

SEED TRANSFER GUIDELINES FOR INLAND NORTHWESTERN SPECIES

Introduction

The seed transfer guidelines in this booklet are based on geneecology studies. They have been developed to assist IETIC members in choosing the most appropriate seed sources for planting in the inland northwest. Note that the guidelines are flexible. They should be used in conjunction with the forester's knowledge and experience of the species and ecosystems. They apply to seed movement within the natural range of the species and do not necessarily compensate for moving a species beyond its current natural range.

Two sets of guidelines have been included: those developed by the USFS to cover Region 1, which extends into central Montana and stops at the Idaho/Washington border, and those developed by the IETIC which also include lands in northeastern Washington. Copies of several papers by Rehfeldt have also been included as an appendix for reference for supporting information. For some of the species, the two sets of guidelines are similar. Where they differ substantially, the IETIC guidelines tend to be somewhat more conservative than those developed by the USFS.

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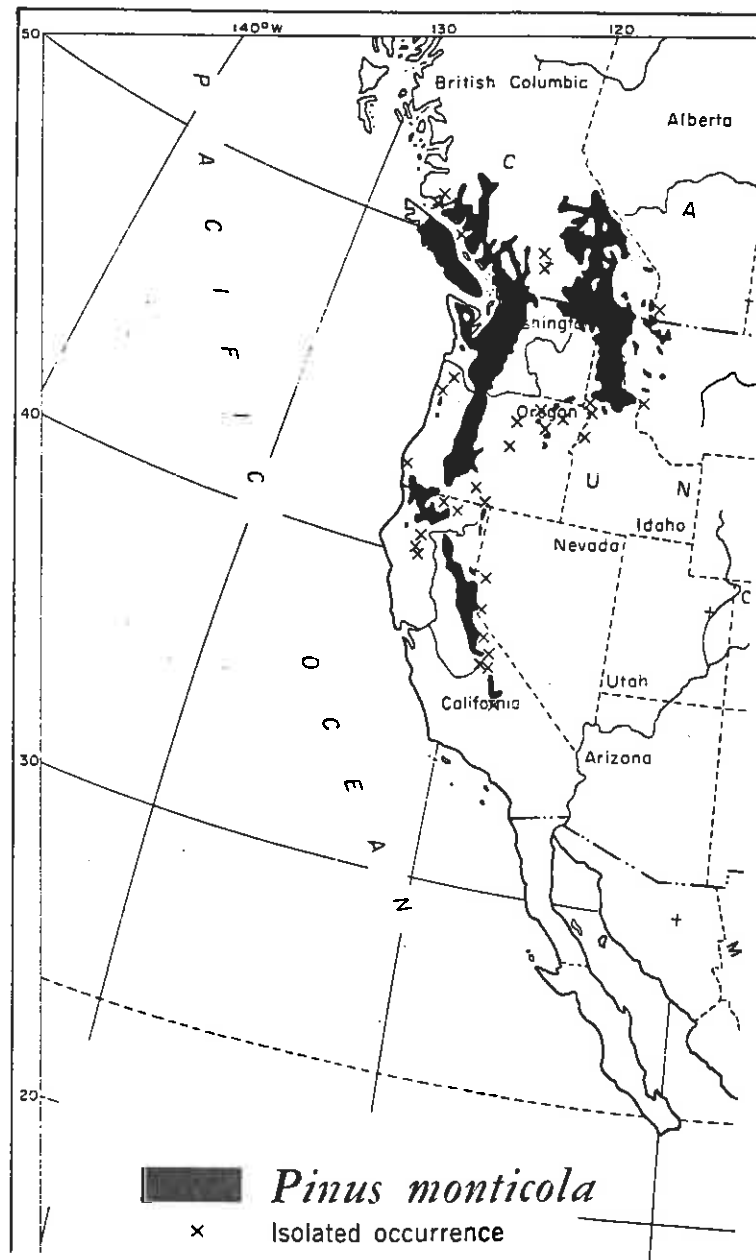
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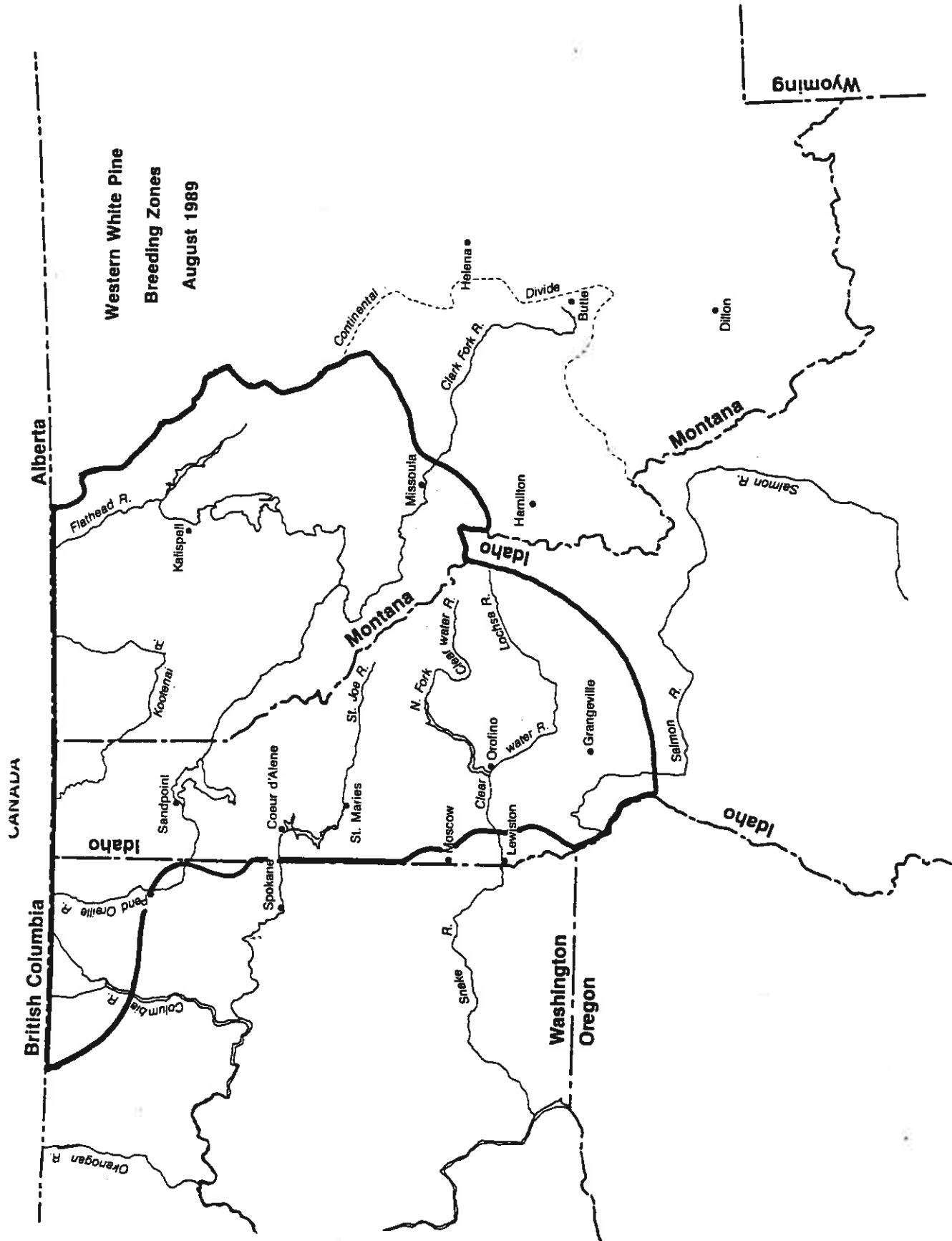
IETIC Seed Transfer Guidelines

1. Western white pine

One geographic breeding zone established, which is the same as the natural range of the species in the Inland Northwest (see map). Studies indicate that western white pine seed can be moved successfully within its range in the Inland Northwest without regard to latitude, longitude, elevation or habitat type.



**Western White Pine
Breeding Zones
August 1989**



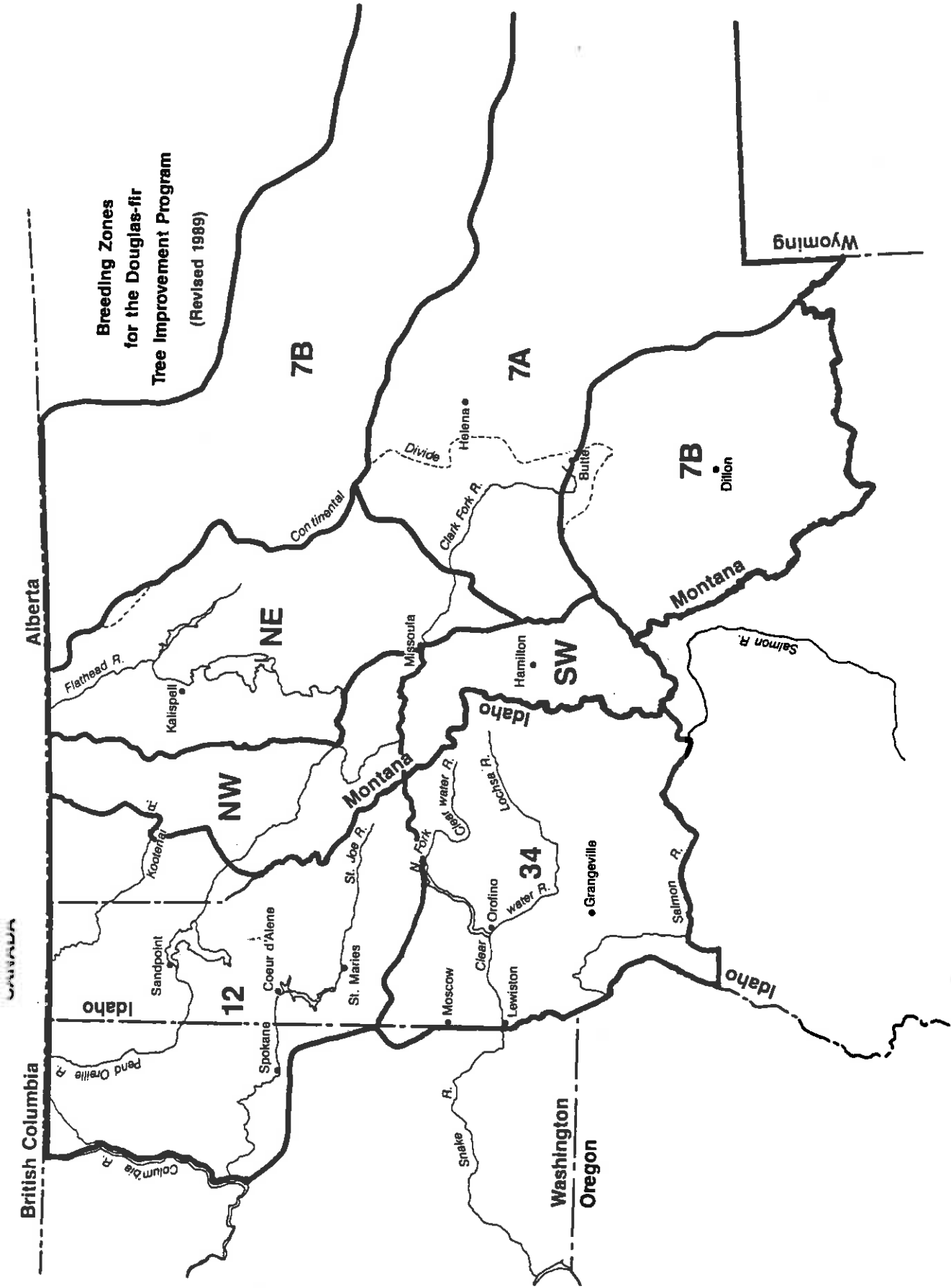
2. Douglas-fir

Seven geographic breeding zones established for Douglas-fir (see map); elevational zones established within geographic zones (see table). Elevational seed transfer differs among Breeding zones. See map for details.

Douglas-fir breeding units and elevation zones

Breeding Unit	Low	Mid	High	Elevational Transfer
Idaho 12	2100' - 2999'	3000' - 3999'	4000' +	±328' (100m)
Idaho 34	2100' - 2999'	3000' - 3999'	4000' +	±328' (100m)
Montana NW	2500' - 3999'	XXX	4000' +	±460' (140m)
Montana NE	3500' - 4999'	XXX	5000' +	±460' (140m)
Montana SW	3500' - 4999'	XXX	5000' +	±460' (140m)
Montana SE		all elevations		±460' (140m)
Montana 7		all elevations		±1065' (325m)

Breeding Zones
for the Douglas-fir
Tree Improvement Program
(Revised 1989)



3. Western larch

Four geographic breeding zones have been established for western larch (see map); Elevational seed transfer should be restricted to $\pm 225\text{m}$ from the elevation of a given seed source. However, "floating" seed transfer guidelines can also be used (see Rehfeldt 1983).

"Based on studies of 2-year-old seedlings planted in 3 contrasting environments, Rehfeldt described 3 geographic zones for larch in the Inland Empire. "(1) Idaho south of 48° latitude, (2) eastern Washington and Idaho north of 48° ; and (3) western Montana" (Rehfeldt 1982). He recommended elevational seed transfer to be limited to $\pm 225\text{m}$ from a given seed source.

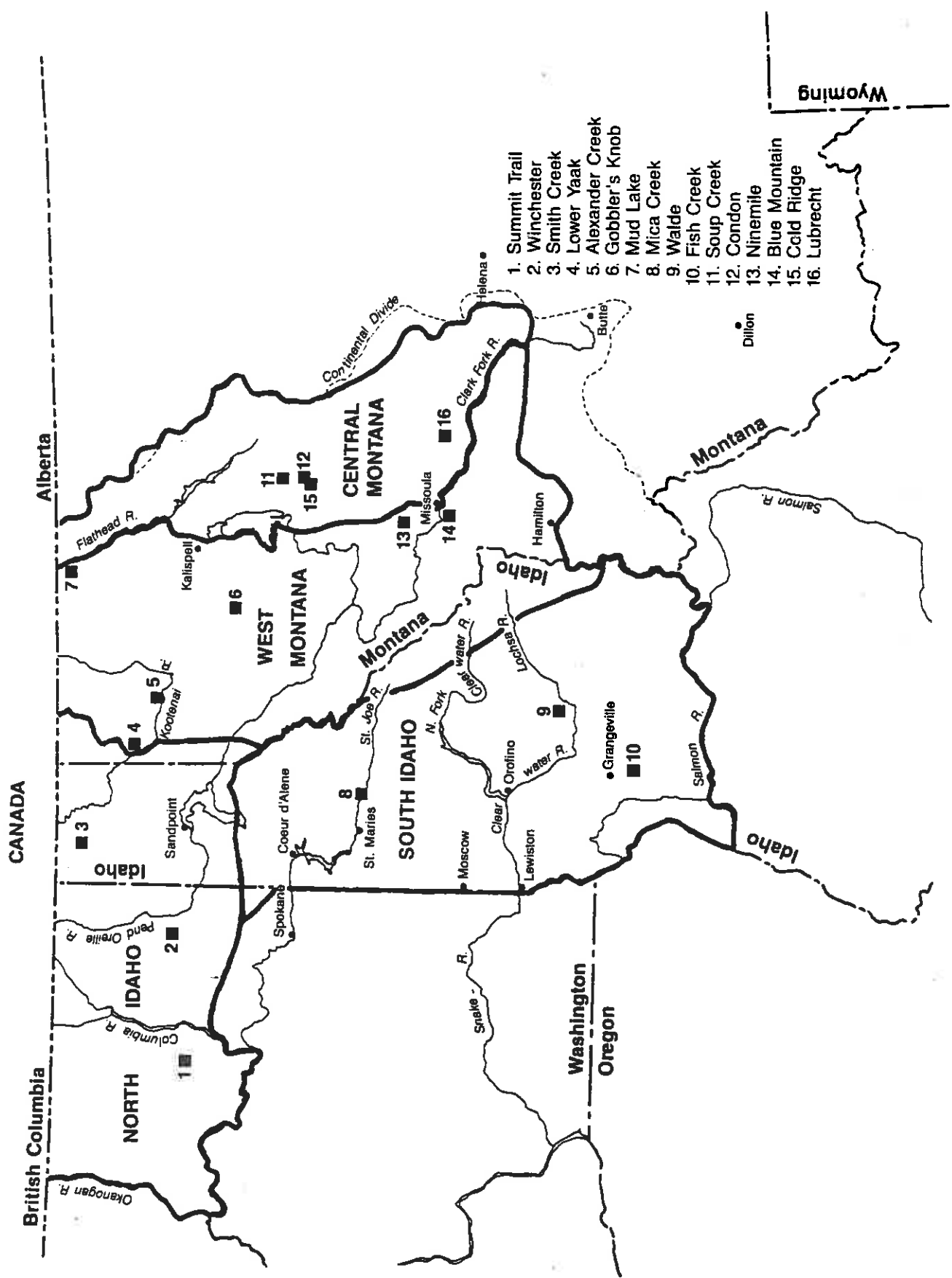
$\pm 700 \text{ ft.}$

In a later paper, Rehfeldt suggested that floating seed transfer guidelines could be "developed from the similarities between elevational and geographic patterns of genetic variation...Such floating guidelines provide flexibility in seed transfer while maintaining adaptation." (Rehfeldt 1983)...

Breeding Units

The IETIC Western Larch Species Group used geographic zones recommended by Rehfeldt in 1982 as a guideline to delineate breeding zones...Genetic tests have been established using those guidelines."

(The preceding paragraphs were copied from the IETIC Western Larch Tree Improvement Plan by Fins and Franc 1984.)



1. Summit Trail
2. Winchester
3. Smith Creek
4. Lower Yaak
5. Alexander Creek
6. Gobbler's Knob
7. Mud Lake
8. Mica Creek
9. Waide
10. Fish Creek
11. Soup Creek
12. Condon
13. Ninemile
14. Blue Mountain
15. Cold Ridge
16. Lubrecht

4. Ponderosa pine

Six geographic breeding zones have been established for ponderosa pine (see map). Seed transfer is recommended not to exceed ± 200 meters (650 ft). Seed may be moved freely within breeding zones provided the elevational transfer is within the specified limits. Seed may also be moved between adjacent zones if compensated with an elevational adjustment (see table). Note that the natural range of the species should also be used to guide planting efforts and may limit transfer to some elevations in some zones.

Note that the locations of the boundaries between zones are approximations. Thus sources to one side or the other of the boundary locations are likely to be very similar to each other in adaptation given elevational equivalencies. Cooperators are encouraged to establish seed transfer guidelines specific to their own lands for their own administrative use.

Guidelines for transfer of ponderosa pine seed in the Inland Empire. Zones refer to breeding zones depicted on map.

Seed Transfer allowable		
from zone	to zone	But, plant at
IA	IB	+650'
IB	IA	-650' north of Pend Oreille River
IB	II	+650' south of Pend Oreille River only
II	IV-V	-650'
II ¹	III	+650'
III	II ¹	-650'
III	VI	-650'
IV-V	II	+650'
IV-V	VI	-650'
VI	III	+650'
VI	IV-V	+650'

¹ From south of the Pend Oreille River only.

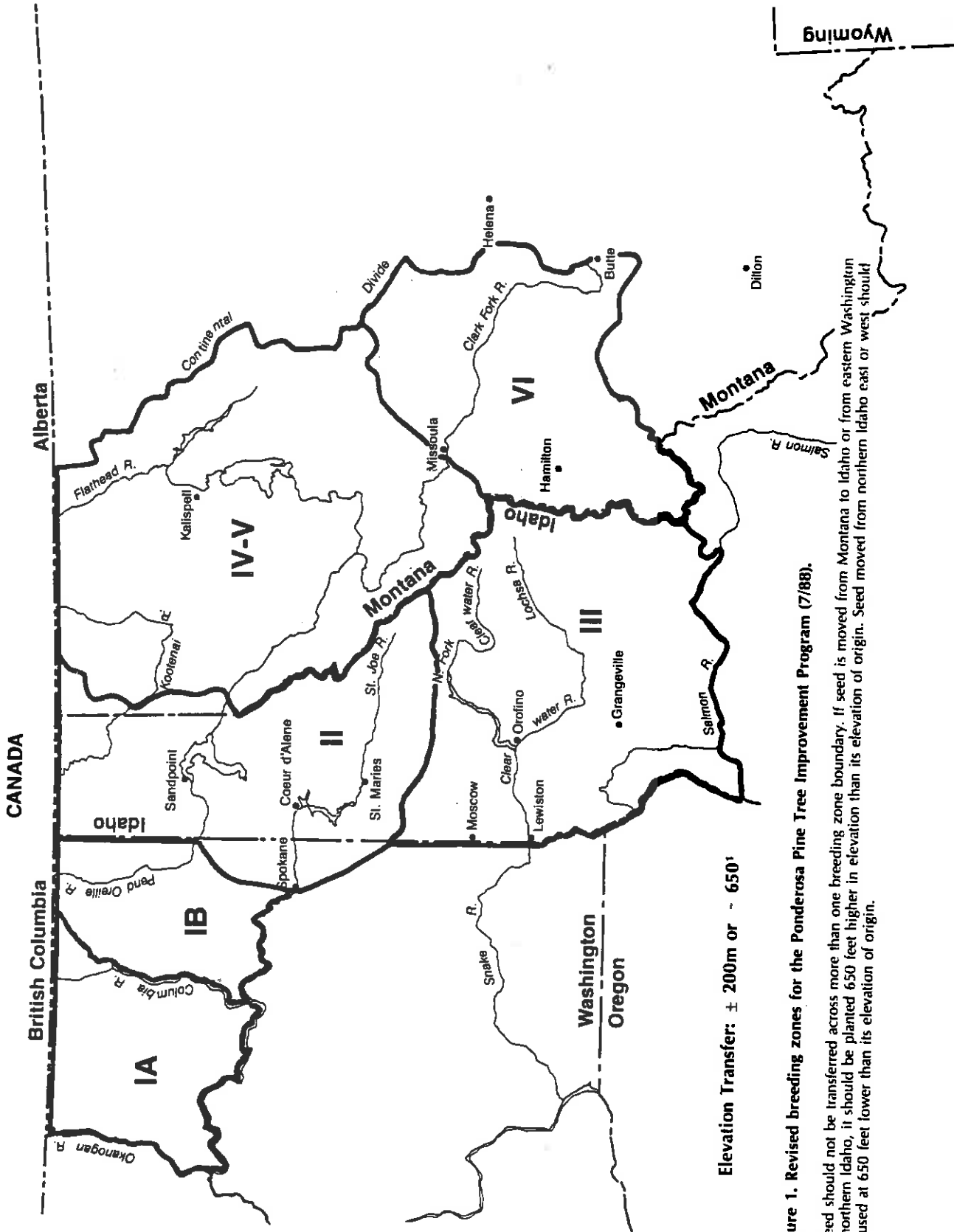
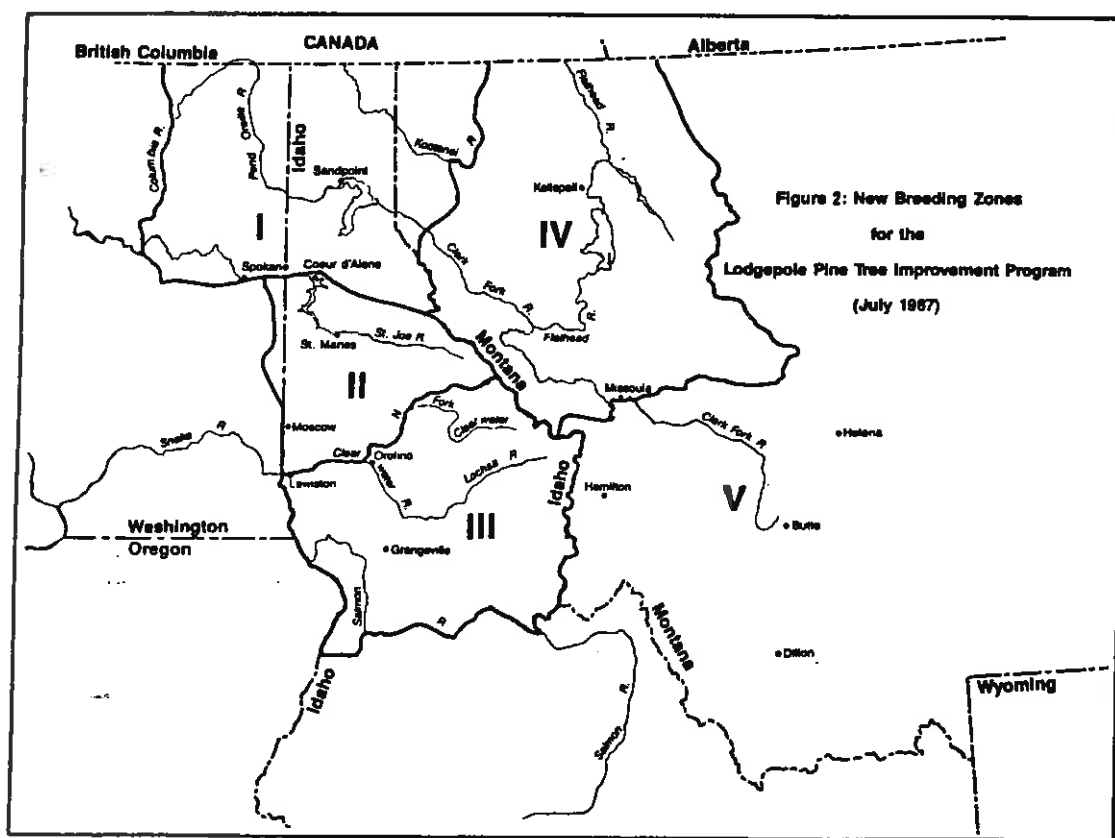


Figure 1. Revised breeding zones for the Ponderosa Pine Tree Improvement Program (7/88).

Seed should not be transferred across more than one breeding zone boundary. If seed is moved from Montana to Idaho or from eastern Washington to northern Idaho, it should be planted 650 feet higher in elevation than its elevation of origin. Seed moved from northern Idaho east or west should be used at 650 feet lower than its elevation of origin.

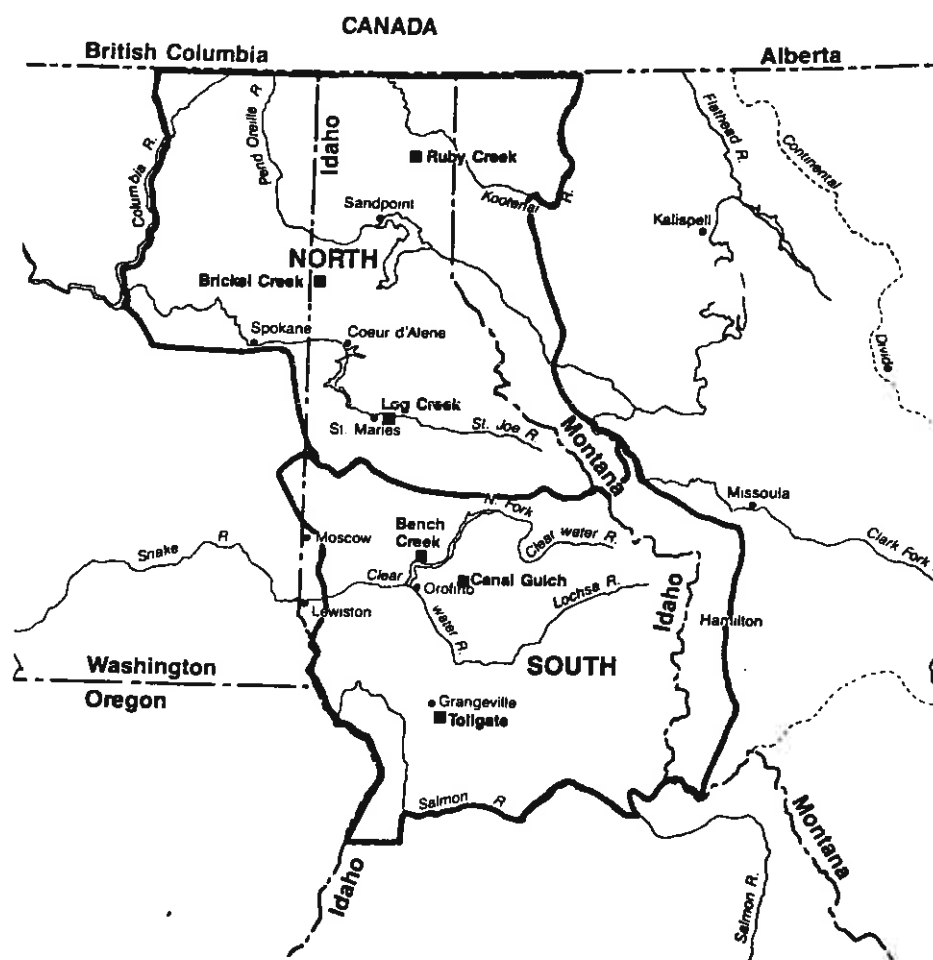
5. Lodgepole pine

For IETIC cooperators, five broad geographic breeding zones have been established for lodgepole pine (see map below). USFS zones are considerably different and are oriented from southwest to northeast (see map on next page). Regardless of which map is used, Rehfeldt's recommendations are that seed transfer be geographically liberal, but elevationally restricted to $\pm 106\text{m}$ (350 ft) within zones. Seed may also be moved between adjacent zones if compensated with an elevational adjustment.



6. Grand fir

Steinhoff's studies showed that a 5 percent difference in height could result from seed transfer of more than 1.5° N. latitude, and this, in turn could result in large and significant losses in volume over a rotation. Two geographic breeding zones (north and south) have been established for grand fir (see map). Seed should be used primarily within zone, but can be moved up to one-third the distance into the alternative zone.



Breeding zones and test site locations for the IETIC grand fir tree improvement program

