

NORTHWEST TREE IMPROVEMENT COOPERATIVE

ANNUAL REPORT

APRIL 1 2005 TO JUNE 30 2006

AUGUST 2006



Members of the Northwest Tree Improvement Cooperative as of June 30 2006

Bureau of Land Management
Cascade Timber Consulting, Inc.
Forest Capital Partners
Fruit Growers Supply Co
Giustina Land and Timber Co
Green Crow Management Services
Green Diamond Resource Co.
Hampton Tree Farms, Inc.
Hancock Forest Management
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Washington Department of Natural Resources
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Pacific Northwest Tree Improvement Cooperative
USFS-PNW Research Station Genetics team

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Annual Report

April 1 2005 to June 30 2006

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Cover – Two Douglas-fir trial series established in 2001 are now ready for their first measurement, and cooperators are preparing to make selections in these trials. Left: NOCTIC Phase I site at McDowell Creek, with Howard Dew and Bill Marshall. Vernonia/Ryderwood Phase I site at Ryderwood, with Andrew Wodnik

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COOPERATIVE SECOND-GENERATION BREEDING AND TESTING OF COASTAL DOUGLAS-FIR

The overall progress and status of the various advanced-generation programs is summarized in Table 1.

Table 1. Summary of advanced-Generation Douglas-fir trials established in 2006

Program	Entries	Locations	Number of		Purpose
			Test Trees	Test Trees + Fillers + Buffers	
South Central Coast	69 families + 3 woodsrun controls)	6	15,309	20,532	Rank families and parents Verify breeding zone(s) Make forward selections

Puget Sound

The Puget Sound metacooperative Phase I tests were visited regularly in 2005-6. Spring bud flush was scored on two test sites in May 2006; the full-sib crosses ranked very similarly on the two sites. Puget Sound intends to measure the Phase I tests after the end of the 2007 or 2008 growing seasons (depending on tree growth), and to sow the Phase II tests in early 2008.

Washington Coast

Crossing continued for the Washington Coast program. WA Coast intends to sow the first Phase of tests in the winter of 2006-7, with about 100 crosses to be planted in spring 2008 on five sites. Three sites have already been selected (summer 2006).

Washington Cascades (WACTIC)

Crossing continued for WACTIC, with notable success accessing and crossing in the USFS Cispus orchard. Relatively light snow in winter 2005-6 made it possible to access this high-elevation orchard in time for isolation and pollination.

WACTIC planted the first four of eight Phase I sites. The two low-elevation sites were planted shortly after lifting, while seedlings for the two high-elevation sites were frozen and planted in May.

The ownership transition for the Crown Pacific land was completed with the purchase by Sierra Pacific Industries. SPI has been active in tree improvement in California and planned to continue membership in WACTIC. Management of part of the WACTIC land was transferred to Hancock Forest Management, and HFM decided to enroll all its Douglas-fir acres in the WA Cascades to WACTIC. Longview Fibre also decided to join WACTIC. With these membership changes, WACTIC gained in strength, stability and momentum, serving over 600,000 acres of productive Douglas-fir timberland.

Vernonia/Ryderwood

Vernonia/Ryderwood clone banks were established on two locations in spring 2006. The Phase I and Phase II tests were visited and maintained (weed control, trapping rodents) in 2005-6. Spring budburst was assessed at Stimson's Military site. Work continued on correcting errors in the Phase I plantation maps and database, in preparation for the first measurement (height, dbh, stem form) at

the end of the 2006 growing season. NWTIC plans to include some of the first-generation data when analyzing these data. At least one member plans to move forward quickly grafting forward selections in spring 2007.

Discussions began on progressing Vernonia/Ryderwood to a third cycle of breeding and testing; several cooperators showed interest in moving forward, including tentative plans to establish a breeding orchard in 2008.

TRASK

TRASK Inland Phase I sites were visited, maintained and tagged during this period. Instead of the informative tags used in the past, sequentially numbered tags were used. Trask Coast Phase I tests were visited and maintained (weed control, trapping of rodents). Tree growth at the Branch Flats (Starker) and Neskowin (Green Diamond) sites has been particularly good. Three test sites were tagged in summer 2005.

Seedlings for Coast and Inland Phase II sites were sown in 615A cavities at Sylvan Vale nursery. About 100 crosses were sown for each. In addition to high-gain local crosses the following non-local crosses were included: South Central Coast and Washington Coast in Coast Phase II, ROSETIC and Trask Coast in Inland Phase II.

Boise Cascade LLC was purchased by Forest Capital Partners, but the new owners continued membership in Trask.

NOCTIC

NOCTIC Phase II sites were visited, maintained and tagged during this period. Similar to Trask Inland Phase I, sequentially numbered tags were used. Growth in the two Cascade Timber Consulting sites was particularly good, with a few seedlings nearly five feet tall mid-way through the second growing season. We can speculate this was due to a combination of intensive site preparation, excellent weed control, productive sites, good moisture, and large 615A seedlings. Such rapid takeoff has been observed in some other sites (e.g. Lyon Ridge and Miller Flyway - SCC Phase I); we wish we could

achieve such results more consistently!

All the Phase I tests were visited during the period of this report. Growth varies from good to excellent on four of the six sites, and another site is responding well to much-needed weed control. NOCTIC members look forward to results from the first measurement in September 2006 (height, dbh, stem form), and at least one member plans to move forward quickly grafting forward selections. NWTIC plans to include some of the first-generation data when analyzing these data.

NOCTIC clone banks were established on two locations in spring 2006.

South Central Coast

For the most part, the South Central Coast (SCC) tests grew well during their fourth and fifth growing season. All the sites were visited in October 2004. On productive sites where weeds could be controlled with herbicides, some trees exceeded 20 feet in total height (see photos). Phase I sites were to be measured at the end of the 2006 growing season.

SCC established six Phase II test sites in early February. The test sites ranged from slightly west of Elkton south to the Sixes River area and near Powers. DBH was measured in two Reedsport test sites, and data were obtained from the Forest Service for two other sites.

Roseburg-Umpqua (ROSETIC)

There was intense activity, as this program took shape and expanded. From a core group of 'founders' (Roseburg Forest Products, Seneca Jones and Lone Rock), membership expanded to include Fruit Growers Supply Co., Giustina Land and Timber Co, Rocking C Ranch and Silver Butte Timber Co. From a limited scope of the eastern part of the former Umpqua co-op, it expanded to encompass three testing zones: Umpqua, Roseburg Low-elevation (up to 2,500 feet) and Roseburg High-Elevation (above 2,500 feet). From a modest original plan of 100+ crosses members opted to aim for a total of 380 or so crosses. All these developed from long and intense discussions. ROSETIC was chosen as an abbreviation to distinguish this program from the first-generation

Table 2. Status of / plans for cooperative second-generation Douglas-fir breeding populations as of 2006.

Status	Number of Crosses			Test Establishment			
	Total Population Size	Planted or Sown	Local or Elite Crosses w. Sufficient Seed	Target no.	No. Established	Start planting in spring of	Complete planting in spring of
Washington Cascades	300	160	235	16	4	2006	≈2011
Puget Sound	276	143	90	10	5	2003	≈2009
Washington Coast	160	0	137	5	0	2008	≈2012
Vernonia/ Rydenwood	404	416	325	10	10	2001	2005
North Oregon Cascades	414	399	350	11	11	2001	2005
Trask (Coast + Inland)	550	500	427	21	11	2004	2007
South Central Coast	760 ¹	604	604 ¹	20 ¹	20	1998 ¹	2006
ROSETIC- Umpqua	160	100	250	10	0	2007	2011
ROSETIC- Roseburg Low	200	0	0	8	0	2011	2011
ROSETIC-Roseburg High	100	0	0	4	0	2011	2011
TOTAL	2,658	≈2,268	116	61			

¹ Including Plum Creek's advanced-generation Coos Bay program which was amalgamated to South Central Coast in 2003

Overview of the Roseburg-Umpqua 2nd-Generation Douglas-fir Breeding Program (ROSETIC)

A 2nd-generation breeding program is underway for Douglas-fir on the eastern slopes of the Oregon Coast range west of Eugene, and on low to high-elevation land in the vicinity of Roseburg / Myrtle Creek / Riddle/ Glendale and north of the Rogue river. The elevation cutoff is 5,000'. The landbase includes moderate- to high-productivity Douglas-fir timberland (age-50 site index of 75-120 feet).

Parents to this program would be drawn from 20 "Core" 1st-generation breeding zones, from the Noti, Elkton and Wells Creek zones of the Umpqua co-op, BLM-Lorane and Coquille Inland and from the North Umpqua, South Umpqua, Riddle and Tyee breeding zones of the Roseburg co-op. Over 6,000 1st-gen. parents were tested in these zones.

The intensity of selection for parents from the "Core" zone would be 1 in 20 (in other words we use the best 5 of every 100 tested 1st-gen. parents); each parent would be crossed twice. Crosses would be made on parental selections (as against on forward selections from the open-pollinated progeny tests). Most crosses would take place in the Bureau of Land Management's Travis Tyrell seed orchard.

We plan to include elite crosses from the Trask Inland and South Central Coast 2nd-generation programs (located north and west of this program respectively). A few 2nd-generation crosses from the BLM – McKenzie program (directly north of North Umpqua), the USFS Oakridge program, and Giustina Land and Timber's program will also be used. The total number of crosses would be about 390.

The very high intensity of selection in this program (highest of all the 2nd-generation co-operative programs in the region) would allow high genetic gains. Based on 1st-generation predicted gains, we expect about 40% average age-15 volume gains for the top 40-50 crosses. We expect to add a further 10% to 20% gain by selecting the best trees within those crosses; thus we expect the top forwards selections to have predicted gains in the order of 50-60% age-15 volume gain. [However, note these gains are predicted on current knowledge based on several assumptions and first-generation data, and not guaranteed results. Further, we are still working on growth modeling protocols and realized gain trials to extrapolate to rotation-age volume gains].

Another goal of this 2nd-generation program is to provide data for safely combining across 1st-generation programs, both for breeding and seed deployment purposes. At this point, we have limited test data for such seed movement, since most 1st-gen testing was done within small breeding zones.

The crosses would be tested in two Phases. About 100 crosses on 5 Umpqua sites in Phase I (planted spring 2007); about 200 crosses on 8 low-elevation Roseburg sites, about 100 crosses on 4 high-elevation Roseburg sites, and about 60 crosses on 5 Umpqua sites in Phase II (planted spring 2011 or thereabouts). Each test site would have 20 trees per full-sib family.

The tests would be measured at ages 6-7 (ht and dbh) and 10-12 (ht, dbh, stem forking, ramicorns and sinuosity) from seed. Forward selections (2nd-generation selections) would be available for grafting after the first measurement, and their performance would be re-evaluated at the second measurement. We aim for commercial seed production from the 2nd-gen selections starting shortly after the second measurement.

The total cost of breeding and testing is estimated at about \$550,000 2005 dollars. Depending on the number of cooperators, the total cost to participants is likely to be \$ 1.0 per Douglas-fir timberland acre, over a period of 15 years or so.

Rigorous quality control in all aspects of the testing program will be needed to ensure optimal gain. The recommended goal is a within-site narrow-sense heritability of 0.3 for age-12 volume. The tests will be fenced to eliminate browse by large herbivores. The tests should be kept totally weed-free for three years after planting. This will improve heritability, gains, survival and growth rate, and reduce the delay to making selections.



Puget Sound Phase I – Green Diamond Site near Matlock (Randall Greggs)

NOCTIC Phase I : Weyerhaeuser's Roaring River site (Nate Meehan)



NOCTIC Phase II : CTC's Jack 32 site in 2nd growing season



TRASK Coast Phase I :ODF's
Klines Creek site



TRASK Inland Phase I : Forest Capital's
Fir Grove Orchard site



Graft of HEMTIC forward selection



SCC Phase I: 18 feet tall in 4.5 years at
Menasha's Lyon Ridge site



SCC Phase I : BLM-Coos Bay's
Middle Overlook site (Mike Cook)



Broadcast burns are much less common in 2nd-generation tests than in the 1st-generation – at SCC Phase II Lone Surprise site (ODF)



Grays Harbor Genetic Gain / Type IV site: Donkey Creek (Rayonier)



Grays Harbor Genetic Gain / Type IV site: Crane Creek (Quinault)



Grays Harbor Genetic Gain / Type IV site: Crane Creek (Green Diamond)

Roseburg co-operative. An overview of the ROSETIC program is given in the inset.

Seed from 100 crosses (ROSETIC, SCC, Trask Inland) were sown at Sylvan Vale nursery. Five sites were selected by May 2006. ROSETIC moved from initial discussion to sowing in nine months – an unprecedented achievement made possible due to the crossing work done by Al England and Rich Kelly of the BLM .

The evolution of this program has proved interesting. A few years back, there seemed little likelihood of a second-generation program getting underway in the Roseburg vicinity. Federal agencies, the major cooperators in first-generation testing, had shrinking budgets and reduced staff and were directed not to join new second-generation programs. Meanwhile, very little orchard seed was available, further discouraging cooperators who had invested years of time and millions of dollars, but had little operational gain to show for it.

Over time, more seed has come available (as the BLM's Tyrell and Provolt orchards matured). NWTIC's BLUP analyses have shown the genetic gains potentially available. Oregon Department of Forestry took the initiative to propose cooperative

1.5-generation orchard blocks for southern Oregon. The momentum for second-generation breeding in adjacent programs (especially South Central Coast), and growing awareness by foresters regarding tree improvement also gave impetus. Finally, as the supply of Federal timber declined in the 1990s, private industry has learned to rely instead on boosted plantation productivity (intensive weed control, large high-quality seedlings, mid-rotation fertilizer, tree improvement etc).

The Roseburg vicinity also has some interesting features. While the sites are not the most productive in Oregon, site quality ranges from moderate to good. The lower cost of forestry land compensates (to some extent) for lower productivities, and Douglas-fir does not have to fight Swiss Needle Cast. Forestry has no serious competitor on a large proportion of the land. There are many large processing facilities (dimension lumber, studs, plywood, siding etc) in the vicinity consuming a lot of wood. Federal land contains a vast volume of timber, but much of it is no longer available for timber production. Oregon-based family-owned companies (small, medium-sized and large) are important owners of forestland, and such companies comprise most of ROSETIC's membership.

COOPERATIVE SECOND-GENERATION BREEDING AND TESTING OF WESTERN HEMLOCK

A multivariate BLUP analysis including all test sites, adjusting for spatial correlation and variation was completed before the end of 2005. The analysis showed differences in growth rate between seed sources, realized gain compared to the woodsrun controls, and shed light on the similarity of ranking between pairs of test sites both close to and far from each other.

Scion were collected from over 100 forward selections from several test sites, both for three

production orchards and for a HEMTIC clone bank. Preliminary discussions began regarding a 3rd cycle of breeding and testing. BC MOF has already made considerable progress grafting and crossing forward selections from their HEMTIC sites.

The ownership transition of the Crown Pacific land through Cascade Timberlands was completed, with Green Crow Management Services as the new HEMTIC member.

TECHNICAL INFORMATION

The time has come to start thinking and planning for a potential 3rd cycle of breeding and testing, both for Douglas-fir and western hemlock. NWTIC has now a draft 3rd-cycle breeding strategy (see inset) which

will be refined and developed over the next couple of years. The Technical Committee met and discussed the draft strategy in June 2006. A summary of the proposed strategy is shown in the inset: this will be

A draft 3rd-cycle breeding strategy for coastal Douglas-fir , and making selections from 2nd-cycle Douglas-fir progeny tests: An Executive Summary

Three of the cooperative second-generation Douglas-fir progeny test series should reach measurement size by the end of the 2006 growing season. Other trials will reach measurement age in 2007 and 2008. A draft strategy for cooperative 3rd-cycle breeding of coastal Douglas fir in the Pacific Northwest is therefore briefly outlined; this strategy will be refined over the next year or so.

The objectives of this cycle would be (1) Identify new forward selections superior for one or more desired traits (e.g. growth rate, log quality, adaptability, health) to the best 1st- and 2nd-cycle forward selections (2) Rank high-gain forward selections from 2nd-cycle tests and (3) Resolve any breeding zone delineation questions remaining from 2nd-cycle tests (this should be a relatively minor component).

Depending on the results of 2nd-cycle tests, appropriate breeding zones will be refined / confirmed. Thus, 3rd-cycle zones may be larger, smaller or the same as 2nd-cycle zones. In some cases, there may be a realignment of land from one cooperative to another.

Each 3rd-cycle program would have about 200 selections: a combination of untested true 2nd-cycle forward selections from full-sib tests (the largest component), very high-gain untested forward selections from open-pollinated 1st-cycle tests, and tested parents. These would be grouped into 18 sublines containing 12 selections in each subline, with relatedness kept within sublines, making 216 selections. Another option would be 16 sublines of 12 selections (=192 selections). Each selection is to be crossed four times (compared to twice in the 2nd-cycle), with 10 progeny planted per cross (compared to 20 in the 2nd-cycle) on each of five sites (five to eight sites in the 2nd-cycle). In some cases, elite 2nd-cycle crosses from new programs (e.g. ROSETIC) not available at the time of 2nd-cycle testing may now be available and used.

In many aspects, the 3rd-cycle strategy will be similar to the 2nd cycle: (1) Breeding zones will be defined by adaptability (2) A single group of full-sib crosses for both ranking and forward selection (3) Use of single tree plots (4) Outplant crosses in two phases (5) Measure trees nominally at ages six and 12 from seed.

Predicted gains from a 3rd-cycle breeding program will depend on many factors, such as additive variance, heritability, intensity of selection for 3rd-cycle orchards etc. Based on a few fairly typical scenarios, and with the use of POPSIM software, we obtained estimates from 34 to 48% age-15 volume gain over the base 3rd-cycle population. Data from the small number of full-sib programs analyzed by NWTIC suggest that as much as 30% within-family gain can be obtained for age-15 volume. More work will be done on 3rd-cycle vs 2nd cycle gains.

A typical 3rd-cycle program is estimated to cost about \$390,000 over the course of about 16 years (this would be about 50-75% of the cost of a typical 2nd-cycle program). This would be an adequate base for many future cycles of breeding after the 3rd-cycle. In cases where there is interest in proceeding to a 3rd cycle, but funds are limited or the landbase is small, a smaller breeding program adequate just for a 3rd cycle could be designed.

A procedure to include forwards selections into 2nd-cycle production orchards is proposed. Given the larger standard error around forwards selections, we propose to make up to three forward selections in each of the highest-gain 2nd-cycle families. This would reduce the probability of missing the true winner(s) within such a family. Ideally we would move forward concurrently with 3rd-cycle breeding and testing, so that early 3rd-cycle test data are available when 2nd-cycle orchards are in full production, to guide orchard roguing and refinement.

refined over time. Measurement specifications for 2nd-cycle tests were also discussed at this meeting.

Terrance's simulation study on combining 1st and 2nd cycle data into a combined analysis is under review at Tree Genes and Genomics.

NWTIC continues visiting and monitoring the young tests, trying to maintain standards, learning what works and what should be avoided. The young 2nd-cycle tests have faced the gamut of challenges, from nursery issues (e.g. cankers, excess of fertilizer,

small seedlings) to establishment issues (e.g. poor weed control, mapping issues, herbicide damage) and damage by animals (gophers, deer, mountain beaver, rabbits, elk). By and large we have moved to a high level of establishment and maintenance. One advantage of moving quickly to 3rd-cycle testing (compared to the long interlude between 1st-cycle and 2nd-cycle tests) would be keeping this institutional memory alive, the expertise available, and not repeating the same mistakes again.

GENETIC GAIN VERIFICATION / DEMONSTRATION TRIALS

The second group of three sites of the Grays Harbor Genetic Gain/ Stand Management Type IV trial were established in February 2006. Sites were provided by Green Diamond Resource Co, Port Blakely and WA DNR. The delay between lifting and planting was kept to a minimum, except that planting the Green Diamond site was postponed by a week due to very cold freezing weather in mid-February. Site layout, pinning and fencing were handled by the SMC, while NWTIC was responsible for producing the seed, and growing, transporting and planting the seedlings. WA DNR kindly transported the seed-

lings from Sylvan Vale Nursery to Tumwater, WA. We had a scare with apparent damage to seedlings (perhaps due to herbicide, frost, high water table) on one site, but the seedlings seemed to have recovered by mid-July.

The age-10 measurement of the Molalla genetic gain trial is scheduled after the 2006 growing season.

Five genetic gain demonstrations were established using overrun from SCC Phase II, one for each cooperator. This brought the total of NWTIC-led demonstration plantings to 16.

DATA MANAGEMENT, ANALYSIS AND REPORTS

Work has continued on updating the database. The NWTIC directory now holds 27,893 files. Of the 32,567 parent-tree records expected, the database contained complete data for 31,643 records by June 2006. There were also data on 1,851 cross-tested parents involving 94 programs; a minority of first-generation parents were tested in two (or perhaps three) programs; cross-testing was typically in adjacent breeding zones.

Starting in mid-2003, the main focus in data management was in loading progeny measurement files into SQL server and making them available through views that could be called up in Microsoft Access or on the member-access website. By June 30, 2006 3,623,227 records had been loaded (355,618

for 2nd-generation programs), and 1,112 views (92 of which were 2nd-generation) had been created.

Information on full-sib and polymix crosses were updated as information was received. These were mainly crosses made by the advanced-generation Douglas-fir and western hemlock metacooperatives, but also included crosses sown in the first generation tests. By June 30 the database contained records on 4,832 full-sib and polymix crosses (3,846 of which were made for the 2nd-generation testing effort).

The member-access secure website has been updated and improved. It is now set up to allow viewers to view and download Excel datasets, meeting notes, progeny data files etc.

NWTIC maintained a strong emphasis on data

Table 3. Summary of genetic gain predictions using BLUP, and reports, completed April 2005 through June 2006

First-Generation Analyses

Tillamook	Western Hemlock
Umpqua Noti	Douglas fir
Umpqua Elkton	Douglas fir
Skagit (North High and Low, South High and Low)	Douglas fir
Tyee BU1	Douglas fir
Umpqua Wells Creek	Douglas fir
Blue River McKenzie Mid-Elevation (18022)	Douglas fir
Marial BU-1	Douglas fir
Alsea Waldport High-Elevation	Douglas fir
Powers Mid-Elevation	Douglas fir
Riddle BU-1,2,3,4	Douglas fir
Dallas Addition	Douglas fir
BLM BU-12 and 13	Douglas fir
Coquille Inland	Douglas fir
BLM-Lorane	Douglas fir
Plum Creek Toledo Plus	Douglas fir
Plum Creek Toledo Roadside High	Douglas fir
Plum Creek Toledo Roadside Low	Douglas fir
Vernonia SE	Douglas fir
Cave Junction BU 1	Douglas fir
Forks	Douglas fir
South Umpqua BU-1 to 5 (jointly)	Douglas fir
North Umpqua BU-2	Douglas fir
Sunday Creek Age-24 data	Douglas fir
BLM-60	Western Hemlock
Oakridge/Ridgon/Lowell Low-Elevation	Douglas fir
Grants Pass BU-2	Douglas fir
Oakridge/Ridgon/Lowell Mid-Elevation	Douglas fir
Cowlitz BU-4	Douglas fir
Mid-Columbia	Douglas fir
Cowlitz BU-5	Douglas fir

Second-Generation Analyses

HEMTIC Age-5 (all sites)	Western Hemlock
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analysis, completing genetic gain predictions and reports for 42 first-generation breeding units and one advanced-generation program.

GETTING GENETIC GAIN IN OPERATIONAL PLANTATIONS

A second Controlled Mass Pollination (CMP) project was undertaken in the Interim Burnt Woods orchard block at Schroeder. NWTIC has been involved in discussions and planning for CMP in some other orchards. There was continued progress on establishing cooperative orchard blocks to serve the ROSETIC area. Three blocks are to be established, roughly mirroring the three ROSETIC testing zones. The "Roseburg Low" orchard block was grafted in February 2006, and the "Roseburg Cascades" block will probably be grafted in 2007.

A major concern for several NWTIC members was the fate of the BLM's three Douglas-fir orchards, as BLM management took a serious look at options for these orchards. With greatly reduced BLM harvest, reforestation and seed needs, BLM management was concerned about the cost: benefit ratio of remaining the main funder for these orchards. NWTIC has been involved in these discussions and made suggestions on options for these orchards.

Progress on a cooperative orchard for the Washington Cascades area has been slow. The two Skagit orchards were heavily rogued.

NWTIC attempted to collate the number of coastal Douglas-fir and western hemlock seedlings planted by members, since there are no published reports on the number of seedlings derived from orchard seed. While data were not provided by some members (three of 32), and non-members (some private companies and non-industrial woodland owners) were not included, the figures in Table 4 provide some idea of the impact of the tree improvement programs in the region. With some extrapolation and assumptions, we can estimate that between 55 and 65 million coastal Douglas-fir seedlings originating from seed orchards or rogued progeny tests are planted in western Oregon and

Table 4. Survey response on coastal Douglas-fir and western hemlock seedlings planted by NWTIC members in 2005 and 2006¹.

Year	Coastal Douglas-fir			Western hemlock		
	Clonal/ Seedling orchard	Rogued progeny test	Woodsrun	Clonal/ Seedling orchard	Rogued progeny test	Woodsrun
2005	53,737,985	1,469,000	7,292,511	5,342,251	0	1,437,774
2006	56,437,587	1,595,000	6,994,261	4,775,327	0	1,771,017

¹ Responses provided by 28 of the 32 NWTIC members

Washington each year. This number is likely to increase as seed production for southern Oregon increases over the next few years. The corresponding figure for western hemlock is between five and six million seedlings per year. While a significant amount of woodsrun hemlock is planted (about 1.5 million seedlings/year), there is in fact orchard production capacity to substitute for most of those woodsrun seedlings.

There has been some interest and activity on starting a “Seedlot Rating System” in the US PNW,

and an NWTIC subcommittee was formed to investigate options. Attaching genetic information to seedlots and stands, according to a standard system, could (eventually) result in investments in tree improvement being reflected in inventory estimates and in the value of forestland; this in turn could strengthen tree improvement in the region. The GF/GF Plus system in New Zealand, and the rating system used in British Columbia, were used as references to start the discussion.

MEMBERSHIP CHANGES

Fruit Growers Supply Co., Giustina Land and Timber Co, Rocking C Ranch and Silver Butte Timber Co joined NWTIC in 2006, Forest Capital Partners continued Boise’s membership, and Sierra Pacific and Green Crow Management Services continued Crown

Pacific/Cascade Timberlands membership. Giustina recently reactivated a tree improvement program dating back to Giustina Brothers’ establishment of a seed orchard in the 1960s. NWTIC is pleased to welcome all these organizations!

MILESTONES

The year 2006 marks 20 years since NWTIC was formed, 40 years since the IFA-USFS “Progressive” tree improvement program got underway, and around 50 years since tree improvement first began in the region. While progress might have been faster in some cases, and (with hindsight) we might have

done some things differently, there are many accomplishments to take satisfaction in. The fact that 60 to 70 million coastal Douglas-fir and western hemlock trees originating from tree improvement programs are planted each year, is probably the most significant of those achievements.

COOPERATORS

Jeff Madsen (Port Blakely) continued as NWTIC chair for 2006. NWTIC representatives for 2005-6 were:

Bob Ohrn (Bureau of Land Management)

Howard Dew/Bill Marshall (Cascade Timber Consulting)

Dan Cress/Keith Greenwood (Cascade Timberlands/Sierra Pacific)

John Goodrum/Harry Bell (Cascade Timberlands/Green Crow)

Jerry Anderson/Phil Cannon (Forest Capital Partners)

Rod Burns (Fruit Growers)

Mike Tucker (Giustina Land and Timber)

Randall Greggs (Green Diamond Resource Co. – WA and OR operations.)

Beth Fitch (Hampton Tree Farms)

Dean Stuck (Hancock Forest Management)

Bryan Nelson (Lone Rock Timber)

Chris Lipton (Longview Fibre Co.)

Jim Carr (Menasha Corp.)

Joe Steere (Miami Corp.)

Sara Lipow (Oregon Department of Forestry)

Eric Lamfers/David Lysne (OSU College Forests)

Jim Smith (Plum Creek Timberlands.)

Dan Cress (Pope Resources)

Jeff Madsen (Port Blakely Tree Farms)

Jim Hargrove (Quinault Indian Nation)

Jessica Josephs (Rayonier Timberlands)

Marty Amos (Rocking C Ranch)

Dave Walters (Roseburg Resources)

Mark Diegan (Green Diamond Resource Co.– CA Operations)

Bill Moore (Seneca Jones Timber Co.)

Lew Howe (Silver Butte Timber Co.)

Marc Halley (South Coast Lumber)

Fred Pfund (Starker Forests)

Margaret Banks (Stimson Lumber Co.)

Dave Rumker (The Campbell Group)

Tim Crowder (Timber West Forest)

Jeff DeBell (Washington Department of Natural Resources)

Christine Dean/Jim Reno (Weyerhaeuser Co.).

STAFF

There were no staff changes in 2005-6. NWTIC personnel were as follows:

Director:

Keith Jayawickrama

Quantitative Geneticist:

Terrance Ye

Information Management Specialist:

Denise Steigerwald

Test Coordinator:

Ron Rhatigan

Mission of the Northwest Tree Improvement Cooperative

- Oversee cooperative breeding of Douglas-fir, western hemlock and other species of the coastal forests of the Pacific Northwest
- Guide technical aspects of implementing these tree improvement programs
- Analyze and interpret genetic test data
- Store test data and breeding records
- Provide expertise and training in tree breeding



Roseburg-Umpqua forestry and tree improvement : clockwise from top:

- *Old-growth stand*
- *Second-rotation Douglas-fir and clearcut*
- *The sites may be demanding, but successful reforestation and productive plantations are possible with modern silvicultural tools. Lew Howe in a fine, young stand.*
- *Keeping the mill fed is a full-time job.*
- *Lumber is a major product.*
- *First-generation parent tree near Riddle*
- *First generation progeny test near Riddle*
- *BLM's Travis Tyrell seed orchard is an important source of orchard seed.*
- *The first season of crossing for the Roseburg breeding zones. Bob Lee has undertaken a major crossing effort in his 'retirement'. (center)*