CHAPTER 81

STAND CONSIDERATIONS

Just as each species presents a unique set of positive and negative aspects in terms of its silvicultural adaptability to aesthetic management, each stand has a personality of its own. Each aspect of the stand must be carefully examined to identify all positive aesthetic management opportunities.

SPECIES COMPOSITION

Most forest stands consist of a variety of species growing together in various proportions, Even-aged and all-aged species commonly occur together in various proportions.

- Aspen (even-aged) -- northern hardwoods (all-aged)
- White pine (even-aged) -- northern hardwoods (all-aged)

Likewise, short-lived and longer-lived species commonly occur together.

- Aspen (short-lived) -- birch (medium-lived) -- maple, oak (long-lived)
- Aspen (short-lived) -- red pine, white pine (long-lived)
- Jack pine (short-lived) -- oak (long-lived)
- Balsam fir (short-lived) -- spruce (long-lived)

Even in a relatively "pure" monotype, careful field examination will often reveal the presence of a significant component of associated species.

By careful examination of the attributes of the entire species complex within a stand, and an accurate assessment of site potential, it is often possible to utilize the more aesthetically adaptable components of the stand to minimize both short-term and long-term aesthetic impacts.

Retention and enhancement of the more aesthetically flexible component of the stand on all or part of the area is probably the single most valuable tool in aesthetic management. As long as species objective decisions are compatible with site potential, the long-term stand productivity can be maintained while simultaneously reducing the visual impact of management activities.

It is very important that this technique be used with flexibility and imagination. In some cases, the long-lived component of a stand (hardwood, for example) may not be as productive on a given site as its short-lived component (aspen, for example). In these situations, it must be remembered that management of a small portion of a stand for a more aesthetically flexible species will often permit the bulk of the stand to be managed for the more productive species on a more intensive basis. This increased level of intensity will usually more than offset any volume losses in the visual enhancement zones. The keys to success are:

- *Site compatibility*. Even though the aesthetically desirable species may not be the most productive alternative, it should be a silviculturally sound alternative. The visual enhancement zone should be a manageable unit -- and it should be managed -- even if at a reduced level of productivity.
- *Imaginative sale layout*. When dedicating acreage to a less productive species for aesthetic purposes, each acre should have maximum impact. Imaginative sale design, use of topography, and modification of rotation age will help meet visual goals with minimum productivity losses.

A. Total Removal of a Designated Species

In situations where a stand contains a sufficient amount of long-lived, all-aged species, the short-lived, even-aged component can be totally removed. This method can be used to screen sensitive areas as well as reduce the effective size of large harvest areas. See Figure 81.1.

B. Partial Removal of a Designated Species

In many cases, where the long-lived, all-aged component is insufficient to meet minimum aesthetic goals, it can still be used to advantage. Its presence, although not sufficient to permit total removal of the short-lived, even-aged species, will at least permit removal of a substantial portion of that component. This will permit immediate harvest of part of the volume and increase the likelihood of harvesting the remaining volume of short-lived, even-aged species at a later date, since only the most vigorous trees are left to grow. See Figure 81.2.

C. Retention of Selected Individuals

The presence of relatively small quantities of long-lived, all-aged species within a large even-aged block should not be overlooked in timber sale design. Aspen stands, for example, often contain scattered, large, super-canopy white pine. Such trees can be marked on a risk basis with selected vigorous individuals left standing for another aspen rotation. Since these trees are already above the main canopy, losses to windthrow should be negligible. These individuals will often seed in enough individuals to replace themselves and provide future foresters with a similar opportunity. See Figure 81.3.

Selected large oak and maple wolf trees can also be left standing to reduce the visual impact of a large clearcut. The number of trees so left will depend on the quantity available and the degree of visual sensitivity present in the area. In the absence of significant aesthetic sensitivity, the value of these scattered individuals in terms of wildlife habitat should not be overlooked (roosting sites, mast, den trees, etc.). See Figure 81.4.

STAND STRUCTURE

The entire vegetative community occurring in a timber stand should be considered in the development of an aesthetic management plan -- not just that portion being harvested. A well developed understory of white pine, red pine, northern hardwoods, or balsam fir can be used to great advantage in a sale design. Such an understory will not only help screen the impact of an even-aged harvest, it will also greatly shorten or eliminate the wait for regeneration to become evident on the sale area. See Figure 81.5.

When the understory is not yet of sufficient height or density for visual diffusion purposes, thought should be given to a "development cut" prior to the main harvest (Figure 81.6). The goal of this cut would be to thin the overstory and encourage understory height and crown development. This would enhance the future screening potential and allow removal of a greater volume of the overstory when the main sale occurs later.

STAND AGE

As a timber stand grows, it passes through a number of stages in its life cycle. Each of these stages presents differing degrees of aesthetic value and management flexibility. By recognizing the pluses and minuses of each stage, in terms of its management flexibility, we can use each to its best advantage.

A. Seedling Stage

Aside from screening some of the slash and debris resulting from the harvest, stands in the seedling stage offer little in terms of positive aesthetic value.

Foresters often view a stand of seedlings in a positive manner, since it represents the successful beginning of a new forest. The viewing public, however, may not share this perception. This is an important point to remember in planning adjacent harvest cuts. A forester will recognize a tangle of new aspen shoots, for example, as a stand of young trees. A forest visitor, on the other hand, may not recognize this same lush growth as a stand of trees. As a result, the success of the harvest operation may not be at all obvious to the visitor.

The forest manager must remember that the objective in spacing cuts in time is not necessarily to establish regeneration before cutting an adjacent area, but to make regeneration evident before harvesting adjacent areas. Furthermore, the regeneration must not only be evident to the forest manager, but to the forest visitor as well.

When dividing stands into cutting units and determining intervals between cuts, this concept must be kept in mind. Regeneration may become evident in an aspen stand in two to three years, whereas regeneration in a jack pine stand may require five to six years to become evident because site preparation and planting are required.

B. Sapling Stage

While opportunities for timber management activities are limited in this stage, there are some positive aesthetic values. Regeneration is now evident to even the most undiscerning visitor. Sapling stands are generally very dense and provide excellent screening opportunities. Even though sapling stands themselves will not support a harvest, their presence within larger, mature stands lends a great deal of increased flexibility in sale design.

C. Immature but Merchantable

Stands in this stage, although still immature, are physically large enough and have sufficient volume to be operable. Timber in this stage presents the most flexibility in aesthetic management. It is often the only stage in which many of the short-lived, even-aged species can be effectively dealt with when they occur in "pure" stands.

1. Cutting Strategies -- Large Blocks

In dealing with large blocks of even-aged, short-lived species (aspen, jack pine, etc.), the overall goal should be a reduction in stand size and increased age distribution. Exactly what stand size and degree of age distribution will be optimum depends on the aesthetic sensitivity and property objectives. By reducing stand size, the cutting is spread over a longer period, with small portions of the block being cut each year. This has a number of advantages:

- Visual impact is reduced through reduction of sale size.
- By cutting smaller units each year, several large problem areas can be treated simultaneously with minimum impact on sustained yield and work load.
- Post-sale treatment work (shearing, burning, site preparation, planting, etc.) is spread out over a longer period. Workloads are evened out.
- Wildlife habitat is enhanced by spreading out the period during which slash is available for browse, and by increasing age distribution and edge.
- Future sale establishment costs are reduced through re-use of existing sale boundaries, road systems, etc.

Figure 81.7 is a simplified example of a typical large monotype with little or no existing age or species diversity. "Large" refers to any block of timber which cannot be cut all at once without unacceptable visual impact. Depending on the species involved, the aesthetic concerns, and other management considerations, "large" may range from 40 acres on up to thousands of acres. The approach described below is adaptable to any size block.

The following steps are required in the planning process:

- Step one: Determine the harvest period.
- Step two: Determine the number of cutting units.
- Step three: Design the cutting unit boundaries.
- Step four: Assign harvest dates to cutting units.

Each of these steps is examined in detail below:

a) Step one: Determine the harvest period.

The forest manager must first determine the maximum amount of time over which the area in question can be harvested without incurring unacceptable risk of volume or growth loss.

In order to determine this "harvest period", the earliest possible entry date must be established. This is done by estimating the year in which the stand will attain merchantability. If the stand is not already merchantable, analysis of older stands on similar sites can be used to estimate when an operable volume will be achieved.

The forest manager must next establish the latest year in which the stand could be harvested without incurring excessive risk of loss in timber value.

Rotation ages presently in use are geared toward harvest of timber at its maximum rate of return. After rotation age is attained, the growth rate of the stand declines and it should be regenerated to maximize economic return. Even though growth has declined, however, it will be a period of years before an unacceptable risk of catastrophic loss is incurred. This period of time, the estimated realistic period between rotation age and unacceptable risk of catastrophic loss, is the second half of the total harvest period. This estimate can only be made based on intimate knowledge of the stand condition, site potential, insect and disease history, etc., on the part of the local forest manager. It should be a conservative, realistic estimate.

In the example illustrated in Figure 81.7, it will be assumed that the stand is now operable, that it will reach rotation age in 10 years, and that it can be carried five years past the optimum rotation age.

The acceptable leeway in harvest dates is: -10 years to +5 years. Therefore the total harvest period is 15 years.

b) Step two: Determine number of cutting units.

In order to determine the number of cutting units needed, the manager must first determine what the optimum size of the cutting unit should be. This decision is based on aesthetic sensitivity in the immediate area, economic considerations, and property objectives.

When the size of the optimum cutting unit is determined, it can be divided into the total stand acreage to arrive at the number of cutting units needed.

The number of cutting units required is then compared to the number of years in the harvest period to determine how many units will be cut each year.

In the example illustrated in Figure 81.8, the 15-year period would permit harvesting 15 cutting units at a rate of one unit per year. If more than 15 units were needed, two or more separated units would be cut each year. If less than 15 units were needed, a single unit would be cut every other year, or every third year, etc.

In this way, management strategy can be adapted to any size monotype.

c) Step Three: Design the cutting unit boundaries.

The goal of cutting unit design is to attain required aesthetic management goals while still not unduly complicating timber management activities. Units should not all be the same actual acreage, but rather the same effective acreage. The goal is not equal acres, but rather equal impact.

- Unit design considerations:
  - Aesthetic sensitivity in the sale area as a whole, and in each unit in particular.
  - Harvesting system to be employed.

- Road needs; existing roads.
- Regeneration requirements; follow-up activities.
- Topography, drainage patterns, roads and other natural features.

- Unit size considerations:
  - Degree of species diversity. Size can be increased as diversity increases. Reduce the size of other blocks with little or no diversity.
  - Degree of visual sensitivity. Smaller units along roads, streams, etc. Larger units in "back land" areas.

The scheme illustrated in Figure 81.8 is geared toward reduction of visual impact. A plan designed to maximize age distribution on a game property might look totally different. A design devised primarily to facilitate regeneration efforts might look different still. The underlying methods and principles, however, would be the same in each case.

d) Step Four: Assign harvest dates to cutting units.

The goal is to maximize the average time between any two adjacent harvests. As in unit size, the time between all adjacent cuts will not be equal. Time between some cuts will be reduced in order to increase time between other cuts in more sensitive areas.

Harvest date considerations include:

- Risk-Vigor. High-risk, low-vigor units should be cut first. Vigor often varies throughout large stands even though age may be constant.
- Aesthetic sensitivity. Maximum time should be allowed between adjacent cuts in the most sensitive areas.
- Size of unit. Generally the larger the units, the more time should be allowed between cuts.

Obviously, when fewer units are created, greater time will elapse between cuts. However, fewer units will generally be larger and have greater visual impact. There are many things to consider in the development of a cutting strategy of this sort. There are no easy answers!

As cutting proceeds through the cycle, constant monitoring of the uncut unit is necessary to make any harvest year adjustments which may be needed due to changes in stand vigor, etc.

In Figure 81.9, the harvest dates have been assigned to the cutting units in our example. Notice that the time between units varies, with the greatest intervals left between roadside cuts and units without favorable species composition. The average time between adjacent units in this case is seven years.

Depending on the sensitivity of the area, the length of the regeneration period, and other non-timber objectives, seven years may or may not be sufficient. A long regeneration period, or a goal of greater age distribution for habitat purposes, may require that this period be extended.

If this is the case, the same procedure can be followed in subsequent rotations to further enhance the age distribution, as shown in Figure 81.10. By cutting the timber in each unit when it reaches the same age at which it was harvested in the first rotation, the time between any two adjacent cuts, as well as the entire cutting period, will double during the second rotation, triple during the third rotation, and so on, until the desired age distribution is attained. At that time each unit would be cut at its proper rotation age and the existing distribution would be maintained.

During the second rotation, one unit would be cut every other year. During the third rotation, one unit would be cut every third year, and so on.

In this example, the type effectively would be fully regulated after three rotations. The first cut in the third rotation would begin three years after the last cut in the second rotation.

2. Cutting Strategies -- Roadsides

Oftentimes, special efforts are required to reduce the visual impact of large, even-age harvest operations adjacent to travel corridors (roads, trails, streams, etc.). When this is necessary, the roadside treatment should be an integral part of a larger plan to deal with the entire stand. See Figure 81.11. This will help insure that the cut results in a manageable unit in the future.

When developing a roadside visual enhancement area in an immature stand, keep in mind that the stand has not yet reached its full productive capacity. Any removal should involve only enough acreage to result in a manageable unit. The bulk of the stand should be left uncut until its optimum harvest date.

The best alternative in this situation is to harvest a portion of the stand along with the sensitive area as soon as the timber becomes merchantable. This area can then be regenerated and managed as a separate stand to screen the harvest of the residual area at the optimum rotation age. See Figures 81.12.

The early recognition of a potential aesthetic management problem in this stand has permitted the development of a cutting scheme which has met that concern without removing any acreage from full production. If similar future needs are not recognized early in pure, even-aged, short-lived types, these opportunities are lost.

D. Mature Timber

As timber reaches rotation age, the length of time available to break a stand into smaller units to reduce visual impact and enhance age distribution is greatly reduced. In addition, the time that is available has a greater degree of uncertainty. The entire harvest period is now between rotation age and stand deterioration -- a difficult period to accurately estimate.

Since the harvest period is much shorter, the cutting approach used for immature timber would result in insufficient time between cutting units.

In mature timber, a system is needed to reduce the potential impact of the uncertainty involved in estimates of the harvest period, and at the same time, retain the flexibility needed to use all the time that may be available. The system must be capable of reacting quickly to any sudden change in stand risk and vigor.

One approach, called the two-cut system, meets a number of these criteria:

- All the time available is used between adjacent cuts.
- Flexibility is retained, since the second cut can be delayed for a variable period -- based on an annual assessment of stand risk and vigor.
- The impact of sale size is reduced through sale design, while still retaining the economic advantages of large volume.
- Double duty is derived from sale boundaries since both the first and second cuts use the same lines.

1. Cutting Strategies -- Large Blocks

The two-cut system is used (see Figure 81.13).

2. Cutting Strategies -- Roadsides

A similar approach can be used along roads and other sensitive areas. Since the stand is now mature, however, it is best to harvest the bulk of the stand immediately. Timber in the visual enhancement areas is then retained to screen

the harvest of the main stand and harvested at a later date as stand vigor dictates. Removal of high risk trees within these areas concurrent with the main harvest will enhance the vigor of the residual timber and allow it to be retained for a longer period. Again, these cuts should be done as part of the systematic treatment of the main stand wherever practical. See Figure 81.14 and 81.15.

E. Overmature Timber

Overmature stands, by definition, should be cut as soon as possible. Significant delay, particularly in short-lived, even-aged species could result in an unacceptable loss of timber volume and aesthetic values.

A word of caution is in order as to determining when, in fact, a stand is actually overmature. Traditionally foresters have underestimated the longevity of some timber stands, particularly when making aesthetic management decisions. A stand which exceeds the optimum rotation age is not automatically in imminent danger of catastrophic loss. When the realistic harvest period is underestimated, many other aesthetic management options are precluded. The decision as to whether a stand is "mature" or "overmature" is very complex. Site, insect and disease history, and local knowledge of the behavior of similar stands on similar sites must all be considered. The local forester is usually in the best position to make this judgment.

In a stand that is truly overmature, any acreage left uncut in order to reduce the visual impact represents a loss in productivity. Foresters must accept the fact that in large, overmature, even-age monotypes, some timber will have to be sacrificed in order to accomplish aesthetic management goals. The idea is to make the best of a very difficult situation.

One approach to the problem is the use of a visual diffusion area (see Figures 81.16 and 81.17). These areas differ from the more common visual enhancement areas in several important aspects.

Visual Diffusion Area	Visual Enhancement Area
Temporary, one-time solution.	Long-term solution.
Timber is left unharvested.	Timber is managed with slight, one-time modifications.
Acreage is kept to a minimum to minimize present losses and facilitate regeneration and rehabilitation in succeeding harvests.	Acreage is kept large enough to form a viable management unit.

A visual diffusion area can take on a variety of forms, depending on the specific situation involved. In general, they consist of narrow corridors (2-3 chains wide) of uncut timber. The number, length, and location of the corridors are tailored to the needs of the particular site in question.

In some cases, a single uncut corridor adjacent to the road can be effective. Indeed, where clearcutting up to the road is not acceptable for some reason (local ordinance, etc.), this may be the only alternative. When this is done, however, it must be remembered that stand deterioration in the near future may well result in more adverse aesthetic impact than the harvest operation itself. Thought should be given to dealing with this future problem (salvage, underplanting, etc.).

To be most effective, a roadside visual diffusion area should be part of a comprehensive stand harvest plan. Such an approach offers a number of advantages:

- The visual impact of future stand deterioration within the diffusion area is reduced. The areas can be set back from the road and still mitigate the impact of the harvest, while the newly regenerated area adjacent to the road softens the appearance of the deterioration within the diffusion area.

- Fewer acres are left unharvested. Full use of topography, scattered long-lived trees, clumps of younger timber, other stands, and other natural features enhance the effectiveness of the diffusion area. The same effect can be achieved with fewer acres.

- Future rehabilitation and regeneration of the uncut area is easier. Visual diffusion areas are a one-time solution. In succeeding rotations, better longer-term solutions should be used (visual enhancement areas, stand size, reduction through increased age distribution, etc.). As a result, thought must be given to getting these areas back into production after they've served their purpose. By using a number of uncut strips throughout the stand to reduce the visual impact, the strips can be made narrower. This is especially important in aspen types. The strips can then be hand cut along with the next aspen harvest and they will restock through sprouting from adjacent areas. If fewer, wider strips are used, sprouting may not extend far enough into the strip to achieve full stocking. Three strips, each two chains wide, will regenerate vigorously, while the regeneration in the center of one strip, six chains wide, might be questionable. The screening value in either case is the same.

AGE DIVERSITY

Age difference within a stand can be used to great advantage in sale design. Such differences may be difficult to detect, especially since many such small age variations within a stand were lumped together in the compartment reconnaissance process. When they can be identified, however, there is an opportunity to enhance the existing difference and increase future age diversity.

In Figure 81.18, portions of the stand were found to be five years younger than the rest of the stand. By cutting the older portions now, five years before rotation age, and holding the younger portions until five years after rotation age, the age difference can be increased to 15 years. Prior planning of the road layout when the older timber is cut will insure access to all parts of the deferred areas without additional disturbance in the newly regenerated stand.

The tendency to "square off" sales boundaries should be resisted, especially in sensitive areas. The squared-off sale design in Figure 81.19a would delay harvesting the fingers of Stand 1 until Stand 2 is cut unlike the design in Figure 81-19b. When sale boundaries are squared-off, excellent opportunities are lost to reduce future sale impact through increased age diversity and more advantageous stand configuration.

STAND SIZE AND CONFIGURATION

Both the size and shape of a stand have an impact on the degree of silvicultural flexibility available in sensitive areas.

Small stands allow much greater flexibility in harvest alternatives. In Figure 81.20, even very intensive treatments in Stand 1 (clearcutting, scarification, etc.) would have minimal impact due to its size. Again, the tendency to cut Stand 1 concurrently with Stand 2 should be resisted. As long as Stand 1 can be harvested economically as a separate unit, any age and species differences between adjacent stands should be enhanced for future use in sale design.

As a stand gets larger, harvest alternatives become more limited. In Figure 81.21, Stand 1 could be selectively harvested, but a clearcut would probably require some modification to be aesthetically acceptable.

Stand distribution or configuration may also have an impact on management flexibility. Stand 1 in Figure 81.22, though large, is distributed in such a way as to minimize visual impact -- even if harvested all at once.

Recognition of these opportunities for natural reduction of visual impact is critical in the planning process. Time, manpower and money are limited.

The forest manager must set priorities in order to focus efforts on the most critical areas. Stand 1 in both Figures 81.23 and 81.24, for example, is identical in total stand acreage, age, and species composition. Figure 81.24, however, is a much more difficult situation to deal with. If efforts to break up the size of this stand are not commenced immediately, the only effective tool available to deal with this situation -- time -- will be lost.

Stand 1 in Figure 81.23, on the other hand, could easily be held to rotation age and cut as one unit with minimal impact. Time spent in this stand, now, could probably be spent more productively in areas which have fewer natural opportunities.

PHYSICAL FEATURES

A. Soil Type

Soil erosion and excessive rutting from logging machinery can be very unsightly. Advance planning and imaginative sale design can reduce these problems considerably. Such considerations include:

- Restricting logging on potential problem soil areas to winter only.
- Locating road entrances on more stable soil types.
- Including in your sale plan a provision for prompt post sale clean-up and seeding of unavoidable problem spots.
- Designing logging road systems that reduce the number of exits onto heavily traveled roadways.

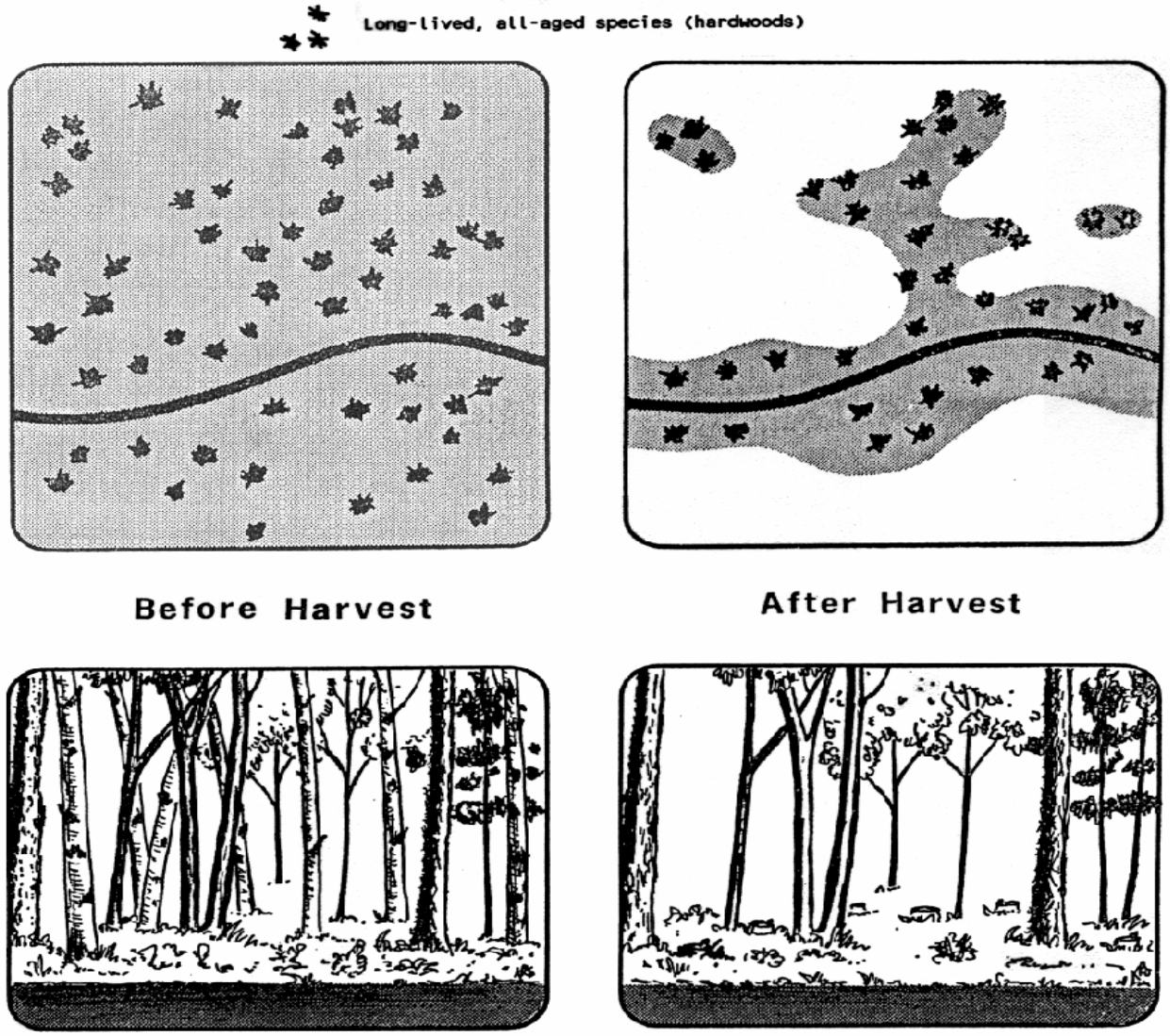
B. Topography and Drainage Patterns

Sale cutting boundaries should be laid out in harmony with existing land features whenever possible. Laying out visual enhancement areas along ridge lines not only results in a more natural appearance, but also increases their screening value. This allows an equally effective reduction in visual impact with fewer acres. See Figure 81.25.

Streams should be incorporated into cutting boundaries whenever feasible (Figure 81.26) for the following reasons:

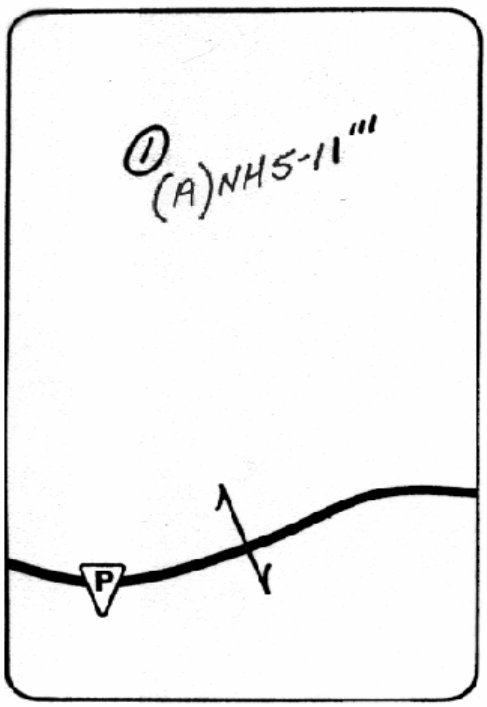
- They generally are associated with bands of lowland brush, swamp hardwood and swamp conifers which have an excellent screening value.
- They form a more or less permanent visual barrier between cutting units. Time between adjacent units separated by such barriers can be decreased and that time used to better advantage between other units without permanent boundaries.
- The need for stream crossings is reduced; erosion and siltation are minimized.

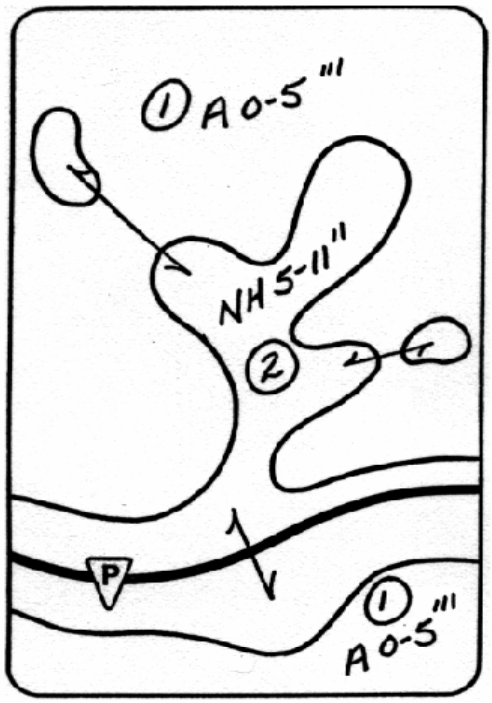
Figure 81.1a Total removal of a designated species.



In the aspen-northern hardwood stand above, the aspen component was designated for total removal. Hardwood was retained along the road and on selected parts of the main sale area to reduce visual impact. The hardwood was removed from the bulk of the stand to ensure adequate regeneration. The new hardwood stand that was created will be managed under the all-aged selection system in the future (see Figure 81.1b).

Figure 81.1b Total removal -- recon update.





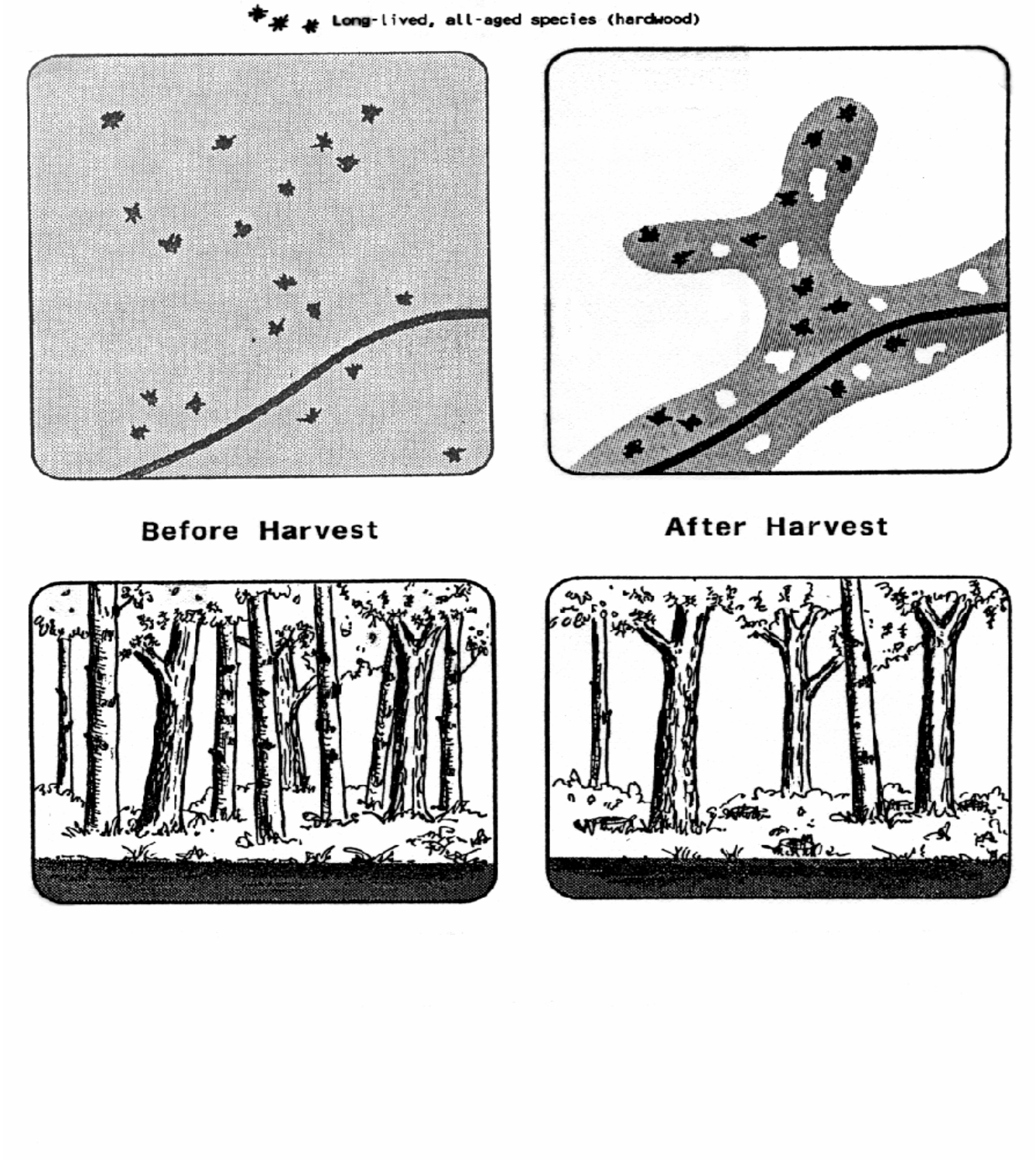
Recon Data
(Before harvest)

Stand number	A1
Primary type	A5-11"'
Secondary type	NH5-11"
Acres	300
Year of orign	1935
Stocking	105 □'
Volume	22 cds
Mgt. objective	Aspen

Recon Data
(After update)

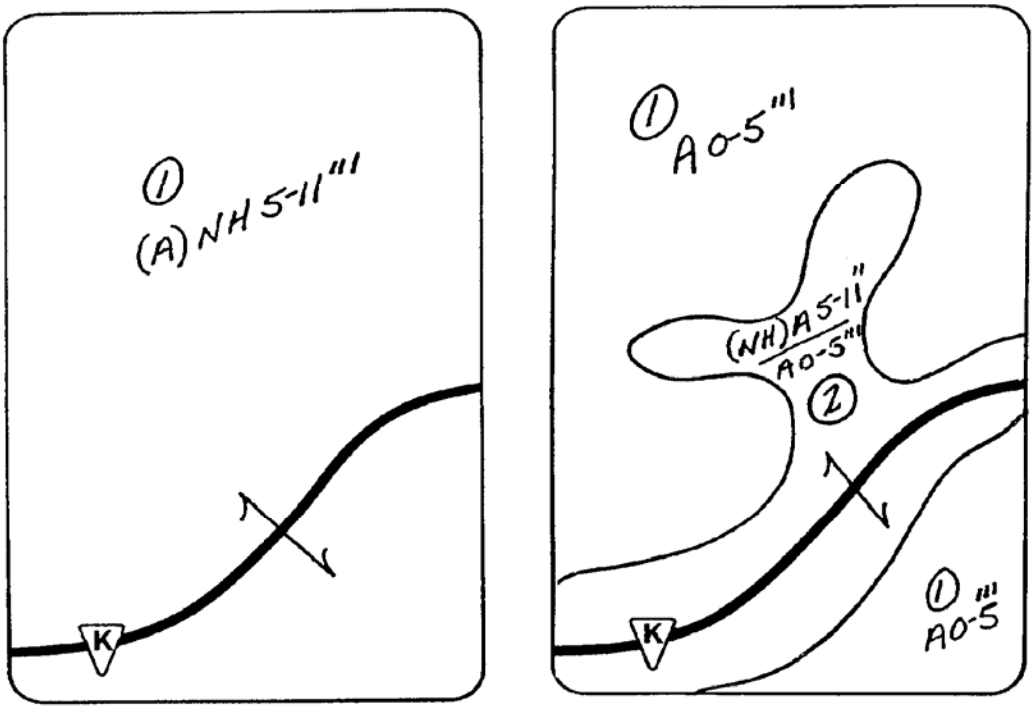
1	A2
A0-5"'	NH5-11"
	A0-5'
225	75
1983	
3	50 □'
0	9 cds
Aspen	NH

Figure 81.2a Partial removal of a designated species.



In cases where the long-lived, all-aged component is insufficient for visual diffusion purposes, a portion of the short-lived, even-aged component can be retained to further reduce the visual penetration. In the example above, selected vigorous aspen were left to enhance the northern hardwood stocking. As the hardwood crowns and the aspen understory develops, more aspen will be removed in later harvests (see Figure 81.2b).

Figure 81.2b Partial removal -- recon update.



Recon Data
(Before harvest)

Stand number	A1
Primary type	A5-11'''
Secondary type	NH5-11'
Acres	300
Year of origin	1935
Stocking	105 □'
Volume	22 cds
Mgt. objective	Aspen

Recon Data
(After update)

1	A2
A0-5'''	NH5-11''
	A5-11'
225	75
1983	
3	50 □'
0	9 cds
Aspen	(NH) A
	NH- SELECTIVE CUT A - REMOVE ALL MATURE TREES IN 10 YEARS

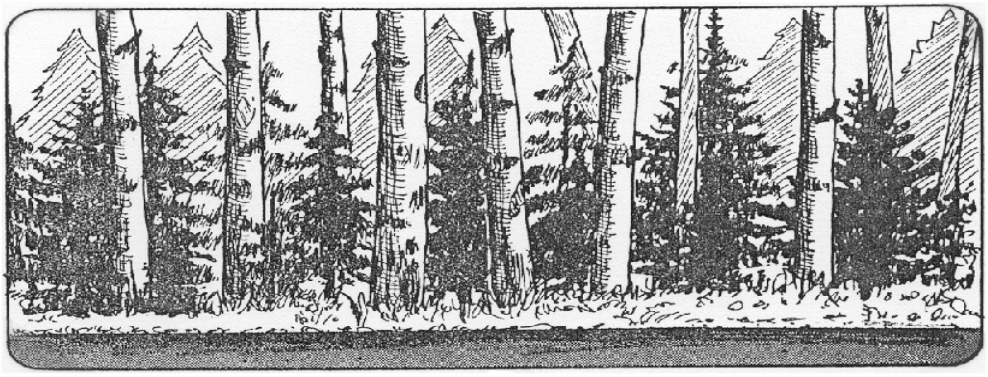
Figure 81.3 Retention of selected individuals -- long-lived species.

When possible, thought should be given to carrying over selected long-lived individuals for another rotation.

Figure 81.4 Retention of selected individuals -- "leave trees".

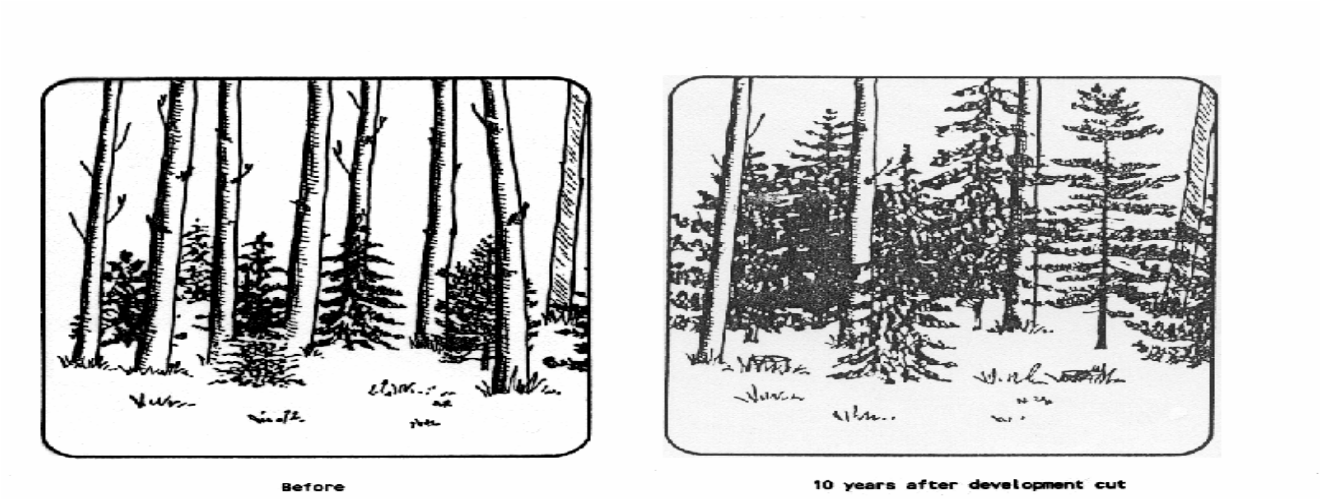
The retention of even small numbers of "leave trees" have a positive effect on the visual impact of a timber harvest. The wildlife benefits of such trees should also be considered.

Figure 81.5 Use of stand structure in aesthetic management.



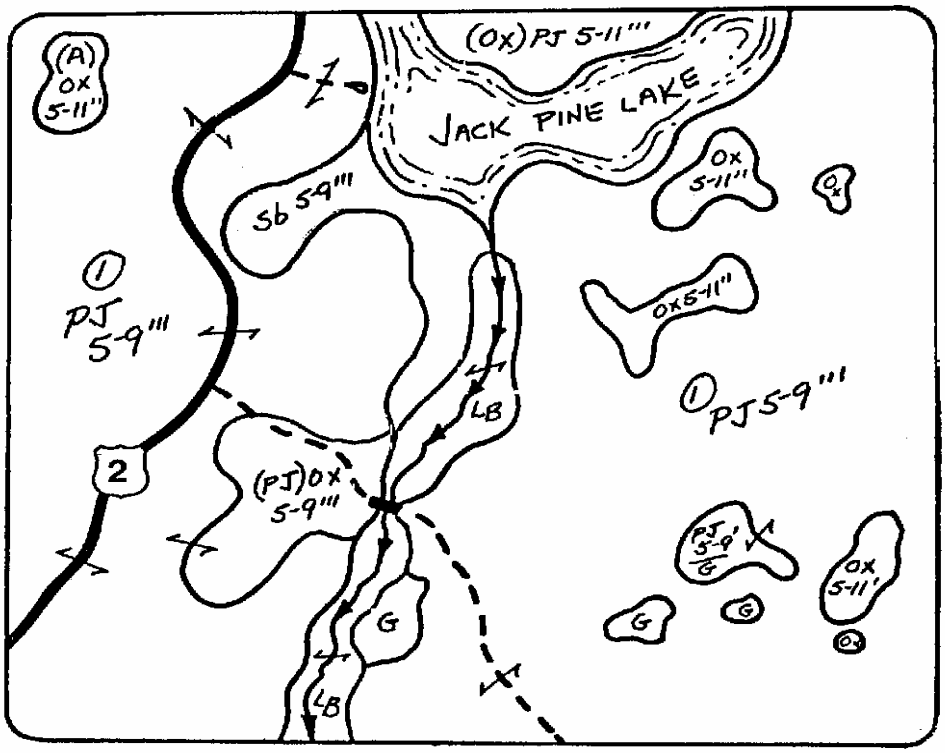
The screening potential of a well-developed understory can make clearcutting acceptable where it normally would not be. The balsam fir understory, above, makes the removal of the aspen overstory much more visually acceptable.

Figure 81.6 Development cut.



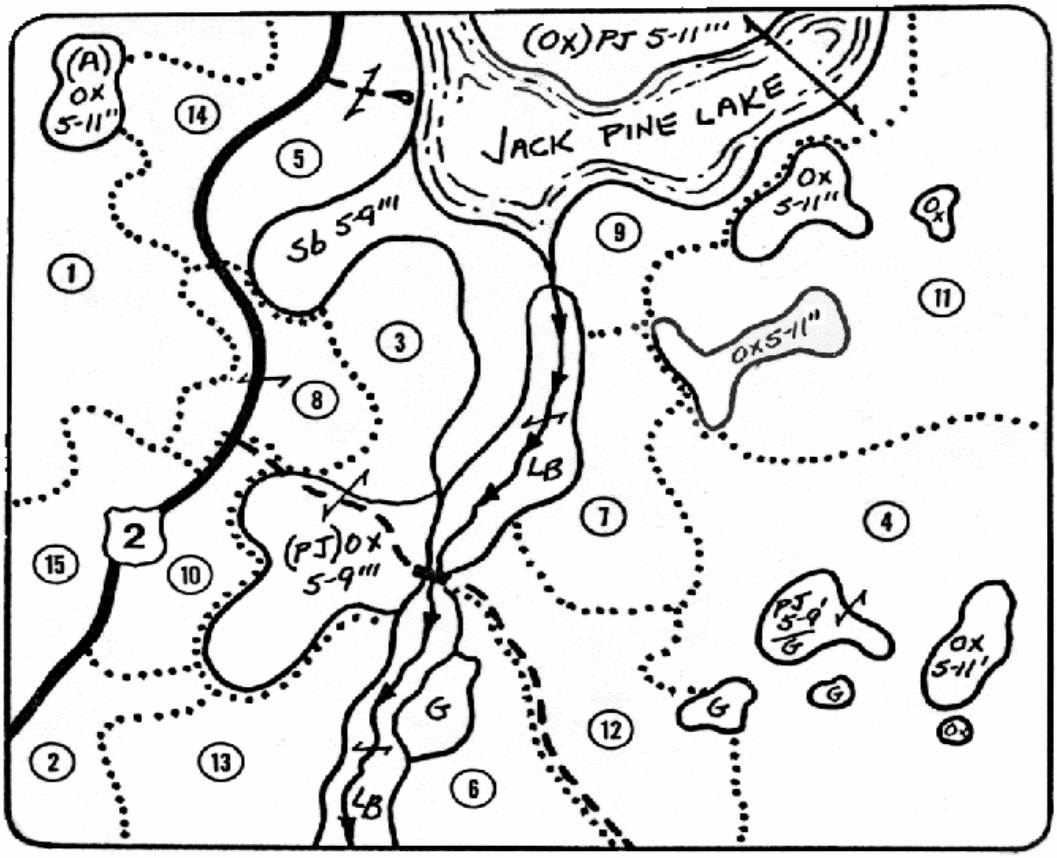
A pre-sale development cut can be used to increase height growth and crown development in the understory, allowing removal of greater overstory volume at rotation age.

Figure 81.7 Large, even-aged monotype -- immature timber.



Stand number	A1
Timber type	PJ 5-9'''
Age	40
Rotation age	50
Mgt. objective	JACK PINE
Mgt. prescription	CLEARCUT
Year of harvest	1990

Figure 81.8 Cutting unit boundary design -- immature timber.



In this example, 15 cutting units were laid out. The units along the main highway and the flowage (5, 7, 8, 11, 12, 13, and 14) were made smaller. These units were also more intensively configured to reduce the line of sight and present a less artificial appearance.

Units along the secondary road (1, 2, 10) are larger and less meandered.

The "backland" units (4, 6, 15) are considerably larger due to reduced visual sensitivity and increased species composition.

Stay flexible! Be adaptable to changing priorities.

Figure 81.9a Assigning harvest dates to cutting units -- first rotation -- immature timber.

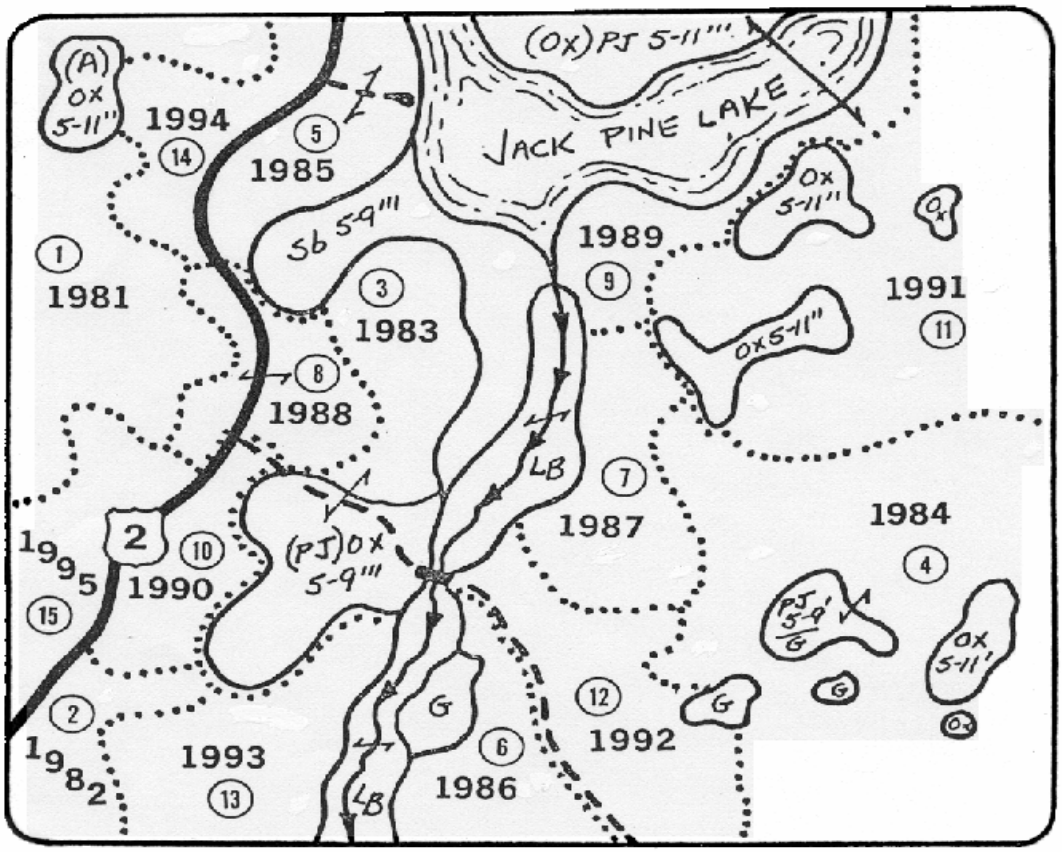


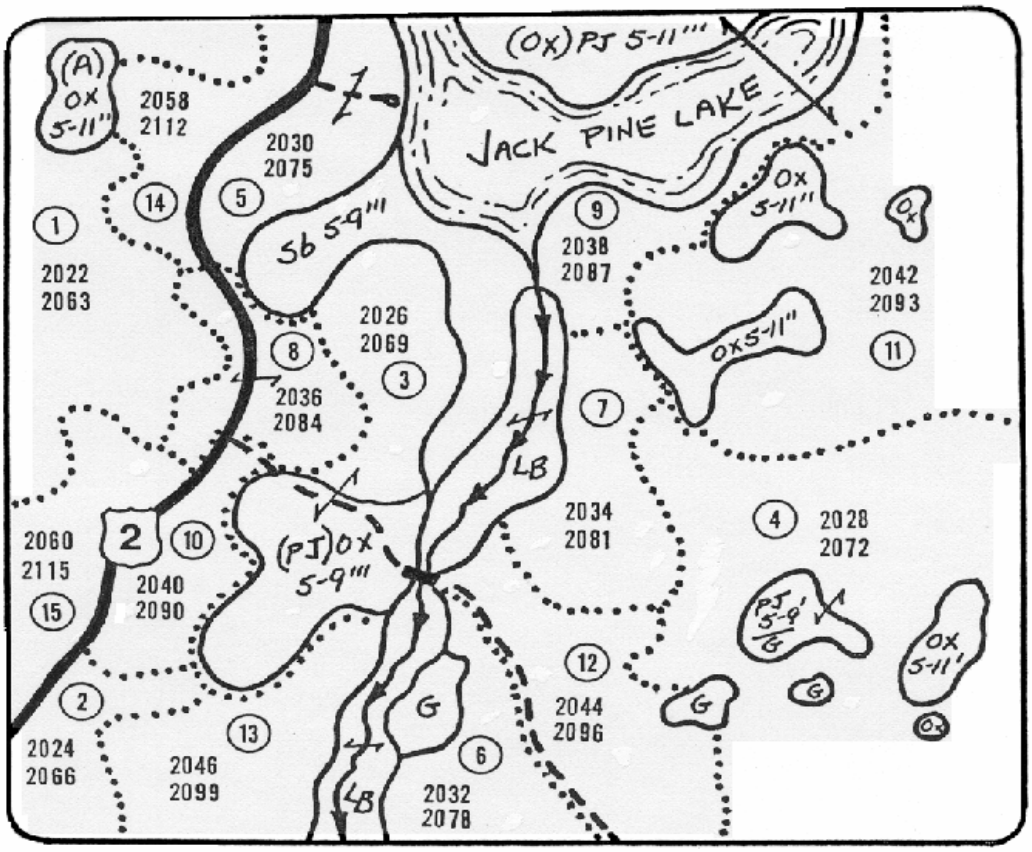
Figure 81.9b Cutting unit harvest dates -- first rotation.

Block no.	Age when cut	No. of years away from optimum rotation age	Year of harvest
1	41	-9	1981
2	42	-8	1982
3	43	-7	1983
4	44	-6	1984
5	45	-5	1985
6	46	-4	1986
7	47	-3	1987
8	48	-2	1988
9	49	-1	1989
10	50	0	1990
11	51	+1	1991
12	52	+2	1992
13	53	+3	1993
14	54	+4	1994
15	55	+5	1995

Total harvest period: 15 years

Average time between adjacent cuts: 7 years

Figure 81.10a Assigning harvest dates to cutting units -- second and third rotations -- immature timber.



Harvest dates

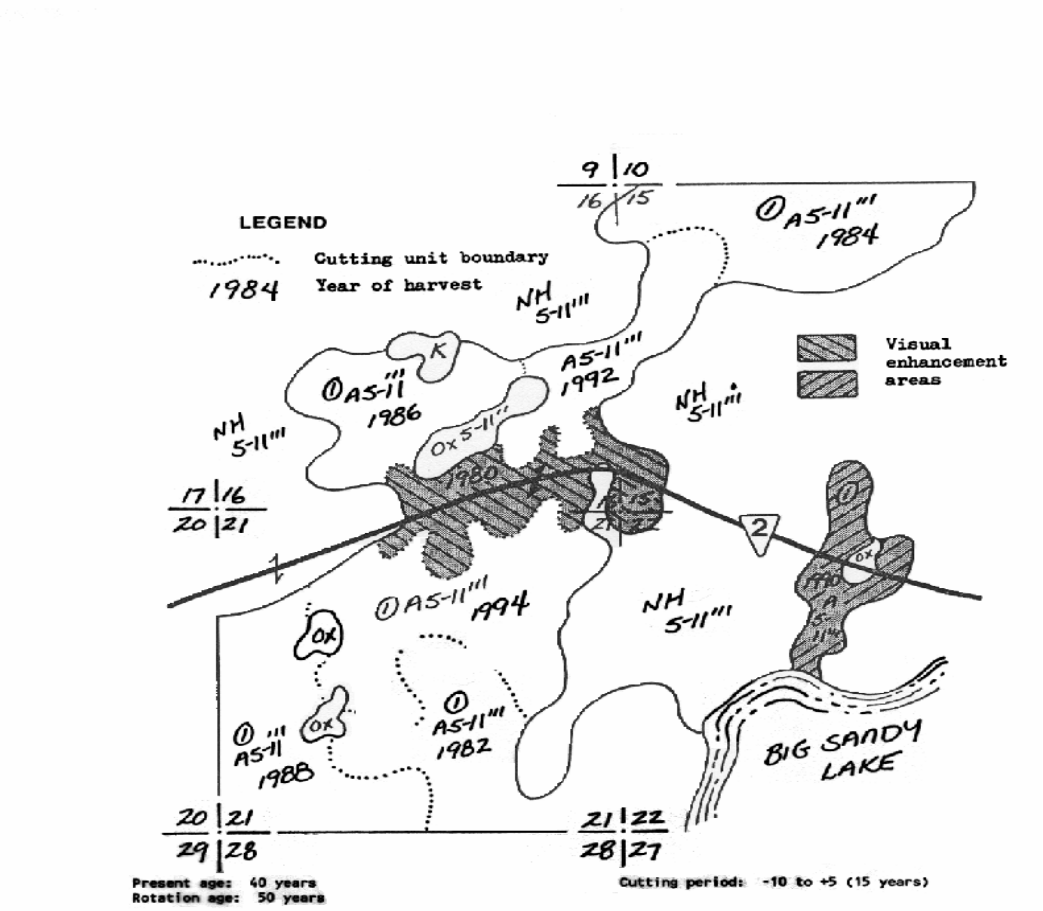
Second rotation -- top number

Third rotation -- bottom number

Figure 81.10b Cutting unit harvest dates -- second and third rotations.

Block no.	Age when cut	No. of years away from optimum rotation age	Year of harvest: First rotation	Second rotation	Third rotation
1	41	-9	1981 + 41=	2022 + 41 =	2063
2	42	-8	1982 + 42 =	2024 + 42 =	2066
3	43	-7	1983 + 43 =	2026 + 43 =	2069
4	44	-6	1984 + 44 =	2028 + 44 =	2072
5	45	-5	1985 etc.	2030 etc.	2075
6	46	-4	1986	2032	2078
7	47	-3	1987	2034	2081
8	48	-2	1988	2036	2084
9	49	-1	1989	2038	2087
10	50	0	1990	2040	2090
11	51	+1	1991	2042	2093
12	52	+2	1992	2044	2096
13	53	+3	1993	2046	2099
14	54	+4	1994	2048	2112
15	55	+5	1995	2050	2115
Total harvest period:			15 years	30 years	45 years
Average time between adjacent cuts:			7 years	14 years	21 years

Figure 81.11a Roadside treatment as part of a total sale design -- immature timber.



In this example, a visual enhancement area has been created along a major highway. Notice that the treatment is an integral part of a larger plan designed to deal with the entire stand.

Eight cutting units were used in this harvest plan. One unit would be cut every other year. The roadside units are cut before or at rotation age to reduce the chance of stand break-up in a sensitive area.

Figure 81.11b Recon data for Figure 81.11a.

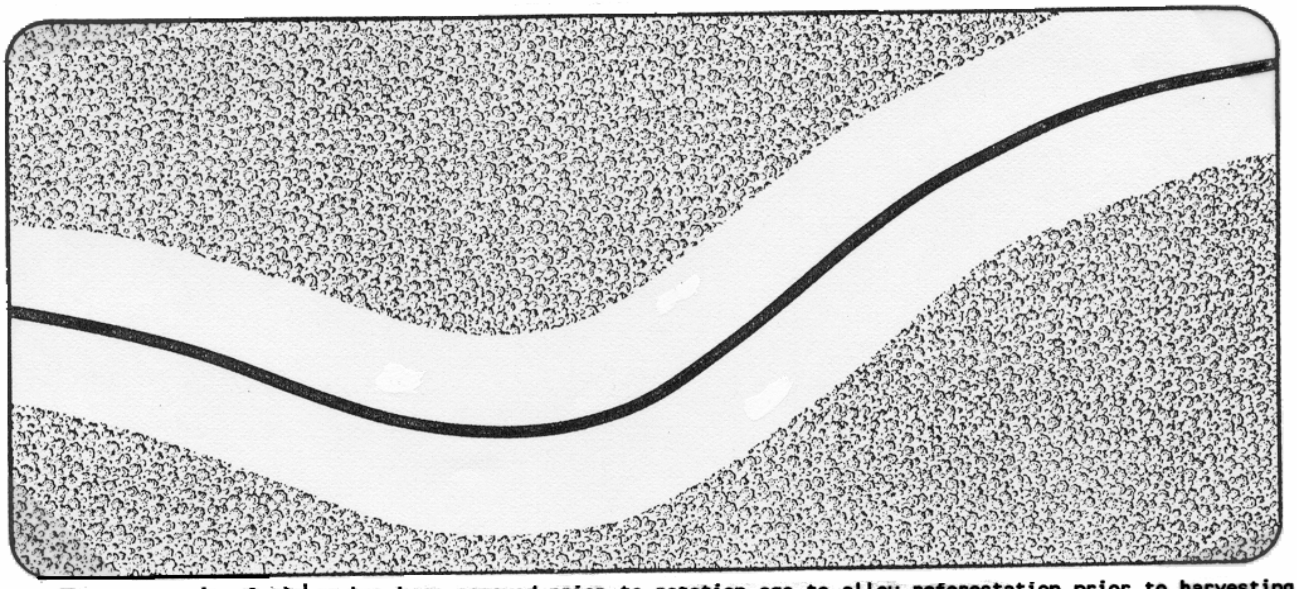
Old Recon Data - 1980

Stand number	A1
Timber type	A5-11"
Acres	810
Age	40
Mgt. objective	Aspen
Mgt. prescription	CLEARCUT
Year of harvest	1990

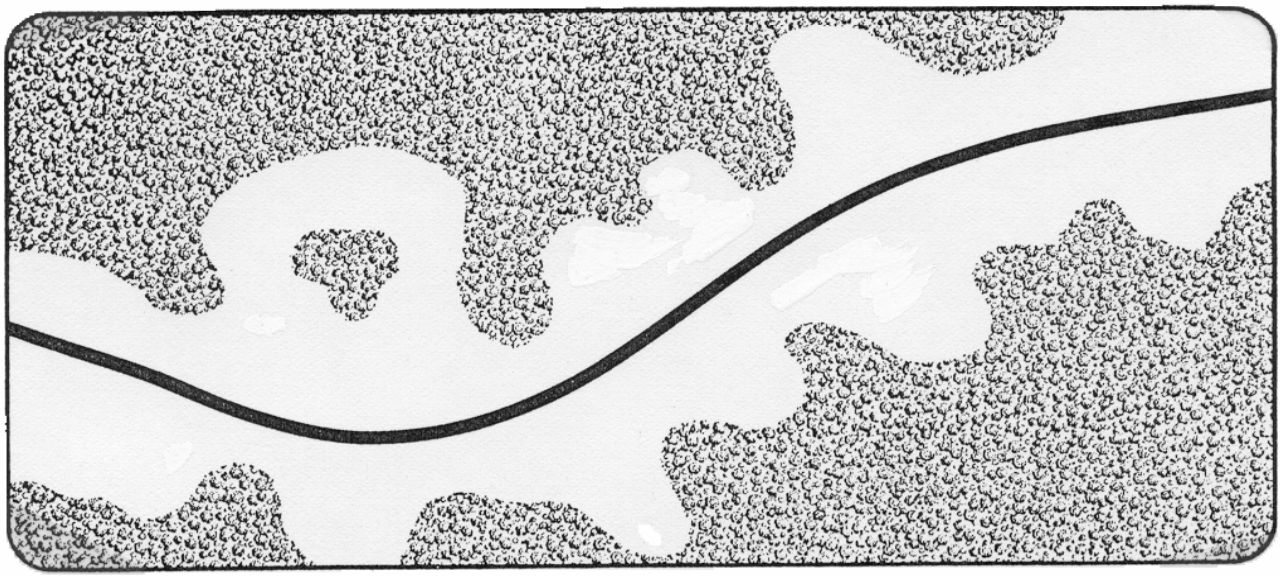
Recon Update Data - 1994

Stand number	A1	2	3	4	5	A6	7	8
Timber type		← A 0-5" →						
Acres	75	140	92	85	123	50	95	150
Age	14	12	10	8	6	4	2	0
Mgt. objective		← Aspen →						
Mgt. prescription	←	CLEARCUT →						
Year of harvest	2030	2032	2034	2036	2038	2040	2042	2044

Figure 81.12 Roadside visual enhancement area -- immature timber.

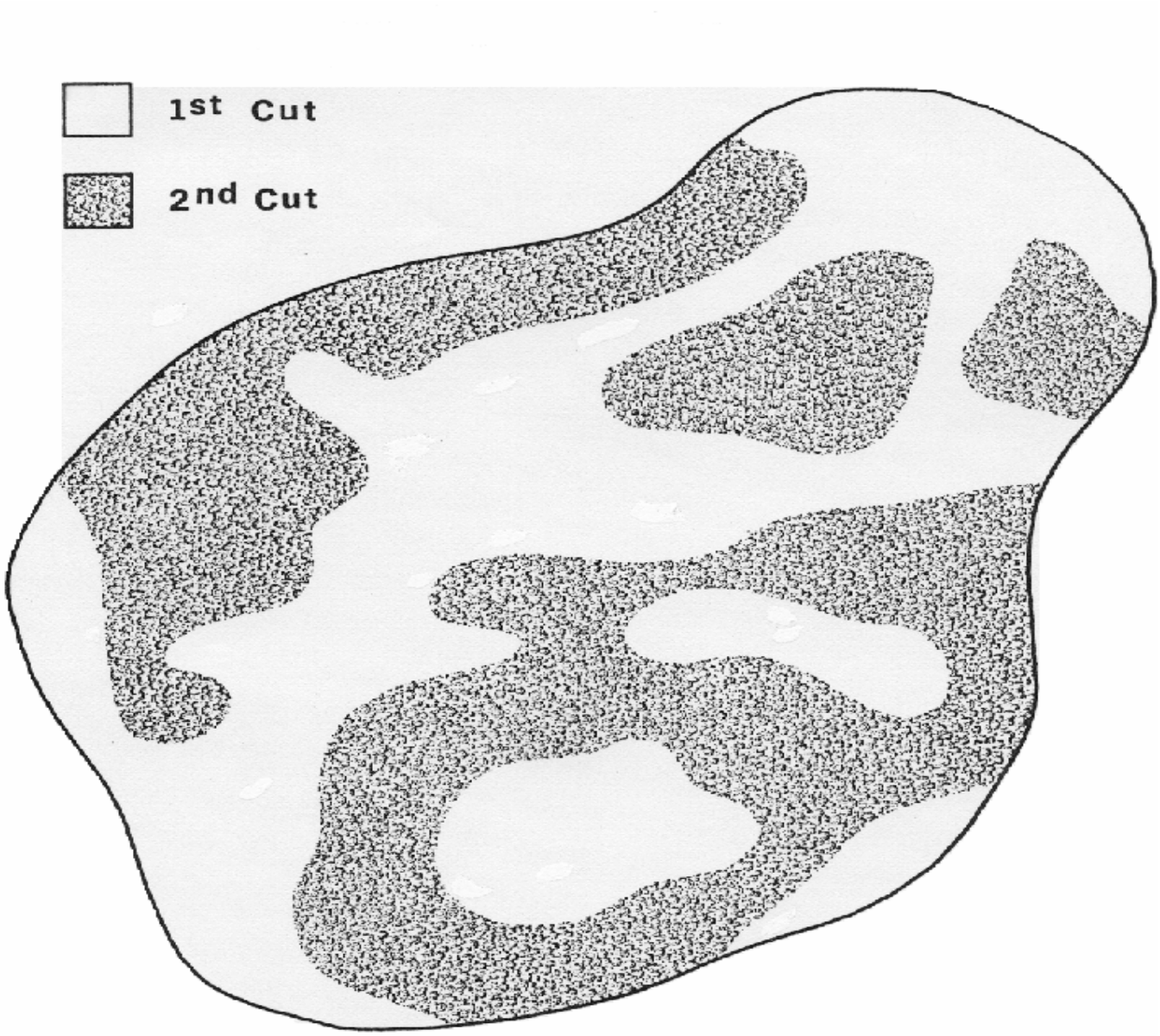


Above, a strip of timber has been removed prior to rotation age to allow reforestation prior to harvesting the main stand. In this way, the vast majority of the timber is harvested at the optimum rotation age. Possible volume losses due to over-maturity are minimized.



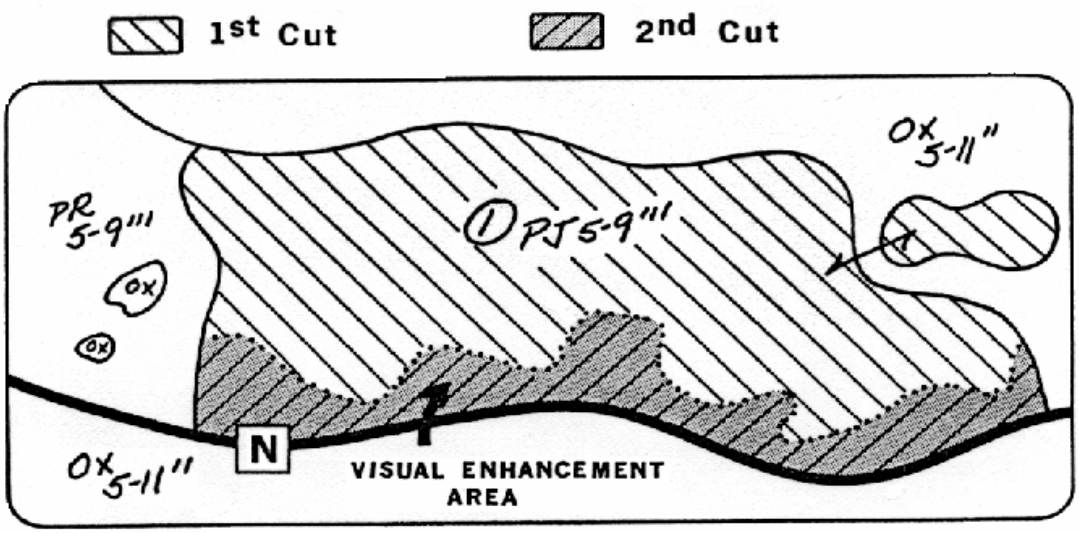
In this example, a strip of timber was also removed prior to rotation age. In this case, however, the edge of the residual stand has been scalloped to present a more natural appearance while the area is reforested. This approach is better suited to timber types with a long regeneration period.

Figure 81.13 Cutting strategies -- mature timber.



The first cut is made immediately, while the second cut is delayed as long as possible, based on an annual assessment of the residual stand risk and vigor. In this way, maximum time is allowed to elapse between adjacent cuts. Visual impact is reduced through imaginative sale design to limit line of sight.

Figure 81.14 Cutting strategies -- mature timber.



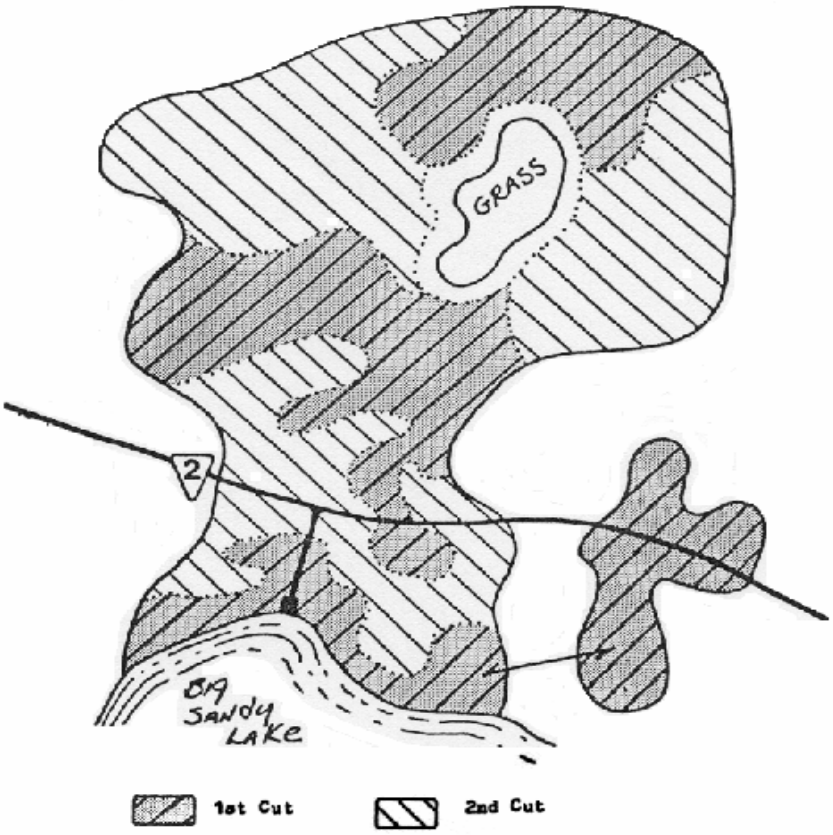
Recon Data (Before cutting)	
Stand No.	A1
Type	PJ 5-9"
Acres	80
Age	
Rotation Age	
Mgt. Objective	JACK PINE
Mgt. Prescription	CLEARCUT
Year of Harvest	1980

Recon Data (After the first cut)	
1	A2
PJ 0-5"	PJ 5-9"
60	20
1	
JACK PINE	JACK PINE
CLEARCUT	CLEARCUT
2025	1985+

The bulk of this mature stand is being harvested immediately. A visual enhancement area (VEA) has been created out of a smaller portion of the stand. Harvest of the VEA will be deferred as long as risk and vigor permit. This will allow maximum time to regenerate the harvested area.

If this stand were being converted to a long-lived species, such as red pine, it may be desirable to manage the VEA as an opening after harvest, in order to reduce the "tunnel" or "fiber factory" appearance along this road in the future.

Figure 81.15a Two-cut system incorporating a visual enhancement area -- mature timber.

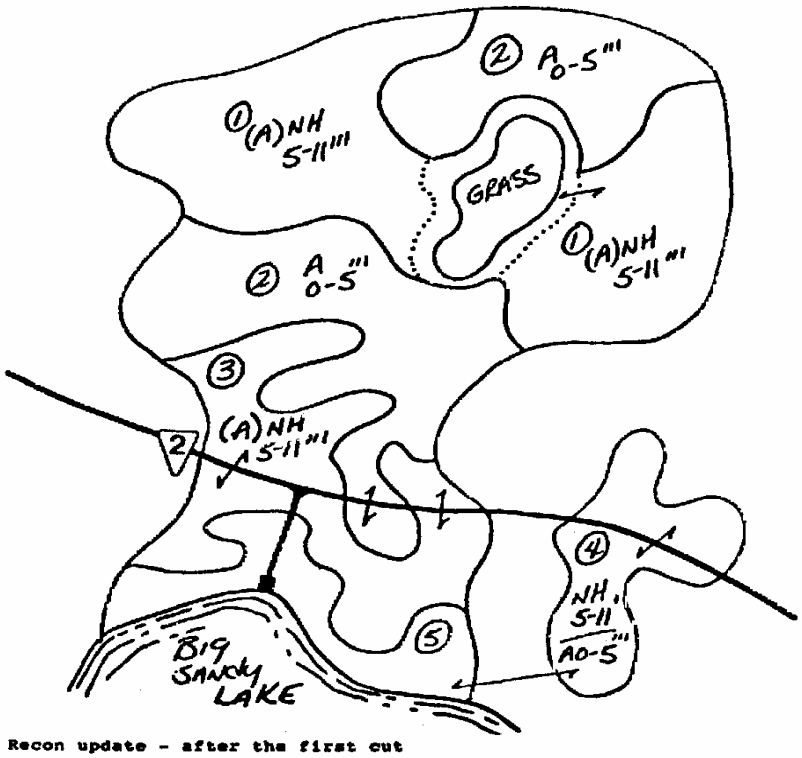


Recon data - before cutting

Stand number	A1
Primary type	A5-11"1
Secondary type	NH 5-11'
Acres	505
Age	45
Rotation age	45
Mgt. objective	Aspen
Mgt. prescription	CLEARCUT

Figures 81.15a and 81.15b illustrate the creation of visual enhancement areas in the overall harvest plan for a large stand. The entire stand would be harvested in two cuts.

Figure 81.15b Two-cut system incorporating a visual enhancement area -- mature timber.

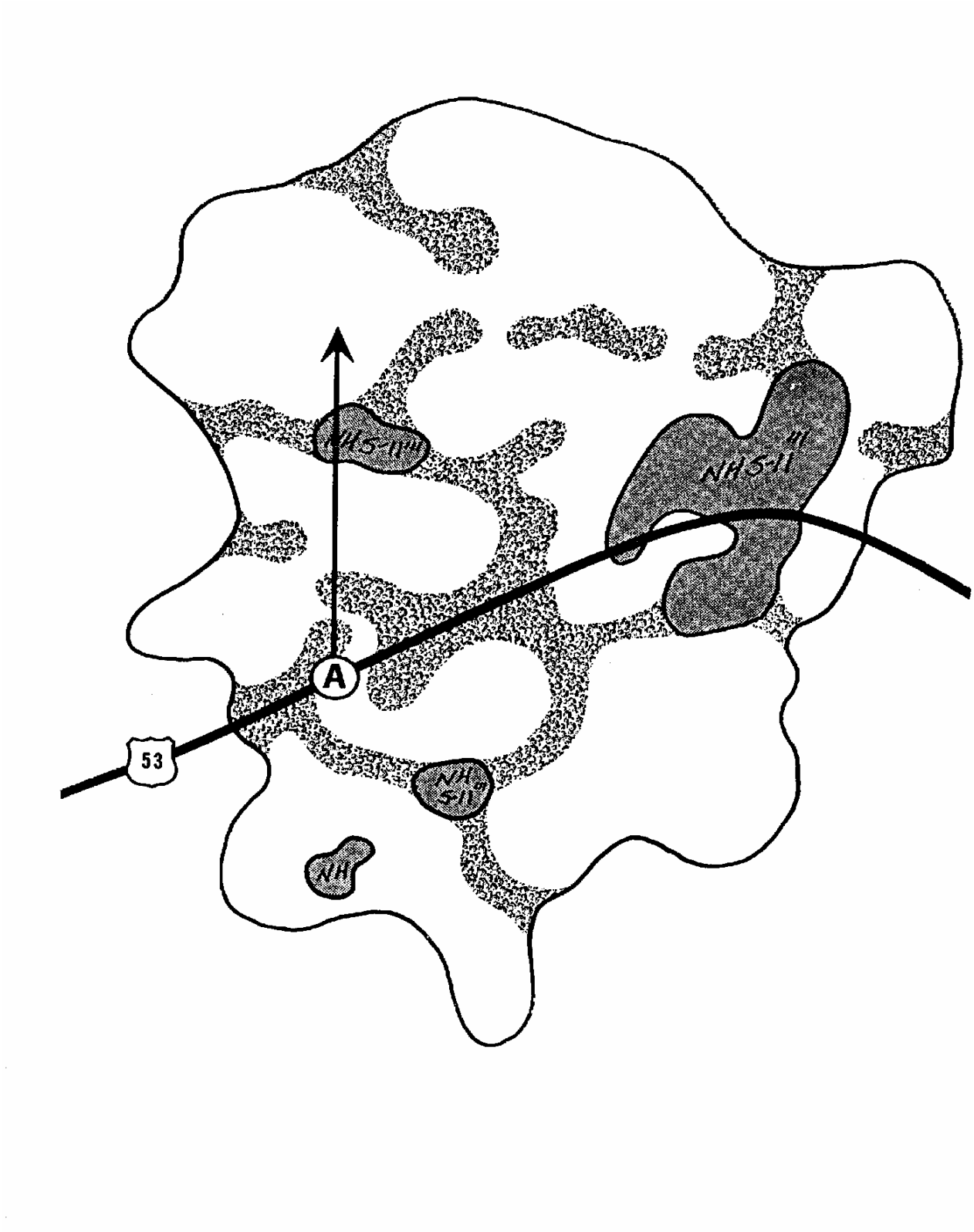


Recon update - after the first cut

Stand number	1	A2	A3	A4	A5
	A5-11"	A0-5"	A5-11"	A0-5"	NH5-11'
	NH5-11'		NH5-11'	NH5-11'	A0-5"
	160	170	87	40	48
	45	1	45	1	
	45	45	45	45	
	Aspen	Aspen	(A)NH	(A)NH	NH
	CLEAR CUT	CLEAR CUT	CLEAR CUT Aspen / RETAIN NH IN SELECTED AREAS	CLEAR CUT Aspen / Retain SELECTED NH	PARTIAL CUT IN Aspen AT ROTATION AGE

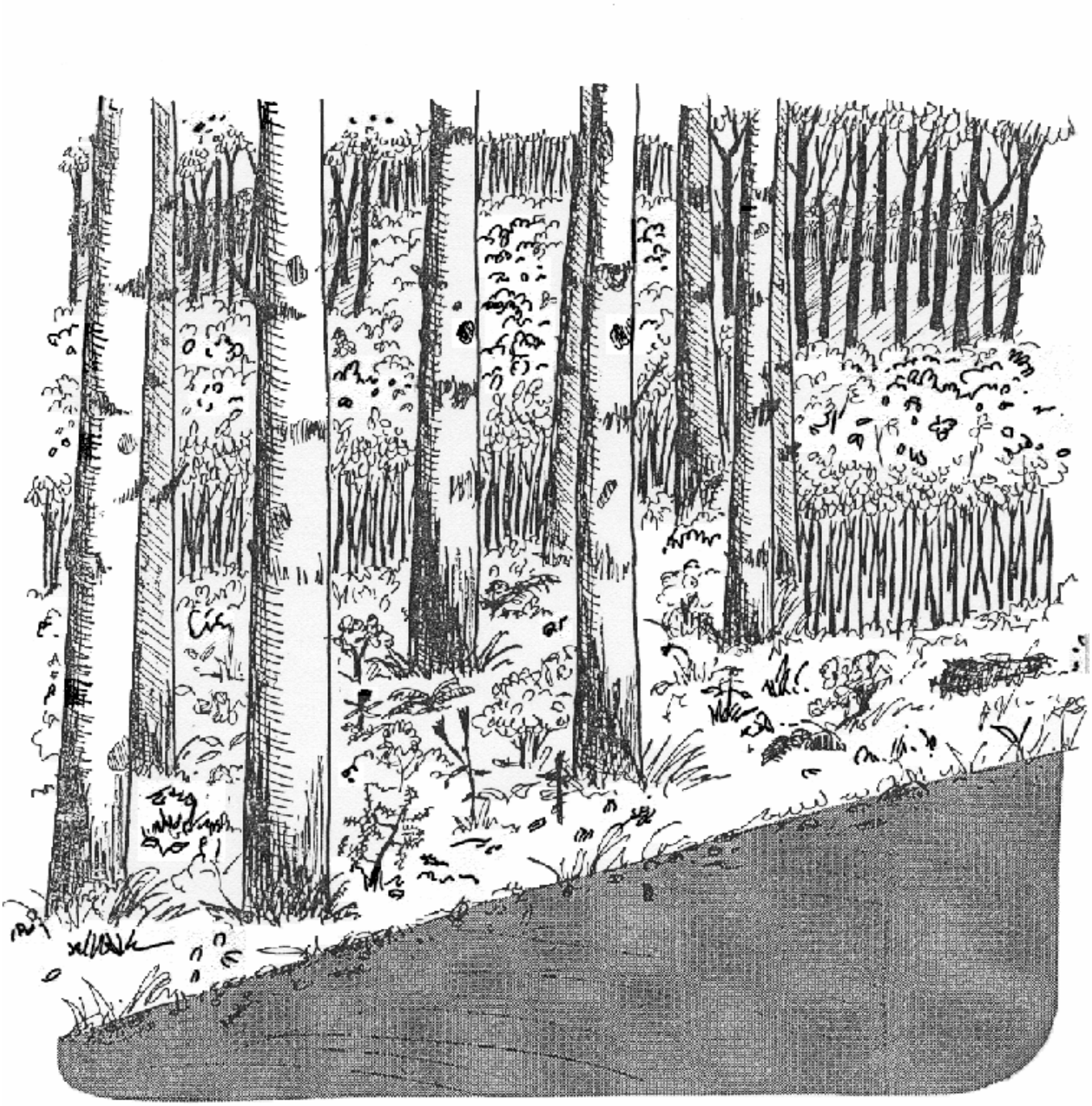
In addition to sale boundary manipulation, selected northern hardwood were left along the road to further reduce the visual impact. All the hardwood was retained in the unit bordering Big Sandy Lake. This unit will be gradually converted to northern hardwood. By doing so, long-term aesthetic management problems along the lake will be reduced.

Figure 81.16 Visual diffusion areas -- overmature timber.



Visual diffusion areas created in a large, overmature aspen stand.

Figure 81.17 Visual diffusion areas -- ground view.



Ground view of Figure 81.16 after the harvest, looking from point "A" in the direction indicated. The goal is not total screening but rather, a reduction of the visual impact.

Figure 81.18 Age diversity within a stand.

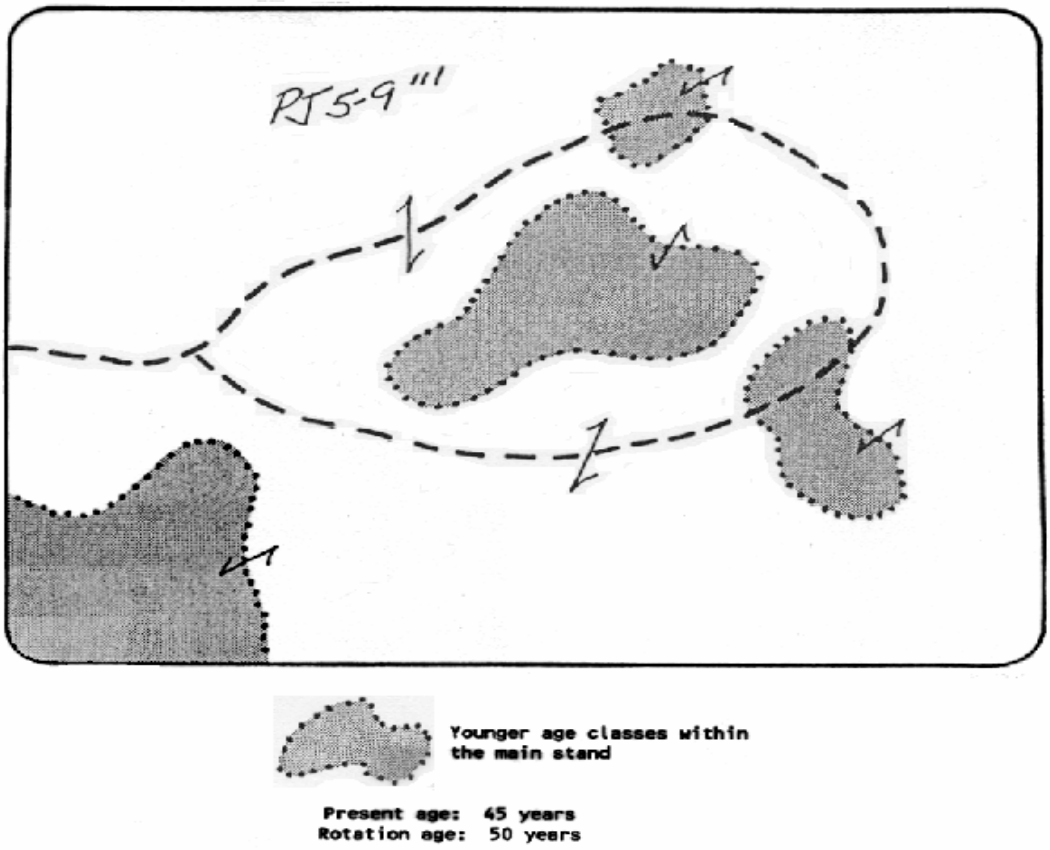
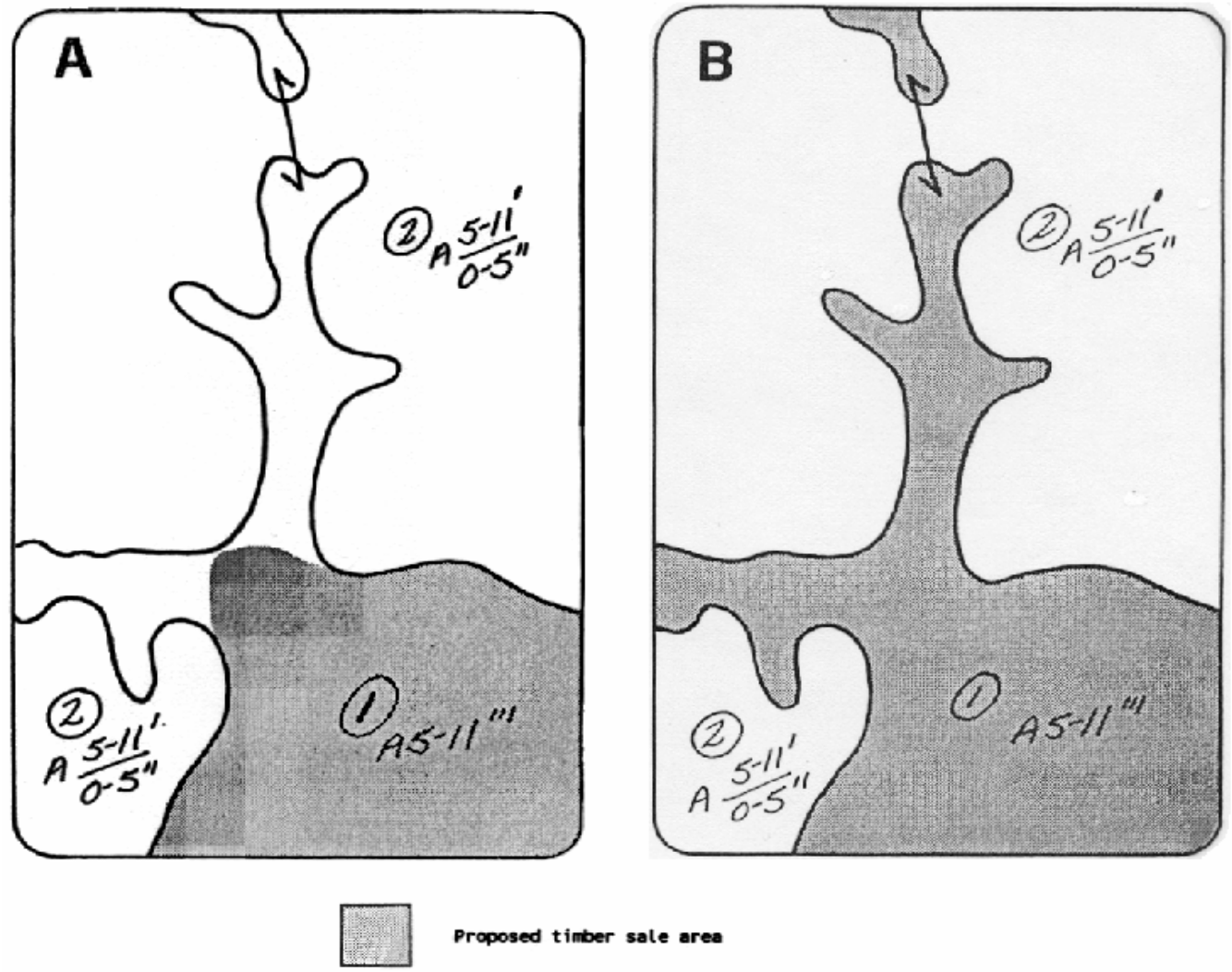


Figure 81.19 Enhancing existing age distribution.



Squared-off sale boundary represents lost opportunity to improve age diversity.

Figure 81.20 Harvest alternatives in small stands.

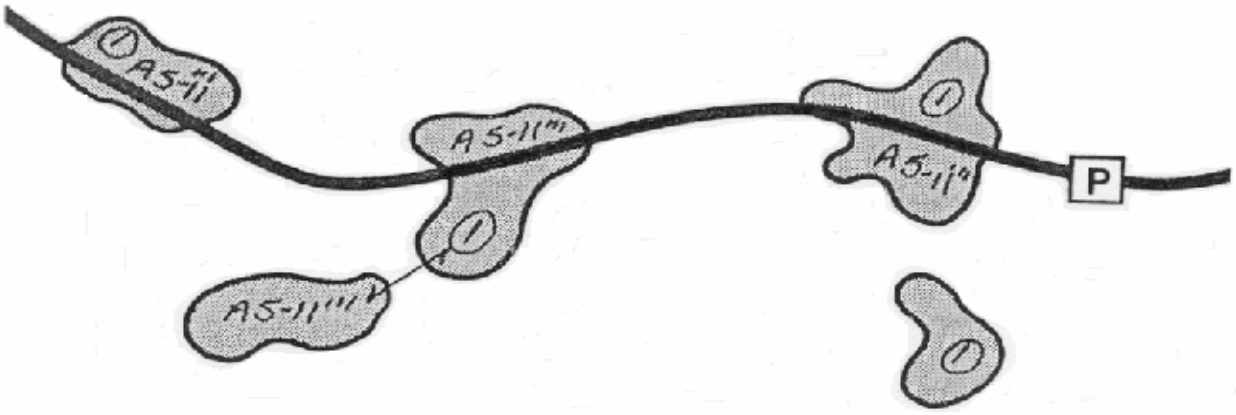


Figure 81.21 Harvest alternatives in large stands.

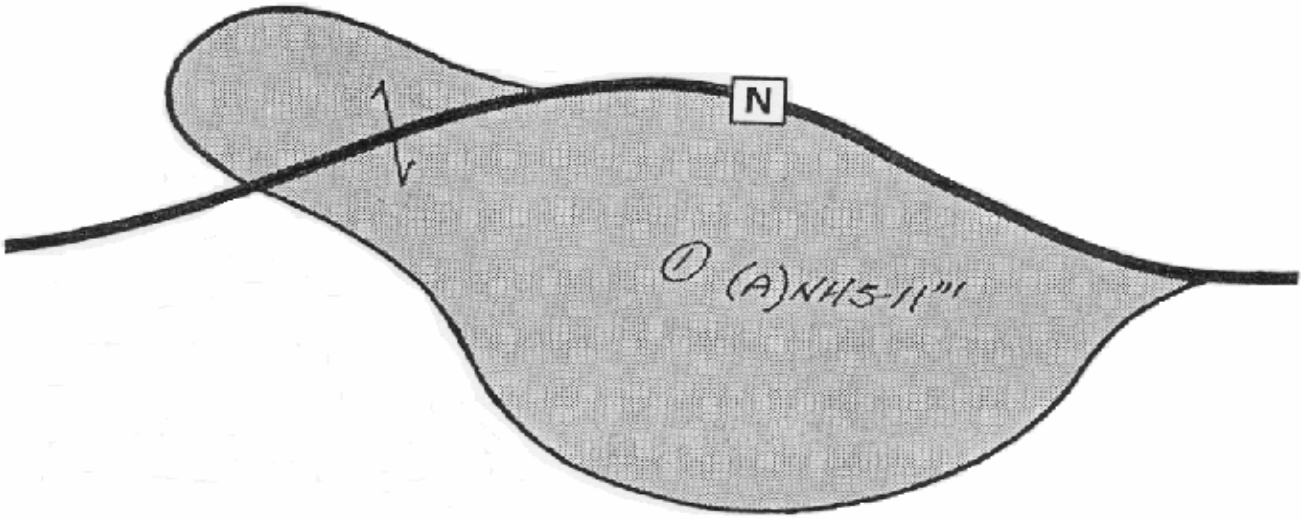


Figure 81.21 Harvest alternatives in large stands.

Figure 81.22 Use of stand distribution in aesthetic management.

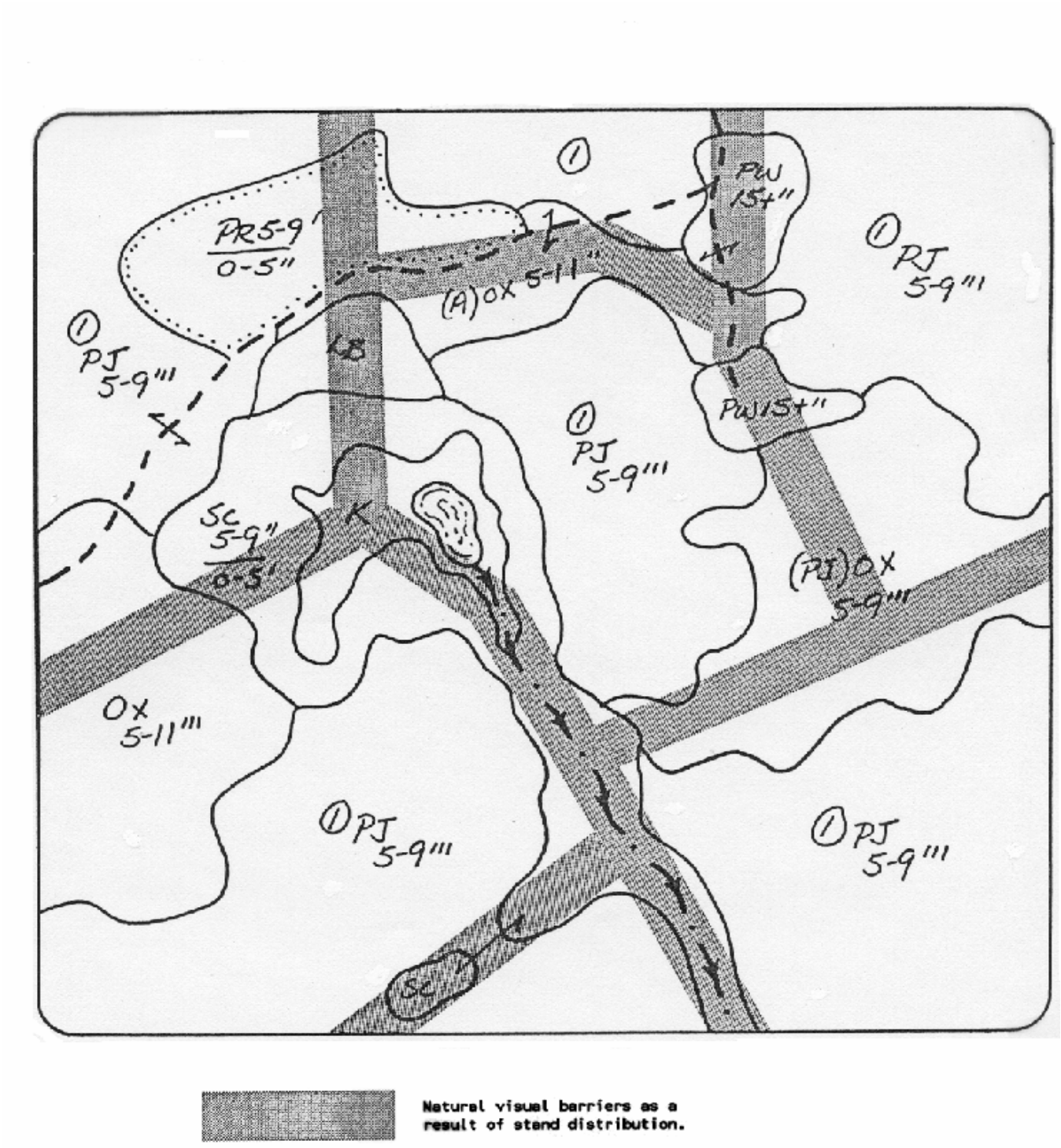
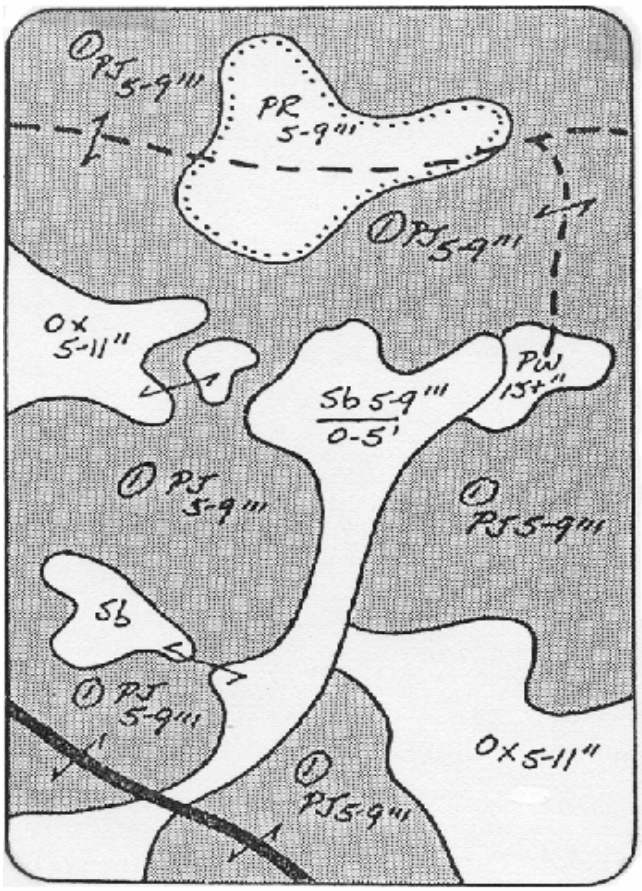
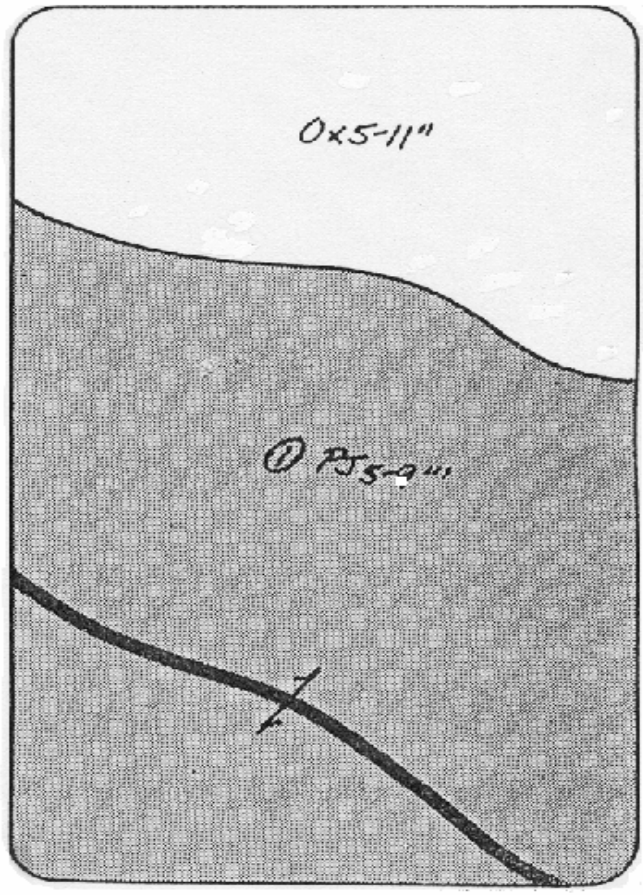


Figure 81.23
Favorable stand distribution.



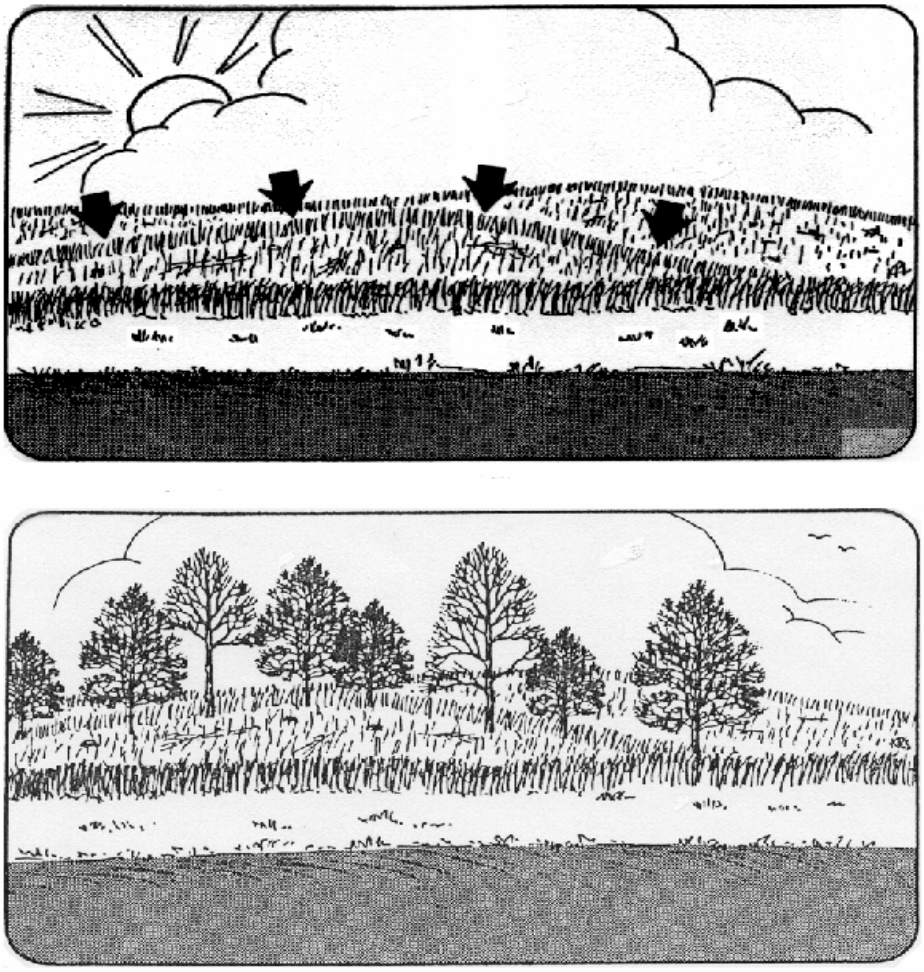
Stand 1: 350 acres
Age: 40 years
Rotation age: 50 years

Figure 81.24
Poor stand distribution



Stand 1: 350 acres
Age: 40 years
Rotation age: 50 years

Figure 81.25 Use of topography in sale design.



By locating this visual enhancement area on a ridge line, its effectiveness is greatly increased.

Figure 81.26 Use of streams as cutting boundaries.

Streams make excellent sale boundaries for a number of reasons and should be incorporated into the sale design whenever possible.