MANAGEMENT PLAN
KANANASKIS RESEARCH FOREST

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HISTORICAL INTRODUCTION

The Kananaskis Forest Experiment Station is located 52 miles by road west of Calgary, on the east bank of the Kananaskis River about 5 miles south of its confluence with the Bow River.

The research forest lies within the East Slopes Rockies Section (SA.1) of the Subalpine Forest Region (Rowe, 1959) which is a mountain counterpart of the Boreal Forest.

The station was established in 1934 having originally an area of 63 square miles located on both banks of the river, but with several subsequent changes in boundaries the area was decreased to its present size of 23 square miles.

Following establishment of the station, research and forest management cutting activities were conducted on various parts of the forest resulting in changes in composition and structure of some of the original stands. These operations affected about 1,000 acres with the largest portion of the areas treated falling into the categories of empirical thinning and selective cutting. There are no extensive areas of clear-cutting except for 100 acres of over-mature spruce-fir which were cut over in a sawlog operation during the period 1951-53. These operations produced a considerable volume of products including fuelwood, saw timber, poles, piling, pulpwood, mine timbers, fence rails, posts, Christmas trees and landing-strip markers.

A limited road system was developed to service these operations.

There have been no extensive fires within the present boundaries of the research forest since it was established.

GENERAL PHYSICAL DESCRIPTION

Geodetically, the research forest is located at 51° N. latitude and 115° W. longtitude. It lies in a region which had relatively recently undergone extreme geological upheaval prior to being subjected to almost complete glaciation by the Cordilleran Ice sheet during the Glacial Period of the Pliocene Epoch. The altitudinal range within the present boundaries of the research forest is between 4,500 feet and 7,000 feet above sea level with timberline at about 6,500 feet.

A complete range of slope occurs from the level valley bottoms with alluvial deposits to precipitous rock walls with talus footings. The major aspects and drainage systems are north and west but locally all aspects are found.

The climate of the Forest Region is humid, cool temperate. The mean annual temperature is 37°F, the mean frost-free period is 59 days and mean annual precipitation is 27 inches of which 17 inches is rainfall fairly uniformly distributed from April to October inclusive. The mean monthly temperature during the latter period is 48°F.

The extreme topography and the phenomenon of chinook winds cause considerable local climatic variation within small intervals of time and space. These geologic, topographic and climatic variations have produced

even-aged. The major exception occurs in the older stands in which the shade-tolerant spruce and fir are components. Occasionally 2 or 3-aged stands are encountered where ground fires have burned through the older stands producing a small-patch distribution of age classes.

Lodgepole pine is the most widely distributed species (Map No. 1) at all elevations and on all moisture conditions. Spruce occurs in pure stands generally at the higher elevations and along water courses but it is a component in mixed stands on all sites and occurs to varying degrees of density as advance growth in practically all stands.

Douglas fir is in pure and mixed stands of limited area mainly in the northern sector of the forest and sporadically in the southern sector. It has a preference for the drier sites and higher altitudes, occupying shallow lithosols and well-drained fresh soils.

Aspen is found mainly at the lower altitudes on fresh to moist sites. At the higher elevations it usually occurs along stream courses and where it occupies dry sites it has poor form, low vigour and slow growth. Balsam poplar is often associated with aspen but only on the wetter sites.

Alpine fir occurs mainly at the higher altitudes, usually with spruce, although individual specimens can be seen at all elevations down to the valley floor.

The other minor species occur sporadically as single stems or small groups throughout the forest showing ecological site preferences peculiar to the species.

DIVISION OF THE FOREST - MANAGEMENT AND PROTECTION

The total area of the Kananaskis Research Forest is approximately 15,300 acres of which 8,500 acres is watershed protection forest and 6,800 acres constitute the management forest. Of the latter category, 400 acres are in non-productive types.

The protection forest includes areas of extreme topography which generally do not bear commercial forest stands and where the soils would be subject to erosion if denuded. The protection forest boundary separates the areas characterized by steep slopes and higher elevations from those of more moderate topography and lower elevation.

Although some portions of the protection forest produce commercial stands, operating conditions are difficult and rotations would be longer than those on the management forest area. Clear cutting cannot be generally applied in the protection forest and each cutting operation will require an individual plan which will have a substantial experimental component in its design and execution.

A general cutting plan can be prescribed for the management forest where clear cutting is silviculturally preferable, operationally desirable and topographically permissible.

THE MANAGEMENT PLAN - OBJECTIVES

The [illegible] and distribution of forest renewal that would result

from the normal rate of cutting for research and demonstration projects would be insufficient to fully develop the potential of the forest for the future use of those engaged in this work. A management plan is a prerequisite to the progressive diversification and restoration of those parts of the forest not currently in use as project areas and reserves.

The primary objective of the plan is to create forest conditions that will meet the present requirements of the regional staff and that will improve until the full potential of the forest as a research area has been exploited. Coincidental to the attainment of this objective will be the creation of an age class distribution of stands in the classical normal forest concept.

All current research and demonstration areas and other reserves are to be fully protected at all times. New areas for these purposes may be established on any location and at any time and abandoned areas will revert to management forest status.

All planning and operational activities will include provision for the protection of the forest from destruction by fire, disease, insect, wind, water, animal and human factors.

The initial construction of an access road system will be done at a permissible cost and subsequent improvements will be made as required.

Although the economic aspects of cutting on the forest are not the primary consideration, full advantage will be taken of all cost and return factors in forest management operations. This includes all activities,

particularly logging and marketing.

BASIS FOR THE SELECTION OF A CUTTING PROGRAM

The more diverse conditions are on the forest the greater is the probability of fulfilling specific requirements of the regional staff for demonstration and research purposes. Within the limitations imposed on the area by the unchangeable and uncontrollable factors of geography, geology, topography and climate, the variety of conditions that can be produced depends entirely on the manipulation of the cutting program.

A recently completed survey of the management forest to establish silvicultural requirements showed that the condition of the stands on the whole is relatively uniform with no critical disease or insect problems which would require special consideration in a cutting schedule. One major exception is an area of about 250 acres supporting overmature fir-spruce stands in which there is a high incidence of decay, particularly in the fir. It is proposed to reserve this stand for use in a selection cutting program because of its age, species composition and watershed value (Map No. 2). In a few minor instances where stands require early removal, they are wholly or partially slated for early cutting under the plan.

Figure 1 shows the present age-class distribution of the stands on the management forest. Eighty-one per cent of the stands are in the 70- and 100- year age classes while one half of the remaining stands are over-mature spruce-fir types. This age class distribution is not the best for demonstration and research purposes or for sustained yield management. It

the entire cutting program under this plan. Under this regime the number of age-site-species combinations will increase in direct proportion to time elapsed with the greatest number being reached 140 years from the present. At that time about one half of the forest will have been cut over once and the other half twice. Approximately 10,000 acres of forest land will have been clear-cut to provide fourteen 10-year age classes each having 430 to 470 acres fairly uniformly dispersed in 5-chain wide strips throughout the forest.

DIVISION OF THE CUTTING REGIME - TWO STAGES

The cutting regime is divided into two 70-year stages. During the first stage all existing stands in the management forest will have reached maturity and will be cut. The objectives of cutting during this stage will be twofold; firstly to produce the desired distribution of older age classes that is planned for the end of the cutting regime and secondly to provide merchantable stands for cutting in the prescribed cutting periods during the second stage of the regime. The objective of the second stage is to produce the planned distribution of younger age classes at the end of the cutting regime and this is contingent on the fulfillment of the second of the foregoing objectives.

At the beginning of the second stage the assigned cutting periods for specific strips can be adjusted for deviations from the plan that were made during the first stage.

THE CUTTING PATTERN

The cutting pattern selected as the most suitable to achieve the previously stated objectives is a basic 10-chain wide strip oriented at right angles to the major contours in most cases but occasionally parallel to these contours and at right angles to the minor contours. The altitudinally-oriented strips will provide for inter-factor comparisons of stands of the same age class following cutting. The strips are practically all aligned along the primary and secondary compass points.

Each 10-chain strip is designed to contain 2 age classes, each occupying one half the width (5 chains) of the strip and usually having an age difference of 70 years. The two 5-chain strips within each 10-chain strip are termed complementary half-strips.

There are 192 10-chain strips of varying length distributed over the management forest in 27 groups, each group, with 1 or 2 minor exceptions, having strips representative of all cutting periods in the regime. Each group may be considered as a logging unit having a 10-year cutting cycle over the 140-year span of the cutting regime which is equivalent in time to the maximum rotation applied in the plan. At a recurring interval of approximately 10 years a portion of each strip group will be cut over. Where necessary the assigned cutting period of a strip can be transposed, preferably within its own strip group, during the first stage of the cutting regime to meet any contingency that may require such action.

ADVANTAGES OF THE CUTTING PATTERN

Cutting in strips, usually of 10-chain width, has been used in commercial operations in Alberta. It is to be expected that problems will be encountered on the research forest similar to those to be found in commercial operations in the Subalpine Region. Thus the plan will provide for a full-scale simulation of current and probably future commercial clearcutting methods and associated problems, as well as the facilities for research into improvement of the methods and solution of the problems.

The cutting pattern will remove only portions of stands leaving other portions of the same stands for research and demonstration use and concurrently creating additional ecological conditions for these purposes. The advantage of the group organization of strips for research and demonstration purposes is the proximity of a complete series of stands of different age classes.

In addition to fulfilling research and demonstration requirements the cutting pattern incorporates the prerequisites of silviculture, protection, access and other functions conditional to the over-all development of the research forest.

The cutting pattern, essentially a clearcutting method, meets the silvicultural requirements of the major species for regeneration purposes.

Stands that would normally be neglected under a commercial

cutting scheme will either be cutover or treated to meet the plan objectives.

The group organization of cutting strips provides for a regional distribution of age classes within the management forest that will prevent serious disruption of the total age class structure on the area in cases of additions or deletions to the forest produced by boundary changes, fires or other factors.

The cutting pattern, particularly the wide distribution, planned arrangement and high proportion of cutting strips allocated to the first 10-year cutting period, is designed to activate the whole of the research forest on a continuing basis. The road system developed for management purposes in this period will provide broad access to all parts of the forest for research, demonstration, fire-fighting, salvage and stand treatment activities. The strip pattern provides a continuing system of external and internal fire breaks throughout the cutting regime.

APPLICATION AND ADAPTATION OF THE CUTTING REGIME

To attain the planned distribution of age classes strips must be cut within the assigned cutting periods. One half the width of each 10-chain strip is scheduled to be cut in a specific cutting period in the first stage and the other half in a specific period during the second stage. Half-strips cut during the second stage will be undergoing a second cut under the cutting regime. To provide merchantable stands on these half-strips they should undergo their first cut 70 or more years prior to the second cut.

In instances where the stand is not suitable for commercial cutting during the first stage, a decision must be made as to whether or not the stand will produce commercial volume in time for the second cut, either with or without silvicultural treatment. If it is decided that the stand will not be merchantable, due to stagnation, disease or other factors, but the site is capable of producing a commercial stand, then the stand must be removed during the first stage in time to produce a merchantable harvest for the prescribed cutting period in the second stage.

The cutting regime is, however, subject to all relevant silvicultural, economic and operational considerations and must therefore be flexible. In carrying out the cutting program, coordination is required with other operational factors which are concurrently active and which affect the time and place of cutting. These are both internal and external factors and include research programs, demonstration programs, insect and disease problems, fire hazard conditions, possible salvage operations resulting from fire or windstorm, lack of accessibility, changes in stand condition, market conditions for products and the availability of logging operators, equipment and personnel. Some problems in coordination will undoubtedly be encountered and the cutting regime adjusted. These adjustments should not affect the cutting regime in its over-all application because they would be in most instances of a relatively short term nature and would usually involve small areas. By providing a flexible cutting program for the first 70-year stage of the cutting regime and a 10-year cutting period for individual strips, the volume of wood production can be adjusted to meet the existing situation with regard to the availability of markets and logging operators, changes in stand condition,

salvage operations or other factors.

To comply with operational, silvicultural, economic or other management considerations, a strip may be cut in selected sections along its length in different years within its allotted cutting period. To avoid extreme fragmentation of an area, however, the minimum length of strip to be cut or left standing will be set at 5 chains. Because of the flexibility in time of cutting permitted for some half-strips in the first stage of the cutting regime it is possible in one cutting operation to cut over a 20-chain wide strip. Thus cutovers ranging from blocks 5 x 5 chains (2.5 acres) to strips 20 chains wide are permissible under the plan. The usual cutovers will, however, be 5- and 10- chain wide strips.

SILVICULTURAL OBJECTIVES

Clearcutting will be the basic harvesting method.

The silvicultural objectives of management cutting operations in the first stage will be:

1. To produce fully stocked (not overstocked) stands immediately following cutting.
2. To increase the proportion of minor commercial species in the regenerated stands.
3. To treat existing stands where the cost of treatment is returned through sale of the products produced in the course of treatment.
4. To treat regenerated stands where the investment in treatment is

economically warranted on the basis of total financial returns for products over the course of the rotation.

5. To treat existing and regenerated stands for values other than wood fibre production such as insect and disease prevention and control, watershed improvement, wildlife, recreational considerations and fire hazard reduction.

BASIC SILVICULTURAL POLICY

When non-commercial stands presently occur and these stands can be economically converted into commercial stands, the required treatment (thinning, fertilizing, conversion cutting) should be applied. On areas where a commercial stand cannot be produced, the existing stand will be left intact.

Where erosion problems would be created by clearcutting, as on steep slopes and shallow soils over bedrock, the stand would either be left intact or partially cut. The probability of windthrow in the residual stand will be a controlling factor in prescribing partial cutting.

To promote regeneration, scarification of the ground will be carried out as required. To minimize the program of intentional scarification summer logging should have precedence over winter operations as disturbance of the exposed and unfrozen ground surface would be greater. Clear cutting provides for maximum disturbance of the ground since logging activity is concentrated and it also provides a large amount of conebearing

slash. The slash will be lopped and scattered.

Unstocked and understocked cutovers will be artificially regenerated by the most suitable methods as soon as failure of natural regeneration is apparent. Cutovers should be fully stocked within 7 years following logging.

The destruction of advance growth is to be kept to a minimum consistent with practicability in the conduct of logging operations.

To promote a greater component of the minor commercial species in stands following cutting, unrestricted cutting will apply only to lodgepole pine. Restrictions to provide seed sources will be applied to all other species as circumstances require. Generally, except where they occur in pure stands or are in excess of requirements, all other species will be reserved from cutting. Even with a consistent application of this policy a large proportion of the area will regenerate to pure lodgepole pine stands.

There will be no minimum diameter limit imposed on areas being clearcut except that all advance growth will be excluded from cutting. Due to the relatively large proportion of trees in the lower diameter classes, it will generally be required to remove all trees down to 4 inches d.b.h. This provision will result in a greater volume per acre, provide better conditions for ground preparation, planting and other activities and reduce the volume of fuel on cutover areas. The availability of a market for small wood will determine the applicability of the 4-inch d.b.h. rule to commercial sales.

FIRST 10-YEAR CUTTING PERIOD

There are slightly over 1,200 acres of forest allocated for cutting in the first 10-year cutting period. This acreage is on 34 strips distributed throughout all 27 strip groups and constitutes almost 20 percent of the management forest area.

Priority of selection was given to this cutting period to attain the following objectives:

1. To bring out problems that will be encountered when using the clearcutting method in the Subalpine Region.
2. To provide areas for research and for the demonstration of research results on the problems encountered.
3. To take full advantage of the existing road system and to provide a basis for the development of a road system in the first 10 years that will service the whole forest.
4. To provide a system of external and internal fire breaks.
5. To remove stands or portions of stands that are deteriorating.
6. To provide a series of stands that will be ready for harvesting at the beginning of the second 70-year stage of the cutting regime. At this time a re-assignment of cutting periods for some of these stands will be required to produce a balanced age-class distribution.

vehicles to pass. Secondary roads would be of all-weather construction and of 1-vehicle width. Tertiary roads (not shown) would be temporary access roads constructed for all other operational purposes.

Priority in road construction will be based on the greatest long-term benefit for all operational activities. Generally arterial roads into the larger areas that are at present inaccessible will be constructed first.

Road location will take into consideration ease of construction, grade, erosion problems, fire protection requirements and access to scheduled cutting areas. The proposed roads shown on Map No. 3 have been internally connected within areas to arterial routes to provide a minimum of exits onto public roads.

MARKETS

At the present time there is no local market for pulpwood or veneer. The market for fuelwood and mine timbers is limited. A market for sawlogs, poles, posts, and small-wood chipping material for specialty paper products exists within a 60-mile radius of the forest.

The expected development of pulping industries in south-western Alberta and south-eastern British Columbia may provide a market for pulpwood and chips although transportation distances could remain critical.

FOREST PROTECTION

The cutting pattern and access road development set out in the plan will contribute substantially to effective fire prevention and suppression activities on the forest and will also facilitate over-all inspection of the stands for insect and disease conditions.

Fencing will be required along open portions of the forest boundary to exclude ranch stock from the forest and cattle guards (Texas gates) should be erected on the roads leading into the research forest. Exclosures may be required within the forest where wild browsing animals and stray domestic stock could cause undesirable damage to special-purpose areas.

It is planned to construct water holes for fire-fighting purposes where they are needed and a water source is available.

RECREATION

The forest area is used by the public for fishing, hunting, camping, picnicing, hiking and other activities. Suitable facilities and programs will be instituted to adjust the recreational demands on the forest to the basic functions of the area and to promote and develop public interest in the over-all forestry operations of the Department.

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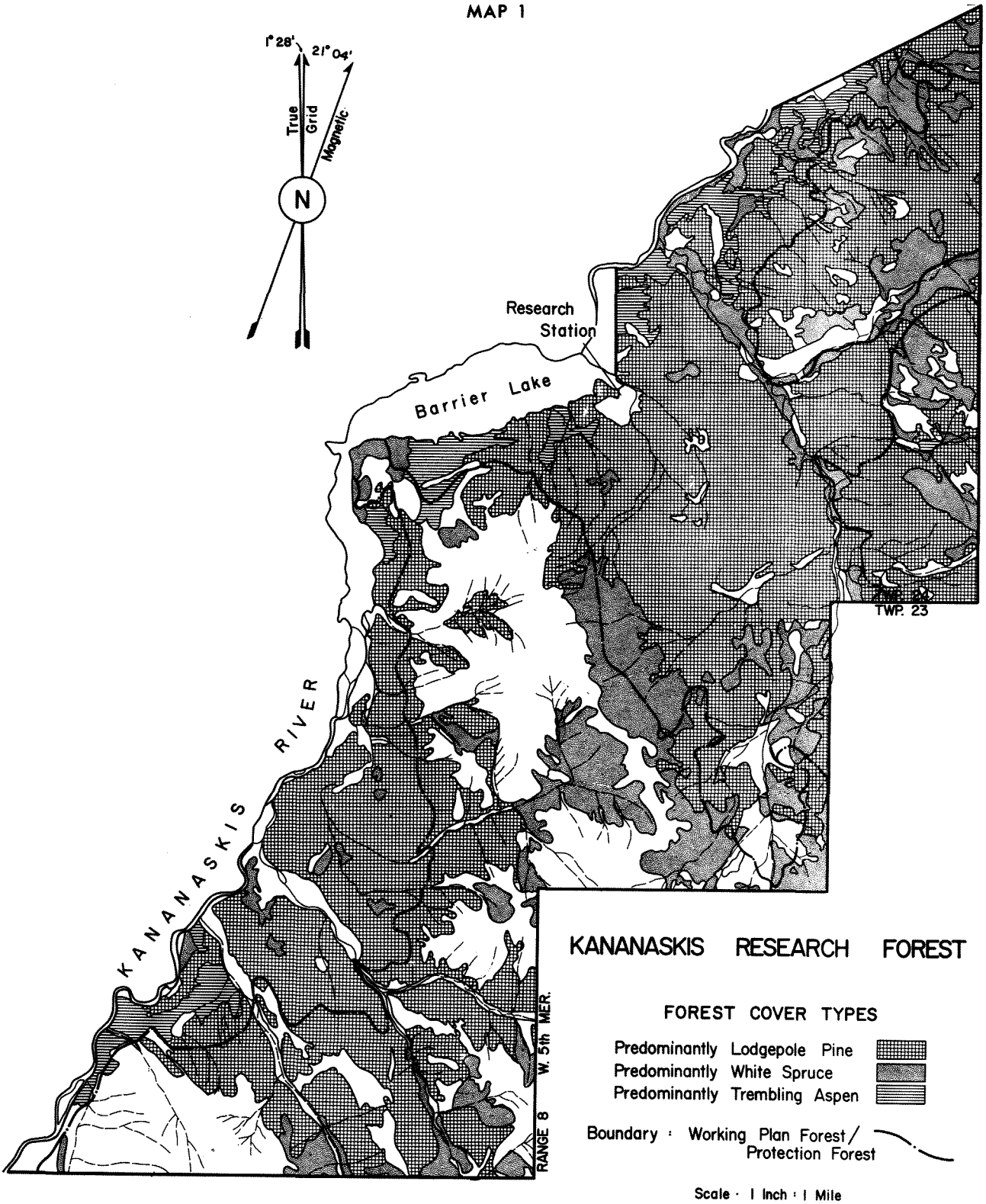
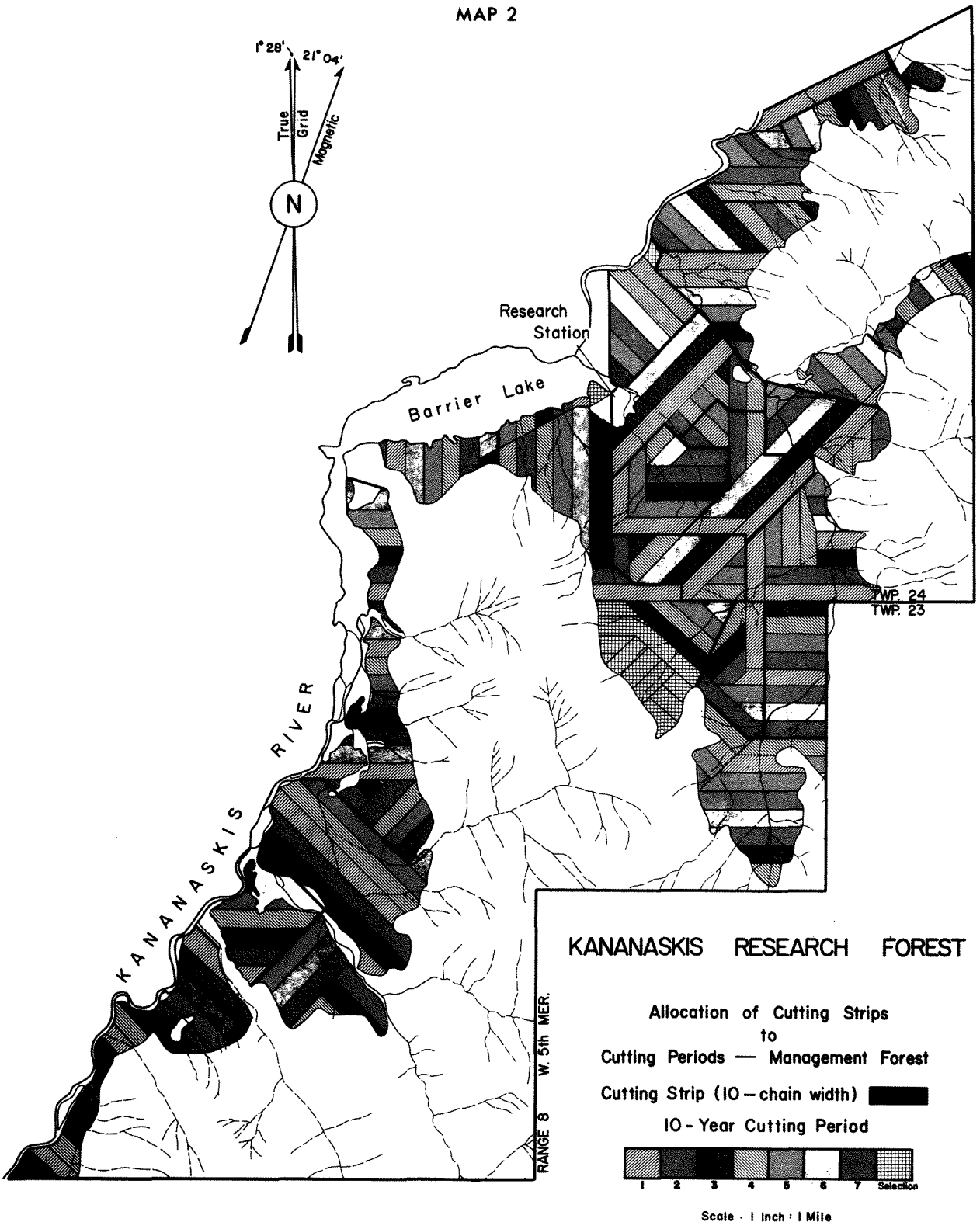
MAP 1


1°28'
21°04'
True
Grid
Magnetic
N
Research
Station
Barrier Lake
TWP. 23
KANANASKIS RIVER
RANGE 8 W. 5th MER.
KANANASKIS RESEARCH FOREST
FOREST COVER TYPES
Predominantly Lodgepole Pine
Predominantly White Spruce
Predominantly Trembling Aspen
Boundary : Working Plan Forest / Protection Forest
Scale · 1 Inch : 1 Mile

MAP 2



KANANASKIS RESEARCH FOREST

Allocation of Cutting Strips
to
Cutting Periods — Management Forest

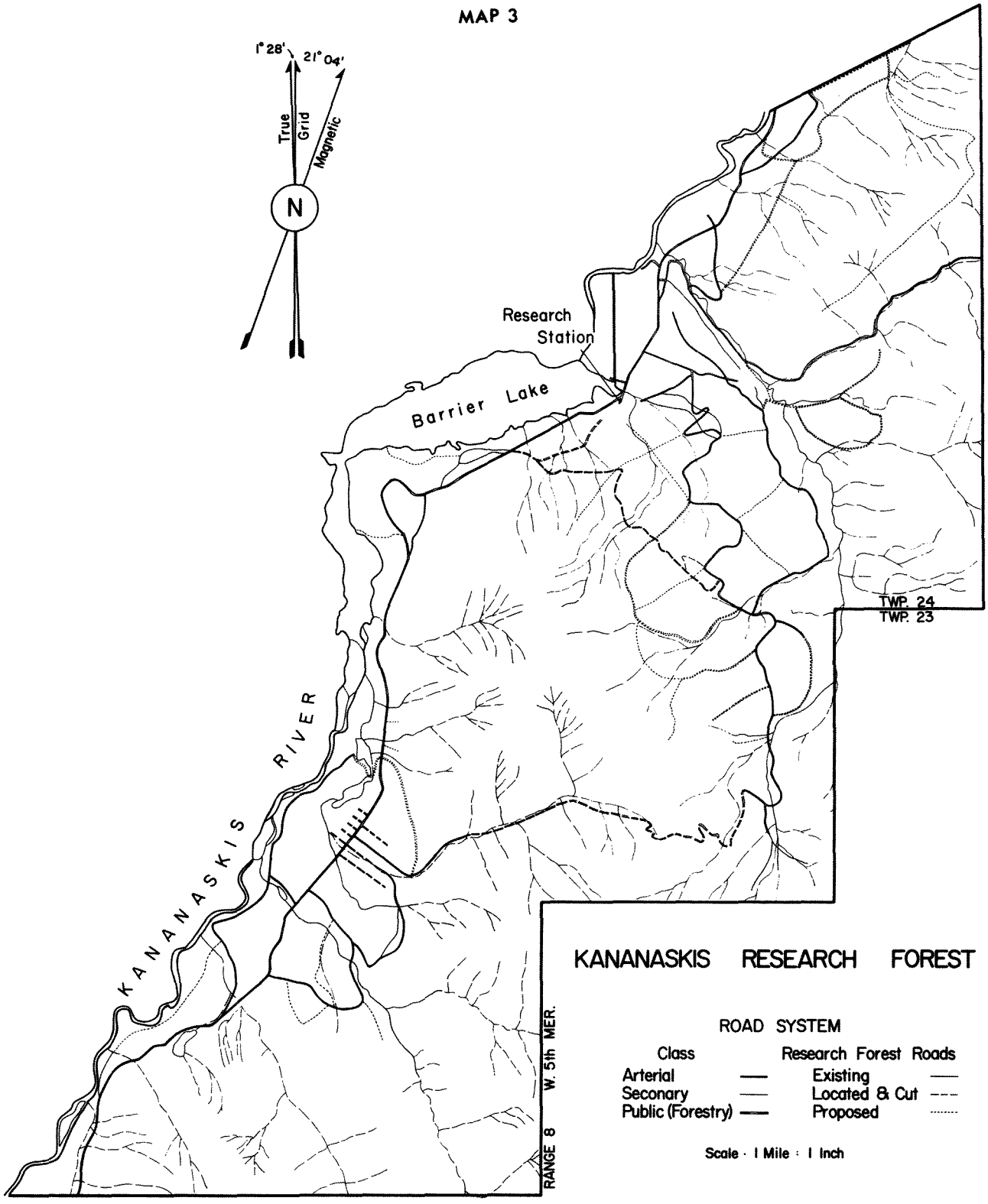
Cutting Strip (10 – chain width)

10 - Year Cutting Period

1 2 3 4 5 6 7 Selection

Scale - 1 inch = 1 Mile

MAP 3



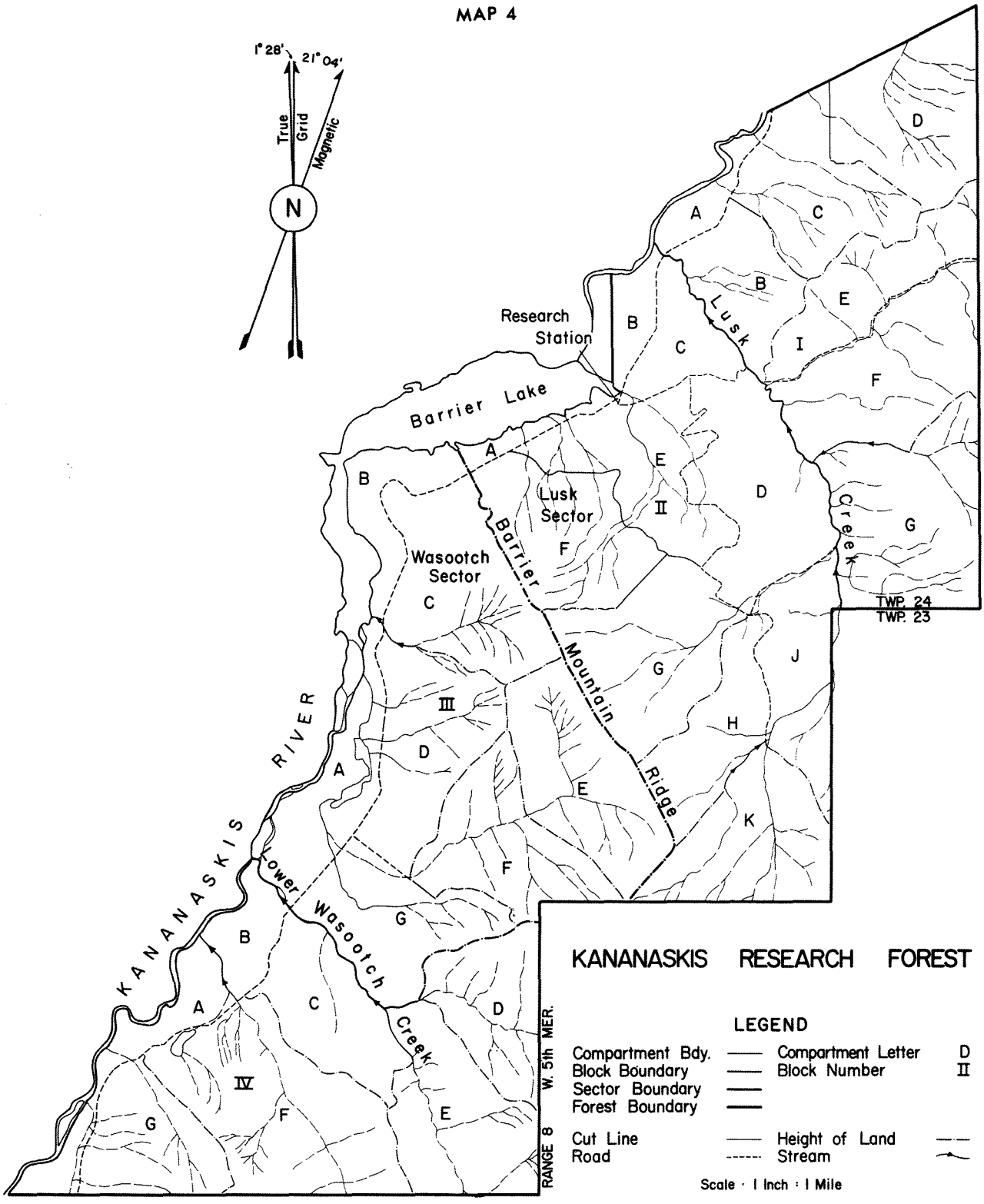
KANANASKIS RESEARCH FOREST

ROAD SYSTEM

Class		Research Forest Roads	
Arterial	——	Existing	——
Seconary	——	Located & Cut	- - -
Public (Forestry)	——	Proposed	.....

Scale - 1 Mile : 1 Inch

MAP 4


1°28'
21°04'
True
Grid
Magnetic
N
Research Station
Barrier Lake
Lusk
Lusk Sector
Barrier
Creek
Wasootch Sector
Mountain
Ridge
KANANASKIS RIVER
Lower Wasootch Creek
TWP. 24
TWP. 23
RANGE 8 W. 5th MER.
KANANASKIS RESEARCH FOREST
LEGEND
Compartment Bdy.
Block Boundary
Sector Boundary
Forest Boundary
Compartment Letter D
Block Number II
Cut Line
Road
Height of Land
Stream
Scale · 1 Inch = 1 Mile

APPENDIX

A Condensed Graphic Illustration Of The Cutting Regime

Figures 2 and 3 illustrate the areas of cutover and subsequent regenerated stands planned for under the cutting regime. Figures 4 - 9 illustrate the areas of presently existing stands that have been cut and the ages of succeeding stands at selected times throughout the cutting regime on a synthesized model area.

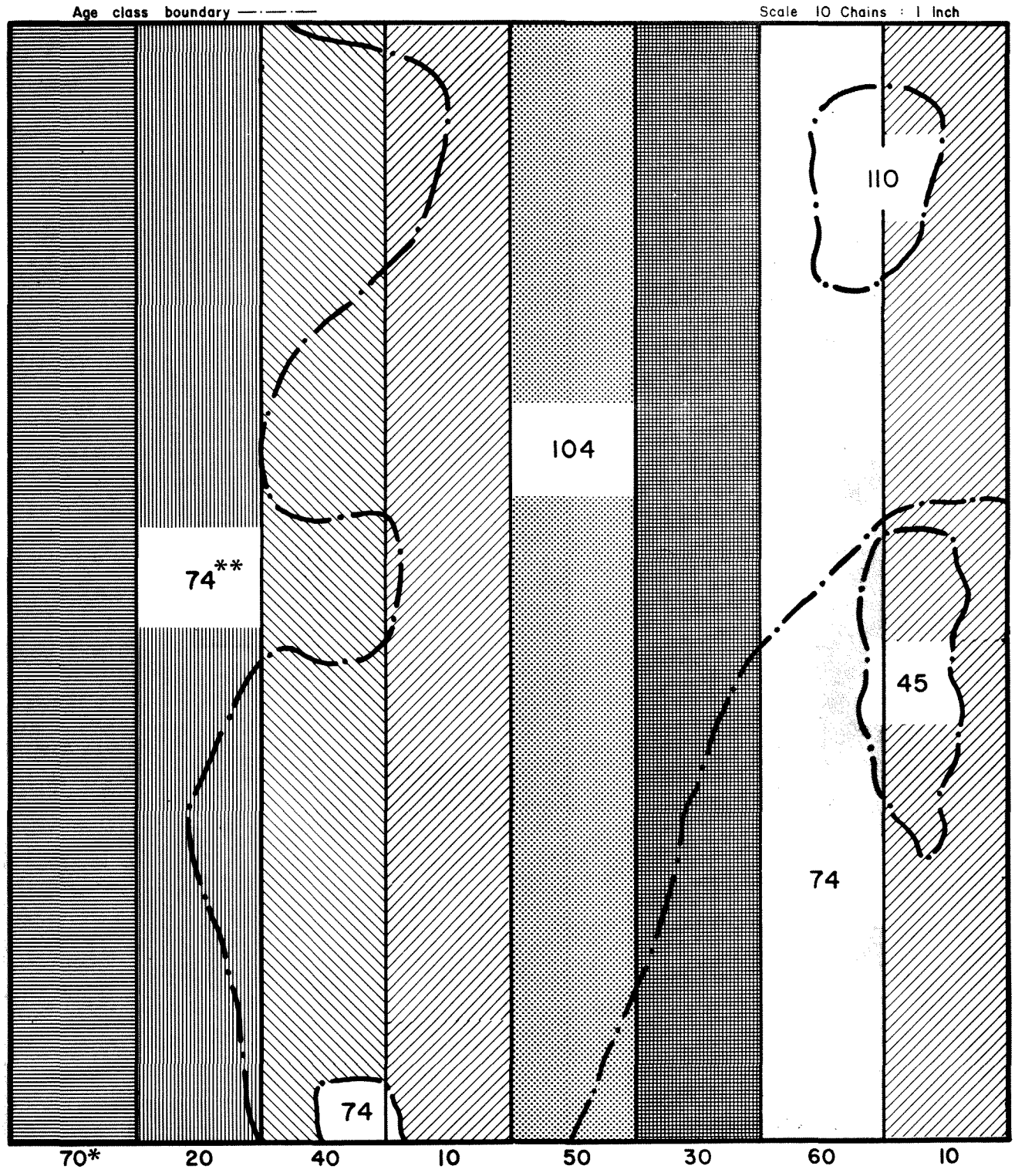


Figure 4. **Ages of stands now existing on a model area.
*Last year of 10-year cutting period counting from the present year.

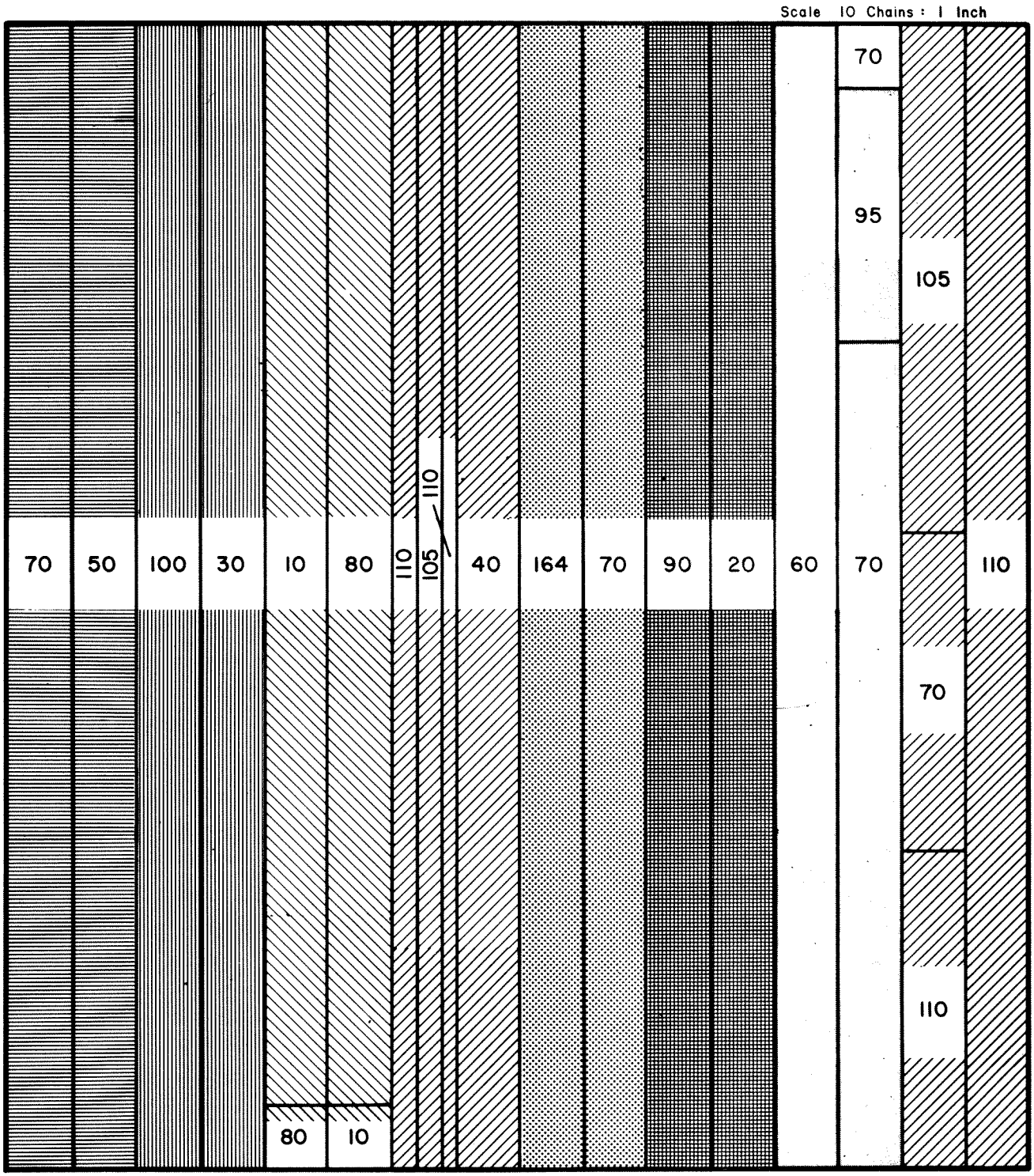


Figure 8. Ages of stands 110 years from now on model area.

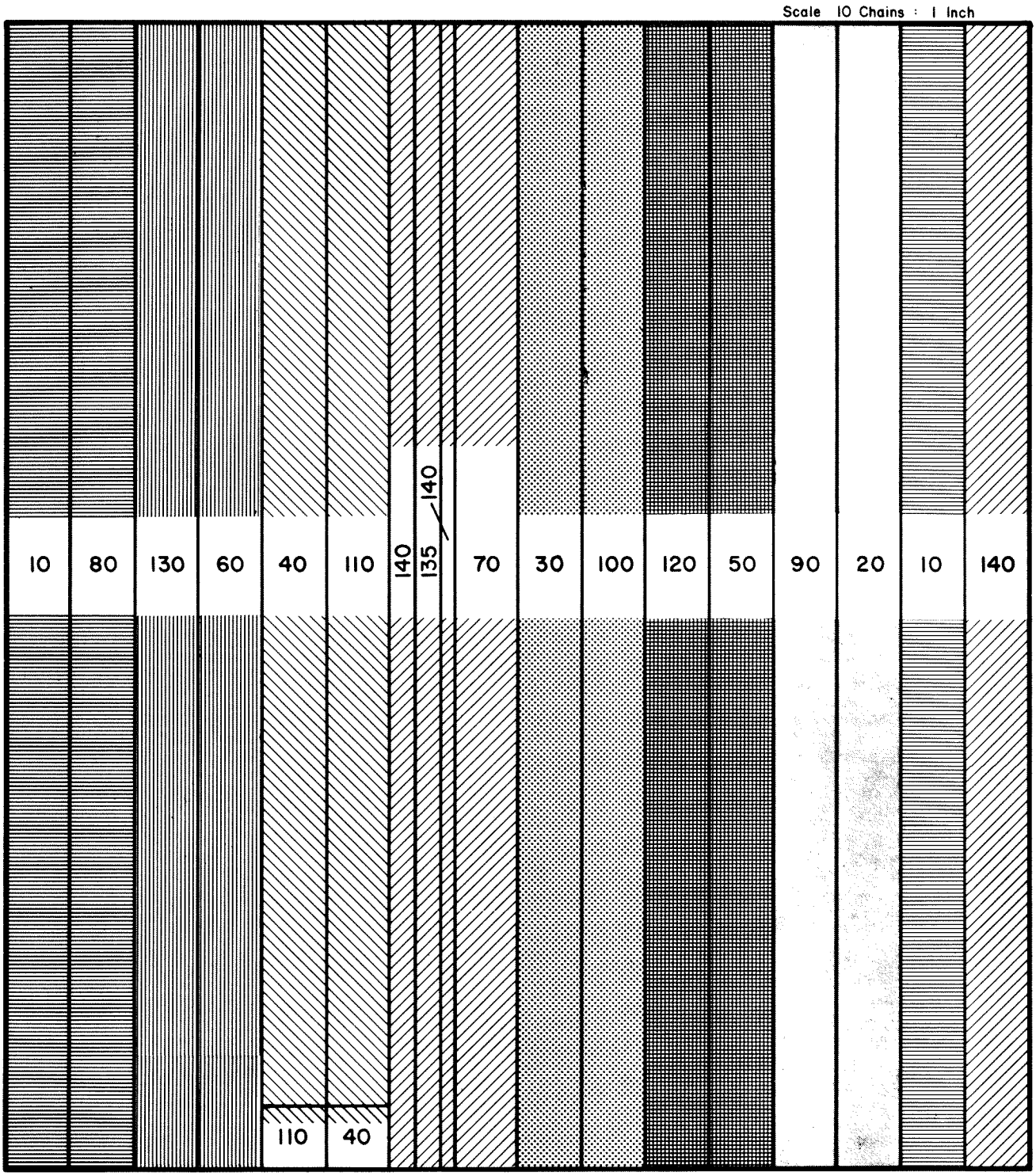


Figure 9. Ages of stands 140 years from now on model area.