FOREST AND CONSERVATION NURSERY TRENDS IN THE NORTHWESTERN UNITED STATES[1]

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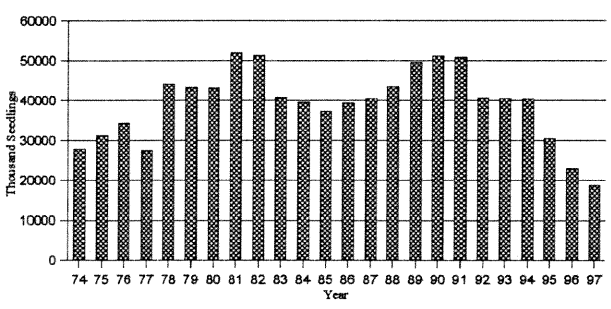
ABSTRACT—There are many changes happening in forest and conservation nurseries in the Northwestern United States. I will be focusing on three trends that I have been watching over the past decade: 1) Changes in federal government nurseries, 2) Demand for larger stock types, and 3) Increased interest in native plants.

CHANGES IN FEDERAL GOVERNMENT NURSERIES

Federal government nurseries, especially those of the USDA Forest Service, continue to decrease in production and some are even being closed. The Forest Service is the largest government nursery operator in the Northwest and the majority of seedlings grown in their nurseries are for reforestation after timber harvest and for fire rehabilitation. Since the early 1950's, the Forest Service was operating under the traditional perception that one of their primary roles was to supply wood and wood fiber from their lands that had been designated for timber production. In the late 1970's, congress mandated that all Forest Service lands be brought up to full production and so a survey of timber lands was conducted. This "reforestation backlog" of lands that were non-stocked or understocked created an increased demand for seedlings (fig. 1). To meet this demand, Congress provided additional funding to bring existing Forest Service nurseries up to full capacity and even build new nurseries, such as the J. Herbert Stone nursery in Oregon. In 1983, however, poor economic conditions and high stumpage prices in the Northwest caused economic hardship to many timber companies that had bought Forest Service timber sales. Congress provided relief through the "timber buyback" program causing a decrease in the demand for reforestation stock for several years (fig. 1). Recently, harvesting has been restricted on timber lands where threatened or endangered species, such as the northern spotted owl, would be adversely impacted. In Region 6 of the Forest Service (Oregon and Washington), timber harvesting on National Forest lands decreased from 5.2 billion bd. ft. in 1987 to 401 million bd. ft. in 1995. This has caused a severe reduction of the reforestation program on some National Forests such as the Umpqua NF in southwestern Oregon where timber harvest decreased from 282 MM bd. ft. in 1989 to just 13 MM in the last 6 years - a decrease of over 95 percent (table 1).



Source: USDA-FS, Reforestation and Timber Stand Improvement Reports

Figure 1—USDA Forest Service nursery production trends in Region 6 (WA & OR) for 1974 to 1997.

This reduction in timber harvest has translated directly into less demand for seedlings. Forest Service nurseries produced over 50 million seedlings in 1990-1991 but this has steadily decreased. In fiscal year 1997, Forest Service nurseries produced less than 20 million seedlings - a greater than 60 percent decrease in only six years (fig. 1). And, it doesn't look like we're at the bottom of the trend yet.

Because of this reduced seedling demand, the Forest Service completed a management review of their Western nursery program which recommended closing nurseries. The Wind River Nursery in western Washington, which was the first forest nursery in the West and had produced over 30 million seedlings per year, was closed in the summer of 1997. The Bend Pine Nursery in Oregon and the Humboldt nursery in California are slated to be closed this coming year. By the turn of the century, there will be only three Forest Service nurseries in the Northwest: the J. Herbert Stone nursery in Medford, Oregon; the Coeur d' Alene nursery in Northern Idaho; and the Lucky Peak Nursery in Southern Idaho.

The future of timber harvesting and therefore reforestation on federal lands is uncertain. Just this year, environmental groups like the Sierra Club and the Native Forest Network have revealed their true intent - zero cut which would mean no more timber harvesting on federal lands. Environmental groups such as the Sierra Club, the Oregon National Resources Council and the Native Forest Network have staged a recent series of protests in Oregon and Washington designed to disrupt logging (Bernton 1997). Just how this will affect the demand for federal seedlings remains to be seen.

Demand for Larger Stock Types

Another trend that we're seeing in the Pacific Northwest is that foresters are asking for larger and larger seedlings. Bareroot transplants are becoming increasingly popular,

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Table 1—Protection of endangered species, such as the Northern Spotted Owl, has severely restricted timber harvest and thereby reduced demand for seedlings in Region 6 of the USDA Forest Service

Northern Spotted Owl	Administrative unit	Year	Timber harvest	Reduction
			MM bd. ft.	Percent
	Region 6 (OR & WA)	1987	5,200	
		1995	401	92
	Umpqua National Forest (OR)	1989	282	
		1995	13	95

especially the 1+1 stock type, and container transplants are in demand for reforestation as well as for specialty crops like Christmas trees. Foresters are requesting large transplants, from 30 to 50 cm in height (12 to 18 in.) and 5 to 10 mm in caliper (0.2 to 0.4 in.), for outplanting sites in the Coast Range of Washington and Oregon where brush competition is intense. In the 1986-1987 season, the Webster Nursery of the Washington Department of Natural Resources sold 90 percent 2+0 seedlings and only 10 percent transplants. Ten years later, in 1996-1997, the ratio had changed dramatically to only 48 percent 2+0 seedlings and 52 percent transplants (Ramirez 1997).

Several things have contributed to this trend. New "Free-to-Grow" reforestation standards have made foresters demand larger and larger stock that not only survive but will get up and grow quickly. For example, reforestation laws in the State of Oregon require that cutover lands must be "free-to-grow" in only 5 years. In addition, fewer mechanical and chemical site preparation options are available nowadays and larger seedlings with more buds seem to be able to tolerate browsing better. Burning restrictions have left more slash on the outplanting sites, and so foresters like larger trees that can get up above this competition. Fewer and fewer herbicides are available and many foresters are using less chemicals because of environmental restrictions and this trend is expected to get even worse. Because of concerns over dioxin in 2,4,5-T herbicides, a US Federal court in Portland banned the use of all herbicides on federal lands in the early 1984 and this herbicide ban lasted until a mediated agreement in 1989. During this time, foresters experienced what the loss of herbicides would mean and came to realize the benefit of larger stock.

This switch to larger stock types has had several effects on nurseries but lower growing capacity is the primary impact in both bareroot and container nurseries. Bareroot seedlings can be grown at 160 to 270/m^2 (15 to 25/ft^2) whereas transplants are much less dense - 53 to 64 seedlings/m^2 (5 to 6 seedlings/ft^2). Container nurseries have adjusted to the larger volume containers with fewer cells by starting the seedlings in greenhouses and then moving them to open growing compounds, growing them outside for the entire season, or transplanting from miniplugs to large containers. Container-to-container transplants are a relatively new stock type where seedlings are started in very small volume containers in the greenhouse and then transplanted to larger volume, lower density containers that are grown in open compounds. Nurseries also are restoring their old transplanting machines or are buying new ones. The cost per seedling has increased, of course, but it appears that there is little price resistance to these larger seedlings.

Increased Interest in Native Plants

Finally, let's look at another trend that continues to increase in the northwestern US - propagation of native plants. With the change in emphasis from timber production to ecosystem management, there is an increased demand for native plants for a wide variety of uses, especially habitat restoration and diversity plantings.

Of particular interest in the Northwest is the "salmon crisis" (fig. 2). Restoration of salmon habitat is fueling the need for a variety of plant materials such as willows and other riparian trees and shrubs. Most of these plants are being grown in containers and a variety of different container stock types are being used. Large container stock is being used to stop soil erosion and provide instant shade for cooling the water temperature in salmon spawning areas. Other riparian shrubs such as red-osier dogwood are also being grown in containers both by seed and from cuttings. Several Northwest nurseries are growing wetland plants in containers such as sedges and native grass plugs that are being used to restore wetland habitats in meadows.

Since little is known about how to propagate these native species, government nurseries are working to develop the propagation protocols. In Northern Idaho, the USDA Forest Service Coeur d' Alene nursery has been asked to grow whitebark pine (*Pinus albicaulis*) seedlings for grizzly bear habitat. The large seeds are favored food because their high fat content helps the bears store energy for hibernating. Whitebark pine seeds also are available when many other food sources are scarce. X-ray examination when the seeds arrived at the nursery showed that many

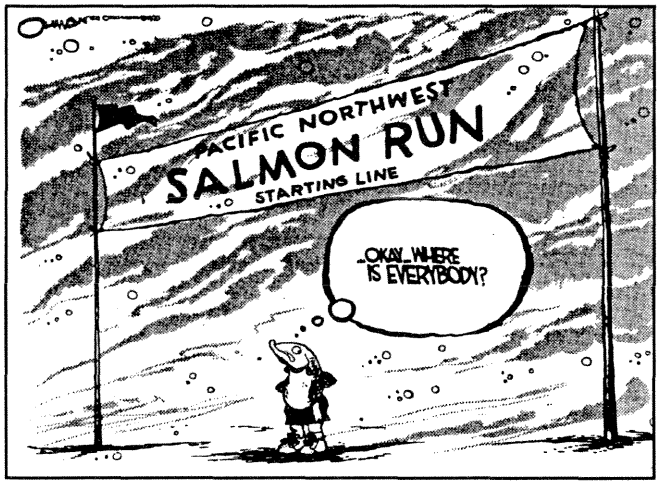

Figure 2—The "salmon crisis" should generate a demand for a variety of native plants for riparian restoration projects.

have immature embryos and so needed warm, moist stratification to allow the embryo to finish development. The first step was to sterilize the seedcoat with a 10-minute soak in dilute household bleach (1 part bleach:10 parts water) followed by a running water rinse for 48 hours. Then, the seeds were put into mesh bags within plastic bags and placed into a germination chamber at 24° C (75° F). Three warm, moist stratification periods of 7, 14, and 21 days followed by a 60-day cold, moist stratification period at 4° C (40°F) were tested. The mesh bags are removed weekly for 1-hour running water rinses which help reduce surface mold development during the long stratification period. The 21-day warm/60-day cold stratification appeared to be the best with germination of one lot reaching the high 80 percent range, although others reached only 20 to 30 percent.

Using the warm-moist/cold-moist stratification treatment, the following propagation protocol was developed. At the end of the cold, moist stratification period, the seeds are hand scarified and placed in germination trays with the cut side down to reduce moisture loss. The germinants are then hand-sowed into Ray Leach Super Cell containers [164 cm^3 (10 in^3)] and are grown for two years. After planting in the spring of the first season, they are allowed to grow in a fully-controlled greenhouse until fall when they are moved to a shelterhouse for natural hardening and overwinter storage. At the start of the second year, the seedlings are brought back into the greenhouse where they resume growing until they are hardened-off for late summer-early Fall outplanting (Burr 1997).

CONCLUSIONS

Forest and conservation nurseries in the northwestern US are undergoing many changes, with government nurseries being the most severely affected. USDA-Forest Service nurseries are growing fewer seedlings and some are even being closed due to decreasing demand for reforestation stock. Foresters and other seedling customers are ordering larger stock types, especially large containers and transplants. Many Northwest nurseries, and especially government facilities, are growing more non-commercial native trees, shrubs, forbs, and grasses for a wide variety of restoration and biodiversity projects.

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