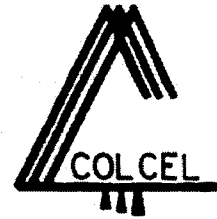


**APPENDIX II**  
**HISTORY OF TFL 23**

# THE HISTORY OF TREE FARM LICENCE 23



COLUMBIA  
CELLULOSE  
A DIVISION OF THE CELANESE CORPORATION



Canadian Cellulose

BC Timber  
A Member of the BC Resources Group



Westar





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## **INTRODUCTION**

### **Preface**

The history of TFL 23 summarizes the major events in a chronological sequence concerning the development and management of the licence since its inception. It is intended to be a dynamic document that is updated with the preparation of each new management plan.

### **Early Development**

The first European interest in the Arrow Lakes District began with the fur-traders and explorers in the 1830s, who used the access provided by the Columbia River. Subsequently a Hudson's Bay Company trading post was established at Fosthall, on the west side of the Upper Arrow Lake, 12 miles north of Nakusp.

Free gold was discovered in the Big Bend of the Columbia River in 1860. By 1865 it was reputed that some 10,000 placer miners had taken out four to five million dollars worth of gold. The settlement and homesteading of the district began after the CPR railway was completed in 1885. At that time Revelstoke began to be established. Settlers purchased land grants from the railroad company and began homesteading forested land between the two Arrow Lakes. Homesites were established, and alluvial land was cleared for fruit and mixed farming. Local markets for agricultural produce proved to be unreliable. The settlers became dependent on the mining and sawmilling activity in the region. Various small sawmills operated for varying periods.

At Nakusp the first sawmill was established in 1893. The White Pine Lumber Company operated in Nakusp for a number of years, until it burnt down in 1929. The Big Bend Lumber Company built a sawmill on the same site in 1935, which operated until 1960. Some of the employees moved to Castlegar to work at the new sawmill constructed by Columbia Cellulose Ltd. The company obtained their logs from various small contractors who were logging along the Upper Arrow Lakes. One of the larger harvesting areas was at Fosthall. Logs were transported to the Nakusp mill site by towing in flatbooms across the lake.

In many cases "stump ranches" were abandoned by the settlers to work in the mines and woods. By the early 1950s, with the exception of Revelstoke, the only surviving communities from the early settlement days on the main line of the CPR are those that have been supported continuously by the forest industry.

### **Licence Holder**

The TFL was originally awarded to Celgar Development Company Ltd. on July 20, 1955 as Forest Management Licence 23. The licence then covered 889,360 acres (359,923 ha) between Mica Creek and Castlegar in the Upper Columbia River/Arrow Lakes valley. It was one of the largest Forest Management Licences in the province but only about one-third of this area was estimated to be loggable. The balance is non-productive, alpine, glaciers, scrub, lakes and rivers.



Subsequently the forest management licence was replaced as a tree farm licence with a renewable term and there have been several changes in licence holder and in the size of TFL 23. In 1980 the licence was replaced and issued to the licensee, Canadian Cellulose Company Ltd. for a term of 25 years. The notable changes are listed below. The corporate logos of the licence holders are illustrated on the cover page.

- 1955 Licence issued to Celgar Development Company Ltd.
- 1958 Licensee name changed to Columbia Cellulose Company Ltd. (Celgar).
- 1973 Ownership acquired by the provincial government, and licensee changed. A new company, Canadian Cellulose Company Ltd. (Cancel) was formed and assigned TFL 23.
- 1980 Licensee name changed to BC Timber Ltd. Assets became part of British Columbia Investment Corporation (BRIC).
- 1984 Licensee name changed to Westar Timber Ltd.
- 1992 Tree farm licence and sawmill assets acquired by Pope & Talbot Ltd. who became the new licence holder.

## **Boundary Revisions**

Since the original TFL 23 was awarded, numerous parcels of Crown land have been deleted for other uses, including homesites, mineral claims, park reserves, lookout and cabin sites, TV and radio repeater sites, BC Hydro transmission line right-of-way, access roads, highway gravel pits, and recreation sites. There have been 137 amendments to TFL 23 as of July 1, 2002.

Three significant land removals have taken place:

In 1965-66, Crown land was withdrawn around the perimeter of the Upper and Lower Arrow Lakes and the Columbia River for the clearing and creation of the High Arrow Reservoir. This was followed in 1977-78 by the withdrawal of lands in Upper Columbia Valley north of Revelstoke to create the Upper Columbia Reservoir, as part of the Columbia River hydro project.

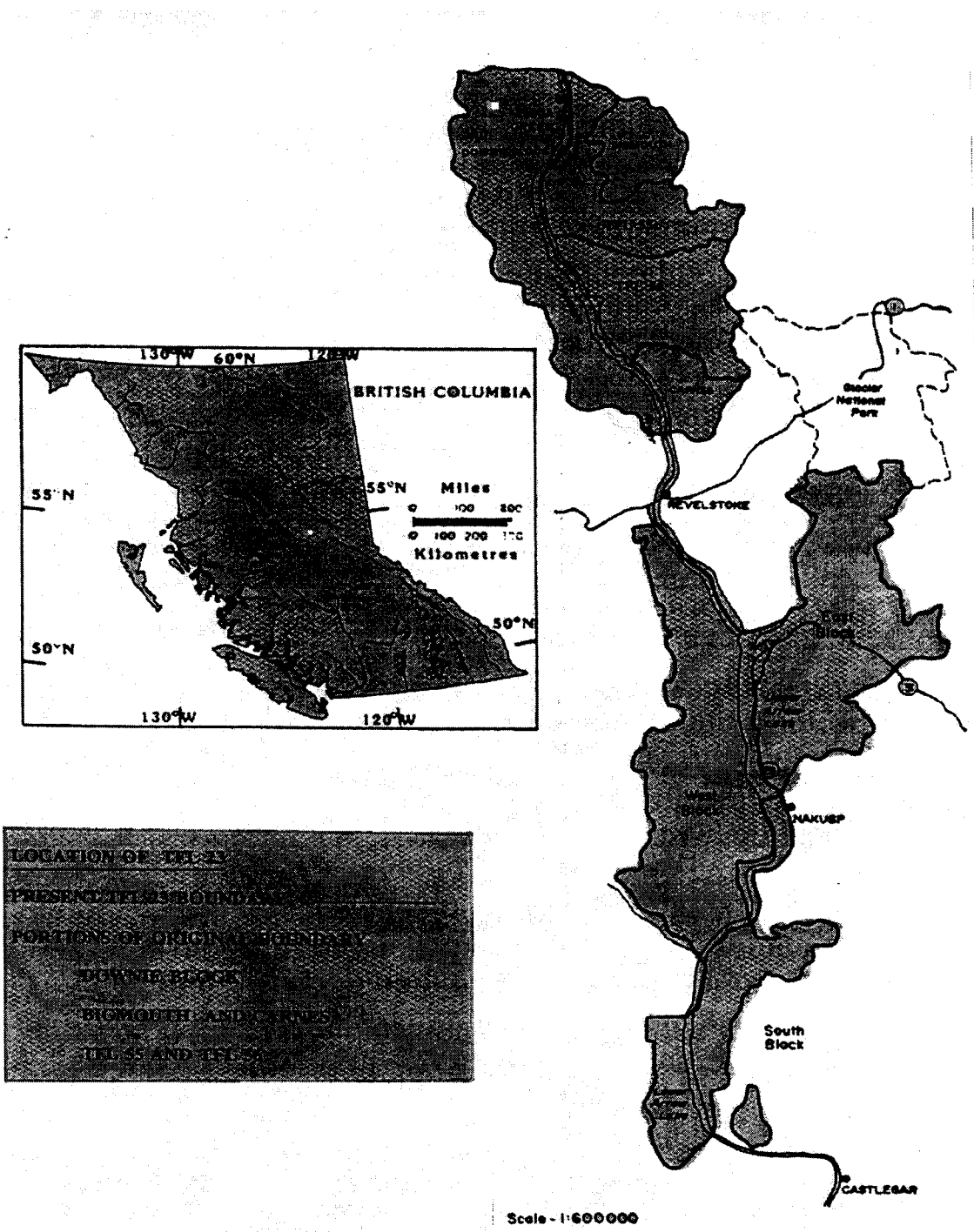
In 1987 the TFL was downsized by the removal of approximately 244,868 hectares northwest of Revelstoke, the Downie Block. The area was added to the Revelstoke timber supply area.

In 1992 TFL 23 was subdivided, and the remaining TFL lands north of Revelstoke were withdrawn to become the new TFLs 55 and 56. TFL 23 was now reduced to 554 997 hectares.

As a consequence, between 1955 and 1992, the gross area of TFL 23 was reduced by 55 percent from 1 011 750 hectares to 544 997 hectares. The estimated productive area was reduced by 52 percent to 236,095 hectares. The former and current boundaries of TFL 23 are illustrated on the key map.



Figure 1: TFL 23 Key Map





## Manufacturing Facilities

Utilization of the Arrow Lakes forests entered a new era in the 1950s when the Celgar Development Company showed an interest in establishing a pulpmill at Castlegar. The Celanese Corporation of America operated a successful textile business in the US. After World War II, Celanese began searching for a new source of raw material. This led the company to British Columbia. In 1952 the company applied to the BC government for a forest management licence over the Arrow Lakes forest. After holding public hearings on the application, the government awarded the licence, stipulating as a condition that Celgar Ltd. construct and operate an integrated pulpmill and sawmill complex at Castlegar.

### Pulpmill

Construction of the combined pulpmill / sawmill complex began in 1958. Start-up of the pulpmill commenced in early 1961. It had a production capacity of 500 tonnes per day of bleached and semi-bleached kraft pulp. Associated with the pulpmill was a woodroom for whole log chipping, and a new sawmill.

In 1991 the new owners of the pulpmill, Stone Venepal (Celgar) Pulp Inc., built a new state-of-the-art bleached kraft pulpmill adjacent to the old pulpmill. This pulpmill has a capacity of 1,200 metric tonnes per day. In July 23rd, 1998 the owners put the operation into receivership and remains unsold as of August 2002.

### Sawmill

In 1952 Celgar Development Company acquired three sawmills that were cutting the majority of the timber on the proposed forest management licence area:

Columbia River Timbers	at Sidmouth, north of Arrowhead.
Big Bend Lumber Company	at Nakusp
William Waldie and Sons Ltd.	at Castlegar

The Sidmouth sawmill was shut down in 1954. The last of these old sawmills was shutdown in 1960, coinciding with the opening of a modern three-line sawmill in Castlegar. The new sawmill had an annual capacity of 10 million board feet of lumber per year. Woodchips produced by the sawmill, and low quality roundwood from TFL 23 were the primary sources of fibre for the pulpmill.

In 1985-86 the owners, Westar Timber Ltd., completed a major upgrade of the sawmill. This sawmill, now owned by Pope & Talbot, is still operating. Continued modifications have kept it modern and competitive.

Since purchasing of Westar Timber's operations in 1992 Pope & Talbot has invested in excess of \$50 million on upgrading the Castlegar saw mill. The major upgrades have included replacing of link line system with new canter quad, conversion from 20' maximum lumber lengths to 24', optimizer trimmer on B and C lines, burning of hog fuel in hot oil energy system to generate heat for dry kilns and geometric grader for grading of lumber. The mill, which annually consumes 740,000 m<sup>3</sup> of sawlogs, has increased its lumber recovery factor by 21% since 1992.



## FOREST MANAGEMENT

### Harvesting and Log Transportation

The first logging was initiated on TFL 23 in 1957 to supply pulpwood for the new pulpmill, due to be commissioned in 1961. These initial operations were in the area between Arrowhead and Revelstoke and the Fosthall area. Logging commenced the following year north of Revelstoke in the Goldstream and Spikers Valley. The attached article from the Castlegar News in 1964 describes the operations on TFL 23 during these early years.

At the time water transport was an important part of the log transportation system. Logs were delivered by a combination of trucking, river drives on the Columbia River and towing in bundle booms down the lower Arrow Lake to Castlegar. River drives of logs took place on the Columbia River, and on the Canoe River. This system was to change with the announcement of the Columbia River hydro project.

BC Hydro plans for the construction of the three dams during the mid 1960's to the late 1970's; the High Arrow dam, the Mica dam and the Revelstoke dam caused a major change in how logs would be transported to Castlegar. River drives would cease, and new main logging roads would need to be constructed.

A new provincial highway from Nakusp to Galena Bay was opened in 1960. Clearing of the High Arrow Reservoir took place in 1967, and the High Arrow dam was closed in 1968. The last river drive on the Upper Columbia River to Galena Bay took place in 1963. River drives continued on the last open section of the Columbia River, until 1978 when the Revelstoke dam was closed. Since 1978 log transportation has been a dual combination of truck haul to a lake dumpsite, then towing in bundle booms down the Arrow Lakes to the Castlegar mill site. A network of main forestry roads was progressively constructed into the majority of main drainages with more recent development taking place in the Gladstone and Hutcheson drainages north of Castlegar during 1999-2001. All main road systems are networked to link with the lake towing system. Road deactivation in the form of semi-permanent and permanent deactivation has been completed on approximately 400 kilometres since 1994.

Until the mid 1960's selective harvesting of preferred species, i.e., white pine, spruce, Douglas fir, larch and cedar poles, was a common system. The timber stands were regarded as defective and low in sawlog quality. Logging was by small crawler tractor which was prevalent until the mid 1980's when skidders became the norm. During the late 1960's to mid 1970's progressive clear cutting with seed tree patches was the norm while the mid 1970's and onward the norm was clear cutting with leave patches consisting of mature timber for fire breaks or seed blocks. From 1996 onward the silviculture harvesting systems changes from clear cutting to clear cutting with internal retention. Block sizes averaged 24 hectares and did not exceed 40 hectares unless rationalisation for larger blocks could be justified to the MOF District Manager for biodiversity or forest health reasons.

Cable harvesting was first introduced into the TFL in 1974. During the 1970's conventional interior ground-based skidding systems became well established. It was followed in the early 1980's by introduction of feller-buncher logging. The use of crawler tractors and FMC skidders on steeper ground (greater than 50 percent slope) attracted criticism for the amount of soil disturbance, sidecuts and skidtrails needed to log a cutblock.





Commencing in the 1980's cable yarding was introduced. By 1999 more than 45 percent of the volume logged on TFL 23 is by various configurations of hi-lead tower and grapple yarding set-ups. More recently, long yarding cable configurations and helicopter logging (introduced in 1996) have substantially increased accessibility to merchantable timber. Longline cable yarding systems with intermediate tree supports now allow yarding distances in excess of 500 meters.

Log utilization standards also changed over the years. In 1970 a major shift of the intermediate utilization standard to close utilization (CU) occurred, lowering the compulsory minimum harvestable tree diameter from 22.5 cm to 17.5 cm dbh. In the 1980 during the economic recession in the forest industry Westar obtained temporary relief from this standard so that lower quality logs did not have to be utilized. But by the mid 1980's the utilization was back to normal CU standard and by the early 1990's was exceeding the minimum standard, due to a buoyant market for low-grade pulplogs.

## Planning

Forest management of TFL 23 has been guided by nine successive management and working plans. Each plan was written for a five-year period and approved by the provincial chief forester.

The term of each MWP, the cut level approved and the actual cut are in Table 1. (the table does not show volume by cut control period).

**Table 1: AAC & Actual Cut by MWP period**

MWP Period	Term	Cut Control Period	Periodic AAC (m <sup>3</sup> )	Actual Cut (m <sup>3</sup> )
1	1954-58	*1956-60	1,647,613	1,586,457
2	1958-61		1,738,227	1,820,855
3	1962-66	1961-65	4,247,520	4,140,517
4	1967-71	1966-70	4,451,401	3,964,237
5	1972-76	1971-75	5,756,005	4,674,238
	ext 1977-79	1976-79	4,497,728	3,909,654
6	1980-84	**1980-84	5,333,545	4,084,668
	ext 1985-88		4,921,121	5,002,068
7	1989-92	1985-89	4,921,121	5,002,068
	ext 1993-94		3,571,900	3,437,225
8	1994-98	1995-99	2,996,500	2,807,608
9	1999- 03	2000-04	tba	tba

\* start-up phase

\*\* cut control period coincides with replacement of TFL document.

Table 2 lists the volume cut since 1995 summarised every five years. The AAC shown from 1992 excludes the SBFEP volume.



**Table 2: TFL 23 History of Volume Cut (m<sup>3</sup>)**

Period	Year	Allowable Cut	Actual Cut	Deviation from Allowance m <sup>3</sup> m <sup>3</sup>	
Initial	1955	379,445	18,889		
1st Period	1956	379,445	238,495	-140,950	-37.1%
	1957	379,445	259,228	-120,217	-31.7%
	1958	312,193	228,097	-84,098	-26.9%
	1959	218,039	229,333	11,294	5.2%
	1960	358,491	631,305	272,814	76.1%
	<b>Total</b>	<b>1,647,613</b>	<b>1,586,458</b>	<b>-61,155</b>	<b>-3.7%</b>
2nd Period	1961	849,504	732,124	-117,380	-13.8%
	1962	849,504	748,223	-101,281	-11.9%
	1963	849,504	896,719	47,215	5.6%
	1964	849,504	896,923	47,419	5.6%
	1965	849,504	866,528	17,024	2.0%
	<b>Total</b>	<b>4,247,520</b>	<b>4,140,517</b>	<b>-107,003</b>	<b>-2.5%</b>
3rd Period	1966	849,504	847,349	-2,155	-0.3%
	1967	849,504	619,264	-230,240	-27.1%
	1968	849,504	901,117	51,613	6.1%
	1969	849,504	938,987	89,483	10.5%
	1970	1,053,385	657,520	-395,865	-37.6%
	<b>Total</b>	<b>4,451,401</b>	<b>3,964,237</b>	<b>-487,164</b>	<b>-10.9%</b>
4th Period	1971	1,056,217	815,558	-240,659	-22.8%
	1972	1,175,147	846,542	-328,605	-28.0%
	1973	1,175,147	1,080,377	-94,770	-8.1%
	1974	1,175,147	1,104,522	-70,625	-6.0%
	1975	1,175,147	827,239	-347,909	-29.6%
	<b>Total</b>	<b>5,756,805</b>	<b>4,674,238</b>	<b>-1,082,567</b>	<b>-18.8%</b>
5th Period	1976	1,175,147	1,022,356	-152,791	-13.0%
	1977	1,175,147	924,730	-250,417	-21.3%
	1978	1,132,553	802,226	-330,327	-29.2%
	1979	1,014,881	1,160,342	145,461	14.3%
	<b>Total</b>	<b>4,497,728</b>	<b>3,909,655</b>	<b>-588,073</b>	<b>-13.1%</b>
6th Period	1980	1,066,709	1,194,697	127,988	12.0%
	1981	1,066,709	772,449	-294,260	-27.6%
	1982	1,066,709	440,358	-626,351	-58.7%
	1983	1,066,709	840,361	-226,348	-21.2%
	1984	1,066,709	836,803	-229,906	-21.6%
	<b>Total</b>	<b>5,333,545</b>	<b>4,084,668</b>	<b>-1,248,877</b>	<b>-23.4%</b>
7th Period	1985	1,066,709	905,930	-160,779	-15.1%
	1986	1,066,709	1,193,447	126,738	11.9%
	1987	977,000	965,430	-11,570	-1.2%
	1988	853,703	949,079	95,376	11.2%
	1989	857,000	988,182	131,182	15.3%
	<b>Total</b>	<b>4,921,121</b>	<b>5,002,068</b>	<b>80,947</b>	<b>1.6%</b>



**Table 2 continued**

<b>Period</b>	<b>Year</b>	<b>Allowable Cut</b>	<b>Actual Cut</b>	<b>Deviation from Allowance</b>	
				<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>
8th Period	1990	857,000	846,177	-10,823	-1.3%
	1991	857,000	525,910	-331,090	-38.6%
	1992	619,300	579,455	-39,845	-6.4%
	1993	619,300	806,374	187,074	30.2%
	1994	619,300	678,362	59,062	9.5%
	<b>Total</b>	<b>3,571,900</b>	<b>3,436,278</b>	<b>-135,622</b>	<b>-3.8%</b>
9th Period	1995	599,300	433,669	-165,631	-27.6%
	1996	599,300	600,951	1,651	0.3%
	1997	599,300	702,413	103,113	17.2%
	1998	599,300	629,733	30,433	5.1%
	1999	599,300	616,463	17,163	2.9%
	<b>Total</b>				
10 <sup>th</sup> Period	2000	599,300	588,926	10,374	1.7%
	2001	599,300	505,389	93,911	15.7%
	2002	599,300	548,140	511,60	8.5%

For MP8 and MP 9 the ACC was partitioned into a conventional and aerial volume. The partition applied to both Pope & Talbot and the SBFEP allocation of the AAC. Pope & Talbot's actual cut performance for each cut control period spanning MP8 and MP9 is shown in Tables 4 and 5.

### **Small Business Forest Enterprise Program**

In 1978 Columbia Cellulose reached agreement with the MoF to provide Downie Street Sawmills of Revelstoke with a log supply from within TFL 23. An operating area west of the Revelstoke reservoir, the Downie block, was allocated as a timber sale licence of 160,300 m<sup>3</sup>/year for a 12-year term. The volume was part of the TFL AAC. The MoF cancelled this agreement and the TSL in 1987 due to recurring undercut performance and the Downie block was removed from the licence area.

The Small Business Forest Enterprise Program was established in 1992. The Columbia SBFEP operates in the ShelterBay block with 37,000 m<sup>3</sup>, while the Arrow SBFEP operates in the southern area with an AAC of 43,000 m<sup>3</sup>. The SBFEP was renamed the BC Timber Sales Program in 2002 and the administration was separated from MOF.

### **Kootenay-Boundary Land Use Plan**

In 1997 the provincial government approved the Kootenay-Boundary Land Use Plan Implementation Strategy (KBLUP-IS). This was followed by the Kootenay-Boundary Higher Level Plan Order on January 31, 2001 which declared the forestry related components of the KBLUP-IS as legal requirements. A revised higher level plan order was issued in October, 2002. Under the existing January 2001 order the major impacts on timber supply is related to mature + old being turned on for all landscape units and the management guidelines for caribou for the three landscape units north of Nakusp. These impacts on timber supply will be reduced.

The Revelstoke MAC Land Use Plan Final Recommendations was completed in 1999. It is a subset of the KBLUP, adapted for the Revelstoke area.



## **Timber Inventory**

### **Forest Cover**

The initial forest inventory of TFL 23 was undertaken in 1952 to gather data for the proposed licence application. Columbia Cellulose used aerial photographs for identifying and mapping the forest cover types.

In 1973 Reid Collins and Associates, forestry consultants of Vancouver, completed a comprehensive inventory, using the latest BC Forest Service inventory techniques. The inventory has been refined periodically since then, including classification of ESA's, identification of terrain slope classes and periodic revisions of an operable outline.

In 1989 Industrial Forestry Service Ltd. of Prince George carried out a re-inventory of the TFL to MoF Inventory Branch standards, focussing on the reclassification of the younger age classes. Attributes for age class 1 and age class 7 to 9 stands were updated based on the existing shortform labels, using midpoints to assign age and height. Since that time the inventory has been maintained by Timberline Forest Inventory Consultants.

A vegetation resources inventory phase 2 was carried out between 1999 and 2002 by Sterling Wood Group Inc to adjust age, height, site index, and volume attributes of productive stands in the TFL. This involved the establishment of ground cluster plots, and an analysis of the relationships between the ground sample data and the existing inventory estimates to adjust the attributes per the MSRM Fraser Protocol. The analysis showed both significant adjustments and bias in some of the adjustments for age and height, resulting in the decision to adjust site index and volume, without age or height adjustment. MSRM approved the site index and volume adjustments in July 2002.

### **Growth and Yield**

Between 1959 and 1965 Columbia Cellulose established approximately 400 growth and yield permanent sample plots to monitor the growth rates of immature stands. Re-measurement was scheduled for five and ten-year intervals.

By 1994 over 200 plots were still being maintained and measured by the MoF. The results have been entered into the provincial interior growth and yield database. In 2002 the MOF informed Pope & Talbot that they do not have funding to continue remeasurements of these plots. For year 2002 Pope & Talbot will be remeasuring 36 PSP's with Forest Investment Account (FIA) funding. Funding for remeasurement in subsequent years is yet to be determined.

Vegetative Resource Inventory (VRI) Project 2000-2002 focused on stands > 10 years of age resulting in site index adjustments and culminating in an increased projected timber volume of 11.5 %.

### **Operability**

During 1997 revisions to the operability line were completed. The effect was an increase of timber harvesting land base by approximately 12%. Of this increase, approximately three quarters was a direct result of including land base for aerial harvesting systems.



## Resource Inventories

Additional inventory work completed or undertaken since 1995 includes the following:

Fish Stream Inventory work commenced in 1996 and by 2003 to be completed for the entire TFL

Ungulate Winter Range Species Habitat Models Capability \ Suitability Mapping started in 1999 and completed in 2002.

Central Selkirk Mountain Caribou Habitat Use and Species: habitat model for TFL 23 commenced in 1995 and completed in 2002.

Predictive Ecosystem Mapping: during 2002-2002 the entire TFL was completed

Level D Terrain Mapping: upgrading of 1996 mapping, which was completed with 1:40,000 airphotos to work completed in 2000 & 2001 using 1:20,000 photographs. This fine tuning of mapping resulted in reduction of areas classified as high or very high by 41%.

Old Growth Management Areas: during 2000-2002 areas where identified for potential old growth candidate areas submitted to MOF / MSRM.

Visual Inventory: 2000-2002 upgrade of viewpoints visible from highway

## Forest Protection

Since the award of the licence in 1955, the TFL 23 area has been relatively stable and protected from major catastrophic events such as wildfire or disease outbreaks.

**Fire.** Forest fires, both of lightning origin and from operations, have occurred periodically, but have been contained without major losses.

**Disease.** White pine blister rust became noticeable in the early 1950s. This disease has been progressively infecting white pine trees in mature stands and in regeneration. Over time, it has proven to be the most difficult pathogen to control on the TFL since infection is dispersed and salvage logging is ineffective.

Armillaria root disease continues to be expressed within TFL 23. In conjunction with the planting of more resistant species there has also been an increase of stumping on areas harvested which represents ~ 5%.

**Insects.** In 1981/82 an outbreak of spruce bark beetle infestation was noted in Plant Creek and Pingston Creek.

Mountain pine beetle-attacked scattered lodgepole pine stands in Cayuse, Gladstone, and Hutchison Creeks during 1989. 1999-2003 emphasis continued in salvaging of infested stands along with a focus on addressing highly susceptible stands. These priority stands are identified through Pope & Talbot's "Beetle Management Plan – 2000-Present".

In 1991/92 gray spruce looper severely defoliated hemlock stands on the west side of the lake across from Nakusp. It resulted in harvesting of 250,000 m<sup>3</sup>.



**Blowdown.** A strong windstorm in the fall of 1993 caused extensive blowdown damage of approximately 60,000 m<sup>3</sup> in the Beaton River drainage. Prompt salvage logging has minimized timber losses to these and other major insect infestations. During 1996 Rioulx Creek experienced 300 hectares, 95,000 m<sup>3</sup> of blowdown.

## Forest Renewal

In the early 1960s harvesting and silviculture systems were designed to encourage natural regeneration, typically clearcutting and leaving trees under five inches in diameter as seed and shade trees. The leave blocks were also seen to act as a seed source. This system continued until about 1969 when a shift to planting occurred.

At the same time it was recognized that to regenerate preferred species, such as Douglas-fir and spruce planting was needed. A bare-root nursery was established in 1960 at Box Lake east of Nakusp to supply seedlings for a planting program. The first seedlings were planted on TFL 23 in May 1957; 3,200 Douglas fir wildings from Taite Creek were planted on a 1945 burn on the backside of Saddle Mountain.

The first plantation of about 50,000 seedlings was established in 1961 at Fosthall, Trout Lake, and Big Bend. Planting continued at a modest rate until the mid 1970s when it was recognized that more extensive planting was required to successfully re-establish preferred conifer species and to prevent unwanted woody brush species from occupying the sites. The company's nursery had closed when the BC Forest Service took the responsibility to supply all licensees with seedlings.

Between 1960 and 2001 approximately 59 million seedlings and 48,068 hectares were planted. Plantations were established with a mixture of two or more species. Table 3 and Figures 1a, 1b show the increase in the planting program during this period.

Efforts were also made to re-establish white pine through Westar's white pine management program. This involved co-operation with the US Forest Service and the BC Forest Service in a tree improvement program and reforestation with genetically improved rust-resistant seedlings. Harvesting of rust-infected white pine trees also received priority. Pope & Talbot has built upon these early initiatives. The company continues to plant rust-resistant white pine in mixed species plantations and carry out low pruning of white pine in conjunction with juvenile spacing treatment to minimize plantation losses. This improved rust-resistant stock continues to exhibit ~80% resistance to white pine blister rust. In 1987 the new *Silviculture Regulation* passed technical and financial responsibility for the reforestation program from that date onwards to the company. The licensee at that time, Westar, began placing more emphasis on practices to improve the survival, establishment and growth of the plantations. Improvements began at the initial reforestation planning level. Detailed ecosystem-based pre-harvest silviculture prescriptions were now being prepared for every cutblocks prior to harvesting.

By 1989 a program, the Forest Renewal Initiative, to restock and brush 12 000 hectares of backlog NSR commenced, and was substantially completed by 1994. By the end of 2001 NSR was less the 25 hectares.



From 1995 to December 2001 Pope & Talbot has been able to carry out enhanced forestry and back log reforestation utilizing Forestry Renewal Funds (FRBC). Approximately \$12.5 million was spent on addressing the back log issue while \$3.5 million was spent on incremental activities such as spacing and pruning. By 1969 mechanical site preparation had started and broadcast burning became increasingly common. By mid to late 1980's mechanical site preparation strategies moved from crawler tractors with brush blades to site preparation using backhoes. Coincidental with this time frame broadcast burning decreased substantially. Presently 15-20% of harvested areas are mechanically site prepared or broadcast burned. .

**Brush control.** The nutrient rich valley bottom sites were proving difficult to re-establish with conifers due to the dense regrowth of brush species that occurred after logging. Stand tending brush control also was recognized as needing a higher priority. Various hand brush control techniques were tried, which varied from hand control techniques to power techniques. During 1990 to 1993 up to 4,000 sheep were used to graze brush on plantations and to browse herbaceous brush in areas to get them ready for planting. The use of sheep for brush control has been discontinued as remaining brushy sites are scattered and not conducive to the use of sheep. The prompt reforestation and planting of preferred \ good quality seedlings has reduced appraisal brushing to 600 hectares per year. Conifer release which includes the removal of over topping \ competing deciduous species represents ~ 600 hectares per year.



**Table 3a: TFL 23 - Summary of Forestry Activities 1957 –1979**

Activity	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Logged (ha)	1,046	1,226	1,634	2,325	2,974	3,134	3,450	3,056	2,464	2,766	3,382	3,134	1,567	2,144	2,773	2,428	2,539	1,720	1,886	1,328	2,587	2,687
Planted (ha)	-	-	-	-	24	62	16	95	160	96	97	161	371	168	200	261	138	779	551	213	945	1,030
Trees Planted (000)	-	-	-	-	10	25	5	52	72	50	43	60	177	n/a	121	249	96	888	646	209	1,115	1,166
Spaced (ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brushed (ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Site Prep –mechanical (ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	132	162
Site Prep -broadcast burn (ha)	-	-	-	-	-	-	-	-	-	-	1,300	674	3,273	1,139	1,228	2,326	2,105	1,404	2,747	1,075	-	1,926
Pruned (ha)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Surveyed (ha)	-	-	-	-	-	-	-	1,498	1,615	2,328	1,559	944	2,393	3,097	4,198	3,014	1,089	1,185	5,571	9,486	6,852	2,371



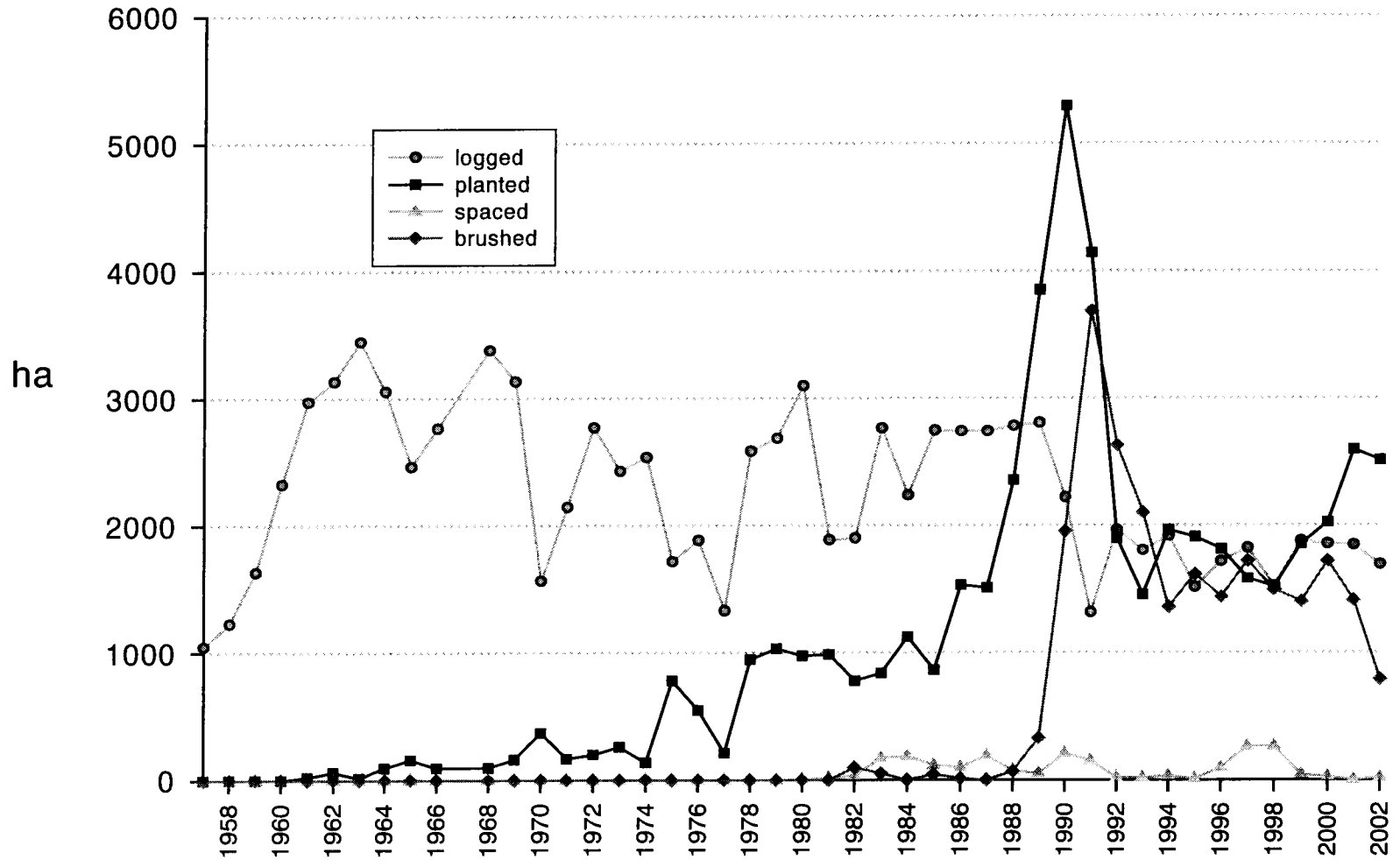


**Table 3b: TFL 23 - Summary of Forestry Activities 1980 –2002**

Activity	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Logged (ha)	3,098	1,887	1,901	2,767	2,235	2,747	2,742	2,742	2,784	2,807	2,218	1,313	1,963	1,806	1,918	1,514	1,718	1,825	1,522	1,877	1,855	1,847	1,692	
Planted (ha)	973	984	777	837	1,121	861	1,531	1,508	2,356	3,852	5,294	4,139	1,898	1,453	1,963	1,910	1,815	1,583	1,516	1,855	2,023	2,598	2,515	
Trees Planted (000)	1,008	1,157	935	959	1,398	1,029	1,798	1,908	3,447	5,268	6,845	4,762	2,083	1,775	2,560	2,380	2,320	1,958	1,924	2,443	2,606	3,453	334	
Spaced (ha)	3	15	31	171	185	115	98	188	73	50	207	152	19	18	31	7	95	263	265	38	24	0	15	
Brushed (ha)	-	-	98	51	-	43	12	-	67	330	1,954	3,687	2,628	2,100	1,355	1,618	1,436	1,724	1,493	1,399	1,721	1,408	787	
Site Prep –mechanical (ha)	415	275	324	650	411	668	649	833	1,505	1,648	1,527	552	168	450	373	161	176	303	322	259	369	405	509	
Site Prep -broadcast burn (ha)	4,512	1,749	2,304	2,348	1,095	696	2,046	1,381	1,468	915	361	659	156	232	369	205	245	194	89	283	159	123	60	
Pruned (ha)	3	12	151	399	57	88	129	128	111	49	98	152	6	21	182	570	505	296	282	234	0	0	197	
Surveyed (ha)	7924	5123	3852	5,831	5,689	5,114	6,171	4,903	6,613	10,000	13,410	13,584	12,964	14,656	11,927	13,787	11,885	12,134	13,559	11,143	11,037	14,632	12,515	



**Figure 2: TFL 23 Silviculture Activities vs Logged  
1957 - 2002**





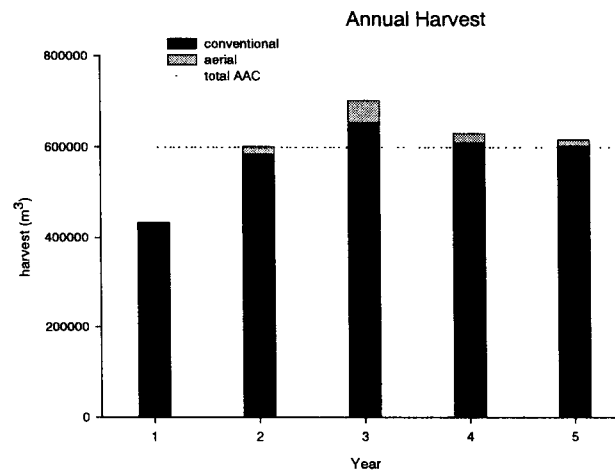
**Figure 3: TFL 23 Planted vs Logged  
1977 - 2002**





**Table 4: TFL 23 Management Plan 8: 5 Year Harvesting Performance**  
Cut control period 1995-1999

	1995	1996	1997	1998	1999	Total
<b>AAC Partition (m<sup>3</sup>/year)</b> P&T AAC portion only, excludes SBFEP						
Aerial	50,000	50,000	50,000	50,000	50,000	250,000
Conventional	<u>549,300</u>	<u>549,300</u>	<u>549,300</u>	<u>549,300</u>	<u>549,300</u>	<u>2,746,500</u>
Total AAC	599,300	599,300	599,300	599,300	599,300	2,996,500
<b>Actual Harvest (m<sup>3</sup>)</b>						
Aerial	0	15,112	47,306	18,646	12,359	93,423
Conventional	<u>433,669</u>	<u>585,840</u>	<u>655,107</u>	<u>611,087</u>	<u>604,104</u>	<u>2,889,807</u>
Total Harvest	433,669	600,952	702,413	629,733	616,463	2,983,230
<b>(Under) / Over Cut (m<sup>3</sup>)</b>						
Aerial	(50,000)	(34,888)	(2,694)	(31,354)	(37,641)	(156,577)
Conventional	<u>(115,631)</u>	<u>36,540</u>	<u>105,807</u>	<u>61,787</u>	<u>54,804</u>	<u>143,307</u>
Net (under) /over cut	(165,631)	1,652	103,113	30,433	17,163	(13,720)
<b>Accumulated % Actual Cut</b>						
	<u>1 year</u>	<u>2 year</u>	<u>3 year</u>	<u>4 year</u>	<u>5 year</u>	
Aerial	0.0%	15.1%	41.6%	40.5%	37.4%	
Conventional	78.9%	92.8%	101.6%	104.0%	105.2%	
Total Harvest	72.4%	86.3%	96.6%	98.7%	99.6%	





**Table 5: TFL 23 Management Plan 9 Harvesting Performance**  
Cut control period 2000-2004

	2000	2001	2002	2003	2004	Total
<b>AAC Partition (m<sup>3</sup>/year)</b>						
P&T AAC portion only, excludes SBFEF						
Aerial	50,000	50,000	50,000	50,000	50,000	250,000
Conventional	<u>549,300</u>	<u>549,300</u>	<u>549,300</u>	<u>549,300</u>	<u>549,300</u>	<u>2,746,500</u>
Total AAC	599,300	599,300	599,300	599,300	599,300	2,996,500
<b>Actual Harvest (m<sup>3</sup>)</b>						
Aerial	0	12,196	2,664	-	-	14,860
Conventional	<u>588,926</u>	<u>493,193</u>	<u>545,476</u>	-	-	<u>1,627,595</u>
Total Harvest	588,926	505,389	548,140	-	-	1,642,455
<b>(Under) / Over Cut (m<sup>3</sup>)</b>						
Aerial	(50,000)	(37,804)	(47,336)	-	-	-
Conventional	<u>39,626</u>	<u>(56,107)</u>	<u>(3,824)</u>	-	-	-
Net (under) /over cut	(10,374)	(93,911)	(51,160)	-	-	-
<b>Accumulated % Actual Cut</b>						
	<u>1 year</u>	<u>2 year</u>	<u>3 year</u>	<u>4 year</u>	<u>5 year</u>	
Aerial	0.0%	12.2%	9.9%	-	-	
Conventional	107.2%	98.5%	98.8%	-	-	
Total Harvest	98.3%	91.3%	91.4%	-	-	

