-to-grow and “well-distributed” (see page 80). The law is clear: It is the responsibility of the landowner to establish the next generation of trees after a harvest.

Planning for reforestation goes hand in hand with timber harvest planning. The harvest activity often triggers both the need and the time limits for reforestation. Harvest machines and activities can be used in ways that promote successful reforestation. Some income from the harvest usually is budgeted for seedlings and other reforestation needs.

Landowners should order seedlings 1-2 years before they need them. The Oregon Department of Forestry has helpful information on ordering and purchasing seedlings (www.oregon.gov/ODF/Working/Pages/Replanting.aspx) Reforestation and seedling information is also available on KnowYourForest.org

When is reforestation required?

Timely reforestation of forestland following operations that reduce tree stocking below established standards is essential to ensure continuous growth and harvesting of forest trees species.

Reforestation is required any time tree stocking after harvest is below the minimum standards. This applies regardless of what the tree stocking was before the harvest.

Who is responsible for reforestation?

The landowner is responsible for reforestation, regardless of who cuts the trees. When the land is sold, if the reforestation requirements are not completed, that obligation transfers to the buyer. By law, the seller must inform the buyer, in writing, of any remaining requirement. Know your legal obligations whether you are a land buyer or seller.

Which forestlands require reforestation?

Any forestland, Site Class VI or better, is subject to the requirements of the reforestation rules.

There are six major forestland site classes in Oregon (page 145).

- I, II and III are high-site-class forestland
- IV and V are medium-site-class
- VI is low-site-class

Be sure to read the section: “You want to harvest timber on your property. How do you plan for it?” (page 13). It describes how to determine your harvest unit site class, its basal area and your harvest type (1, 2, 3 or Unclassified). Type 1 and Type 3 harvests require reforestation.

Where is reforestation not required?

Reforestation is not required on those portions of the harvest area:

- where adequate free-to-grow tree stocking remains after completion (Type 2 and Unclassified harvests meet this standard)
- that are not disturbed by operation activities
- on sites lower than Site Class VI

How many trees per acre are required?

Use Table 4-1 to determine the minimum stocking requirements for high, medium or low site class harvest units. You can meet the requirements by either planting seedlings (Column 2), leaving adequate saplings or poles (Column 3), leaving adequate basal area in trees 11 inches and larger (Column 4) or a combination of the three. Combinations are determined by using the “equivalent calculation” explained on the next page. All of these choices can and should be made when you plan your timber harvest.

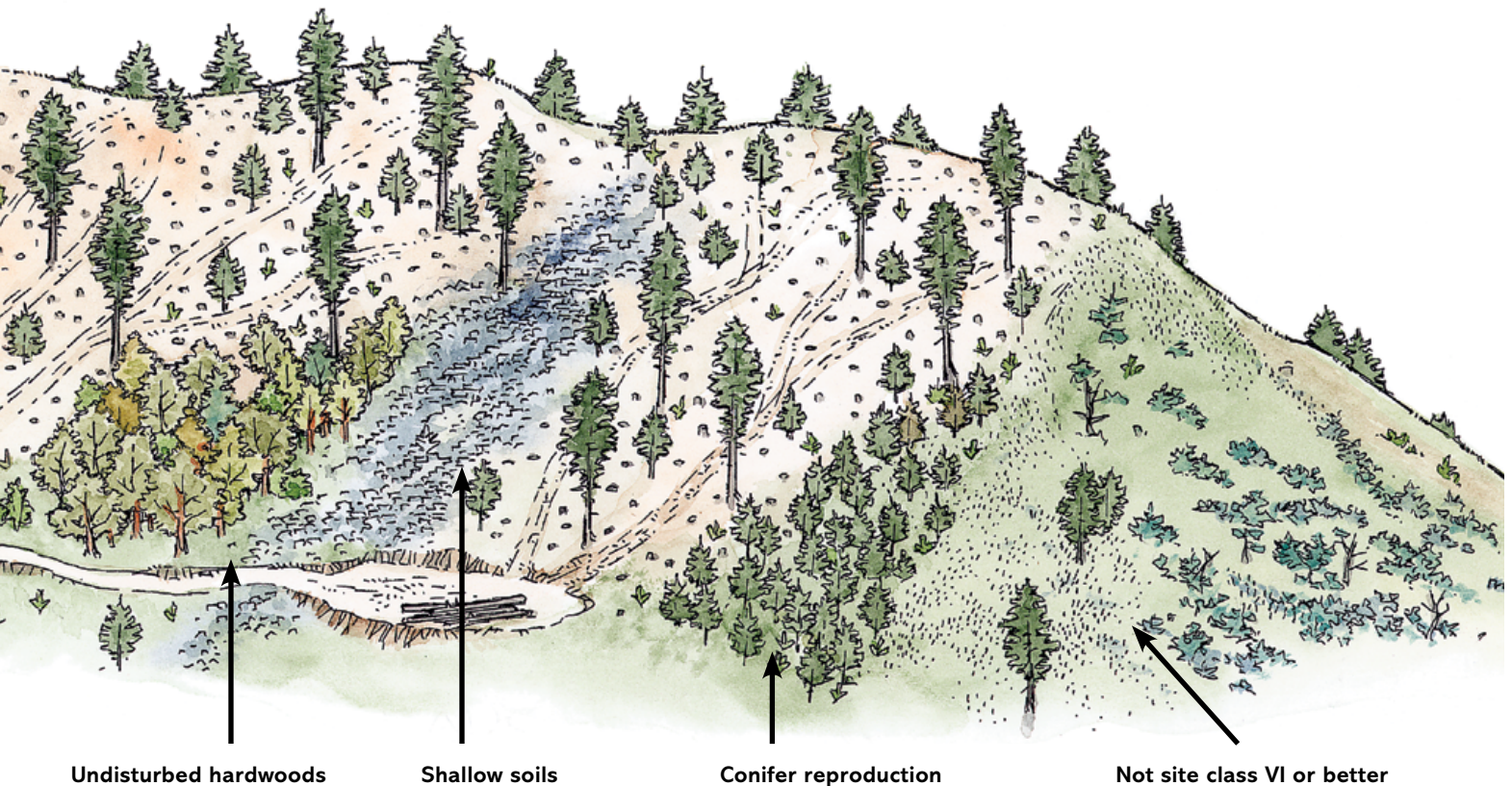
Note that these are the minimum numbers of free-to-grow trees required. As reforestation plans are developed, it's important to consider local conditions and whether all planted and residual trees can be expected to grow and thrive. In addition, the minimum stocking levels may not meet your management objectives.

What are seedlings?

They are live trees of acceptable species of good form and vigor less than 1 inch in DBH.

What are saplings and poles?

They are live trees of acceptable species of good form and vigor, with a DBH of 1 to 10 inches.



This harvest unit includes portions that don't require reforestation. For example, you are not required to plant areas that were not disturbed where young conifer reproduction and hardwoods are growing; areas with very shallow soils that don't support trees; and areas that are lower than Site Class VI.

Table 4-1 Reforestation Requirements for High, Medium and Low Site Classes

Site Class	Seedlings (less than 1 inch DBH) or →	Saplings & Poles (1-10 inches DBH) or →	Trees 11 inches and larger
High (Site Classes I, II and III)	200 per acre, or	120 trees per acre, or	80 square feet of basal area per acre
Medium (Site Classes IV and V)	125 per acre, or	75 trees per acre, or	50 square feet of basal area per acre
Low (Site Class VI)	100 per acre, or	60 trees per acre, or	40 square feet of basal area per acre

Table 4-2 converts the number of trees per acre to average spacing. For example, if the average spacing between remaining saplings and poles on your Site Class IV harvest unit is approximately 19 feet, you have more than the required 75 (saplings or poles, not seedlings) trees per acre.

Between 300 and 435 trees per acre are included in Table 4-2 because higher planting densities are often used on better sites as well as to account for such factors as animal damage, brush competition and mortality. The first few years after harvest are critical for seedling survival and growth. Prompt planting of suitable stock, brush control and other measures can help ensure reforestation success. Seek out technical assistance and local experience if needed.

Table 4-2 Tree Number and Equivalent Tree Spacing

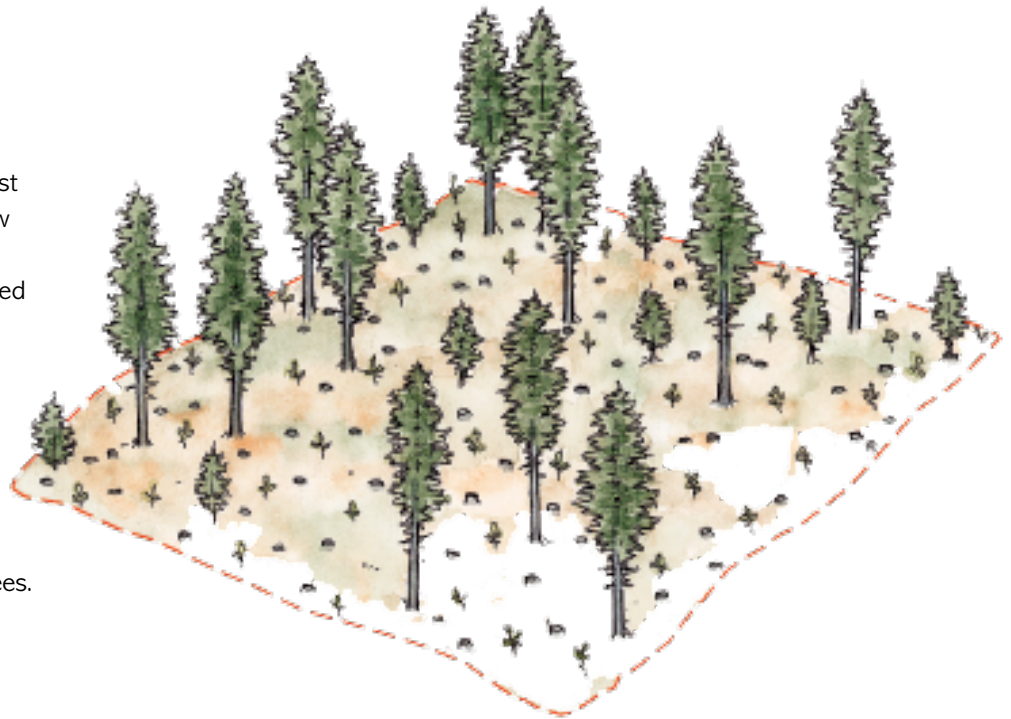
Trees per acre	Average spacing (feet)
435	10
300	12
200	15
125	19
120	19
100	21
75	24
60	27

What are the equivalent calculations used for partial cuts?

The equivalent calculation is useful if you're planning a timber harvest in which some areas of seedlings, saplings and poles, and healthy larger trees will be left. Such a harvest could reduce the need for hand-planting new seedlings, but how do you determine their equivalent value? Use the calculation described here.

Note: Regardless of the site class, the following are equal to one another:

100 seedlings = 60 saplings and poles
 = 40 square feet of basal area
 of 11 inch DBH and larger trees.



Use this formula to make the equivalent calculation:

$$\text{NEW TREES} = \text{RULE STANDARD} - [(\# \text{ SEEDLINGS} + (\# \text{ SAPLINGS AND POLES}/0.6) + (\text{BASAL AREA}/0.4)]$$

New trees are the minimum number of additional free-to-grow seedlings that must be established per acre to meet the Table 4-1 standard.

Rule standard is the site class seedling standard listed in Table 4-1 (200, 125 or 100 seedlings per acre, depending on site class).

seedlings means the number of free-to-grow seedlings per acre that were left after harvest.

saplings and poles means the number of free-to-grow saplings and poles per acre that were left after harvest. This is divided by the equivalent factor (0.6). This includes wildlife trees and trees left in patches.

Basal area means basal area per acre of free-to-grow trees greater than or equal to 11 inches DBH that were left after harvest. This is divided by the equivalent factor (0.4).

Here's an example:

This Site Class IV, Type 3 harvest has the following trees remaining after the harvest.

Average seedlings per acre = 35
 Average number of saplings and poles per acre = 8
 Average BA/acre of trees greater than 11 inches DBH = 15

Use the equivalent calculation formula to determine seedling equivalents:

$$\begin{aligned} \frac{8 \text{ saplings and poles per acre}}{0.6} &= 13 \text{ seedling equivalents} \\ \frac{15 \text{ square feet of basal area per acre}}{0.4} &= 38 \text{ seedling equivalents} \\ 35 + 13 + 38 &= 86 \text{ seedling equivalents} \end{aligned}$$

Site Class IV reforestation requirements (Table 4-1) call for a minimum of 125 seedlings per acre, or equivalent larger trees. The equivalent calculation shows that stocking is not adequate. An additional 39 seedlings per acre must be planted, as shown in the calculation below.

FROM THE EQUIVALENT CALCULATION FORMULA:

$$125 \text{ tree standard} - (35 + 13 + 38) = 39 \text{ new seedlings to be planted per acre.}$$

Will larger trees left on the unit meet the reforestation standards?

When planning a harvest in which trees 11 inches or larger will be left, the basal area (Appendix, page 156) of these trees determines whether the reforestation standards (Table 4-1) will be met. Table 4-3 shows the basal area (Column 2) for individual trees with diameters ranging from 11 to 32 inches. For a given average tree diameter, the other columns show the number of trees per acre that equal the reforestation standards of 80, 50 or 40 square feet of basal area, and the average spacing between those trees. This helps in assessing and planning for reforestation needs.

FOR EXAMPLE:

Let's say you are planning to harvest on Site Class III. You know from Table 4-1 that at least 80 square feet of basal area per acre of 11 inch or greater DBH trees must be left to meet the reforestation standards.

According to Table 4-3, 80 square feet of basal area could be 122 11-inch trees with average spacing of 19 feet, or it could be 15 32-inch trees with average spacing of 54 feet, or some other combination of average diameter and spacing for the trees you must leave.

Note the importance of site quality: Another harvest is planned on a Site Class VI area, which has a reforestation requirement of 40 square feet of basal area per acre. You would need to leave 61 11-inch trees with average spacing of 26 feet, or seven 32-inch trees with average spacing of 78 feet.

In either case, if the minimum basal area can't be maintained with the expected harvest removals, you need to plan for tree planting to meet the reforestation requirements.

Table 4-3 Equivalent Reforestation Standards for Trees of Varying Diameters

Avg. DBH of trees 11" or greater	Basal area (ft ²) per tree	# Trees equal to 80 ft ² BA per acre	Avg. space between Trees (feet)	# Trees equal to 50 ft ² BA per acre	Avg. space between trees (feet)	# Trees equal to 40 ft ² BA per acre	Avg. space between trees (feet)
11	0.66	122	19	76	23	61	26
12	0.79	102	21	64	26	51	29
14	1.07	75	24	47	31	37	34
16	1.40	58	27	36	35	29	39
18	1.77	46	31	28	39	22	44
20	2.20	37	34	23	44	18	49
22	2.60	31	37	19	48	15	54
24	3.14	26	41	16	52	13	58
26	3.69	22	44	14	56	11	63
28	4.28	19	48	12	60	10	68
30	4.90	17	51	11	63	8	73
32	5.58	15	54	9	69	7	78

Do the required wildlife trees count toward reforestation standards?

Yes, if they are alive and large enough. Live conifer trees 11 inches DBH and larger left standing in harvested areas to meet the wildlife tree and snag requirements will be counted toward reforestation stocking standards if the trees are free-to-grow.

To meet both reforestation and wildlife tree requirements, trees must be conifers at least 11 inches DBH, 30 feet tall and free-to-grow. The law allows these conifers to be double-counted. This is an incentive for landowners to retain free-to-grow conifers, rather than hardwoods, as wildlife trees. Why? In general, conifers live and last longer and are used by more wildlife species.

Do the required RMA trees count?

No. For the purpose of determining compliance with the tree stocking requirements of the reforestation

rules, tree stocking in RMAs within an operation area will be considered separately from stocking in the rest of the operation area.

Since the purpose of an RMA is water protection, it is important that RMAs are planted after harvest. You are not allowed to leave understocked openings in the RMA where harvesting has occurred. Landowners are expected to do site preparation and planting inside RMAs, and make good-faith efforts to reforest streamside areas. ODF determines if a reasonable effort has been made. However, a slightly lower level of stocking in an RMA is preferable to repeated entries with chemical or mechanical methods to achieve full stocking.

Free-to-grow trees left in the undisturbed parts of the RMA may not be counted toward the required stocking of the disturbed area. Similarly, reforestation is not required in understocked parts of the RMA if they were not disturbed by the operation.



Above: These ponderosa pine are free-to-grow. Right: This Douglas-fir is not free-to-grow.



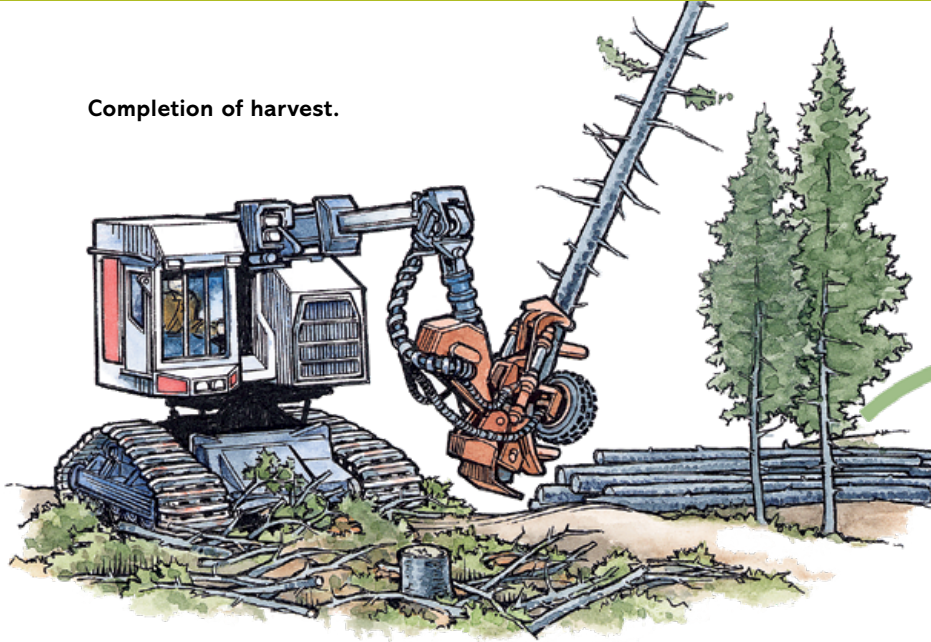
What does free-to-grow specifically mean?

Reforestation involves more than just planting seedlings or saving seedlings, saplings or poles on the harvest unit. To meet the requirements at the end of six years, the harvest unit must be a stand of freely growing, well-distributed trees, of acceptable species and form, with a good chance of becoming healthy and taller than neighboring grass and brush competition. (Keep reading for more about the six-year requirement below.)

What does well-distributed mean?

An effort must be made to reforest the entire harvest unit. However, the unit will be considered adequately stocked and the trees well-distributed if at least 80 percent or more of the harvest unit has at least the minimum per-acre required tree stocking. Not more than 10 percent may contain less than one-half of the minimum per-acre tree stocking required for the site class.

Completion of harvest.



These allowances are not loopholes in the reforestation standards, but rather reflect the variable results that may occur even when initial plantings are well-distributed. It's usually a good idea to plant extra trees to account for those that may die or not be free-to-grow after six years.

How much time is allowed for reforestation?

The time period for compliance with the reforestation rules begins at the completion of the operation or 12 months after tree stocking has been reduced, whichever comes first.



Completion of the operation means that the harvest has been completed and the harvest unit will not be disturbed again. Usually, when the yarding process ends, the harvest is considered to be completed. To prevent delays in reforestation, the compliance schedule begins no later than 12 months after stocking is reduced, meaning 12 months after felling begins.

If the harvesting activity extends long enough, reforestation may be required to begin on a portion of a harvest unit even though other parts are not completed.

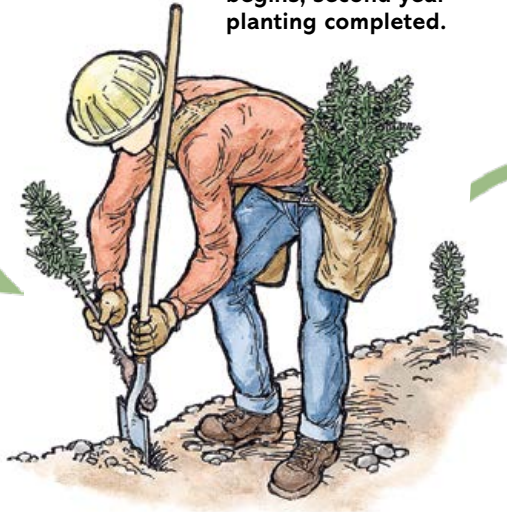
The landowner shall begin reforestation, including any necessary site preparation, within 12 months of when reforestation is required.



WHAT THIS MEANS:

Whether you intend to depend on natural reforestation (described on page 81) or to hand plant seedlings or plant seed, once the clock starts from the date noted above, you have 12 months to start reforestation activities such as site preparation and ordering tree seedlings. For example, if yarding ends on May 1, you should begin site preparation and order seedlings in the next 12 months. Planting could occur during the coming winter/spring if site prep is completed and seedlings are available. Site preparation is often tied with slash treatment. See pages 71-74 for slash treatment requirements.

First year – reforestation begins; second year – planting completed.



Control brush and grass competition. Chemical herbicides are one method.



The landowner shall complete planting or seeding within 24 months unless ODF has approved a written plan for natural reforestation.



WHAT THIS MEANS:

If you intend to hand-plant seedlings or plant seed, it must be completed within 24 months unless a written plan for natural reforestation has been approved. Remember, reforestation timing is critical if your harvest is completed in the fall. For example, if the harvest ends on Oct. 1, site preparation activities, such as burning or spraying, may not be possible due to weather. The first planting season (December to April) could be lost. In this case, site preparation would have to be completed before the second planting season so planting could be done during the second planting season.

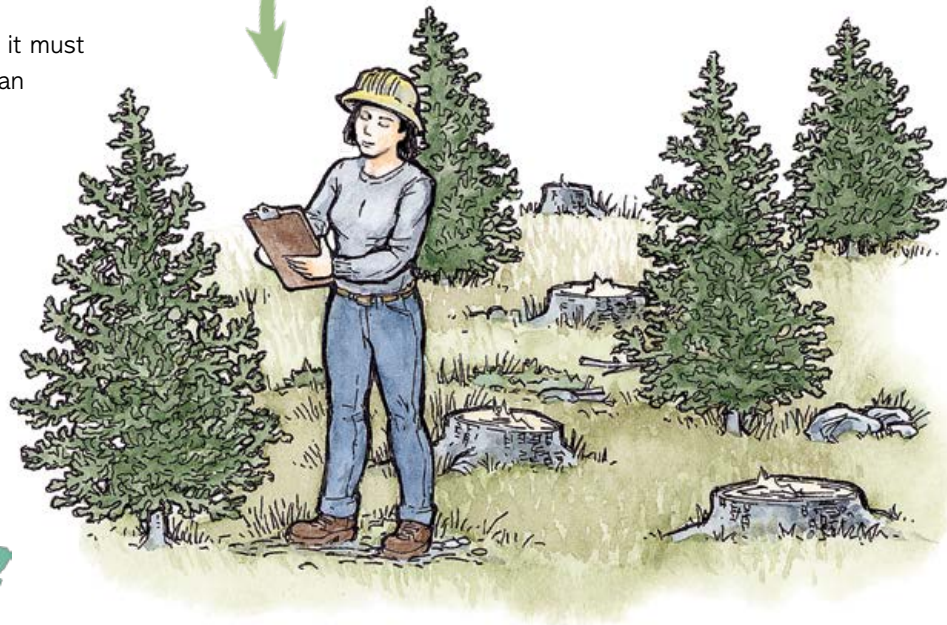
By the end of the sixth full year, the landowner shall have established a free-to-grow stand of trees, which meets or exceeds the minimum stocking level required.



WHAT THIS MEANS:

An adequately stocked, free-to-grow stand must be established by Dec. 31 of the sixth year after the compliance period has started. For example, all operations completed in 2011 that depend on hand-planting seedlings or planting seed must have a free-to-grow stand established before the end of 2017. Six full calendar years are allowed to establish the next generation of trees.

Within six years – free-to-grow stand is established.



Can natural reforestation be used to meet the requirements?

Natural reforestation relies on natural processes to reforest a harvest unit. It is acceptable with a written plan approved by ODF. On Site Class VI or other harvest units with poor soils or harsh climates, natural reforestation may be the best way to reforest. In the case of wetlands with high water tables, competing vegetation and limited accessibility, natural reforestation may have greater success than hand planting.

Landowners may submit plans for alternate practices such as natural reforestation that do not conform to the reforestation stocking standards. A plan for alternate practices may be approved if ODF determines that there is a high probability that the purpose of the reforestation rules will be achieved.



WHAT THIS MEANS:

Landowners must submit a written plan to ODF for an alternate practice for reforestation within 12 months of tree stocking reduction. The plan should describe how reforestation will be accomplished and should describe the following:

- seed sources to be used
- site preparation methods
- vegetation competition control methods
- time estimate to obtain a free-to-grow stand
- how progress will be evaluated
- what will be done if reforestation does not progress as planned

Time limits for natural reforestation may differ.

When natural reforestation is planned, the time limits for evidence of successful germination and for establishing a free-to-grow stand of trees, which meets or exceeds the minimum stocking level required for the site, shall be established in the approved written plan required for such methods.



WHAT THIS MEANS:

A natural reforestation plan must provide specific time limits for site preparation, evidence of reforestation success, and establishment of a free-to-grow stand. The deadlines should not be shorter than six years and rarely longer than 10 years.

What if reforestation cannot be accomplished?

Extensions are granted when reforestation cannot be accomplished within six years due to circumstances beyond the landowner's control. Those circumstances are determined by ODF and may include:

- tree nursery failure
- inadequate availability of seedlings after salvage harvesting
- extreme drought
- insect infestations
- smoke management restrictions on slash burning
- wildfire or disease damage
- severe wildlife damage that could not be reasonably anticipated or controlled

You must submit a written request for an extension to ODF as soon as you realize your reforestation effort may not meet the deadline. Extensions are granted based on evidence documenting reasonable attempts to comply. You will be required to achieve stocking within a prescribed time using recognized methods.

What are unacceptable reasons for reforestation failure?

- failure of hand-planting success when inappropriate seedlings or seed sources are used
- natural reforestation failures due to poor natural seed crops in the years immediately following a harvest



Using natural reforestation can be less costly than hand-planting, but its reliability varies. A written plan is required for natural reforestation.

- failures on harsh sites due to harvest unit design or competing vegetation
- wildlife damage, such as by mountain beaver, that could be reasonably expected and controlled

How are the tree species acceptable for reforestation determined?

ODF determines the tree species acceptable for artificial reforestation, natural reforestation, and as residual seedling, sapling and pole, or larger tree stocking based on all of the following criteria:



- Species must be ecologically suited to the planting site.
- Species must be capable of producing logs, fiber or other wood products for lumber, sheeting, pulp or other commercial forest products.
- Species must be marketable in the foreseeable future.

WHAT THIS MEANS:

In nearly all cases, native species are considered acceptable and are preferred for reforestation. One exception could be white fir that has moved into a ponderosa pine/Douglas-fir site due to fire exclusion. On Site Classes IV, V and VI, landowners are encouraged to favor ponderosa pine and Douglas-fir to white fir.

A conifer or hardwood species that has any commercial value (even commercial firewood) will meet the requirement of B above. A hardwood or mixed hardwood/ conifer stand is as much a forest as a stand of pure conifers.

Tree species that are not currently marketable -- or marketable in the foreseeable future -- cannot be used for tree stocking. Generally, juniper is not considered acceptable, but it often grows on poor sites (lower than Site Class VI) where reforestation is not required anyway.

Hardwood trees remaining after a harvest can meet up to 20 percent of the required stocking levels if they meet the criteria in A, B and C above. With a plan approved by ODF, hardwoods may supply all the required stocking.

When appropriate, reforest with a mixture of acceptable tree species to reduce the risk of insect and disease losses and to promote stand diversity.

Hand planted seedlings or seed should be genetically adapted to the site.

Do non-native tree species meet reforestation standards?

Landowners wishing to use non-native tree species must submit written plans that must be approved by ODF. The plans are required within 12 months of tree stocking reduction, and must include:

- tree species to be used
- evidence that the species is ecologically suited
- evidence that the species is capable of producing commercial forest products
- research or field tests that show success in similar sites

Are reforestation standards ever waived?

Reforestation requirements may be waived or modified following a stand-improvement operation (e.g., pre-commercial thinning, commercial thinning, overstory removal or other partial-cut harvest) if ODF determines that the after-harvest stand will result in enhanced long-term tree growth and there is a high probability that the purpose of the reforestation rules will be achieved.



WHAT THIS MEANS:

Stand improvement harvests, like those noted, are intended to increase long-term tree growth and value if done correctly. Additional reforestation may not be required. In some cases, stand improvement harvests result in stocking slightly below the stocking standard rules. If that happens, ODF must decide if, in the long term, free-to-grow tree stocking will occupy the site. If so, reforestation will not be necessary.

What's needed if there is an exemption from reforestation requirements?

- Landowners may request a suspension of the reforestation rules when salvaging or converting low-value forest stands in order to establish forest stands that are adequately stocked and free-to-grow. There must be evidence that the landowner qualifies for incentive funding and that the harvest costs will exceed revenues.
- Where reforestation is not required, landowners must protect soil productivity and stabilization within 12 months of the operation with suitable trees, shrubs, grasses or forbs.

What if you want to change to a different land use?

Timber harvesting sometimes is done in preparation for a land use different from forestry. For example, trees often are removed when an area is developed for home sites. Such harvesting is still a forest operation subject to ODF oversight, but requirements by other state and local agencies also will require attention:

- An operations notification to ODF is required, and the form includes a place to note a land-use change.
- If you need or want to remove trees that otherwise would be required to stay or be replaced, you must submit a written plan for approval by ODF. The plan must show that local land-use agencies (city and county, usually) have approved the land-use change and will issue the needed permits, and the change will be in compliance with regulations of other state agencies (e.g., Oregon Department of Environmental Quality, Oregon Department of Agriculture).

What are the penalties for inadequate reforestation?

Landowners will be ordered to comply with reforestation requirements and may be fined up to \$5,000. The landowner's property tax status could also adversely change for failure to reforest or complete a conversion of forestland to a non-forest use.

For other information sources, see the Appendix, pages 197-198.

