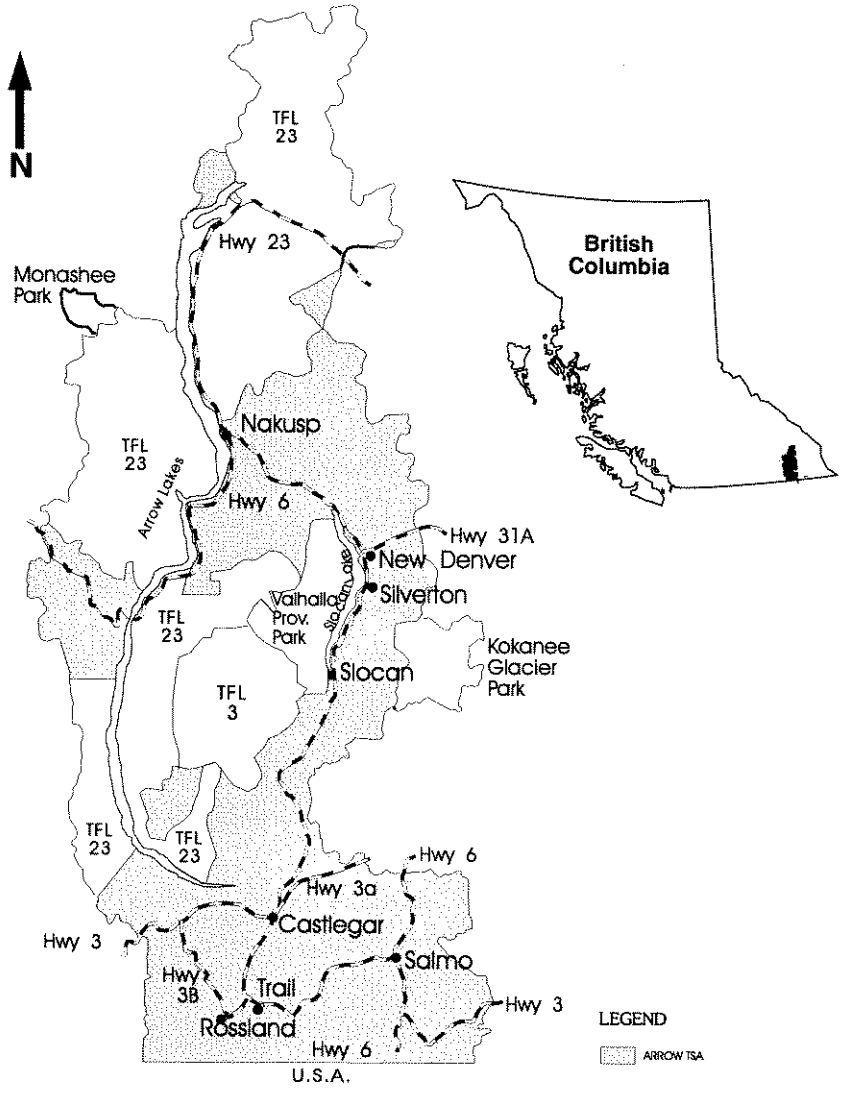
MINISTRY OF FORESTS

Arrow Timber Supply Area

Timber Supply Review Discussion Paper
October 1994



Province of British Columbia
Ministry of Forests

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Timber Supply Review Highlights

- The British Columbia Forest Service is reviewing the timber supply for all timber supply areas* and tree farm licences* in the province. The review examines the impacts of current integrated resource management* practices on the timber supply*, economy and environment of the local area and the province. Based on the results of this review, the chief forester may decide to adjust the allowable annual cut* for the Arrow Timber Supply Area.

- The current allowable annual cut of 619,000 cubic metres per year in the Arrow Timber Supply Area provides approximately 30 per cent of the wood supply for the four major mills in the Arrow Forest District. This harvest supports 600 person-years* of direct forest sector employment in the timber supply area, plus another 432 person-years of indirect employment. In addition, 553 person-years of employment are created outside the timber supply area from the current harvest, for a total of 1585 person-years provincially. (page 4)

- Tree Farm Licences 3 and 23 within the Arrow Forest District provide a comparable volume of wood to local mills, with private purchase and wood from nearby timber supply areas making up the rest. As part of the timber supply review, the allowable annual cut for Tree Farm Licence 3 has recently been reduced from 108,000 to 65,000 cubic metres, and that of Tree Farm Licence 23 has been reduced from 700,000 to 680,000 cubic metres. (page 7)

- The current allowable annual cut in the timber supply area cannot be maintained in the long term with current integrated resource management practices. Over the next 100 years, the timber supply is projected to decline to a sustainable level of 422,000 cubic metres per year. (page 7)

- Additional factors suggest that the short-term timber supply may be lower than initially predicted because:
  - difficulty in defining forest practices in some of the contentious watersheds and visually sensitive areas may prevent these areas from contributing to the short-term timber supply to the degree assumed in the timber supply analysis (page 9);
  - it may take cutover areas longer to reach minimum "green-up" height requirements than assumed in the timber supply analysis (page 9);
  - streamside and riparian* areas where harvesting is restricted can now be estimated and deducted from the timber harvesting land base (page 10);
  - several integrated resource management practices have been implemented to protect biodiversity and to meet old-growth habitat requirements for caribou since the information for the timber supply analysis was prepared (page 10);
  - new guidelines have recently been implemented for harvesting in domestic watersheds (page 11); and,
  - the volume and availability of the timber in older forests may be less than assumed in the timber supply analysis (page 11).

- Silviculture treatments (e.g., juvenile spacing, fertilization), or new estimates of the growth rates of managed forests in the Arrow Timber Supply Area are unlikely to increase the short-term timber supply although they will increase the timber supply in the long term. (page 11)

- There may be opportunities to partially offset reductions in the short-term timber supply by:
  - using alternative harvesting systems to log steep slopes and other areas that are currently inaccessible (page 11);
  - harvesting forest types that are not currently considered merchantable such as some very old hemlock and balsam stands, and deciduous areas (page 12);
  - increasing use of small diameter stems within cutblocks (page 12); and,
  - commercial thinning the large areas of younger forests (page 12).

- Several alternatives exist for the chief forester to adjust the short-term allowable annual cut as part of a strategy to achieve the long-term harvest reduction:
  - the allowable annual cut could be maintained for a longer period, with larger reductions in the future;
  - small reductions could be implemented now, with larger reductions in the future;
  - a consistent level of reduction could occur throughout the transition period; or,
  - large reductions could be made now, with smaller reductions in the future.

- The impact of adjustments in timber supply on the local communities is an important consideration in this review. Opportunities exist in the forestry sector to reduce the employment impacts of adjustments in the timber supply. The challenge for the communities is to develop strategies to minimize the impacts of this transition. (page 12)

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- Factors that may influence the timber supply in the Arrow Timber Supply Area in the future include:
  - decisions from ongoing government initiatives that are not accounted for in this review, such as:
    - the Commission on Resources and Environment (C.O.R.E)*;
    - the Protected Areas Strategy*; and,
    - the Forest Practices Code*.
  - a Land and Resource Management Planning* process involving the public, interest groups and government agencies, which will begin sometime after this review is completed, may result in new integrated management objectives.
- Another review of the timber supply in the Arrow Timber Supply Area will be completed within five years to incorporate decisions from land-use planning processes and new information on the impact of different forest management practices.

*** Throughout this document, an asterisk at the end of a phrase indicates the phrase is defined in the definitions on this page.**

Definitions

Allowable annual cut
The rate of timber harvest permitted each year from a specified area of land, usually expressed as cubic metres of wood per year.

Base case forecast
The timber supply harvest forecast that illustrates the effects of current forest management practices on the timber supply using the best information that was available when the data package was prepared.

Commission on Resources and Environment (CORE)
An independent commission established to develop and test land-use planning processes in consultation with stakeholders. Regional and sub-regional processes have been implemented by CORE in various areas of the province.

Current management practices
Forest practices that were being approved and implemented in the timber supply area when this review was initiated. These practices are described in this paper starting on page 5.

Forest Practices Code
A draft *Forest Practices Code for British Columbia Act* was recently passed in the British Columbia Legislature. The final Code will be proclaimed into law in late 1994.

Forest Renewal Plan
The Forest Renewal Plan is a partnership of all the forest interests, working together to invest in increasing the value of the forest and strengthening the forest sector economy.

Integrated resource management
The identification and consideration of all resource values, including social, economic and environmental needs, in land use and development decision-making.

Land and Resource Management Plan
A consensus-building process involving a cross section of the public, interest groups and government agencies to establish resource management objectives and strategies for a management area (usually a timber supply area).

Person-year
One person working the equivalent of one full year. If someone works full time for six months, he or she accounts for 0.50 person-years.

Protected Areas Strategy
A provincial government initiative to protect representative areas within each ecological region of the province. This may result in some areas in the Arrow Timber Supply Area being protected from timber harvesting.

Riparian area
The stream bank and flood plain adjacent to streams or water bodies.

Timber harvesting land base
Crown forest land which is economical and environmentally feasible to access and harvest.

Timber supply
The volume of timber available for harvesting over time, under a particular management regime.

Timber supply area (TSA)
An area of Crown land defined by an established pattern of wood flow from the forest to the primary timber-using industries.

Tree farm licence
An agreement entered into with the provincial government which provides for the establishment, management and harvesting of timber by a private interest on a described area of Crown land.

Arrow Timber Supply Area

Introduction

The British Columbia Forest Service is conducting a Timber Supply Review in the 36 timber supply areas and 35 tree farm licence areas throughout the province. The objectives of this three-year review include:

- identifying the economic, environmental and social consequences of existing forest management practices including their impacts on the short- and long-term timber supply;
- identifying where improved information is required to make reliable forecasts; and,
- providing the chief forester with information to make necessary adjustments to the allowable annual cuts for the next five years.

This discussion paper summarizes the technical reports from the Timber Supply Review in the Arrow Timber Supply Area and encourages British Columbians to comment on the findings. Public comments will be accepted until January 6, 1995. You will find a response form at the end of this paper to help you provide input.

Background to the Timber Supply Review

For at least 20 years, governments have known that British Columbia's timber supply would decline in the future—we could not keep cutting at the rate we've been going. Now there is an urgent need for up-to-date information to review the timber supply and allowable annual cuts throughout the province.

A 1991 study completed by the Forest Service, *A Review of the Timber Supply Analysis Process for British Columbia*, examined the procedures which led to the determination of allowable annual cuts, and confirmed the need for change. The study found that:

- existing allowable annual cuts were based on outdated information and management practices;
- procedures failed to take into account integrated resource management practices and protection of non-timber values;
- the procedures were far too time consuming; and, analytical techniques had to be strengthened.

As a result, very few timber supply analyses had been completed since the early 1980s with few allowable annual cut adjustments.

The Forest Service acted quickly on the study's recommendations. The Timber Supply Review was initiated to assess short- and long-term timber supplies in light of current forest practices and integrated resource management.

The chief forester's responsibility

Determining the allowable annual cuts for Crown forest lands in British Columbia is the responsibility of the province's chief forester. It is one of the chief forester's most important responsibilities since it affects the local and provincial economy and environment, now and in the future. Section 7 of the *Forest Act* requires the chief forester to consider the following factors to determine allowable annual cuts for timber supply areas and tree farm licences:

a) the rate of timber production that may be sustained from the area taking into account:
   - the composition of the forest;
   - the time in which the forest will become re-established;
   - silvicultural treatments, including reforestation;
   - standards of timber utilization;
   - constraints on the amount of timber produced from the area due to non-timber resource management objectives; and,
   - any other information which relates to the capability of the area to produce timber;

Towards a sustainable future

British Columbians agree there is a need for sustainable resource management to ensure a strong forest economy, viable communities and a healthy environment—today and always. The Timber Supply Review is one of several government initiatives to achieve sustainability:

- The *Forest Renewal Plan* is a partnership of all the forest interests, working together to invest in increasing the value of the forests and strengthening the forest sector economy.
- The *Forest Practices Code* creates a single enforceable law to require better forest practices, with heavy penalties for violators.
- The *Timber Supply Review* is providing the information needed to adjust allowable annual cuts to ensure the sustainability of British Columbia's forests.
- The *Commission on Resources and Environment*, the *Protected Areas Strategy*, and *Land and Resource Management Plans* are moving to integrate all values into land-use planning in an effort to end confrontation and valley-by-valley battles.
- The *B.C. Treaty Commission* is moving us towards fair and equitable settlement of treaties which can create long-term social and economic stability for aboriginal and non-aboriginal British Columbians.

b) the short and long-term implications to the province of alternative rates of timber harvesting from the area;
c) the nature, production capabilities, and timber requirements of established and proposed processing facilities;
d) the economic and social objectives of the Crown, for the area, the region and the province, as expressed by the minister of forests; and,
e) abnormal insect or disease infestations and major salvage programs planned for the timber on the area.

Some of these factors can be measured and analyzed; others cannot. Ultimately, the chief forester's determination is an independent, professional judgment. By law, the chief forester is independent of the political process and is not directed by the minister of forests in determining allowable annual cuts. Nor does the chief forester consider the advocacy efforts of lobby groups.

Timber supply review process

The Timber Supply Review is an improvement over past methods, with better information and superior analytical techniques. The process was designed to stimulate public discussion through the release of reports and this discussion paper, and to accommodate new information, techniques and ideas.

Figure 1 below illustrates the five-step process that has been developed for the Timber Supply Review in timber supply areas. The diagram also indicates the status of the Timber Supply Review for the Arrow Timber Supply Area, and the estimated time required for each step in the process.

The review process for existing tree farm licence contracts is similar, but these contracts require less emphasis on socio-economic impacts. When tree farm licence contracts are replaced, the process will be changed to conform to the Timber Supply Review format.

The data package used for the Timber Supply Review in the Arrow Timber Supply Area was finalized in August 1993. This package was reviewed by Forest Service staff and local timber tenure holders. The Forest Service conducted a short- and long-term timber supply analysis and a consultant completed a socio-economic assessment of the timber supply forecasts. Both reports being released with this Discussion Paper are available from the Arrow Forest District office in Castlegar, the Nakusp field office and the Nelson Forest Region office.

In conjunction with the release of these reports, Forest Service staff will actively solicit public input to ensure the information in the Timber Supply Review for the Arrow Timber Supply Area is correct. Input will be accepted until January 6, 1995.

Public input will be summarized in a report to the chief forester and the minister of forests.

After weighing all of the available information, the chief forester will determine the allowable annual cut for the Arrow Timber Supply Area during the spring of 1995. This determination and a *Rationale Statement* for the determination, will be released to the public along with a *Summary of Public Input*.

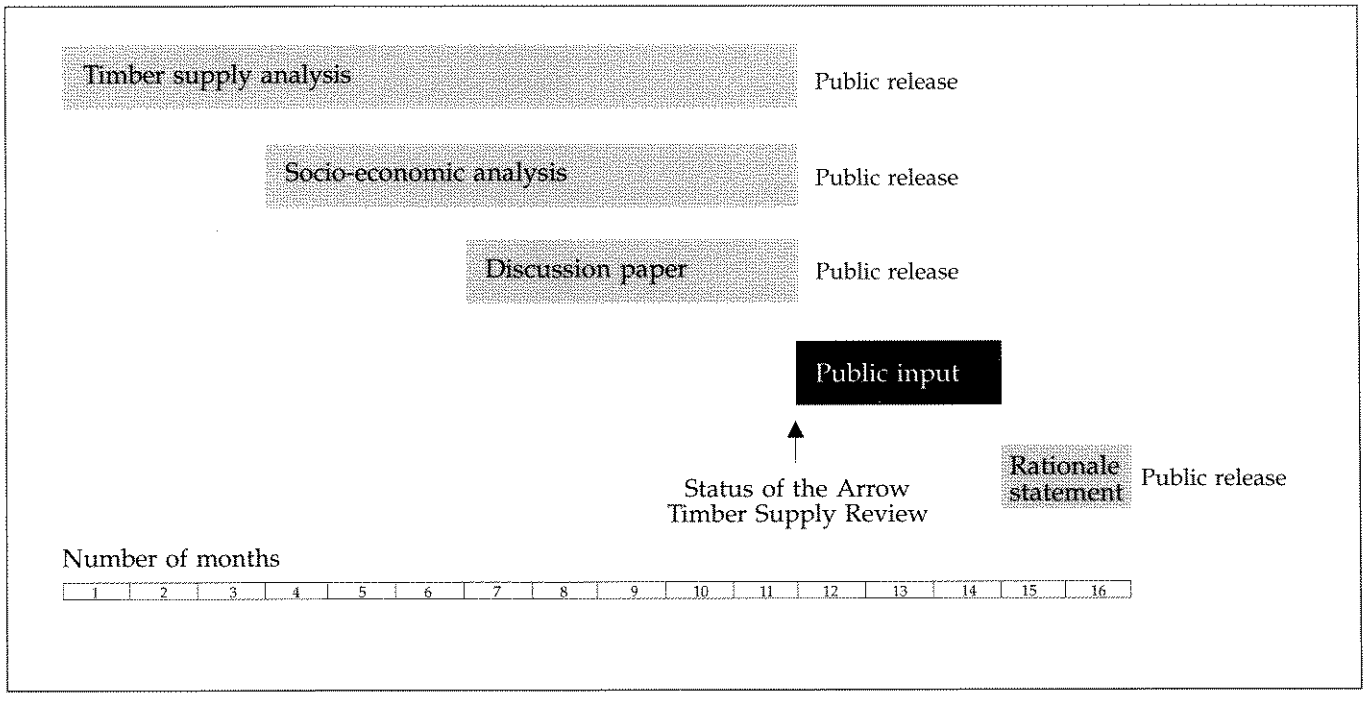

Figure 1. Steps in the Timber Supply Review process

Arrow Timber Supply Area

A commitment to incorporate change

The *Forest Act* requires the chief forester to reassess the allowable annual cut for each timber supply area and tree farm licence area at least every five years following this review, to incorporate new information, new practices and new government policies. Implementation of major government initiatives such as the *Forest Practices Code*, the *Protected Areas Strategy*, and land-use recommendations from the *Commission on Resources and Environment* and *Land and Resource Management Plans* may have significant impacts on the timber supply in specific timber supply areas and tree farm licences. In these cases, the allowable annual cut can be reviewed in less than five years.

Throughout this discussion paper, the page numbers from the technical reports are provided so you can refer to them for additional information (*TSAR* is the *Timber Supply Analysis Report; SEA* is the *Socio-Economic Assessment*). These reports are available from the Arrow Forest District office in Castlegar, the Nakusp field office and the Nelson Forest Region office.

Description of the Arrow Timber Supply Area

Forest resources

The Arrow Timber Supply Area is located in the West Kootenay area of southeastern British Columbia (see map on cover) in the Interior wet belt of the province. Spectacular mountains create varied climates and growing conditions, leading to diverse forests which include many species and ages.

Timber

Mountainous terrain limits harvestable timber in the Arrow Timber Supply Area. Figure 2 illustrates that most of the land base is not available for timber harvesting due either to lack of forest cover or unsuitability for timber harvest (environmental sensitivity, rough terrain, difficult access or unmerchantable timber). Twenty-nine per cent of the land base (216,760 hectares) is suitable for timber harvesting using current methods (*TSAR* page 6).

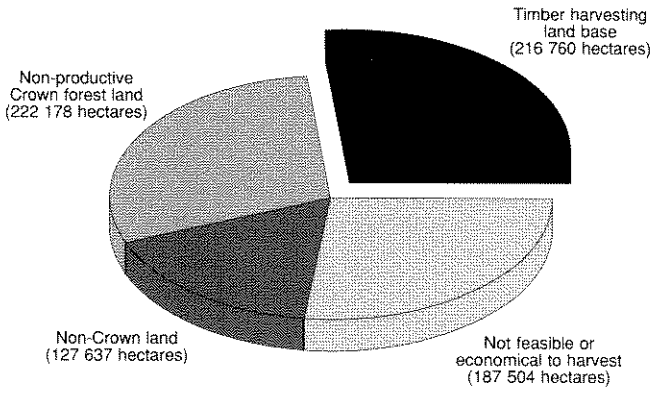

Figure 2. Area summary for the Arrow Timber Supply Area

Notes: Approved study areas and candidate areas for the Protected Areas Strategy have not been subtracted from the timber harvesting land base for this review (*TSAR* page 33).

Figure 3 shows the diversity of tree species in the timber harvesting land base (*TSAR* page 9).

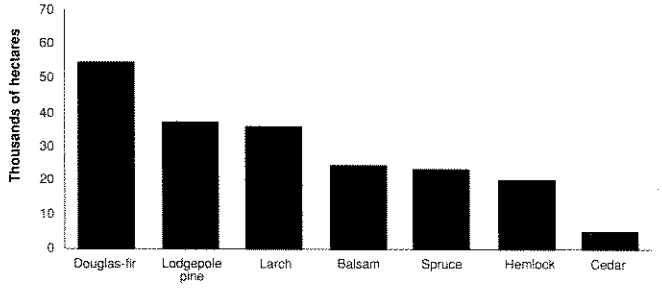

Figure 3. Tree species in the timber harvesting land base

Figure 4 shows that much of the forest in the timber harvesting land base is between 80 and 120 years old (*TSAR* page 8). These younger forests resulted from fires that occurred in the late 1800s.

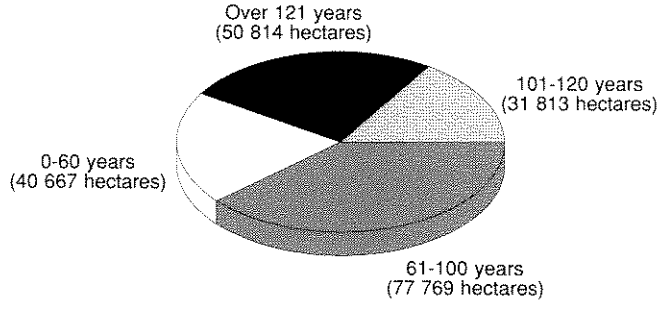

Figure 4. Forest ages in the timber harvesting land base

Wildlife

The area within the timber harvesting land base contains most of the important wildlife habitats in the Arrow Timber Supply Area. A wide range of

wildlife species inhabit these diverse forests including moose, elk, deer, mountain goat, cougar, small mammals and many bird species. Sensitive or vulnerable species include the peregrine falcon, Forster's tern, western grebe, bald eagle, great blue heron, canyon wren, harlequin duck, white-headed woodpecker, badger, Coeur d'Alene salamander, several bat species, grizzly bear, mountain caribou, and several fish species. (*SEA* page 2-19 and 2-20)

Recreation and tourism

The Arrow Timber Supply Area borders on two provincial parks and one national park, indicative of the spectacular mountain scenery and recreational opportunities in the area. Boating, camping, hunting, fishing, hiking, mountain biking, kayaking, bird watching and wildlife viewing are common activities. In the winter, snowmobiling and skiing are popular (*SEA* page 2-11).

Nearly 40 per cent of the timber harvesting land base is visible from communities, highways and boats on Arrow or Slocan lakes. Logging is restricted within these viewscapes.

Water resources

The Arrow Timber Supply Area contains abundant water resources. About 80 per cent of the timber harvesting land base is located within watersheds that are licensed for domestic use.

Current allowable annual cut

The allowable annual cut for the Arrow Timber Supply Area is currently 619,000 cubic metres per year. Approximately 79 per cent of the harvest is allocated to five licensees, 18 per cent is harvested through the Small Business Forest Enterprise Program administered by the Forest Service, approximately two per cent is in woodlot licences and one per cent is unallocated (*SEA* page 4-1).

Within the Arrow Forest District, in addition to the timber supply area, two tree farm licences have a combined harvest level that is slightly greater than that of the timber supply area. All of the wood harvested from these tree farm licences is processed within the Arrow Forest District. As part of the Timber Supply Review, the allowable annual cuts for these tree farm licences have recently been reduced:

- Tree Farm Licence 3, which is managed by Slocan Forest Products Limited, was reduced from 108,000 to 65,000 cubic metres;
- Tree Farm Licence 23, which is managed by Pope and Talbot Limited, was reduced by 700,000 to 680,000 cubic metres, with 50,000 cubic metres of this cut to come from areas where non-conventional harvesting systems are required (i.e., helicopters).

Socio-economic profile

The Arrow Timber Supply Area is situated in portions of three regional districts: Kootenay Boundary, Central Kootenay and Columbia Shuswap. The major communities in the timber supply area are Castlegar, Trail, Rossland, Fruitvale, Salmo, New Denver, Nakusp and Slocan. There are numerous smaller communities, both incorporated and unincorporated, within the region.

As shown in Figure 5, in the Castlegar/Arrow Lakes portion of the timber supply area, income derived from the forest sector far exceeds any other income source (*SEA* page 2-8). In the Trail/Rossland area, the importance of the Cominco smelter to the local economy makes the mining sector the leading income source.

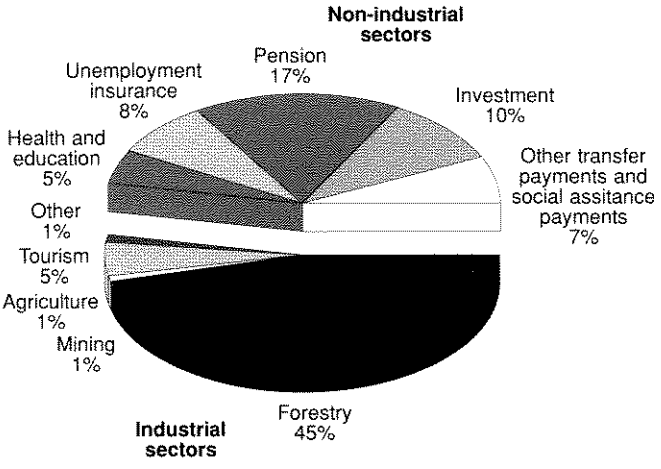

Figure 5. Income economic sectors in the Castlegar/ Arrow area

Although the area depends heavily on the primary resource sectors, economic diversity is provided by tourism and pension income. There has been an influx of new residents moving into the area seeking a rural/small town lifestyle and an improved quality of life. Further economic growth may be achieved through diversifying the service sector to serve this group.

Timber industry

The timber industry in the Arrow Forest District includes numerous sawmills, three of which have licences to harvest timber in the Arrow Timber Supply Area, as well as cedar shake and shingle mills, and a pulp mill. Approximately 30 per cent of the wood supply for these mills comes from the Arrow Timber Supply Area. Additional wood is secured from nearby timber supply areas, tree farm licences within the Arrow Forest District, and private lands (*SEA* pages 4-5 to 4-7).

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Harvesting from the timber supply area accounts for approximately 600 person-years* of direct forest sector employment (*SEA* page 5-3), or 1.0 person-years of employment for each 1,000 cubic metres of timber harvested. This translates into an additional 432 person-years of indirect employment in the area based on the estimate that for every direct forestry person-year an additional 0.72 person-years are generated elsewhere in the local economy (*SEA* page 5-3).

An additional 553 person-years of direct and indirect employment are created outside the Arrow Timber Supply Area from the current harvest, for a provincial total of 1,545 person years.

Provincial revenues

Timber harvesting within the Arrow Timber Supply Area is estimated to generate approximately $14.5 million per year in stumpage, taxes and other government revenues (*SEA* page 6-2). These estimates, developed before the new Forest Renewal Plan was announced, do not include the increased stumpage revenues that will be generated through this plan. While stumpage revenues are expected to increase by as much as 80 per cent, it will not be possible to accurately estimate the impact of this change until the new policy has been in place for a period of time.

Current management practices

Public forest lands in B.C. provide recreational enjoyment, fish and wildlife habitat, water supplies, timber resources and many other benefits. The Forest Service manages the timber, range and recreation resources on public lands. B.C. Environment is responsible for management of fish, wildlife and water resources. Both agencies subscribe to the principle of integrated resource management, where all resources are considered before management decisions are made.

The timber supply analysis and timber supply forecast prepared by the Forest Service were based on current management practices. These are the practices that were actually being approved and implemented in the timber supply area when the information for the timber supply analysis was assembled. Future changes in practices resulting from initiatives such as the Commission on Resources and Environment (both the Kootenay Region and Slocan Valley pilot projects), the Forest Practices Code or Land and Resource Management Plans will be considered during the next reassessment of the timber supply.

Management zones and forest cover requirements

To assess the timber supply impacts of current integrated resource management practices, resource management information was developed for six types of licensed and sensitive watersheds, two categories of visually sensitive areas and two wildlife winter ranges. Forest Service staff developed forest cover guidelines for these areas, which specified:

- the maximum amount of forest land which could be in a harvested or immature state at any point in time;
- the time required after harvest for the young forest to grow sufficiently so that adjacent areas could be harvested (the "green-up age"); and,
- the minimum amount of old-growth forest or wildlife cover to be retained, and its minimum age.

Note: Refer to the *TSAR* Appendix 1 pages 56-60 for more information on how the forest cover guidelines were defined for the Arrow Timber Supply Area.

Classifications can, and often do, occur in combinations on the ground (e.g., a visually sensitive area in a domestic watershed). For analysis purposes, these classifications were combined and the most restrictive forest cover guidelines were applied in the timber supply analysis. Descriptions of the resulting management zones and their forest cover guidelines follow, and their respective areas are shown on Figure 6.

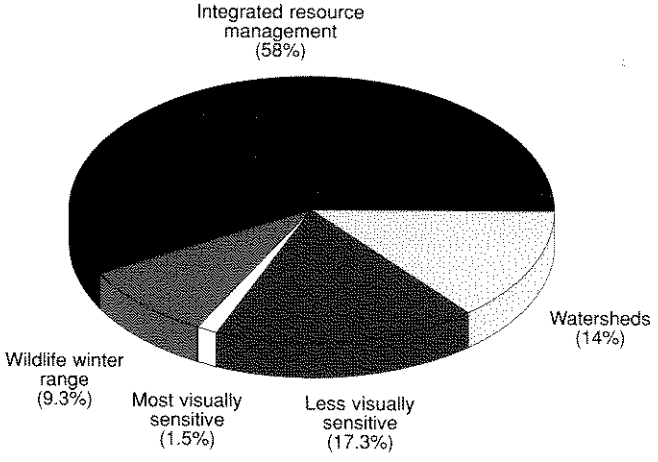

Figure 6. Area of each management zone in the timber harvesting land base

- **Watershed zone** (30,384 hectares)
  This zone includes small, sensitive domestic watersheds and springs and seeps. Maintenance of water quality, quantity, and the timing of flow is a management priority. Harvesting is restricted, with a maximum of 30 per cent of this zone permitted to have forest cover less that seven metres in height (estimated to be 32 years old) at any one time.

- **Very visually sensitive zone (Retention Visual Quality Objective)** (3,156 hectares)
  Maintenance of scenic landscapes is a management priority in this zone. Road construction and logging are planned and implemented to minimize visual impacts.

  Recent studies have shown that, after harvesting, regenerated trees that are five metres tall create acceptable viewscapes. Based on this information, no more than 16 per cent of this zone is permitted to have forest cover less than five metres tall (estimated to be 25 years old) at any one time.

- **Somewhat visually sensitive zone (Partial Retention Visual Quality Objective)** (37,439 hectares)
  The maintenance of scenic landscapes is still a management priority, but some harvesting is possible. A maximum of 25 per cent of this zone is permitted to have forest cover less than five metres tall at any one time.

- **Wildlife zone** (20,162 hectares)
  This zone includes areas of white-tailed deer and mountain caribou winter range. It is important that forest cover is maintained to reduce snow depth for these species during the winter. A complex set of forest cover guidelines were developed for this zone (*TSAR* pages 59-60).

- **Integrated management zone** (125,618 hectares)
  This zone covers all areas within the timber harvesting land base not specifically assigned to another zone. To meet integrated resource management requirements, particularly for watersheds, no more than 49 per cent of this zone may have forest cover below nine metres tall (estimated to be 38 years old) at any one time.

Note: In the *TSAR* this zone is called the Timber Zone because this is where most timber harvesting occurs.

Current practices

The current forest management practices that are approved and implemented in these zones are briefly described here. These practices are in addition to the forest cover requirements previously described for each zone. For more detailed information, readers are encouraged to read the *Timber Supply Analysis Report* (page 9 and Appendix A) or review the information compiled for that analysis.

Wildlife/biodiversity - Riparian areas are protected with non-harvesting buffers on each side of streams. Machines are not permitted adjacent to watercourses. Migration corridors are protected in critical habitat areas.

Watersheds - Harvesting is restricted in watersheds used to supply domestic water. Detailed soil and terrain surveys are undertaken in the most sensitive watersheds to identify areas at risk for landslides or sedimentation. Domestic intakes are protected.

Basic silviculture - British Columbia laws require that areas that are harvested and expected to produce timber in the future must be reforested with ecologically acceptable species within a specified time frame. The typical silvicultural practice is to clearcut harvest, prescribed burn if needed, plant with a mix of species and brush manually.

Harvest age - Minimum harvest ages depend on tree species and location, varying from 70 years for lodgepole pine on good growing sites to 140 years for spruce on poor growing sites.

Soil conservation - Harvesting layout follows provincial guidelines. Some 10.1 per cent of the area that has already been logged was deducted from the timber harvesting land base for roads, skid trails and landings that have become non-productive. For the timber supply analysis, it was assumed that 8.9 per cent of future harvested areas will become non-productive to accommodate roads, skid trails and landings, and will not be reforested.

Silvicultural system - Clearcutting is the silvicultural system presently used for most of the harvesting in the Arrow Timber Supply Area. There is, however, considerable public pressure to do more partial cutting. This option may not be appropriate given the common mixtures of commercial tree species in the Arrow Timber Supply Area and the amount of root disease in these forests.

Cutblock layout - Most clearcut blocks presently being approved in the Arrow Timber Supply Area are under 20 hectares in size. Salvaging pest and fire damaged stands, or using partial cutting systems, may result in blocks that exceed this size.

The areas left between harvested blocks are proportional to block size (with a minimum width of 300 metres) and designed to accommodate wildlife movements and maintain ecosystem connectivity. Cutblock size may be further limited in wildlife winter ranges and visually sensitive areas.

To meet reforestation and wildlife hiding cover requirements, areas in all zones are scheduled to be harvested in at least four separate entries, with a maximum of 25 per cent of the area removed in each entry, and at least 17 years (i.e., the average time required for regeneration to reach a height of three metres) between entries.

Timber utilization - Within cutblocks, all timber of commercial species that meets or exceeds the following size limits and is suitable for lumber or pulp chips must be used:

- 12.5-centimetre diameter at chest height for lodgepole pine and whitebark pine; and,
- 17.5-centimetre diameter at chest height for all other species.

(An exception is for Small Business Forest Enterprise Program sales where, in most cases, all species greater than 12.5-centimetre diameter at chest height are used.)

Protection - Forest losses due to wildfire, insects, diseases and blowdown (trees that are blown over by wind) are minimized as much as possible. An average annual loss of 34,259 cubic metres is assumed from the following sources:

- 7,332 cubic metres to fire,
- 12,956 cubic metres to insects,
- 2,821 cubic metres to blowdown;
- 6,150 cubic metres to diseases (primarily white pine blister rust); and,
- 5,000 cubic metres of timber left on cutovers for wildlife habitat.

Due to lack of data, no allowance was made for losses due to root rot diseases. Recent pest surveys indicate that a substantial portion of the Douglas-fir forests in the timber supply area are infected with root rots. This disease could significantly impact the long-term timber supply, and this impact could be even greater if partial cutting, which promotes the rate of infection and spread of the disease, is increased substantially.

Timber supply forecast and impacts

Timber supply forecast

To complete a timber supply analysis for the Arrow Timber Supply Area, a computer model was used to attempt to generate a base case* timber supply forecast that met each of the following conditions:

- it maintained the current allowable annual cut for as long as possible;
- it reduced the harvest within a defined range, usually eight to twelve per cent per decade, until the long-run sustainable level was reached; and,
- it maintained harvest levels at or above the predicted long-term harvest level.

It is important to note that the timber supply forecasts presented in the analysis report and in this paper do not represent either a short-term allowable annual cut determination or a long-term strategy to adjust harvests to sustainable levels. These forecasts are part of the information that will be used by the chief forester to determine the allowable annual cut for the next five years.

As Figure 7 illustrates, the base case forecast for the Arrow Timber Supply Area, produced using the best information available at the time of the analysis (1992), indicates that the present allowable annual cut cannot be maintained over the long term. Within 100 years the timber supply from the Arrow Timber Supply Area is projected to decline to the long-term sustainable level of 422,000 cubic metres per year. This base case forecast indicates that the present allowable annual cut can be maintained for 70 years, followed by a 10 per cent reduction every 10 years until the long-term sustainable harvest level is reached.

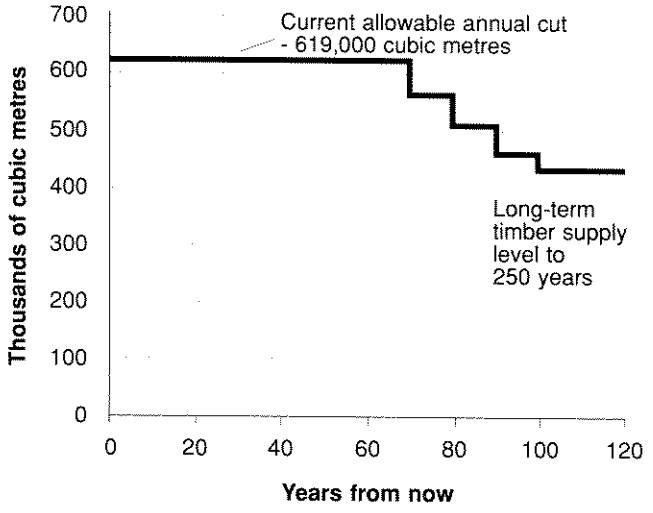

Figure 7. Base case timber supply forecast

There have been questions about why the current allowable annual cut in the Arrow Timber Supply Area is closer to the long-term timber supply level than in some adjacent timber supply areas. This is principally because the allowable annual cut, when it was initially set for the Arrow Timber Supply Area, largely depended on the amount of mature timber that was available in the area. Because much of the forested area had been burnt in the last 100 years, mature timber was limited, resulting in a lower initial allowable annual cut.

The base case is not the only pattern that can be chosen to reduce the timber supply in the Arrow Timber Supply Area. Several alternatives exist for the chief forester to adjust the short-term allowable annual cut as part of a strategy to achieve the long-term harvest reduction:

- the allowable annual cut could be maintained for a longer period, with larger reductions in the future;
- small reductions could be implemented now, with larger reductions in the future;
- a consistent level of reduction could occur throughout the transition period; or,
- large reductions could be made now, with smaller reductions in the future.

Impacts of the base case timber supply forecast

Environmental concerns

B.C. Environment staff support many of the current management practices used to protect watersheds and wildlife habitat in the Arrow Timber Supply Area. However, they are concerned that the following practices were not completely reflected in the base case analysis. Taking these practices into account in the analysis might alter the timber supply forecast over the short and long term.

- Riparian areas and streamside management zones where harvesting is restricted were not deducted from the land base.
- The old-growth forest requirement for caribou winter ranges does not appear to be adequate in the timber supply analysis. Depending on the habitat class, recent guidelines require 40-50 per cent of the forested area within a defined management unit to be maintained as old growth.
- Networks of forested ecosystems have been established to protect old growth in representative ecosystems across the landscape, and to provide connections between these habitats. Biodiversity guidelines are also in place. These practices were not included in the timber supply analysis, yet both may affect the short-term timber supply.
- The practice of retaining trees specifically for wildlife use is not adequately considered in the base case and may have both short- and long-term effects on timber supply.
- Forest cover guidelines for watersheds are presently being refined. A number of changes are likely in the near future, all of which appear to be more restrictive on timber harvesting than those used in the timber supply analysis.
- The requirement that large pieces of woody debris be left on cutover sites for long-term biodiversity has not been included in the analysis.

Community impacts

In the *Socio-Economic Assessment* it is assumed that employment and income will decline approximately in proportion to the decline in timber supply over time. Thus, in the base case, the first employment impacts are projected to occur after 70 years. It is difficult to predict the nature of the forestry labour force so far into the future and therefore to assess the impact of this decline.

In 100 years, when the long-term sustainable timber supply level is projected to be reached, about 190 person-years of direct forestry employment are projected to be lost in the timber supply area, resulting in a reduction in after-tax income of about $6.4 million (*SEA* page 5-3).

Provincial impacts

If the timber supply was reduced to the long-term level projected in the base case, a total of 505 direct and indirect person-years of employment could be lost province wide (*SEA* page 5-5). This could also result in total provincial government revenues declining from the present $14.5 million to $9.8 million (*SEA* page 6-2).

Examining critical factors

This section identifies critical factors that require special consideration during the allowable annual cut determination for the Arrow Timber Supply Area.

When the information for the timber supply analysis was collected in 1992, there were concerns over uncertainties in some of the information. The potential impact of these uncertainties on the timber supply forecast was tested by changing the values for certain critical factors in the analysis. Some of these factors changed the timber supply forecast greatly, particularly in the short term.

Since the analysis, local Forest Service staff have further investigated these assumptions, as well as other critical factors. Their perspectives are outlined in the following discussion. Other factors in the analysis were tested and are discussed in the *Timber Supply Analysis Report* but were not considered critical to this review and therefore are not included in this discussion paper.

The chief forester must carefully evaluate this information to determine the allowable annual cut and identify where improved information is needed for the next timber supply review. We encourage you to do the same.

Critical factors that indicate a reduction in short-term timber supply from the base case

- **Ongoing public planning processes to define acceptable harvesting practices in the watershed and visual quality zones**
  Approximately 33 per cent of the timber harvesting land base in the Arrow Timber Supply Area is located within the watershed and visually sensitive zones. These zones contain a similar proportion of the mature timber volume in the timber supply area.

  Due to the range of highly valued forest resources in these zones, extensive public processes have been launched to develop timber harvesting plans that are acceptable to the local

public. Since the 1960s, Forest Service staff have worked with local residents to develop acceptable practices for these zones. As some of the local public have long been opposed to timber harvesting, some of these processes continued for as long as 15 years to date.

Approximately 10 plans have been prepared in the last 10 years that permit some timber harvesting in the less contentious parts of these zones. This harvesting accounted for approximately 19 per cent of the timber volume cut in the timber harvesting land base during this period, much lower than the 33 per cent of the land base that these areas cover. Currently there are eight planning processes underway in the area including a sub-regional planning process fostered by the Commission on Resources and Environment.

While these planning processes have continued, timber harvesting has had to be concentrated in other portions of the Arrow Timber Supply Area. For several years, Forest Service staff have experienced difficulty locating timber to meet the current allowable annual cut while respecting these planning deferrals and implementing integrated resource management practices within the areas that are being harvested. B.C. Environment staff have noted that concentrated harvesting in the more remote, high-elevation sites is causing conflicts with wildlife such as grizzly bears, caribou and mountain goats.

The outcome of these planning processes—when the processes will be completed, and which practices will be acceptable—cannot be predicted at this time.

It is likely that these processes will take many more years to complete. The impact of deferring harvesting in the meantime is illustrated in Figure 8 (*TSAR* page 34).

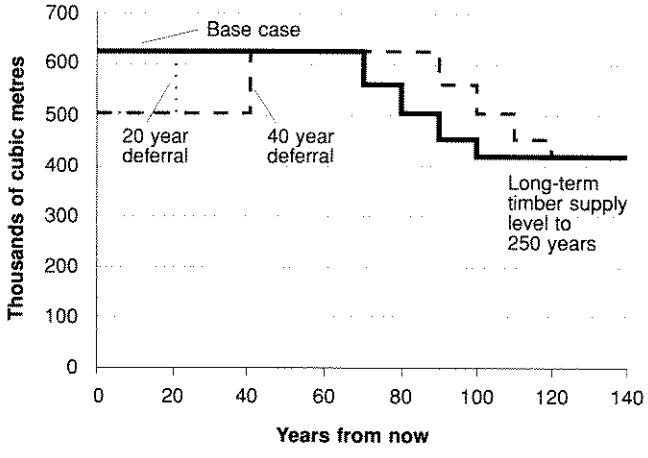

Figure 8. Impacts of deferred harvesting in the watershed and visually sensitive zones

It is possible that acceptable plans will be developed that permit some timber harvesting in these areas, but it seems likely that these plans may greatly limit the amount of timber harvesting that is permitted. This will increase the forest cover requirements compared to those used to produce the base case forecast. The impact on the timber supply of different forest cover requirements in these zones is illustrated in Figure 9 (*TSAR* page 34).

Based on plans that have been accepted in other areas, Arrow Forest District staff believe that the forest cover requirements likely to be acceptable to the public in this area are best represented by the 15 per cent tightening of forest cover requirements (for these zones) in this figure.

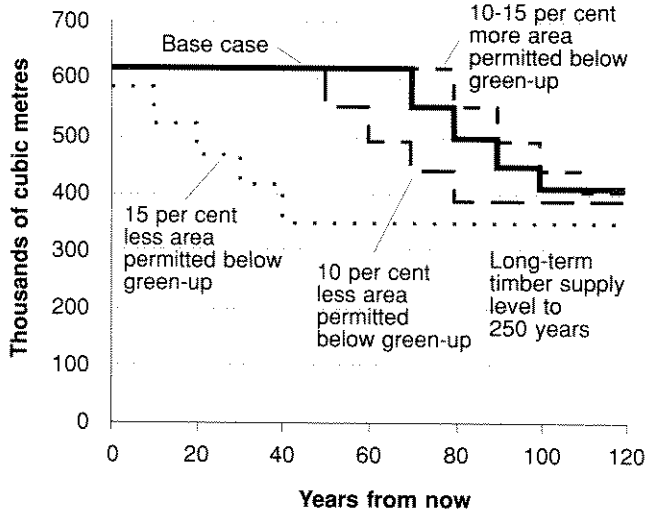

Figure 9. Impacts of changes in the forest cover requirements for the watershed and visually sensitive zones

Another possible outcome of these planning processes is that land-use decisions will be made that will not permit any timber harvesting in some of these areas, resulting in a reduction in the timber harvesting land base. The effect of this outcome on the short- and long-term timber supply would depend on the amount of area that is removed from the land base.

The timber supply review does not consider unresolved land-use decisions, such as those described above, because these decisions rest with Cabinet. In this allowable annual cut determination, the chief forester will consider the impacts of changes in the forest cover guidelines and continued deferral of harvesting as previously described.

- **Length of green-up periods**
  In all management zones, blocks adjacent to existing cutovers are not available for harvest until a "green-up" height of three metres is attained to

provide hiding cover for wildlife. Arrow Forest Service staff have found that, due to brush competition, growth is often slower than was predicted in the information used for the base case forecast. The impact of slower green-up was examined in the timber supply analysis and is illustrated in Figure 10 (*TSAR* page 29).

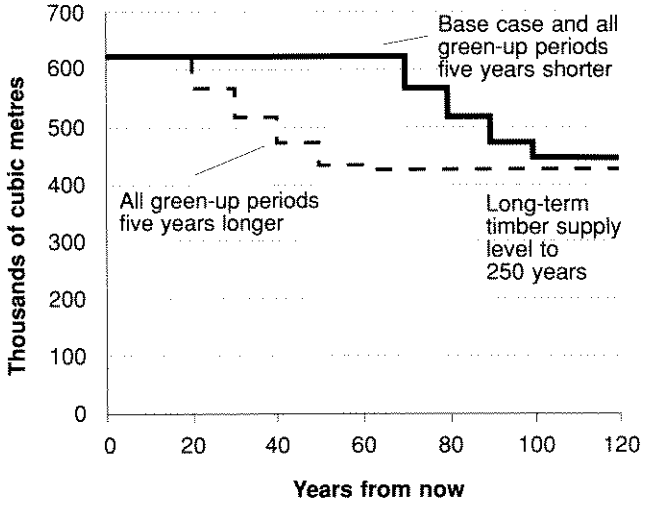

Figure 10. Impact of changes in the green-up period

Although the Forest Service has implemented an extensive brushing program, successful regeneration of many of these sites is both biologically difficult and very expensive. In spite of the brushing program and more prompt regeneration in recent years, significant uncertainty remains as to the time required for appropriate green-up.

- **Limited availability of mature forest for second and future harvesting passes**
  In the timber supply analysis it was estimated that the mature timber in the timber harvesting land base could be removed in four separate entries, with a maximum of 25 per cent of the area harvested in each entry and at least 17 years (estimated time for regeneration to reach three metres tall) between entries.

  This strategy has become difficult to implement, particularly in the integrated management zone where much of the mature timber is located in reserve strips between previously harvested cutblocks that are not yet "greened-up." Arrow Forest Service and B.C. Environment staff have found that less than 25 per cent of the mature timber is available for harvesting if the guidelines for protecting non-timber resources such as wildlife, water and recreation are met. A five-pass system, where less area is harvested in each entry, may be necessary in these areas, restricting the availability of timber in the short term (Figure 11) (*TSAR* page 30).

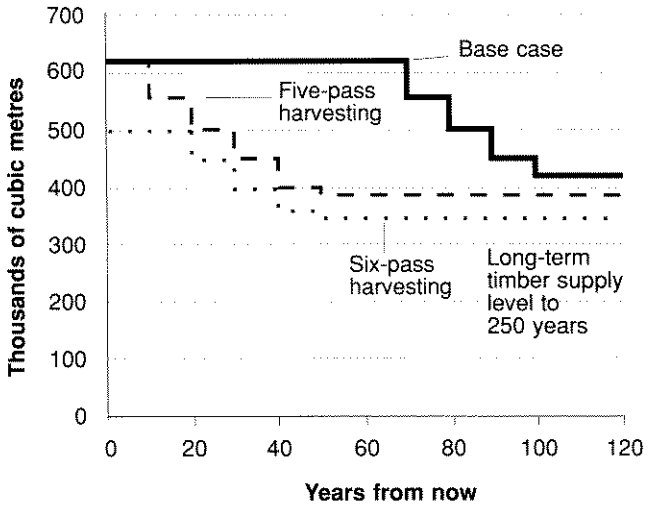

Figure 11. Effects of a five-pass harvesting system

- **Protecting riparian habitats**
  In the Arrow Timber Supply Area, current practices for riparian zones require restricted use of machinery along watercourses and streamside reserve strips. In the timber supply analysis, area was not subtracted from the timber harvesting land base for the protection of riparian habitats since the necessary information was not available at the time.

  Sample mapping projects indicate that about two to four per cent of the timber harvesting land base is occupied by riparian areas and streamside management zones that should be removed from the timber harvesting land base.

- **Integrated resource management practices implemented since the information for the timber supply analysis was prepared**
  The information for the timber supply analysis is based on management guidelines that were being followed in the Arrow Timber Supply Area in the fall of 1992. Many changes have occurred since then, particularly in how the forest is managed to protect biodiversity, wildlife species like mountain caribou that depend on old growth, and water resources.

  Some old growth must now be retained within the timber harvesting land base to protect biodiversity and old-growth dependent species.
  - Field identification of a network of forested ecosystems to protect biodiversity is now required by the Arrow Forest District as part of timber harvesting development planning. The area removed from the land base for forest ecosystem networks will vary from drainage to drainage. In one portion of the Arrow Timber Supply Area, a nine per cent reduction in the timber harvesting land base was required for forest ecosystem networks.

- B.C. Environment will not approve timber harvesting development plans that do not meet the old-growth requirements specified in their caribou guidelines. The impact of these old-growth requirements was tested in the timber supply analysis and resulted in the current allowable annual cut being maintained for only 40 years rather than 70 years as in the base case (*TSAR* page 31).

In the timber supply analysis it was estimated that 5,000 cubic metres of mature timber would be left on cutover areas annually to provide wildlife habitat. B.C. Environment staff are concerned that this amount does not represent current practices. They believe that current practices result in at least twice as much volume being left than was assumed in the timber supply analysis. In addition, no allowance was made for leaving coarse woody debris on the ground, which may have some effect on the volume of timber that can be recovered from a site.

Recent changes to guidelines for managing community watersheds include increasing the green-up height from seven to nine metres, and specifying that the maximum area that can be harvested at one time be calculated for smaller drainage subunits. These changes have not been included in the timber supply analysis, but could significantly reduce the short-term timber supply (see Figure 9).

- **Uncertainty regarding the availability and timber volumes in the existing mature forests**
Approximately 20 per cent of the oldest forests in the Arrow Timber Supply Area are composed of hemlock, cedar and balsam, and include many trees that are decayed and unmerchantable. An initial sample of harvested areas indicates that the actual timber volumes for these forests may be 10-15 per cent lower than those used in the timber supply analysis.

In addition, in the base case forecast, it was assumed that the oldest and highest volume forests would be harvested first. For example, in the first 10 years the average harvest age is 234 years (*TSAR* page 17). In reality, operational constraints limit access to these forests so that much of the harvest is taken from younger forests.

Because less merchantable timber is expected from the older forests, and much of the harvest must come from younger, lower volume areas, more hectares must be harvested each year to provide the allowable annual cut. This is not always possible because integrated resource management objectives limit the number of hectares that are available for harvesting at one time.

A test of the impacts of changing the estimates of timber volumes in mature forests indicated that a 10 per cent reduction in these estimates would result in the drop in timber supply occurring after 40 years rather than 70 years as in the base case forecast (*TSAR* page 26).

- **Combined impacts**
Each of the critical factors listed may negatively impact on the timber supply. In some cases these factors may be additive—their impacts are not linked or interrelated; in other cases their combined impacts may be greater or less than simple addition would indicate. Arrow Forest Service staff believe that the risk of these factors occurring together is high, requiring an examination of their combined impacts.

Opportunities to partially offset reductions in timber supply

- **Increasing the growth rate of regenerated forests**
Few regenerated forests have grown to maturity in the Interior of British Columbia, making it difficult to estimate the amount of merchantable wood we can expect to harvest from these forests. There are opinions that, with planting and stand tending practices such as juvenile spacing and fertilization, the growth rate of these regenerated areas will be higher than the estimates used in the base case analysis. This could result in an increase in the short- and long-term timber supply.

However a test of the possible impacts of a 25 per cent increase in the growth rate of regenerated stands in the Arrow Timber Supply Area did not show this result. The long-term timber supply did increase, but the short-term supply was unchanged (*TSAR* page 24).

- **Increasing the timber harvesting land base**
One of the first steps in a timber supply analysis is to define the area that is feasible and economical to harvest and reforest—the timber harvesting land base. It has been suggested that, with alternative harvesting systems and a possible increase in timber values as wood supplies become limited, more of the forest in the timber supply area will be economical to harvest in the future. This could lead to an increase in the short- and long-term timber supply.

In the Arrow Timber Supply Area, some areas with mature forest were not included in the timber harvesting land base, such as excessively steep and/or difficult to access sites, highly erosion-prone areas, high-elevation areas that are difficult to regenerate, lower-elevation sites of low productivity, and deciduous and poor quality

hemlock and balsam types. However, based on current harvesting practices, Arrow Forest Service staff believe that harvesting opportunities in these areas are very limited.

- **Increased utilization of small diameter stems**
  Current management practices require that all timber of commercial species that meets or exceeds specified size limits and is suitable for lumber or pulp chips must be utilized from within cutblocks. It is common for the minimum size requirements for lodgepole pine to be much smaller than for other species (12.5 centimetres at chest height for lodgepole pine and 17.5 centimetres for other species).

  In the Arrow Forest District, Small Business Forest Enterprise Program operators are required to use the smaller specifications for all species. This results in more timber volume being extracted from cutover areas. If implemented throughout the timber supply area, this move to smaller specified size limits could impact short- and long-term timber supply.

  Before this standard is implemented widely an examination of how it would impact biodiversity by reducing the amount of woody debris that is left on cutover areas is needed.

- **Commercial thinning**
  Fires in the Arrow Timber Supply Area have resulted in large areas of second-growth forests (see Figure 4). A commercial thinning program in these areas might partially offset possible reductions in timber supply and employment. In particular there may be opportunities to recover white pine timber before it is infected by blister rust (particularly in the northern part of the timber supply area) and to commercially thin some of the lodgepole pine forests created by fires.

  Many of these forests are located on gentle slopes that are suitable for commercial thinning. However the impact of widespread commercial thinning on the short- and long-term timber supply must be examined before large programs are implemented. Commercial thinning may reduce long-term timber supply, but this may be offset by the improved quality and value of the remaining trees. Other site-specific factors, such as the presence of root rots which could be made worse by commercial thinning, must be considered.

The ability of local communities to adapt

Stable forest sector employment over the short term would benefit communities in the timber supply area as it would provide a secure base for economic diversification in anticipation of future timber supply reductions. Immediate reductions in the harvest level would compound the jobless rate in the area, which is already relatively high, and contribute to population loss and social problems (*SEA* page 7-1).

To a large degree, the impact on local communities due to the projected long-term loss of forestry jobs will depend on alternative economic strategies that are adopted. Opportunities exist within the forestry sector to reduce employment losses by encouraging value-added manufacturing in high employment milling operations, by harvesting stands that are not currently considered merchantable, and through applying more labour-intensive alternative harvesting systems and silviculture treatments. Additional opportunities are expected to be created through the Forest Renewal Plan. The challenge for each community is to develop a strategy to minimize the impact of long-term timber supply adjustment.

Factors to be examined in other planning processes

Other initiatives such as the Forest Practices Code, the Protected Areas Strategy, and the Commission on Resources and Environment (CORE) have the potential to change land-use designations and forest management practices in the Arrow Timber Supply Area, which may impact future timber supply. The Kootenay regional planning processes of the Commission on Resources and Environment, and their sub-regional process in the Slocan Valley, which is 25 per cent of the Arrow Timber Supply Area, are expected to provide direction for government decisions.

It is also expected that a Land and Resource Management Plan will be implemented in the Arrow Forest District some time after this Timber Supply Review is completed. During Land and Resource Management Planning processes, the public and interest groups work together with government agencies to define future management objectives and practices for public forest land. New management practices in the Arrow Timber Supply Area will be assessed and approved through this Land and Resource Management Planning process.

If these changes significantly affect the timber supply in the Arrow Timber Supply Area, these impacts will be assessed in the next timber supply review within five years.

Arrow Timber Supply Area

Your input is needed

The allowable annual cut is an important decision requiring well-informed and thoughtful public input. We ask you to answer the questions on the response form at the back of this paper. We encourage you to add any additional comments you feel are relevant.

If you prefer, additional comments or a detailed submission may be written on separate pages. Feedback is welcomed on any aspects of this *Discussion Paper,* the *Timber Supply Analysis Report,* the *Socio-Economic Assessment* and other topics related to the timber supply in the Arrow Timber Supply Area. Forest Service staff would be pleased to discuss questions or concerns that you may have that would help you prepare your response.

Please mail the completed questions and your comments to the district manager at the address below. Your comments will be accepted until January 6, 1995.

You may identify yourself on your response if you wish. If you do, you are reminded that responses will be subject to the *Freedom of Information and Protection of Privacy Act* and may be made public. If the responses are requested, personal identifiers will be removed before the responses are released. A summary of public comments will be available from the district manager.

Ken Arnett
District Manager
Arrow Forest District
845 Columbia Avenue,
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Phone: (604) 365-8600
Fax: (604) 365-8568

Arrow Timber Supply Area
Timber Supply Review

Discussion Paper Response Form

The *Forest Act* requires the chief forester to consider the following factors to determine the allowable annual cut for timber supply areas and tree farm licence areas from:

- the rate of timber production that can be sustained from the area;
- the short and long-term implications to the province of alternative rates of timber harvesting from the area;
- the nature, production capabilities and timber requirements of established and proposed timber processing facilities;
- the economic and social objectives of the Crown for the area, the general region, and the province, as expressed by the minister of forests; and,
- abnormal insect or disease infestations and major salvage programs planned for the timber on the area.

The technical reports that have been prepared for the timber supply review of the Arrow Timber Supply Area provide information on these factors. We welcome further input from the public to ensure the best available information is used in the allowable annual cut determination. Please provide your comments on this form, or in another format. Input will be accepted until January 6, 1995.

A. Economic and social objectives

Please use the space below to provide comments regarding the economic and social objectives you believe should be considered in determining the allowable annual cut for the Arrow Timber Supply Area.

B. Technical forestry factors and impacts of alternative rates of harvest

Please use the space below to provide any information which you believe may assist the chief forester in considering the technical forestry factors and impacts of alternative rates of harvest that must be considered to determine the allowable annual cut for the Arrow Timber Supply Area. Further information on the critical technical factors outlined on pages 8 to 12 in this paper would be most helpful.

Which community sector listed below best describes your interests?

- ☐ local business
- ☐ outdoor tourism
- ☐ general public
- ☐ First Nation
- ☐ timber industry
- ☐ environmental conservation
- ☐ other (please define) _____
- ☐ government agency (please identify)

Name (optional) _____

Address (optional) _____

Mail your comments to:

Ken Arnett
District Manager
Arrow Forest District
845 Columbia Avenue,
Castlegar, B.C., V1N 1H3
Phone: (604) 365-8600
Fax: (604) 365-8568