Briefing on Spruce Bark Beetles

2-10-93

Alaska State Legislature

Official Business

HOUSE RESOURCES COMMITTEE

State Capitol
Juneau, Alaska 99801-1182

TO: MEMBERS OF HOUSE RESOURCES AND OTHER LEGISLATORS WHO ATTENDED FEB. 10 BRIEFING ON SPRUCE BARK BEETLES

FROM: OFFICE OF REP. WILLIAMS, CHAIRMAN

DATE: FEB. 11, 1993

RE: FURTHER INFORMATION ON SPRUCE BARK BEETLES

Following the teleconferenced briefing held by the Resources Committee yesterday on Spruce Bark Beetles, Mr. Larry Smith of Homer sent the attached DNR memo and response. He asked that they be distributed to the Resources Committee members and other legislators who attended the briefing.

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KENAI PENINSULA SPRUCE BEETLE
WILDLAND FIRE CONSEQUENCES

Prepared By The Alaska Department of Natural Resources
Division of Forestry
February 1993

The spruce bark beetle infestation has modified the Kenai Peninsula's forest health in a number of ways. Considerable attention is focused on the potential impacts from wildland fire because of the hazard presented by beetle killed stands of spruce. The following facts were collected from foresters, researchers, and fire behavior specialists to offer a realistic perspective on the situation.

1. The advancing tree mortality caused by the spruce bark beetle is causing establishment of a different vegetative type. Once healthy stands of timber are giving way to grass, brush and dead snags. This altered fuel type can burn very rapidly, under the right conditions, particularly in the spring and early fall.[1]

The fire hazard moderates after green-up usually around June 10th, and does not re-appear until the first hard frost.

2. The grass/brush fuel types can be dangerous under the right conditions. Most fatalities and loss of structures in wildland fires occur in these fuel types.[2] Rapid rates of spread can outrun a person, especially when the fire is being pushed upslope by the wind. These new fuel types present more danger to life and property during the pre-greenup and post frost stages than did the previous healthy stands of timber.

3. After the overstory (snags) fall or are wind thrown, the fire behavior will change again. The rates of spread will slow down, however, the fire may be too intense to effectively control unless controlled quickly. The reason for the decreased spread rate is the heavy fuels break up the continuity of the surface fuel bed, acting as a heat sink to the passing flames. If the downed timber is dry and the heavy fuels support combustion, the resulting fire intensity may alter the soil characteristics, enough to effectively prohibit re-establishment of the climax plant community (spruce/hardwoods) over a portion of the fire area. The spruce type may be lost for decades if this occurs.[3]

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[1] John W. See, Cooper Landing Spruce Beetle Fire Behavior Analysis February 23, 1990

[2] Carl C. Wilson, Some Common Denominators of Fire Behavior on Tragedy and Near-Miss Forest Fires, U.S.D.A. Forest Service, December 1978

[3] Rodney A. Norum, personal correspondence, February 1993

4. A "worst case" scenario will occur when a combination of events happen. Long term drying trends that spans several years (drought) reduce fuel moistures in the heavy dead fuels to critical levels. Combined with a wind event, such as a weather frontal passage or subsiding air mass, referred to as "red flag" warning weather conditions, would create the conditions necessary for "worst case" fire behavior. "Red flag" weather conditions refer to a combination of low humidities (less than 20%), high temperatures (80 degrees or more) and high winds (generally over 25 mph).

The probability of experiencing the effects of a long term drying trend (drought) are one year out of every four years. "Red flag" warning weather conditions occur once every five years.[4] The odds of both events occurring simultaneously are between 1 in 10 and 1 in 20 years (estimated) because they are not totally independent events. History supports this assertion considering the frequency of large wildland fires on the Kenai Peninsula. There has been a large fire on the Peninsula every 10 to 20 years.

5. Alaska's spruce trees burn more readily than other tree species such as encountered in the lower 48 states because of low foliar (needle) moisture content. Therefore, when a spruce tree in Alaska turns yellow or red after a beetle attack, it is not significantly more flammable than a healthy tree. Resins and other chemicals in the needles are also partially responsible for this phenomena.

Adjustments have been made by the fire suppression agencies to counteract the increased hazard. The retardant aircraft fleet has been modified to provide a 2000 gallon air tanker stationed at Palmer, Alaska. This aircraft has improved capabilities in the urban wildland interface areas of the Kenai Peninsula. Training sessions on urban wildland firefighting tactics have been developed and presented and a specialized wildland engine firefighter class has been developed and given to the rural fire departments that cooperate with the wildland fire agencies.

The federal, state and local fire protection organizations responsible for fire suppression must be prepared to effectively initial attack fires while they are small. In the pre-greenup scenario, initial attack response times cannot be compromised, especially when the reported fire corresponds with red flag warnings conditions. During drought conditions, additional suppression forces must be in-place to maintain the success of the initial suppression action.

If you have any other questions regarding this subject, please feel free to contact the Division of Forestry Office in Soldotna.

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[4] Neil Marchbanks, National Weather Service, Fire Weather Forecaster, personal correspondence, February 2, 1993

MEMORANDUM STATE OF ALASKA

Department of Natural Resources **Division of Forestry**
Kenai-Kodiak Area Forestry

1

TO: John See
Southern Zone FMO

DATE: February 10, 1993

FILE:

FROM: Wade W. Wahrenbrock WWW
Forest Practices Forester

SUBJECT: Fire Behavior in Beetle Kill Timber

I have recently read a paper you drafted concerning the association of beetle kill timber and wildland fire on the Kenai Peninsula. I have a couple observations and suggestions to offer which relate to this subject.

In item number 5 of your paper, you have developed a line of discussion to compare live white spruce and beetle kill timber. I have measured the FMC of live spruce in a fuel moisture oven several times during extended dry periods. They usually run about 125% during these periods. As comparison, dead spruce needles have been measured at 5% on low RH days. Given two trees of similar size and crown arrangement, one being fresh dead and the other alive, I am hard pressed to believe that they will produce similar intensity and vertical spread rates. The moisture contents are distinctly different. The heat required for fuel ignition should correspond accordingly.

I can only question your line of reasoning that Alaska timber has a lower FMC than other associated species in the lower 48 and that this can be used for any comparison between live and dead spruce on the Kenai. I assume this paper was drafted for layman readers but the conclusions vary from my interpretation of the potential fire behavior in the changing spruce canopy.

So with this variance of appraisal, may I suggest that we take steps to accurately verify the extent, or lack thereof, of fire behavior and risk associated with dead beetle kill timber this summer? For example, we can complete small control burns which contain:

1. Live spruce unaffected by beetles

2

2. Spruce trees hosting bark beetles after 1 and 2 years of attack
3. Spruce of varying mortality ages caused by beetles

Completing this type of research project and measuring the fire behavior responses will pay dividends. With the study results, we can more accurately and professionally address the fire risks of the various alternatives available for managing forests impacted by bark beetles. Beyond this objective, the amount of beetle kill timber showing up in the urban/wildland interface picture on the Peninsula is quite significant. By more fully evaluating the fire behavior affiliated with dead timber, this information can be used as a basis for determining initial attack manning guidelines and the placement of strategic fire suppression resources. Presumably, such information will apply to other areas of the State affected by bark beetles.

If you consider such an evaluation or small study of beetle kill timber and fire useful, I will be happy to assist you in this effort on - ah - Saturdays?

c: Larry Adams, FMO
 Jim Peterson, Area Forester

MEMORANDUM

State of Alaska

DEPARTMENT OF FISH & GAME

FOR PR Falls Ck Timber Sa

TO:	Jim Peterson Area Forester Division of Forestry Department of Natural Resources	DATE:	January 22, 1993
		FILE NO.:	FIL ✓
		TELEPHONE NO.:	267-2284 EF
		SUBJECT:	Review Comments Falls Creek Timber Sale ADL 222802 SC-3010K
FROM:	Steven W. Albert Habitat Biologist Region II Habitat and Restoration Division Department of Fish and Game		

The Alaska Department of Fish and Game (ADF&G) has reviewed the proposed coastal consistency determination, the Forest Land Use Plan, and preliminary decision developed by the Alaska Department of Natural Resources, Division of Forestry (DNR/DOF) for proposed timber harvest and road construction activities in the area near Clam Gulch on the Kenai Peninsula.

The Falls Creek Timber Sale area includes the upper Ninilchik River and five documented anadromous tributaries and a minor reach of upper Crooked Creek near Tustamena Lake. The Ninilchik River in the project area provides spawning habitat for chinook and coho salmon. It also supports populations of steelhead and rainbow trout, and Dolly Varden. Crooked Creek provides spawning habitat for chinook and coho salmon and supports populations of pink salmon, steelhead trout, and Dolly Varden. Crooked Creek also serves as a source of water for the state-owned Crooked Creek Hatchery. Moose are the predominant big game species in this area. Black bears are much more common in the sale area than brown bears that generally prefer higher elevations and more open habitat types. Various furbearer species are also found throughout the sale area.

PROPOSED ACTIVITIES

It is our understanding that DNR is proposing to schedule timber harvesting operations on a total of approximately 14,200 acres of which 6,000 acres is thought to be commercial forest land with 5,300 acres actually available for harvest. The sale should result in the harvest of approximately 20,000,000 board feet (BF) of white spruce and construction of approximately 12 miles of permanent roads and 22 miles of temporary or seasonal roads. The harvest area is generally flat with some steep areas in excess of 30% gradient.

On mixed conifer-hardwood sites, a partial cutting scheme will harvest infested spruce or spruce that appear to be in imminent risk of infestation from spruce bark beetles (SBB). Overmature aspen and cottonwood will be felled to encourage suckering. All birch trees, spruce in advanced regeneration stages, and at least two hardwood snags per acre will be retained along with at least four healthy spruce trees per acre to function as seed trees. Site preparation will be accomplished through mechanical scarification activities. Reforestation of the areas will be accomplished through mechanical scarification and natural regeneration. If adequate stocking is not accomplished, then we assume that DNR will be responsible for ensuring that spruce seedlings will be interplanted to achieve Forest Practices Act (FPA) standards. Activities are scheduled to begin during early spring 1993.

Nearly pure spruce stands with only a minimal hardwood component will be clearcut. Pockets of young spruce regrowth will be retained. Cutting units will not exceed 100 acres. Leave areas will be thinned to remove dead and infested trees. Reforestation of spruce stands will involve scarification or prescribed burns conducted by the state.

It is expected that mechanized harvesting techniques (feller-bunchers, delimbers, rubber-tired skidders) will be utilized on both forest types. Because most of the harvest areas are generally on level ground, cable yarding will likely not be needed.

We do not object to the proposed timber harvesting activities if the following recommendations are followed and our specific comments are adequately addressed.

1. *Waters of the sale area will be surveyed for anadromous and high-value resident fish when they are at their maximum seasonal distribution prior to the beginning of logging operations. This will ensure that the riparian buffers required by the Forest Practices Act are implemented.* Budgetary, logistical, and time constraints have prevented the ADF&G from surveying the sale area and documenting the geographic distribution of anadromous and high-value resident fish species. The fish resources produced in this area support sport and commercial fisheries that are an important base of the local economy. The loss of any anadromous fish habitat is undesirable and unnecessary both from a resource management and an economic perspective. In our view, it is imperative that intensive stream surveys be completed prior to the initiation of logging activities so that any presently undocumented streams can be afforded legally required habitat protection.

discuss protection or enhancement of other wildlife species, such as small mammals, birds, furbearers, and other large game species not addressed in the attached summary.

5. *The sale will rely on temporary roads. This would reduce sale overhead and reduce potential impacts to fish and wildlife resources.* The DNR will commit to work with the ADF&G to ensure that these temporary roads are managed to avoid long-term illegal and excessive exploitation of vulnerable fish stocks in small streams.

6. *Every effort should be made to limit road densities in the proposed sale area to minimize potentially adverse effects on fish and wildlife habitat that would accompany increased human access into the sale area. Roads must be sited to minimize adverse impacts from road runoff to anadromous and high-value resident fish water bodies.* We are concerned that the cumulative effects of planned and ongoing road construction and timber harvesting activities could lead to adverse impacts on fish and wildlife resources of the area. Only on rare occasions can roads be built that have no negative effects on streams. As you are certainly aware, the Falls Creek sale is but one of at least three significant timber harvesting operations planned or ongoing for the area between Tustamena Lake and the Stariski Creek drainage. Circle DE Pacific Corporation (CDP) has already begun road construction and chipping operations on two tracts of private lands of approximately 10,000 acres owned by Cook Inlet Region, Inc. (CIRI). Plans indicate that additional tracts will be made available that will approximate 30,000 acres. The University of Alaska has announced plans for the Tolum Road Timber Sale in an area near the Falls Creek Timber Sale area. There is also a possibility that logging operations could begin again on Ninilchik Native Association lands. This total program is a significant increase in logging activity in a relatively small area.

7. *If adequate stocking rates are not achieved through mechanical scarification and/or prescribed burn site preparation techniques and natural regeneration, then the operator will plant white spruce to meet the FPA reforestation standards, or DNR will reserve funds to cover replanting expenses.* Harvest cuts of any type result in conditions that are favorable for the establishment and growth of grass (mainly Calamagrostis), alder, and other aggressive competitors that constrain regeneration. Heavy grass and/or alders compete not only with white spruce but also with desirable hardwoods such as birch and important browse species like willow. Such competition can severely

2. *Riparian habitat values will be maintained for fish and wildlife resources by retaining buffers along anadromous and high-value resident fish water bodies as required by the FPA.*

3. *The DNR/DOF should provide funding to the ADF&G for personnel and support costs to plan and conduct stream surveys and to participate in harvest planning and monitoring activities to maintain or enhance fish and wildlife habitat values as timber harvesting occurs.* Given the potential level of timber harvesting activity in this sale area, as well as in the adjoining area, we are concerned that the rapid increase in permanent and seasonal road densities and the accompanying level of human encroachment could significantly increase exploitation levels of anadromous and high value resident fish, big game, and furbearer species beyond sustainable levels. Anadromous fish found in the upper portions of most of the drainages within the area would be particularly vulnerable to both legal and illegal harvesting with the increased level of access. This is also true for favored big game species such as moose, black and brown bears, and furbearers.

   Because of the sensitive nature of the sale area, we believe it is important that department staff be available to work closely with the prospective operator and DOF staff to protect residual fish and wildlife habitats by monitoring timber harvesting activities on a regular basis, to identify important wildlife habitats, to identify habitat improvement opportunities, and to ensure compliance with existing Title 16 statutes that apply to instream activities. Timber harvesting levels have increased dramatically throughout southcentral Alaska in the past year. Presently, we have one full-time person and one half-time person with the responsibility of working cooperatively with timber operators/landowners and monitoring logging activities throughout southwest and southcentral Alaska. Unless some additional funding is forthcoming to increase our ability to participate in future project planning and to maintain an adequate field presence, it will become increasingly more difficult to adequately monitor and protect fish and wildlife habitat values in the sale area as timber harvesting levels are expected to increase in FY 1993-94.

4. *The operator will also work closely with the DOF and ADF&G to develop logging prescriptions that achieve the management guidelines suggested in Attachment 1.* This will ensure that the habitat needs of fish and wildlife in the project area are addressed. We will be available to

reduce most other plant development for decades. We are concerned that unless adequate site preparation activities are implemented, initial aggressive competition from grass and alder will ultimately depress conifer stand development and may also result in poor moose habitat.

SPECIFIC REVIEW COMMENTS

The Alaska Department of Fish and Game has the following specific comments and recommendations on the sale proposal:

<u>Page 2, Parag. No. 2</u>

The construction of 12 miles of permanent roads and 22 miles of temporary roads seems somewhat excessive given the size of the project area. With this level of road density combined with the number of anadromous fish streams in the sale area, we have some major concerns regarding potential impacts to riparian habitat from road construction and stream crossings. We want to avoid creating road access to important fish habitat, such as spawning or rearing areas in small streams which would become extremely vulnerable to illegal fishing and /or over-exploitation, but very difficult to police. Please explain why 12 miles of "permanent roads" are necessary to accomplish project objectives. The department requests that no permanent road construction be included in this sale unless it can be substantiated that access from the use of seasonal or temporary roads is not feasible.

<u>Page 3, Parag. No. 3</u>

Because the proposed timber sale has only recently been developed and was not included in the Five Year Timber Sale Schedule as per AS 38.05.113 and 11 AAC 71.010 (Timber and Material Sale Offerings), we have not had sufficient opportunity to survey much of the proposed sale area. We firmly believe, given the existing distribution of anadromous fish streams, that responsible management of this area requires that intensive surveys be conducted to identify the maximal geographic extent of anadromous and high-value resident fish distribution. Therefore, we request that stream surveys be conducted and the appropriate buffers be planned and flagged prior to the occurrence of any timber harvesting activities.

Because of the relatively short notice, budgetary, and time constraints, the costs of stream surveys should be considered part of the timber sale development costs and be the responsibility of DNR. Monies need to be allocated to the ADF&G to complete this work to ensure protection of all fish habitat in the sale area. The optimal time period for completion of these stream surveys occurs when the geographic distribution of anadromous fish is maximal from late July through mid August. Therefore, we request that final forest management prescriptions and siting of roads and other facilities be delayed until after surveys have been completed in August. Department staff would be glad to meet with DNR staff to provide cost estimates and discuss surveying procedures and logistics.

Page 3, Bottom

Riparian standards for state lands also require that any timber harvesting between 100 and 300 feet from a water body must be consistent with the maintenance of fish and wildlife habitat in that area.

Page 4, Parag. No. 1

We believe the last sentence is a bit confusing. After having some time to evaluate the consequences of a no management action alternative, we request that this sentence either be deleted or modified to reflect our view that extensive treatment through selective and clearcut harvesting would lead to more adverse effects on fish habitat than the no management action strategy. Although it is true that we could not find any published data indicating that a no management action strategy could result in no more or less impacts to fish habitats than a clearcut or selective harvesting strategy, we also pointed out a number of potential and likely adverse effects from logging on fish habitat. An abundant amount of information has been developed over the past 20 years in Alaska and the Pacific Northwest that indicated that improper logging practices have the potential to seriously impact fish and wildlife resources. Therefore, we do not support the notion that implementation of the harvesting alternative will be neutral for fisheries concerns. In fact, we believe there is a higher probability of adverse effects on fish habitat from logging than from doing nothing to the landscape. Implementation of an intensive logging program will require stream crossings increasing the possibility of erosion and stream sedimentation and add additional human access to upstream fish habitat that is usually accompanied by increased fishing pressure on stocks that are in a more vulnerable situation, increased opportunities for poaching, and possible streambank deterioration. If DOF will conscientiously enforce the FPA and regulations and use our attached wildlife recommendations, then we believe that adverse impacts to fish and wildlife should be minimized.

Page 9, Bottom

The cyclical pattern of spruce seed production could result in poor seed crops or improper mechanical scarification techniques could lead to inadequate seedbed conditions. These are but two of a number of contingencies that could prevent natural regeneration of a forest. Because it is important that the sale area regenerate for wildlife habitat, will the state plant seedlings to meet FPA reforestation standards at considerable extra cost if natural regeneration does not occur?

Page 10, Parag. No. 1

We are concerned with the proposed 100-acre limit for clearcut size. Clearcuts of this size would not be used as efficiently or as intensively by wildlife species because of their relatively large size. We recommend that clearcuts be limited to 50 acres with a minimum 330-foot naturally vegetated leave strip between cutting units. This will enhance wildlife utilization as well as forest regeneration.

Please provide a description and purpose for the leave areas. Are these leave areas randomly located or are you referring to leave areas between cutting units? If the latter, how wide will these leave areas be? If these leave areas are to function as wildlife habitat, we recommend maintaining leave area widths of at least 330 feet. Such areas could be used by many wildlife species for cover and feeding habitat. We have included some harvest guidelines we think will balance timber harvest and fish and wildlife protection.

Page 10, Parag. No. 2

Please describe reforestation measures to be taken if scarification or a prescribed burn fails.

See previous comment for Page 9, Bottom.

Page 10, Parag. No. 2

Please clarify for readers why the clearcut areas that were originally nearly pure spruce will be seeded with birch and interplanted with spruce. The department certainly would support such an effort to create a temporary availability of moose browse.

Page 12, Parag. No. 4

The riparian standard in the FPA (AS 41.17.118(2)) also requires that timber harvesting activities in the area between 100 and

300 feet of an anadromous fish stream be conducted in a manner consistent with the maintenance of fish habitat.

Appendix A

The total acreage figure does not appear to have been calculated correctly.

We thank you for the opportunity to comment on the proposed project and look forward to working with you on this project. Please contact me at 267-2284, if you have any questions regarding our comments or recommendations.

Attachment

cc: G. Saupe', ADEC
K. Florey, ADF&G
T. Mears, CIAA
K. Pitcher, ADF&G
W. Bucher, ADF&G
F. Rue, ADF&G
D. Nelson, ADF&G
J. Westlund, ADF&G
T. Spraker, ADF&G
T. Kron, ADF&G
K. Tarbox, ADF&G
P. Krasnowski, ADF&G
G. Muhlberg, ADF&G

ATTACHMENT 1

SUMMARY OF RECOMMENDED MANAGEMENT GUIDELINES FOR IMPROVING WILDLIFE HABITAT

MOOSE

The department will identify important moose habitats such as calving areas, winter cover, or other seasonal concentration areas that require varying amounts of mature forest cover. These areas will need to be retained for wildlife habitat.

Roads

Road management is probably the most important factor that will influence moose populations, as well as brown bears, and their habitat in areas designated for timber harvests.

1. Minimize road mileage necessary to achieve forest management objectives.

2. Design and construct new roads using techniques that will facilitate their eventual closure and obliteration.

3. An aggressive road management program involving permanent closure and/or various types of public restrictions on use will be necessary to minimize harassment of and disturbance to moose.

Timber Harvest Scheduling

Proper scheduling of silvicultural activities can be an effective means of meeting wood fiber production goals while minimizing adverse impacts to and improving moose habitat quality.

1. Plan and coordinate timber harvesting activities with seasonal use patterns of moose and other land use activities to minimize disturbances.

2. Schedule timber harvesting activities and other prescriptive activities such as site preparation to maximize vegetational responses beneficial to moose.

3. Plan timber sales to produce a continuous mosaic of mature, closed-canopied timber stands intermixed with variable-sized cut units that range between 5 and 25 years old.

Location, Size, and Shape of Harvest Units

1. Maximize the amount of forage-producing edge by shaping harvest unit borders in an undulating fashion.

2. Maintain some mature coniferous cover in close proximity to winter foraging areas (cut units) to benefit wintering moose.

3. Maintain the timbered margins of ponds and lakes at least 300 feet wide to provide security cover for moose feeding on aquatic plants.

4. Clearcut openings of approximately 40 acres (ranging between 5 and 60 acres) are preferred. Clearcuts that are too large preclude moose use of the total area while cuts that are too small may encourage high-density concentrations that may lead to over-browsing.

5. For maximum utilization, cut units should be configured such that the distance to cover does not exceed 330 feet. In cases where the distance to cover is greater than 330 feet, residual islands of dense cover should be left within the cut unit.

Timber Harvest Systems

1. Clearcutting with an adequate number of seed trees is the preferred harvest method for white spruce and birch.

Debris Management

1. Dispose of logging slash to increase access to available forage for moose, and eliminate barriers to travel for wildlife.

2. Broadcast burns in clearcuts are preferred over burning piles of slash because the growth of early successional shrubs preferred by moose is encouraged.

Prescribed Burning

1. Use prescribed burning to remove logging slash, maintain or create forest openings, provide optimal seedbed conditions for reforestation, and improve the quality and quantity of moose forage.

Herbicides

1. The department recommends against the use of herbicides for regeneration until a long-term evaluation of herbicide effects on moose browse has been completed.

Forest Regeneration

1. Write silvicultural prescriptions to improve the quantity and quality of moose habitat while still maintaining forest management objectives.

2. Natural regeneration can be the primary reforestation practice but when it is determined inadequate, use artificial means (planting) to complete forest regeneration.

BLACK AND BROWN BEARS

1. Plan timber harvests to produce a mixture of different aged cutting units. The spatial relationships of the units influences black bear densities and dispersion behavior.

2. Non-permanent roads should be put to bed as soon as possible to reduce access thereby minimizing hunting vulnerability of bears; roads should also be constructed to facilitate their eventual closure and obliteration.

3. Harvests should be scheduled in winter after bears have denned.

4. Clearcuts should not be larger than 50 acres leaving cover nearby and should be designed with an irregularly shaped edge to maximize ecotone habitat.

5. Clearcut configuration must allow bears access to cover within 330 feet.

6. Maximize age structure diversity and maintain all successional stages.

7. Maintain buffer strips along anadromous fish streams to protect fish resources for food and maintain valuable riparian habitat values.

8. Escape, hiding, and/or resting cover should be maintained around the perimeter of wetlands areas and other open areas.

9. Bear habitat should be maintained or enhanced by maintaining units of forest cover associated with riparian areas; by providing a variety of successional stages; by maintaining or encouraging a cover type mosaic through cutting and burning; by providing units of suitable habitat and area for refuge and travel corridors.

BEAVER AND LAND OTTER

1. Retain sources of hardwood species in the riparian zone for use by beaver to ensure maintenance of habitat.

2. Maintain water quality.

3. Minimize levels of human disturbance associated with road construction and logging activity.

BALD EAGLE

1. All logging-related activities shall be restricted within a concentric circle (primary zone) around a nest tree with a minimum radius of 330 feet. If the nest is active, logging activities should be restricted in a secondary or seasonal zone extending 660 feet from the nest tree during the critical breeding season (March 1 - September 1).

MEMORANDUM

Department of Natural Resources

STATE OF ALASKA

Forestry / Central Office

TO: Dan Golden
Forest Health Project Manager

DATE: February 4, 1993

FILE NO: 9-2100

TELEPHONE NO.: 762-2505

FROM: Frenchie Malotte
Chief, Fire Management

SUBJECT: Wildland Fire Relationship to Tree Mortality

REPLY DUE: N/A

Your requested information on the increased fuel hazard presented by beetle killed stands of spruce on the Kenai Peninsula is enclosed.

This information was jointly developed by staff specialists of the Division and the U.S. Forest Service. A conscious effort was made to provide the most realistic evaluation of the situation as possible.

cc: Dean Brown, Acting State Forester
Jim Peterson, Area Forester

KENAI PENINSULA SPRUCE BEETLE
WILDLAND FIRE CONSEQUENCES

Prepared By The Alaska Department of Natural Resources
Division of Forestry
February 1993

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The fire hazard moderates after green-up usually around June 10th, and does not re-appear until the first hard frost.

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3. After the overstory (snags) fall or are wind thrown, the fire behavior will change again. The rates of spread will slow down, however, the fire may be too intense to effectively control unless controlled quickly. The reason for the decreased spread rate is the heavy fuels break up the continuity of the surface fuel bed, acting as a heat sink to the passing flames. If the downed timber is dry and the heavy fuels support combustion, the resulting fire intensity may alter the soil characteristics, enough to effectively prohibit re-establishment of the climax plant community (spruce/hardwoods) over a portion of the fire area. The spruce type may be lost for decades if this occurs.[3]

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If you have any other questions regarding this subject, please feel free to contact the Division of Forestry Office in Soldotna.

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Land swap

Continued from page 1

Currently, according to Arminski, the AEA pays a small fee to the forest service for use of the land at Swan Lake. This amounts to several thousand dollars yearly in land-use fees.

That could change if the land goes to the trust, however.

"The reason we're concerned about these nominations is that one of the reasons we sought state ownership was so that we could avoid a federal land-use fee," Arminski said. "Our concern is that if these lands are traded ... we'd just be in the same situation and may be burdened with fees we aren't even having to pay right now."

Any additional fees would eventually be passed on to the customers, Arminski said.

The customer at Swan Lake is KPU.

But Stevenson said the contract KPU has with the AEA is secure — at least until the year 2000.

Gloria Manni, director of accounting and administration with the AEA, said she didn't know what would happen if the trust received the land and raised its rent.

She agreed the contract with KPU runs through 2000. However, "any agreement can be renegotiated," she said. "But that was quite a labor-intensive agreement to put together."

Swan Lake and the other hydroelectric projects are just one part of a much larger picture when it comes to replenishing the trust.

The trust has been dealing with the Ketchikan Gateway Borough over original trust land in the borough. About half of the borough's entitlement lands were originally trust lands given to the borough by the state.

The trust has since sued the state over what it called mismanagement of the trusts resources. It is in the process of settling with the state by reclaiming land around the state that is either original trust land, or what is called "proposed substitute" lands.

Meg Hayes with the trust said the process is far from over.

The selection of Swan Lake was made by the trust and then taken to the state, she said. The state is currently in the process of reviewing the selections.

If the state approves them, the selections will eventually go through a public process, during which time, the public can protest any property selected. The state, however, would then have to weigh the public's disapproval with the overall lawsuit, she said.

One of the problems for the Southeast, she said, was that so much of the original trust land came from the Southeast.

"There's a little piece of heaven there in Southeast Alaska. Both for the people who live there and for the trust," Hayes said.

Pekovich said the selection poses problems for his department.

Just denominating the land from the state's selection process won't work, he said, since the trust can both nominate land that has been selected or pick land they want the state to select.

And DNR is trying to settle the issue across the state, Pekovich said, so DNR has a problem protesting individual selections in relationship to the overall settlement.

And on a regional basis, the Swan Lake selection is a problem.

What Pekovich said he didn't want was to have the public panic.

"It's a long way off. A lot could happen between now and 1994," when the settlement should be complete.

"I know your job is to keep the public informed," Pekovich said. "But we try not to get them too excited."

"There's a little piece of heaven there in Southeast Alaska. Both for the people who live there and for the trust." —Meg Hayes

Land swap could raise electricity bills

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By JENNIFER STEINER
Daily News Staff Writer

In the ongoing attempt to replenish its coffers, the Mental Health Trust has selected land surrounding most of the major hydroelectric power plants in Alaska.

In the Southeast, that translates to Swan Lake, where Ketchikan gets most of its power, and the Tyee Lakes project, a future power source.

If Mental Health obtains property around the power plants, electricity bills in the region could rise.

According to Meg Hayes, project manager for the Mental Health Trust, the 600-acre site at Swan Lake has been selected by the trust as proposed substitute lands. The Ketchikan Public Utility currently buys its power from the Swan Lake power plant, the major power supplier for Ketchikan.

According to Tom Arminski, the permits and rights of way specialist for the Alaska Energy Authority, the Tyee Lakes project, Bradley Lake, Soloman Gulch, and Snettisham Project have also been selected, all major power suppliers around Alaska.

How that will eventually affect communities around the state is yet to be determined, but according to Arminski and Andy Pekovich at the Department of Natural Resources, higher rates could result if Mental Health charges larger fees than the federal government.

For example, the land at Swan Lake is currently federal land, Pekovich said. It had been selected by the state to be transferred to state ownership because of fees that are starting to be charged for the use of forest service land.

"The reason we selected the land was to keep (utility) rates reasonable," Pekovich said. "If mental health gets (the land) our reason for having selected it could go by the wayside."

KPU's contract with Swan Lake is through the AEA. It runs through the year 2000, according to Tom Stevenson, Ketchikan Public Utility manager. After that, a new contract would be renegotiated.

If the trust is successful in its bid for the land, however, the Alaska Energy Authority no longer would be leasing the land from the forest service, but from the trust, which could then raise its rates.

See 'Land swap,' page 5

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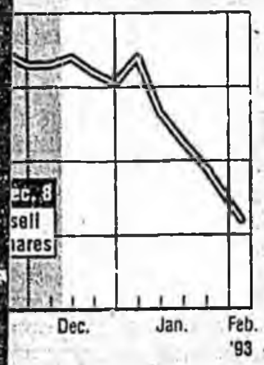

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...o Page C18, Column 6

Lumber Futures Rise the Limit In Bull Market

COMMODITIES

By Jeffrey Taylor

Staff Reporter of The Wall Street Journal

CHICAGO — If you'd asked them a month ago, many of the nation's biggest commodity traders probably wouldn't have known that the Chicago Mercantile Exchange traded lumber futures contracts.

They know now.

The price of the Merc's lumber contract has risen the daily limit for the past seven consecutive trading days, in a raging bull market that few people saw coming.

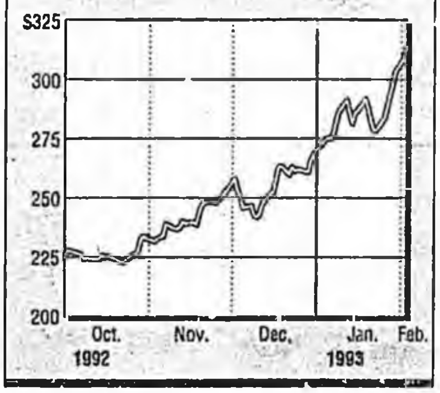
"It's wild," says Gregg Riley, sales manager for Bloch Lumber Co., a lumber wholesaler active in the Merc's futures market. "The market has never been this volatile."

Previously, traders have used the Merc's lumber futures contract mainly as an early indicator of the health of the U.S. economy, because its price tends to reflect home-building activity. In the past two weeks, however, lumber has become a hot trading vehicle.

In fact, since December, small fortunes have been made and lost in lumber futures and options contracts. "People who have been long [a wager that lumber prices will rise] have made a tremendous amount of money," says Steve Moore, president of the Moore Research Center, a commodity analysis firm. "Some people have followed it from $221 per thousand board feet above $300, and that's a huge movement. It's kind of like what happened to oil when Iraq invaded Kuwait."

Lumber Futures

March 1993 contract, in dollars per 1,000 board feet



Conversely, Mr. Moore says, "there are a lot of horror stories out there" about small investors who took short positions, or wagers that lumber prices would decline, because they perceived the price as being too high. "A lot of those people are now trapped," he says.

Traders at the Chicago Merc who have spurned lumber in the past are moving from cattle and currency futures pits into the lumber options pit and placing their bets. These contracts entitle them to buy or sell lumber for a given price at a specified date in the future.

Why lumber *options?* Because lumber futures contracts — when locked at the daily price-move limit, as they are now — aren't available for purchase.

Because of the wild price moves, lumber options trading volume has exploded at the Merc. An average of 1,668 lumber options changed hands each day last month; in January 1992, the daily average was 581 contracts. Before last month, the Merc had never traded more than 1,220 lumber options contracts in a day.

The price of any commodity is governed

Please Turn to Page C12, Column 3

Wall Street Journal February 3, 1993

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DEPARTMENT OF NATURAL RESOURCES

DIVISION OF FORESTRY

FOREST LAND USE PLAN
for the

FALLS CREEK TIMBER SALE
ADL 222802

SC-3010K

KENAI-KODIAK AREA

November 25, 1992

Jim Peterson
Area Forester

INTRODUCTION

In July 1991, the State of Alaska, Department of Natural Resources, Division of Forestry, embarked on a program called the Forest Health Initiative. This initiative was intended to begin to examine the issues and alternatives surrounding the apparent decline in forest health on the Kenai Peninsula as evidenced by the spruce beetle (*Dendroctonus rufipennis* Kirby) infestation. One of the first products of this program has been the development of a management plan entitled "Forest Health Management Plan for the Western Kenai Peninsula and Kalgin Island". Within this plan, the Division identified seven priority areas to be considered for timber harvest. The Falls Creek area is the first of the seven areas that contains a sizeable block of State lands significantly infested by spruce beetle. In accordance with AS 38.05.112, this forest land use plan is intended to provide site-specific information about timber harvesting within this block and to provide the written finding of the director as required under AS 38.05.035.

GENERAL INFORMATION

This timber sale will be sold under the authority of AS 38.05.110-.120 and 11AAC 71, entitled Timber and Material Sales Regulations. This proposed sale is not contained in the division's five year timber harvest plan. Due to the spruce beetle activity and the need to timely process a harvest proposal, the division is processing this sale under the exemption allowed under AS 38.05.113(c). Draft regulations implementing AS 38.05.113(c) are being processed. The Alaska Forest Resources and Practices Act, AS 41.17, will also be used to guide harvest operations.

The timber sale is located in the vicinity of the community of Clam Gulch on the Kenai Peninsula. The sale area is within the Kenai Peninsula Borough Coastal Management Program boundary. The sale contains approximately 14,226 acres. Only approximately 6,011 acres are considered commercial forest land and 5,300 acres are being made available for harvest. The preliminary estimate of volume involved is approximately 57,000 CCF (CCF=100 cubic feet; the conversion factor used is 3.5 board feet per cubic foot. Therefore, the estimate is 20,000,000 board feet.) The State land is bordered by lands owned by the University of Alaska, the Kenai Peninsula Borough, the Kenai National Wildlife Refuge, native corporations, and several private landowners. A complete legal description is located in Appendix A. The sale area can be located on the United States Geological Service 1:63360 Quadrangle maps titled Kenai A-4 and Kenai A-5.

A land title report detailing the acquisition authority, the land classification, and any title restrictions is on file at the Division's office in Soldotna. Only those lands which classification allows for timber harvest are included in this sale. Some of the lands included in this sale are identified as "collateral of last resort", hypothecated Mental Health lands. The department policy involving hypothecated Mental Health lands will be followed prior to final approval of this proposed action.

The proposed sale area may be accessed from several different locations. Presently, the only developed access into the sale is via the Falls Creek Road, which junctions the Sterling Highway at approximately MP 121.5. Access from the south has not been developed to the State lands, but Klukwan Forest Products (harvesting on Ninilchik Native Association lands) does have access developed to within a mile of portions of the block and to within 4.5 miles to the major portion of the block. It is anticipated that both Klukwan Forest Products and Circle DE Pacific (operating on Cook Inlet Region Inc. lands) will be harvesting on lands adjacent to the State lands in this block. Joint road use agreements will need to be developed to reduce road development and to gain access to various parcels of State land. A conceptual access plan has been developed and would involve approximately 12 miles of permanent road construction and approximately 22 miles of temporary or seasonal roads. The temporary or seasonal roads will be closed upon completion of use.

The purchaser will be required to submit an overall harvest plan and a detailed Annual Operating Plan prior to beginning any work on this sale. The Annual Operating Plan will include those items required in a Detailed Plan of Operations as required under the Forest Resources and Practices Act ([illegible]) and will be prepared in accordance with Division's [illegible] and Procedure Manual (PPM), Section 3146.53. The Annual Operating Plan will be subject to interagency review similiar to the review given private timber harvest proposals, however, since this proposal involves State lands, adjustments can be made at the State's discretion to protect public resources. The purchaser will be required to locate property boundaries, layout harvest units and road locations. Approval by the State will be required prior to beginning any construction or harvesting.

RESOURCE ANALYSIS

Geography and Soils.

The proposed sale area is located on the western Kenai Peninsula lowlands. Most of the soils on the upland areas formed in a layer of silty, wind-laid material called loess. The principal difference in soils is the thickness of the mantle of loess over the underlying material, the types of underlying material, and the degree of soil development. Most of the soils in the proposed sale area are in the Cohoe series. These soils are moderately deep to deep loess that lies over layered sediments of the Kenai formation or glacial till derived from this formation. Most soils, due to relatively level terrain, are not significantly erodible. Some concern occurs on steep terrain along road cut banks which can seep and where moderate slumping can occur. Care must be taken to avoid steep terrain when practical and stabilize unavoidable road cut banks and fills on these soils.

The sale area ranges in elevation from 250 to 600 feet above sea level. The area generally faces to the west and most areas are level, however steep areas in excess of 30% are not uncommon as the uplands break off into drainages or river valley bottoms. There are no known natural hazards occurring in this area.

Surface Waters/Fisheries.

There are no significant lakes located in the sale area. There are seven streams within the sale area that are listed by the Alaska Department of Fish and Game (ADFG) as anadromous streams. Most of these streams are important as rearing habitat for kings, and cohoe salmon. Additionally, both the Ninilchik River and Crooked Creek are important for spawning. The ADFG anadromous stream catalog maps are on file at the Division of Forestry office i Soldotna. The most important anadromous and resident fish in the area include chinook, coho, sockeye, pink salmon; steelhead and rainbow trout; and Dolly Varden. There are likely a number of undocumented smaller anadromous and resident rearing streams within the proposed sale area. These streams need to be surveyed to determine if evidence exists that fish utilize these streams and then apply appropriate riparian protection standards to these streams.

Wetlands are scattered throughout the proposed sale area. Permanent road development across wetlands will be kept to a minimum, however, utilization of these wetland areas for winter road use will be common.

Surface water quality will be protected through application of the standards of the Forest Resources and Practices Act (FPA) and the water quality standards pursuant to 18 AAC 70 administered by the Department of Environmental Consevation. Riparian vegetation will be protected by the FPA standards which require a 100 foot no harvest buffer along all high value resident fish and anadromous fish waterbodies. Any variations to these riparian standards will be in accordance with the FPA regulations.

Documentation of any measurable effects on fish habitat directly attributable to the spruce beetle infestation can not be found. ADFG believes that some potential effects are a minor increase in streamflow and runoff rates. There is also the loss of larger spruce trees in riparian areas which would lead to a short-term increase and then a decrease in long-term sources of large woody debris until younger trees mature. The increasing rate of loss of larger-sized spruce trees in riparian areas could result in some decreased streambank stability and some degradation of stream and shoreline areas. However, studies indicate that larger conifers are retained in small streams in excess of 200 years and that increasing amounts of large woody debris yield increasing concentrations of rearing fish. ADFG indicates that they are not aware of any evidence that suggests that no management action would be better or worse than extensive treatment through selective or clearcut harvesting.

Vegetation.

The forest within the proposed harvest area has an overstory composed of Lutz spruce (*Picea x lutzii* Little), white spruce (*Picea glauca* (Moench) Voss), and paper birch (*Betula papyrifera* March). Quaking aspen (*Populus tremuloides* Michx.) and black cottonwood (*Populus trichocarpa* Torr. & Gray) can also be found, but in low numbers. Black spruce (*Picea marianna* Mill) is found along the poorly drained soils located between the upland Lutz and white spruce sites and the lowland bogs and muskegs. The Lutz and white spruce stands have a wide range of density ranging from 40 to 120 square feet of basal area. The site index (a measure of productivity of the site for growing trees) is 65+, which is one of the higher sites for Kenai Peninsula soils. The average height of the spruce is 65 feet and the average height of the birch is 45 feet. Much of the birch is in poor condition, with many dying as a result of age and disease. However, no management of this species through harvest is proposed at this time.

The common undergrowth species include willow, alder, highbush cranberry, rusty menziesia, prickly rose, bunchberry, Labrador-tea, fireweed, blue joint grass (*Calamagrostis canadensis*), feathermosses, oak fern, drawf birch, and service berry. The blue joint grass (*Calamagrostis*) is a serious competitor with tree regeneration and often recolonizes sites opened up by a loss of canopy cover such as from beetle infestation or timber harvest. Mosses and shrubs such as bunchberry and rusty menziesia decrease in opened areas.

Spruce Beetle.

Spruce beetle is prevalent throughout the area and mortality of the spruce trees is increasing. Lands on the Kenai Peninsula managed by the U.S. Forest Service show that mortality caused by beetles exceeds the gross growth rate. While the State lands within the proposed sale area have not reached this level of mortality, the intensity of the infestation is increasing resulting in increasing mortality. Field data indicates that the infestation, over the whole Kenai Peninsula, has increased substantially in recent years and likely will maintain, if not increase, its magnitude. The existence of a previously attacked and currently susceptible forest and an area of potential infestation similar in magnitude to the area of currently ongoing infestations, are strong indicators that the overall infestation could increase.

Studies conducted by U.S. Forest Service researchers indicate that low-elevations (500 feet) mixed spruce-birch stands exhibited the greatest overall risk and hazard levels for spruce beetle infestation. (Risk has been defined as the probability of occurrence of an outbreak and hazard as a measure of the predisposition to damage.) The research has confirmed that there is a clear indication of increasing risk and hazard with increasing elevation. Research also indicates that reduced individual tree vigor, evidenced by reduced radial growth, can increase susceptibility of trees succumbing to spruce beetle attack. Stands once susceptible often remain susceptible to reinfestation. Although stand structure is altered and the remaining trees tend to be smaller in diameter, they often do not increase enough in diameter growth to overcome subsequent beetle attack.

For low-elevation mixed spruce-birch stands, the researchers have indicated a combination of techniques could be used to decrease the likelihood of infestations. These techniques involve the removal of susceptible trees to increase stand vigor and the possible adjustment of species composition of a stand.

Stands in the Falls Creek area were surveyed to determine levels of infestation and the level of impact on existing stands. The results of these surveys are currently being compiled. However, it is evident that the infestation level is increasing. Preliminary results indicate that the infestation ranges from 10 percent to 60 percent of the trees infested. Time is of the essence to remove the infested and high risk trees in hopes of potentially reducing mortality in the smaller diameter trees. Other areas of the peninsula have experienced extremely high levels of mortality (90% +) and resulted in high costs to treat these areas to reduce fuel loading and the risk of wildfire near inhabited areas.

Wildlife.

The Alaska Department of Fish and Game have provided information about important wildlife and their associated habitats that can be found in the Falls Creek area. Moose are widely distributed throughout the area and because of their large recreational, esthetics, and subsistence values, are recognized as one of the most economically important species of the western Kenai Peninsula. Moose in the Falls Creek area are thought to be migratory, possibly traveling from upper elevation areas such as the Caribou Hills to lowland wintering areas. The riparian habitats are heavily used in the winter and serve as migration corridors during spring and fall. Important calving habitat occurs on the margins of wetlands and riparian areas.

Black bears are closely associated with forested cover types, favoring open to partially-open forest types consisting of fruit-bearing shrubs and herbs, lush grasses, and succulent forbs. Black bears tend to avoid expansive open areas. Important black bear habitat includes much of the riparian habitat along most watercourses, the open and semi-open forest types, and pure shrub cover types.

Brown (grizzly) bears occur throughout the Falls Creek area, but are more commonly found at higher elevations than black bears and in more remote locations. Alpine and subalpine habitats are important for summer and fall foraging and denning. In the spring they prefer sedge meadows, grass flats, and south-facing slopes.

Red squirrels are abundant and occupy mature coniferous and mixed forests, while arctic ground squirrels are commonly found throughout the alpine-subalpine shrublands, and meadow cover types where vegetation heights are less than 20 cm (8 in) so that their vision is not obscured.

Beaver are often found in streams and lakes bordered by hardwood and/or mixed forest types and low and tall shrub communities. Population levels are presently at low-to-moderate levels. However, beaver colonies accessible by any form of road access will receive intense trapping pressure.

Muskrat are found in lower elevation wetland communities and their population levels are considered low. Mink are common along most streams and although their population status is unknown, they are sufficiently abundant to attract moderate trapping pressure. River otters are also found in moderate numbers along lowland watercourses.

Although some lynx inhabit the Falls Creek area, they are likely uncommon. The snowshoe hare, which is closely associated with the abundance of lynx, are not relatively abundant. They are found in both forested and shrub habitats but prefer early successional stages.

Coyotes, ermine and Least weasels, and porcupines are found throughout the area. The distribution and abundance of small mammal species in the Falls Creek area is poorly documented.

The mature spruce forests provide important cover and winter food (spruce buds) for grouse, crossbills, redpolls, pine grosbeaks, pine siskins, and other birds.

Some of the effects of spruce beetle infestation on wildlife habitat include the modification of stand structure, particularly in decreasing canopy cover. This will reduce the stands capability to function as snow interception cover or year-around security (hiding) cover. In severe winters, this could adversely affect local sub-populations of moose. However, evolution of more open, less dense spruce stands should benefit moose by increasing browse production. The potential increases in available browse production could result in a small net gain in moose habitat value. Other species such as showshoe hares, lynx, or coyotes could also benefit. With the trend to a more open-canopied spruce forest, there should be an increase in small mammal populations, especially voles. Secondary benefits should then accrue to predators of these species.

Another effect of the spruce beetle infestation is the stand species composition may be altered shifting the ratio in favor of birch. The resulting increase in deciduous browse production (paper birch, rusty menziesia, currants, ferns, and others) could be beneficial to moose, hares, and other species occupying similar foraging niches.

The forest will also shift from late to early successional habitats. The potential removal of spruce trees combined with other related timber harvesting operations will likely reduce availability of late successional habitats in the near term and, thus, will adversely impact snag dwellers and other wildlife species dependent upon such habitats. Snags can be retained to help offset this loss. Newly created openings and edge habitat within infested stands will create favorable conditions for the release of hardwood tree seedlings and sprouts as well as grass-forb and shrub communities. This flush of early successional plant communities should begin immediately and last for 20-25 years and will favor moose, showshoe hares, rodents, and other herbivores. Predators such as lynx coyotes, and wolves will benefit secondarily.

There exits the potential increase in habitat diversity as a result of the beetle infestation. Much of the measured diversity in plant communities found in the boreal forest can be attributed to site-specific differences and historical fire patterns. Spruce beetle infestations can have effects similar to, but to much lesser degree, wildfire on a landscape by shifting the landscape to an early successional stage composed of a large hardwood shrub component. Such a relatively sudden and stand-wide tree mortality factor can significantly increase the mosaic of habitat types in the boreal forest landscape. This diverse mosaic of plant communities and habitat conditions supports a wide variety of wildlife species.

Personal Use Forest Products.

The harvest of forest products for personal use has been severely curtailed within the past year. The Falls Creek Road will be experiencing increased traffic due to intensive harvesting on Cook Inlet Region Incorporated lands and for safety reasons the road will be closed to public use, thus closing areas the State had proposed for personal use. The Division is intending to set aside the majority of State lands west of the Ninilchik River for small timber operators and for personal use harvest. Alternative access may be necessary to provide for these types of operations in light of the increased use mentioned above. Negotiations with landowners is underway.

Recreation.

Recreation resources known to be associated with the sale area are hunting, ATV use, snowmachining, and dog sledding. There are several seismic trails within the sale area that are used for the recreational purposes stated above and to access remote cabins in the Caribou Hills area. (There are no remote cabins parcels located within this proposed sale area.) Users have already been affected by increased trail maintenance due to downed beetle killed trees. These trails will need to be kept open during harvest operations and unobstructed for continued recreational use. Some of these trails have been used for snowmachining and dog sledding events sponsored by local clubs. The streams within the sale area are not known to be used by fisherman. The sale area is not known to have unique tourism values and receives little use except by local residents.

Scenic.

There are no scenic vistas from the major highway system (Sterling Highway) which overlook the proposed harvest areas. The harvest will be evident from the air if flying over the harvest units. The harvest will also be evident from the ground if traveling through the area by foot, vehicle, ATV, snowmachine, or dog sled.

Air Quality.

The air quality in the area is currently good. Generally, the wind is out of the southwest. Care will need to be taken if conducting a prescribed burn to avoid smoke into the Anchorage bowl area. Prescribed fire has the potential to adversely impact air quality and visibility.

Archaeological and Historical Sites.

There are no known archaeological or historic sites within the sale area on file with the Office of History and Archaeology, Division of Parks and Outdoor Recreation. However, the area has not been extensively inventoried for possible archaeology sites.

PRELIMINARY SILVICULTURAL PRESCRIPTION

The silvicultural objectives for the Falls Creek area is to remove the dead and infested trees and those trees highly susceptible to infestation. This means that the spruce trees within the area above 8 inches in diameter at breast height (DBH) will be available for harvest. The birch will not be removed under this harvest prescription to provide seed source and lessen the visual effects of the harvest. The intent is to salvage the dead and dying spruce trees and to remove those spruce trees that potentially could contribute to the continuance of the epidemic infestation. Spruce trees least likely to contribute to the epidemic infestation will be retained. Birch will be encouraged in the reforestation effort along with naturally regenerated spruce and possibly interplanting of spruce to achieve a forest composition similar to what existed 20 years ago. The specific silvicultural prescription is as follows:

Mixed Confer and Hardwood Forest.

These stands are composed of a mixture of spruce, birch, aspen and cottonwood. These stands will undergo a sanitation cutting which involves the removal of spruce trees that have been attacked or appear in imminent danger of infestation from spruce beetles. The birch will be retained. Four uninfested spruce trees that are 10 to 12 inches in DBH and have straight stems free of defect, live crown ratios of 40 percent or more and are firmly rooted will be retained for seed trees. Retain at least two dead trees per acre to serve as snags for cavity dwellers. Overmature aspen and cottonwood will be felled to encourage suckering. Advanced spruce regeneration will be retained.

Reforestation will be accomplished by requiring the purchaser to perform scarification. The birch will provide abundant seed for birch regeneration after the seed bed is prepared through scarification. The spruce seed trees will provide some regeneration of spruce seed, but it is recognized that good spruce cone crops are generally spaced 7 to 8 years apart. If adequate stocking is not achieved by natural regeneration, interplanting with spruce seedlings may be necessary to meet FPA standards.

Conifer Forest.

These stands are composed almost entirely of spruce with minimal amounts of hardwoods present. These stands will be clearcut except for pockets of advanced regeneration which can be retained. These stands comprise approximately 980 acres which is 19 percent of the total proposed for harvest within the proposed sale area. A single clearcut harvest unit will not exceed 100 acres in size. Leave areas will be thinned to remove dead and infested trees, with the retention of some dead for cavity nesters. Harvest boundaries will be irregular to create as much edge-effect as possible for wildlife.

Reforestation will be accomplished by either requiring the purchaser to perform scarification or by the State conducting a prescribed burn to prepare the seedbed. The area will then be seeded with birch and interplanted with spruce.

Harvest Method.

Mechanized harvesting utilizing feller-bunchers, delimbers, and rubber-tired skidders is becoming a more common harvesting method for high production operations. It is expected that ground based equipment such as these will be utilized to harvest the proposed sale area. Due to the rather level terrain, costs and productivity, cable yarding systems will probably not be utilized.

MARKET CONDITIONS

The local market for forest products has been good. Small operators have been producing rough cut dimensional lumber, pallets, timbers, house logs, firewood, and roofing shakes. Demand for these types of products is expected to continue over the life of this proposed contract (the next 5 years). However, with the large volume that needs to be removed in a short timeframe, it is expected that markets will need to be expanded.

Circle DE Pacific is operating on Cook Inlet Region Incorporated lands and is removing the spruce for chip material. Some experimental peeling of logs has occurred and with encouraging results. There has been several entrepreneurs with proposals for utilization of the timber resource. The Kenai Peninsula Borough Economic Development District contracted for the preparation of a study entitled "Kenai Peninsula Borough Timber Utilization Program Product & Market Feasibility Report". This report outlines several potential products and market opportunities for the Kenai Peninsula timber resources.

Currently, both Ninilchik Native Association (NNA) and Cook Inlet Region Incorporated (CIRI) have sold timber rights in areas adjacent to this proposed sale area. Harvesting is underway on the CIRI lands. Harvest operations on NNA lands is presently shutdown, however, it is possible that operations may begin again in early 1993. Harvest is expected to occur on both CIRI and NNA lands during the life of this proposed sale.

The Kenai Peninsula Borough and the University of Alaska are also looking at harvest of their lands within this same general area. Harvesting is expected on their lands during the life of this proposed sale.

It is feasible that a value-added industry may be established on the peninsula that will contribute significantly to the local economy. The benefits of a value-added processing facility in terms of direct jobs created is estimated to be between 100-270 jobs depending on the type of facility and the longevity that the resource will be available.

The current western Kenai Peninsula economy is based on oil and gas industries, fishing, tourism, retail industries, and government employment. Timbering has not contributed significantly to the economy in the past few years. The Kenai Peninsula has traditionally had a seasonal high unemployment rate because of the fishing and tourism industries. Timber harvesting and processing activities can provide quality year-around employment opportunities.

COASTAL CONSISTENCY

This proposed sale area lies within the boundaries of the Kenai Peninsula Coastal Management Program. The Kenai Peninsula Borough's program has been adopted by the Alaska Coastal Management Program and the borough's guidelines and policies were used to guide the consistency of this proposed action. The Division of Forestry believes that timber harvest as outlined in this document is consistent with the borough's policies and with the Alaska Coastal Management Program standards, which are specific to the Alaska Forest Resources and Practices Act (AS41.17) and the regulations and procedures adopted under that chapter.

PRELIMINARY DECISION

The division considered several alternatives prior to proposing this sale. These alternatives ranged from no action to the possibility of enlarging the area to be offered.

The no action alternative would allow the spruce beetle to run its course through the forest stands. No effort would be made to salvage useable wood fibre and this economic opportunity would be lost. Forest succession would be slowed with an increased length of time for tree species to again dominate the sites.

The rate of infestation increase currently outstrips past division harvest practices, which involved a series of small sales averaging 300 MBF (thousand board feet) to 700 MBF each for a total harvest of approximately 1,000 MBF annually. This rate of harvest will not keep up with the rate of infestation and results in the loss of traditional forest product values.

At the present time, the division has elected not to increase the acreage size of this offering. The Falls Creek area has been identified and set aside for timber production since the late '70's when it was identified as public interest lands for forest management. Since that time, numerous small sales have been offered in this general area. To increase the size of the offering would result in expanding the proposed sale into areas that have may have conflicting public interests. The resulting delays would not be the State's interest. The division believes it is in the best interest of the State to continue to proceed with this sale as proposed so that the wood fibre comes to market timely and without significant delays.

Therefore, the division has made a preliminary decision under AS38.05.035 that it is in the best interest of the State to pursue the harvest plan as outlined in this document. This proposal allows for the rapid removal of beetle killed, infested, and spruce at risk of infestation prior to the potential loss of economic value. Harvested lands will be reforested through natural regeneration and, if necessary, planting to ensure that a forest is reestablished on the harvested sites as quickly as feasible.

The fisheries resources will be protected by the riparian standards contained in the FPA, which require a 100 foot no harvest buffer on each side of anadromous and high value resident fish streams. Additionally, water quality on non-fishbearing streams will be protected through application of the water quality standards contained in 18 AAC 70 administered by the Department of Environmental Conservation and the Forest Practices Regulations (draft).

The annual harvest plan submitted by the purchaser will be subject to interagency review in a similar manner that private harvest operations are subject to review under the FPA. The annual harvest plan will contain the same elements that the "detailed plan of operations" is to contain in the proposed FPA regulations. This level of detail will give the review agencies sufficient information to determine if the public resources are being adequately protected. Adjustments will be made to the annual harvest plan where appropriate. With this additional site specific level of review, the division believes that the interests of the State can be best protected.

Area Forester: ____________ Date: 11/24/92

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Appendix - A

Falls Creek Area

Kenai A-4 (Falls Creek, Corea Creek & S. Ninilchik)

Town/Range	Description	Sec	Acres
T1N R11W			
	all	17	640
	E½	18	320
	all	19	640
	all	20	640
	all	29	640
	E½	30	320
T1N R12W	W½	13	160
	E½	14	480
	all, except TBS	22	368
	all	23	640
	all	24	640
	all, except TBS	27	326
	portion s. of small creek	28	60
	SW¼ SE¼	32	40
	all	33	640
	all	34	640
T1S R12W	all	5	640
	all, except allotment	6	600
	N½, N½ SE¼, SW¼	7	560
	N½	8	160
	all	17	640
	SE¼	18	160
	E½	19	320
	all	20	640
T1S R13W	N½ NE¼, SW¼NE¼, S½ NW¼, NE¼ NW¼, N½ SW¼, SW¼ SW¼	1	340
	E½ SE¼, W½	2	400
	S½, NE¼, NW¼ NW¼, S½ NW¼	11	440
	NW¼ NW¼ NW¼, E½	12	160
	all	13	640
	all	14	640
	S½ SE¼, SW¼	15	240
	NW¼, W½ NE¼	22	240
	NE¼	23	160
	NW¼	24	160

Total Acreage: 14,226

FALLS CREEK TIMBER SALE

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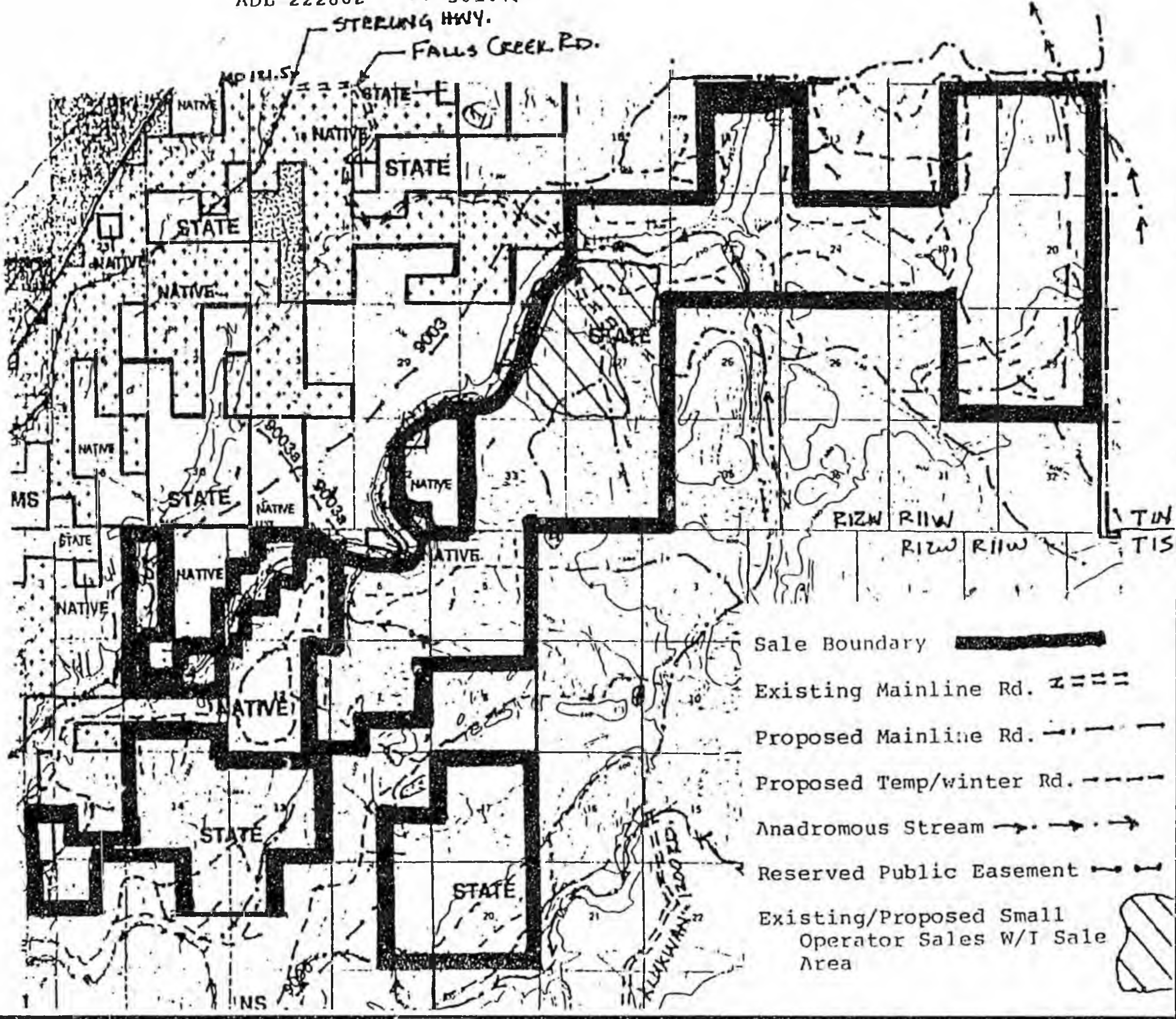

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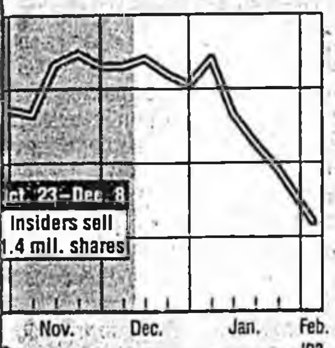
losing stock prices



DD Information Services/Tradeline; reports

tween Nov. 11 and Dec. 7, the now...

tional over-the-counter trading y, Walker shares fell 75 cents to 11...

rownlee declined to comment, but ta said the insider selling was o diversify our holdings." Mr. has "a substantial position in the still in unvested options," Mr. dded.

ogether, sales by officers and s from last Oct. 23 through Dec. 8 about 1.4 million shares, at prices ged from $18.25 to $22.50 a share, gs show. This total doesn't include capitalists, who have also been g their holdings. There are about n Walker shares outstanding.

er was taken public in March of r at $15 a share in an offering ged by Morgan, Stanley & Co. and on, Stephens & Co. In May, Mor- nley analyst J.C. Mendelson rec- ded purchase of the stock, as- it a one-year price target of $27. ndelson, who couldn't be reached

e Turn to Page C18, Column 6

Lumber Futures Rise the Limit In Bull Market

COMMODITIES

By Jeffrey Taylor
Staff Reporter of The Wall Street Journal

CHICAGO — If you'd asked them a month ago, many of the nation's biggest commodity traders probably wouldn't have known that the Chicago Mercantile Exchange traded lumber futures contracts.

They know now.

The price of the Merc's lumber contract has risen the daily limit for the past seven consecutive trading days, in a raging bull market that few people saw coming.

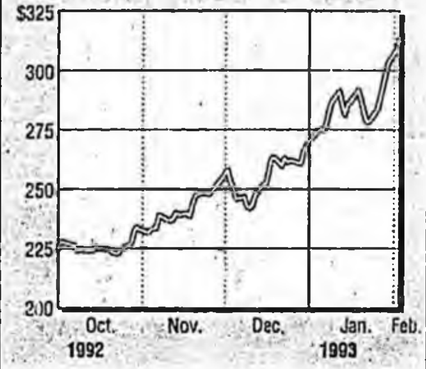
"It's wild," says Gregg Riley, sales manager for Bloch Lumber Co., a lumber wholesaler active in the Merc's futures market. "The market has never been this volatile."

Previously, traders have used the Merc's lumber futures contract mainly as an early indicator of the health of the U.S. economy, because its price tends to reflect home-building activity. In the past two weeks, however, lumber has become a hot trading vehicle.

In fact, since December, small fortunes have been made and lost in lumber futures and options contracts. "People who have been long [a wager that lumber prices will rise] have made a tremendous amount of money," says Steve Moore, president of the Moore Research Center, a commodity analysis firm. "Some people have followed it from $221 per thousand board feet above $300, and that's a huge movement. It's kind of like what happened to oil when Iraq invaded Kuwait."

Lumber Futures

March 1993 contract, in dollars per 1,000 board feet



Conversely, Mr. Moore says, "there are a lot of horror stories out there" about small investors who took short positions, or wagers that lumber prices would decline, because they perceived the price as being too high. "A lot of those people are now trapped," he says.

Traders at the Chicago Merc who have spurned lumber in the past are moving from cattle and currency futures pits into the lumber options pit and placing their bets. These contracts entitle them to buy or sell lumber for a given price at a specified date in the future.

Why lumber *options?* Because lumber futures contracts — when locked at the daily price-move limit, as they are now — aren't available for purchase.

Because of the wild price moves, lumber options trading volume has exploded at the Merc. An average of 1,668 lumber options changed hands each day last month; in January 1992, the daily average was 581 contracts. Before last month, the Merc had never traded more than 1,220 lumber options contracts in a day.

The price of any commodity is governed

Please Turn to Page C12, Column 3

Wall Street Journal
February 3, 1993

Anch. Daily News 2-8-93

Logging plan runs into fight

By TOM KIZZIA
Daily News reporter

HOMER — The state's effort to promote widespread logging on the Kenai Peninsula is running into opposition from residents concerned about potential damage to wildlife habitat, fishing and tourism.

The Hickel administration has proposed emergency timber sales as a way to combat the spread of bark beetles that now infest much of the Peninsula's aging spruce forest. State officials say logging is necessary to restore the forest's health, even if loggers have to be subsidized to cut the spindly, low-value trees.

But a growing chorus of critics, including some Kenai Peninsula Borough officials, say the region might be better off if forests are left alone to regenerate naturally. Some say logging roads and log-storage decks could actually hasten the beetles' spread by providing new incubation areas.

"People are concerned about tourism, fish habitat, and the effects of new roads," said Steve Gibson, a Homer sawmill operator who sat on the state's forest health task force. "You're talking about a real important part of the weave of the fabric we live in here. Any of the concerns outweigh the use-

Please see Back Page, TIMBER

TIMBER: Logging plan runs into opposition

Continued from Page A-1

it-or-lose-it mentality."

Environmental groups charged last week that a fast-track timber sale proposed by the state violates state regulations. "Even worse, the plan appears to exploit the Kenai spruce bark beetle situation in an opportunistic attempt to advance the current DNR commissioner's timber development agenda," said Trustees for Alaska and other groups in formal comments on the sale.

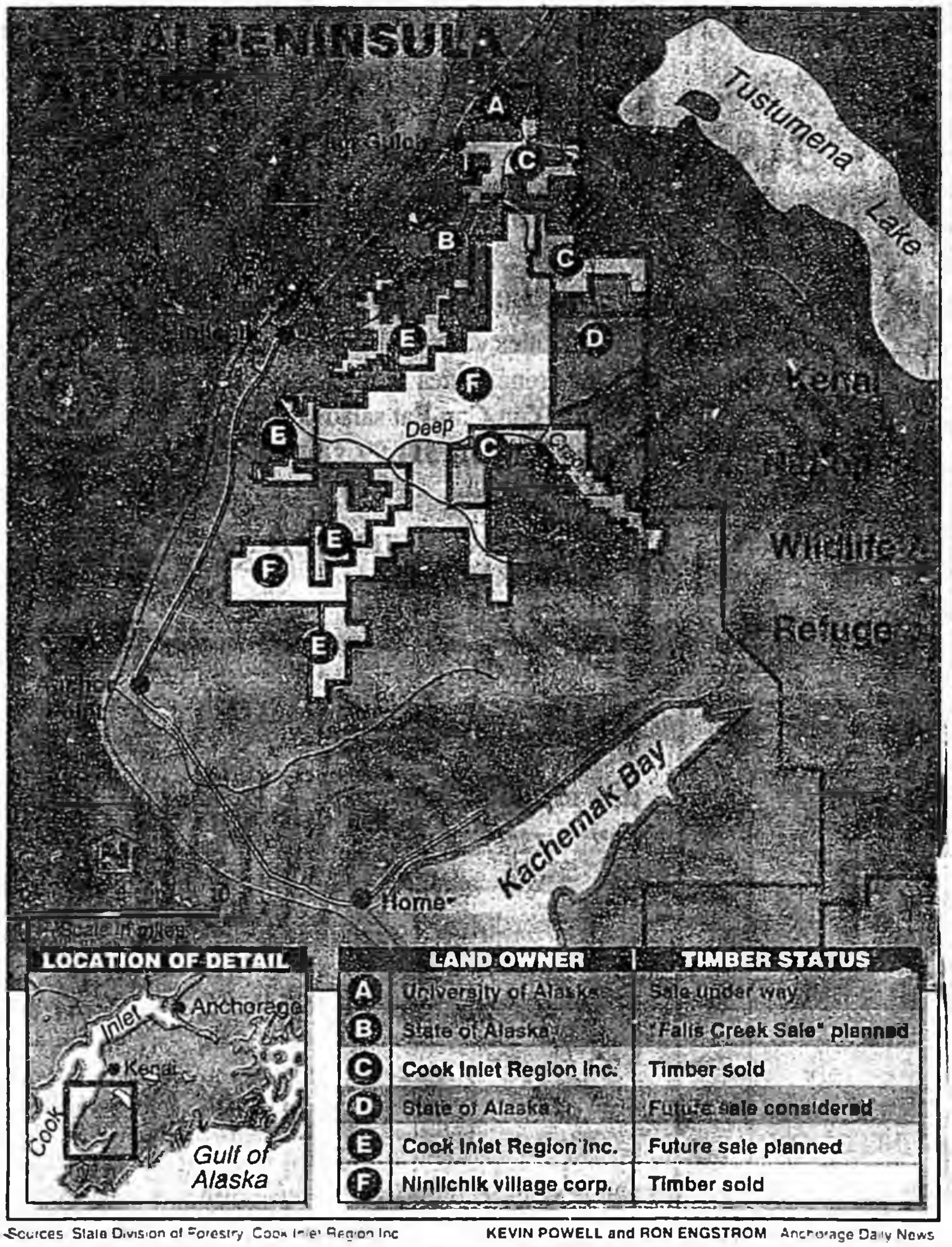
Dan Golden, who is leading the timber effort for the state Division of Forestry, said the constitution requires Department of Natural Resources Commissioner Glenn Olds to manage the forests as a renewable resource.

"He does have an attitude of positive development orientation, but the spruce beetle issue is also an emergency in the eyes of the university and the U.S. Forest Service," Golden said.

The state is preparing to sell 5,300 acres of white spruce inside a 14,000-acre area along the Ninilchik River. The offering, known as the Falls Creek sale, is being pushed under emergency regulations allowing the state to move quickly to salvage trees.

The state sale, combined with other logging operations on Native corporation or University of Alaska land, will clear trees from much of the country east of Ninilchik. Scheduled for logging are the drainages of the Ninilchik River and Deep Creek, both popular salmon-fishing streams.

Golden said the fish streams and views would be in greater jeopardy if the mature spruce die and fall down.



	LAND OWNER	TIMBER STATUS
A	University of Alaska	Sale under way
B	State of Alaska	"Falls Creek Sale" planned
C	Cook Inlet Region Inc.	Timber sold
D	State of Alaska	Future sale considered
E	Cook Inlet Region Inc.	Future sale planned
F	Ninilchik village corp.	Timber sold

Sources: State Division of Forestry, Cook Inlet Region Inc.   KEVIN POWELL and RON ENGSTROM Anchorage Daily News

"We're putting up forest lands for sale for the purpose of bringing the forest back to health," said Golden, a former rural development specialist for the state Department of Commerce. "Roads and economics are secondary. We have a resource and we need to protect it."

But critics say the proposed cure is worse than the disease.

"They're trying to save the forest by cutting it down," said Cliff Eames of the Alaska Center for the Environment. He said the Hickel effort is reminiscent of the widespread logging proposed for the Susitna Valley by then-Gov. Steve Cowper in 1987. That proposal was dropped after an uproar from local residents and tourist businesses.

Eames said environmentalists in the Mat-Su area and Fairbanks are watching the Kenai Peninsula closely. "We think the Falls Creek sale is the first salvo in a war on southcentral and interior Alaska's forests," he said.

Commercial fishermen and some sport fishermen have objected to the proposed sale and the state's emergency timber regulations, citing logging's damage to fisheries in Washington and Oregon.

State law will prohibit logging within 100 feet of any salmon stream in the state sale. But the area proposed for cutting has not been completely surveyed for fish streams, according to the Department of Fish and Game. Area forester Jim Peterson said the stream surveys can probably be completed in a day next summer, before any logging takes place.

Fish and Game habitat biologist Steve Albert said the department is also concerned about the cumulative effects of many separate logging operations and the prospect of new backcountry hunting and fishing pressure because of new logging roads. A borough consultant has recommended building 384 miles of new roads to provide access to state and borough timber.

Tall grass slows the regrowth of forests in southcentral Alaska. At a meeting early this winter in Homer, both sides cited the example of the western Cook Inlet area around Tyonek, which was logged in the 1970s. Though slow to regenerate, spruce are finally poking through the grass, along with deciduous moose browse. But the improved habitat hasn't helped the moose, which now get blasted by hunters using the former logging roads, state habitat biologist Mike Wiedmer said.

Concern for the Kenai Peninsula's forests grew in the late 1980s, as beetles wiped out thousands of acres around Cooper Landing and raised fears of a major forest fire. But a 1991 fire near Cooper Landing raced more quickly through live spruce with resinous green needles than the dead trees. Foresters have largely disowned fire danger as a reason for logging, except near settled areas.

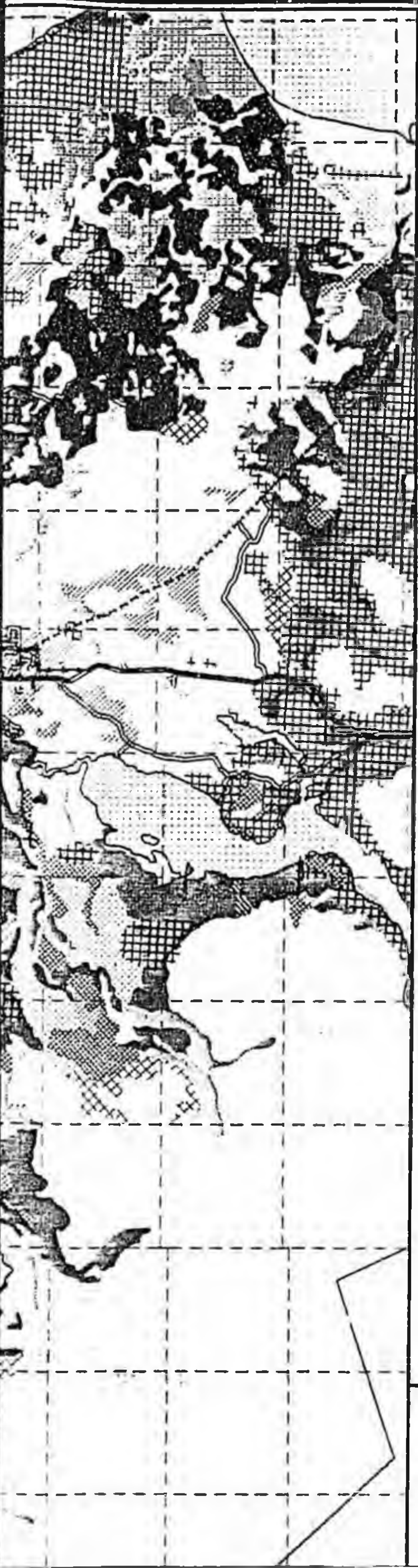
A borough task force made up mostly of loggers generated much of the early enthusiasm for large-scale logging on the Peninsula. At one point, there was even talk of the state turning its own timber sales over to borough managers. But logging has received a cooler reception from the borough assembly.

"I'm not prepared to be the timber guru of the Kenai Peninsula," borough Mayor Don Gilman said. "Two things ought to drive the borough's decision-making. We should be careful not to harvest trees at the expense of other resources like fish and game and recreation. And we shouldn't subsidize it."

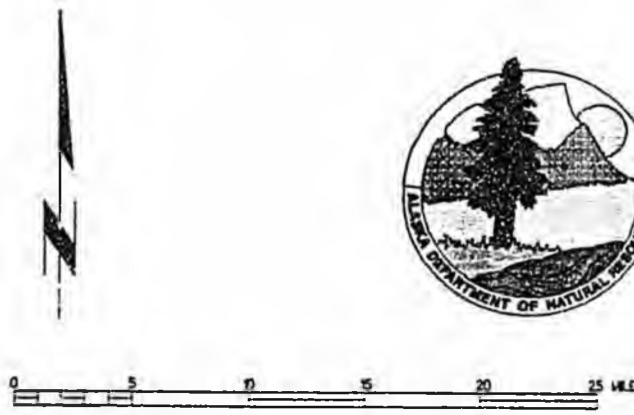
Golden maintains that opposition to logging is still small. He said opinion surveys show support for public efforts to remove dead trees. "The small minority is speaking very loudly," he said.

Finding markets for the relatively low-value trees has not been easy. Trees cut on Cook Inlet Region Inc. land north of Ninilchik are being diced into chips for export to the Far East from Homer. Logging on Ninilchik village corporation land has been shut down by lack of a market for two years.

Golden said the state may try to combine several offerings into a sale big enough to attract a "major player" like a paper company from the Lower 48. He said the state hasn't decided if it would subsidize road construction. State officials have said they're considering state loans or use of Exxon Valdez spill settlement funds to make logging economical.



FOREST HEALTH INITIATIVE
SPRUCE BEETLE SURVEY
1982 thru 1991
VEGETATION COVER



VEGETATION COVER

Primary	Secondary	
		Closed Coniferous Forest
		Open Coniferous Forest
N/A		Woodland Coniferous Forest
		Closed Mixed Forest
		Open Mixed Forest
N/A		Woodland Mixed Forest
		Closed Deciduous Forest
		Open Deciduous Forest
N/A		Woodland Deciduous Forest

Note: Primary and Secondary forest covers may overlap.

ROADS and TRAILS

- Highway
- Road
- Seasonal Road
- 4WD or ATV Trail
- Power or Telephone Line
- Pipeline

SPRUCE BEETLE AREAS

- Mapped 1982-1991

Vegetation is the plant cover of the landscape. Any vegetation type occupying 75% to 100% of the area was mapped as a single type. Areas mapped as a complex of vegetation covers with no type exceeding 75% were assigned Primary and Secondary types. Vegetation was base upon "Revision of Preliminary Classification For Vegetation of Alaska" authored by A.R. Batten, C.T. Dryness, and L.A. Viereck, May 1982.

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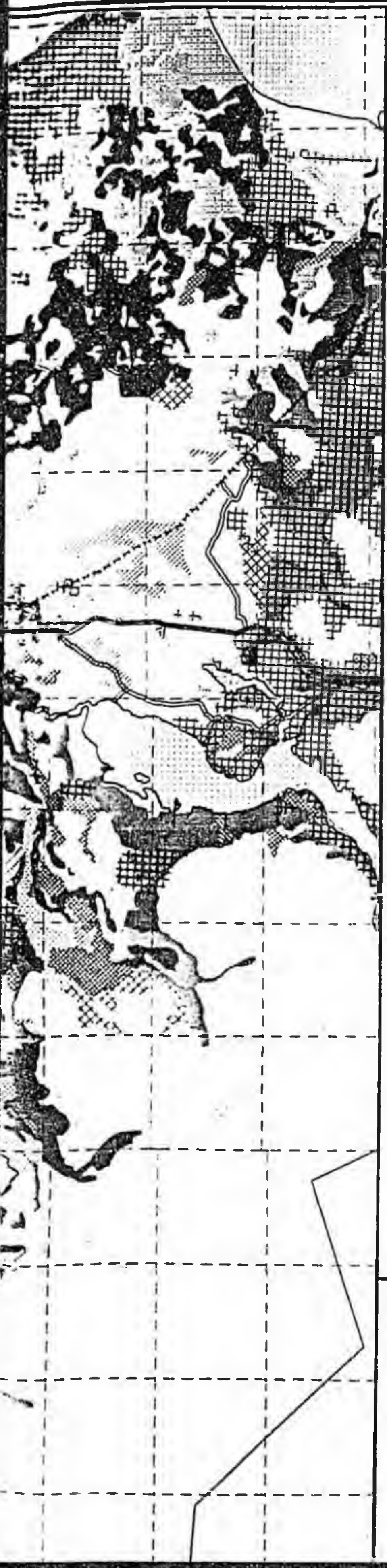

FOREST HEALTH INITIATIVE
SPRUCE BEETLE SURVEY
1982 thru 1991
VEGETATION COVER

0 5 10 15 20 25 MILES

VEGETATION COVER

Primary	Secondary	
		Closed Coniferous Forest
		Open Coniferous Forest
N/A		Woodland Coniferous Forest
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		Open Mixed Forest
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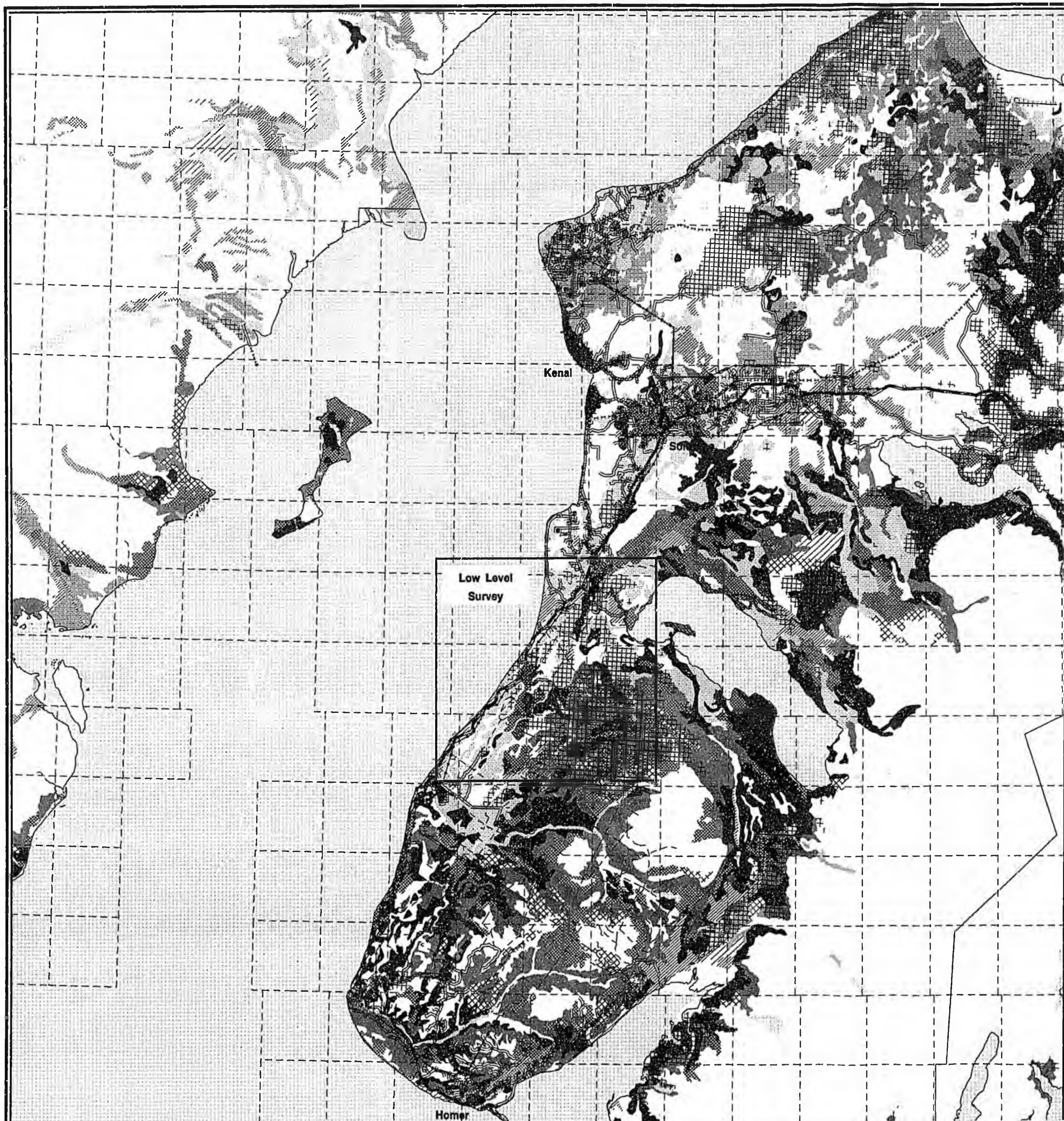

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1982 thru 1991
VEGETATION COVER

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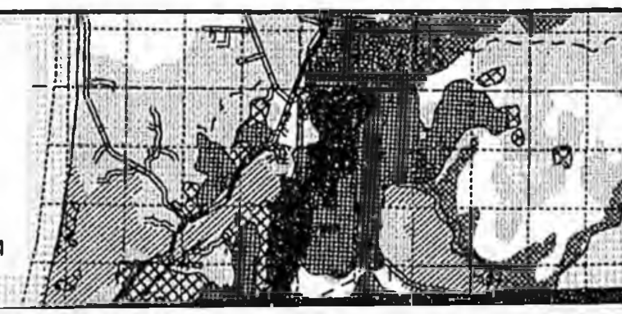
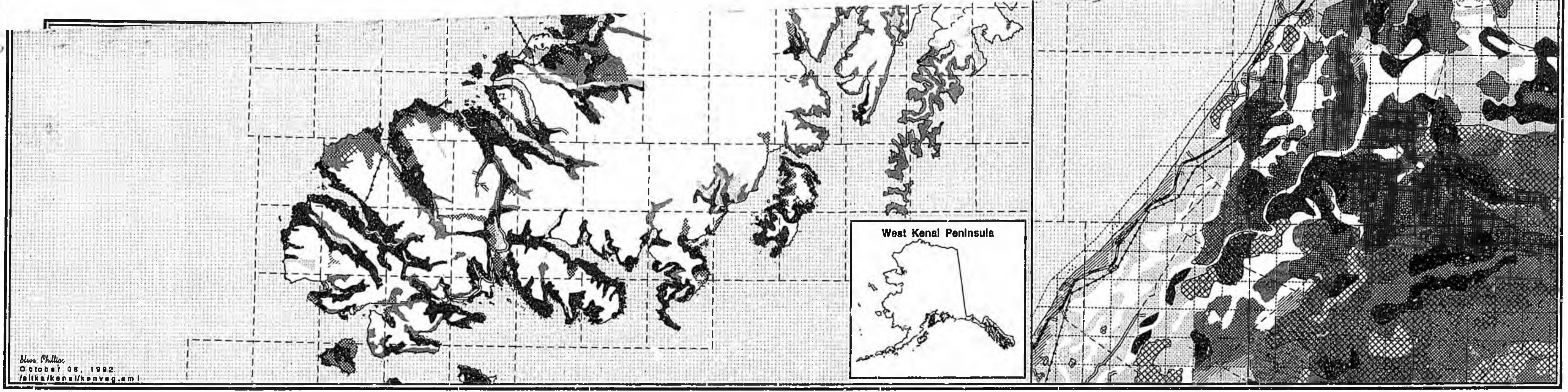
Low Level Forest Survey
1990 and 1991
VEGETATION COVER

MILES
0 1 2 3 4 5

Mapped 1990 · Mapped 1991




West Kenai Peninsula
October 06, 1992
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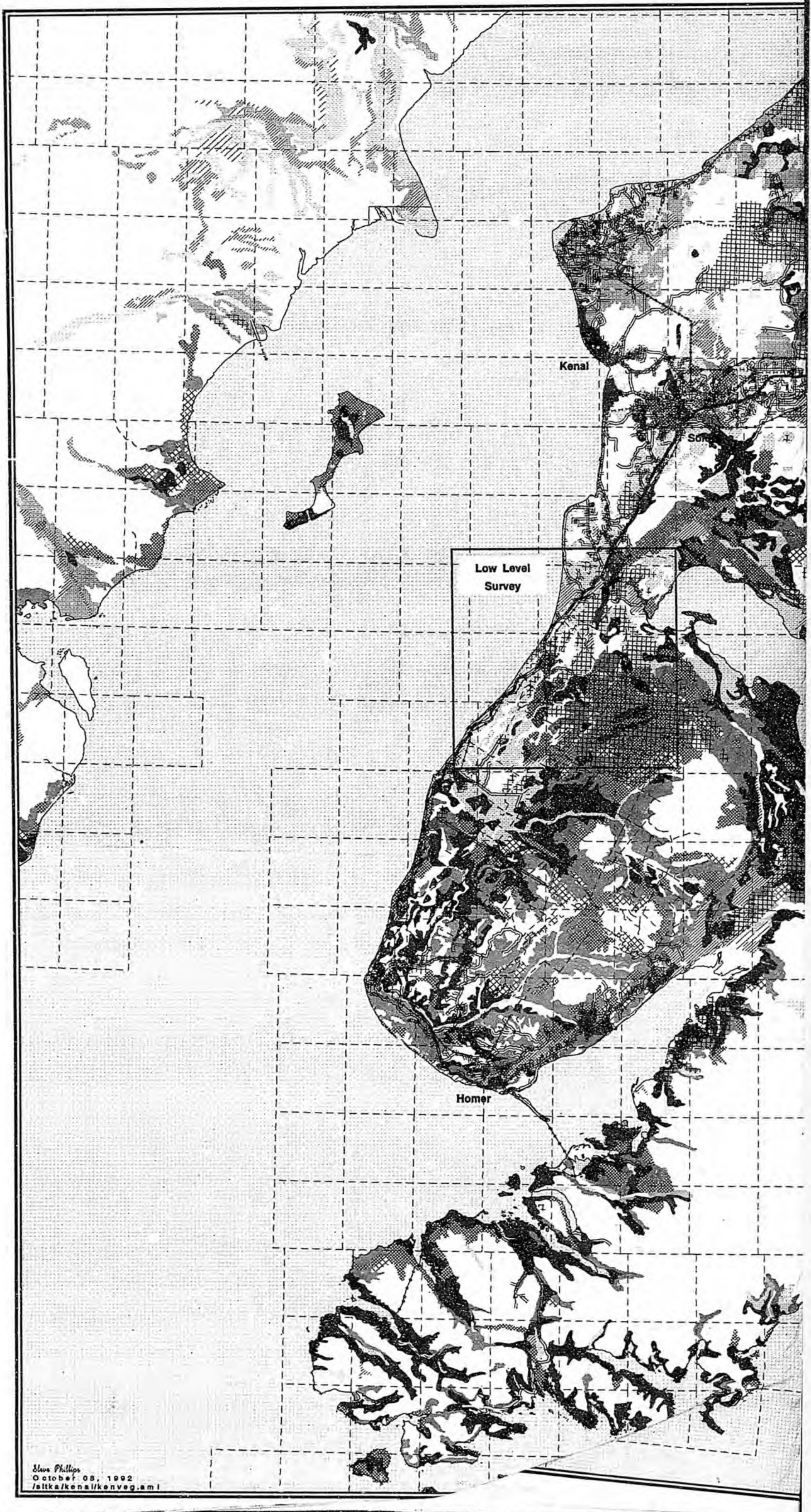
Kenai
Low Level
Survey
Homer
Steve Phillips
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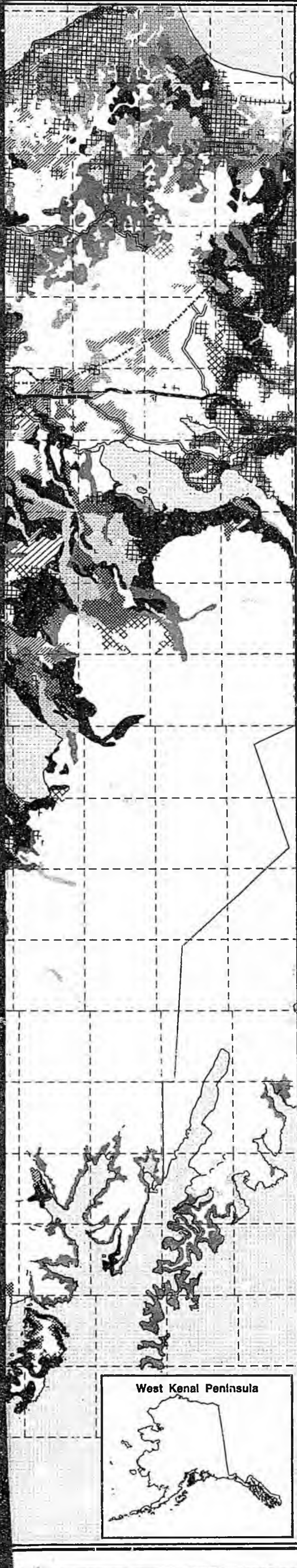

FOREST HEALTH INITIATIVE

SPRUCE BEETLE SURVEY

1982 thru 1991

VEGETATION COVER

0 5 10 15 20 25 MILES

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- Seasonal Road
- 4WD or ATV Trail
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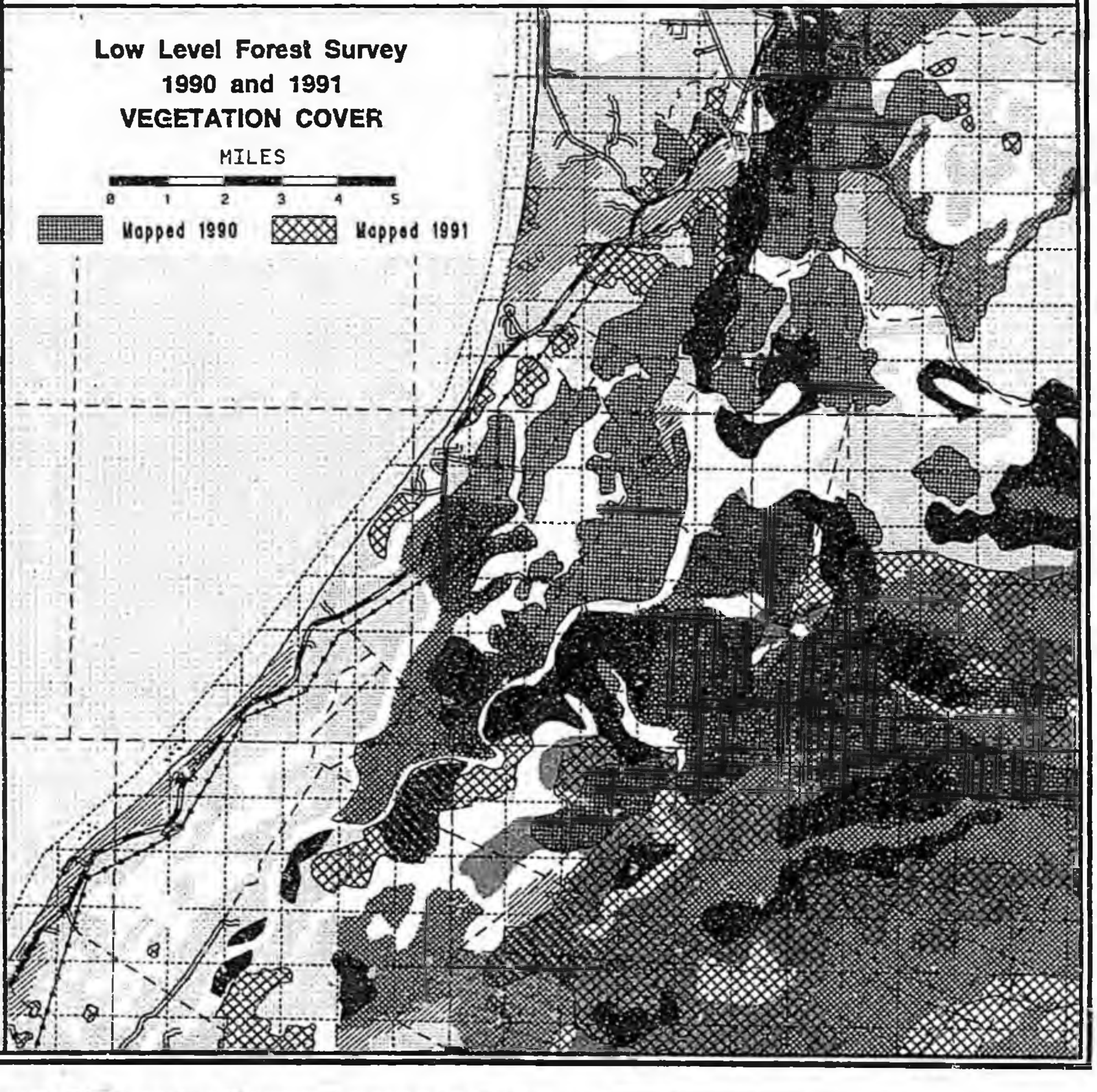

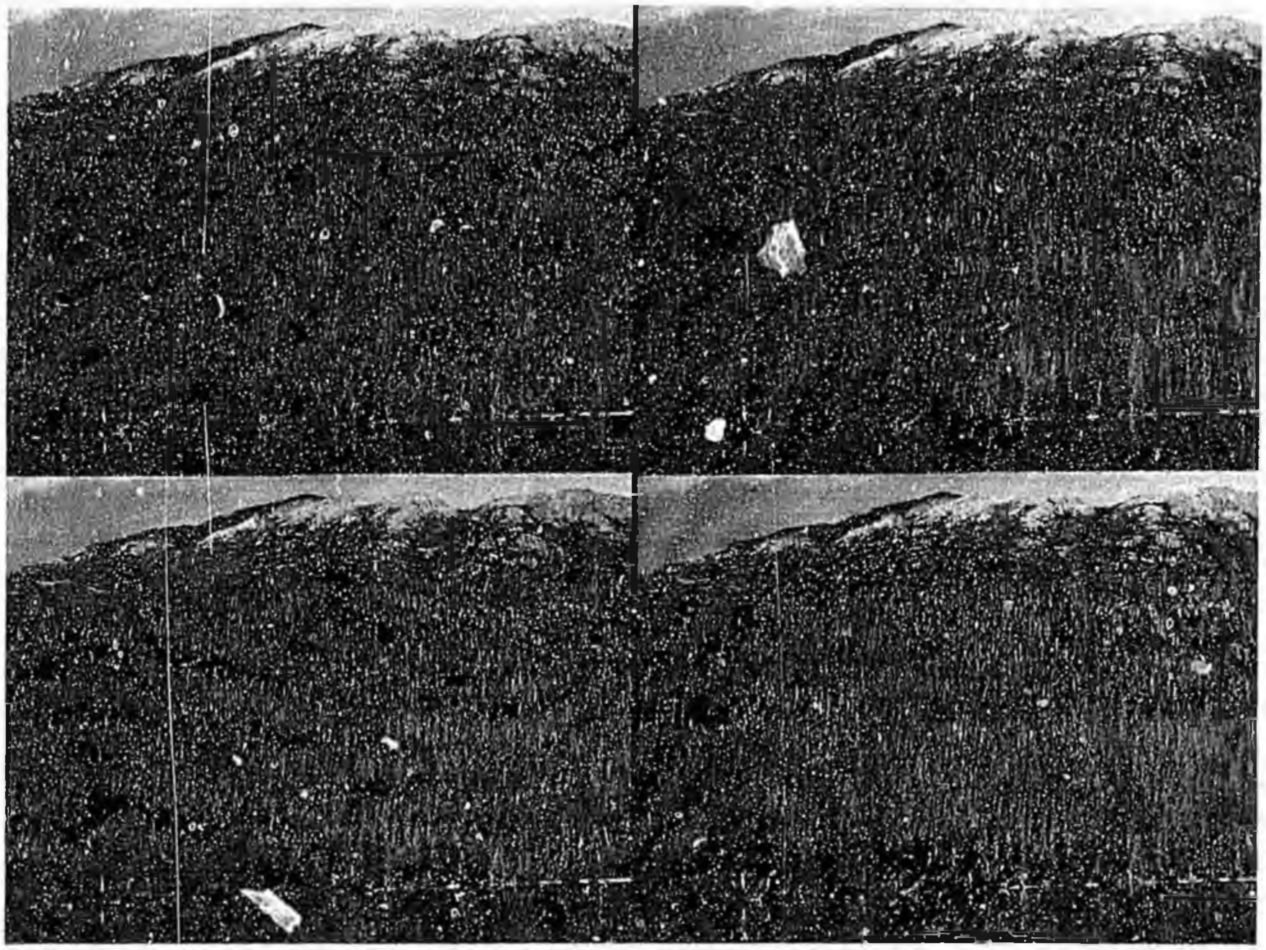

PUBLIC PERCEPTION AND ATTITUDES REGARDING SPRUCE BARK BEETLE DAMAGE TO FOREST RESOURCES ON THE CHUGACH NATIONAL FOREST, ALASKA

Final Report December 1992

prepared for:
USDA Forest Service
Forest Pest Management
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ACKNOWLEDGEMENTS

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The continuing support of Bill White, Methods Applications Group, Forest Pest Management, USDA Forest Service is also gratefully acknowledged.

Finally, a very special thanks is extended to the citizens of the Kenai Peninsula who invited us into their communities and recruited their neighbors and friends to participate in this assessment.

EXECUTIVE SUMMARY

The spruce bark beetle outbreak on the Kenai Peninsula, Alaska, poses a continuing threat to internationally significant scenic and recreational resources. Reported here are the results of an assessment of perceptually preferred forest conditions and acceptable forest management policies as judged by residents and visitors in the affected area.

Computer visual simulations were employed to depict a range of forest conditions projected to occur over the next 50 years as a result of bark beetle infestation. Conditions expected to result from alternative forest management actions were also simulated for comparison. Respondents rated individual simulated scenes for ***natural scenic beauty*** or selected between pairs of four-scene scenarios that depicted expected outcomes of **treatment** *vs* **no treatment** options for representative forest scenes.

Alternative management strategies were described and respondents rated the relative acceptability of (or their agreement with) each. Management options assessed included **general policies**, methods for **prevention** of future beetle outbreaks, **protection** of threatened stands during outbreaks, **restoration** of stands already affected and **expectations** for continuing spread of the current outbreak. Principal findings of the assessment included:

> ***Sight-seeing*** was the predominant activity for visitors and ***views of natural scenery*** and ***viewing wildlife*** were the most important factors affecting the quality of their trip to Alaska.
>
> Residents were very much aware of the bark beetle outbreak and reported ***loss of scenic beauty*** and ***increased fire danger*** as the most important impacts.
>
> Based on computer simulations of forest scenes, residents' and visitors' **scenic beauty ratings** were highly consistent and significantly declined as the proportion of beetle-killed trees in the scene increased.
>
> Respondents consistently preferred four-scene scenarios depicting forest conditions projected for **treatment** options over those for **no treatment**. A preventative **thinning** scenario was preferred to **no treatment** for threatened stands, and **cut/leave/burn** was the most preferred restoration scenario for stands with high beetle-caused tree mortality.
>
> A substantial majority of respondents rejected ***let nature take its course*** as a policy for areas ***near*** developments where beetle effects were ***more severe***; this policy was most acceptable for areas ***far*** from developments where effects were ***less severe***.
>
> ***Thinning*** was preferred over ***clear cutting small patches*** as a method for **prevention** of beetle outbreaks, and residents agreed that ***cut trees should be sold to private companies*** even when ***selling the trees will only pay part of the costs***.
>
> The use of "environmentally approved" ***insecticides*** for **protection** of selected trees during an outbreak met with divided responses; the number "strongly agreeing" was essentially matched by the number "strongly disagreeing."

Restoration of areas already severely affected by bark beetles was a high priority for respondents and generally treatments that produced more rapid regeneration of spruce forests were preferred; ***cut/remove/burn*** (moderately hot fire) was the most preferred option, followed by ***cut/remove/scrape*** (mechanical scarification), with ***leaving the forest undisturbed*** least preferred. The use of "environmentally approved" ***herbicides*** produced strong responses almost equally split between support and non-support.

Respondents **expectations** were that the outbreak ***will continue to spread***, including ***to their own properties***, and that the effects will be severe, ***at least half of the spruce trees will die*** in affected areas.

Over 65% of respondents disagreed with ***allow(ing) most of the spruce trees in your area to be killed by bark beetles (rather) than to have the forest treated by cutting and spraying insecticides.***

The strongest differences among respondents were with respect to the use of insecticides and herbicides: Supporters of **chemical treatments** agreed that ***spraying insecticides is the best way to protect large trees near homes***; that sprayed trees are ***essentially 100% safe from beetle attack***; that ***approved insecticides are safe*** and they ***would be willing to use*** them; and supported ***applying environmentally approved herbicides*** to restore spruce in damaged areas. At the same time, supporters tended to disagree that ***other insects and animals might be harmed***, that insecticides are ***potentially dangerous to humans*** and that ***herbicides should not be used under any circumstances because of possible contamination of the environment.*** Non-supporters of **chemical treatments** exhibited the opposite pattern of agreement/disagreement.

To be consistent, respondents who exhibited perceptual preferences for particular forest conditions should have supported management policies required to achieve those conditions. However, no consistent relationships were found between preferred perceptual *ends* and supported management *means*; preferences for forest conditions produced by **treatment** were not consistently associated with support for active management policies implied by those preferences.

In conclusion, results indicated that bark beetle-caused tree mortality has significantly reduced scenic beauty of forest scenes in the Kenai Peninsula study area. Future forest conditions resulting from active management policies were consistently preferred over conditions projected for non-intervention alternatives. There was substantial public support for active management response to the spruce bark beetle outbreak, but there was no clear consensus for any particular management strategy. The greatest divisions among the sampled publics revolved around the use of **chemical treatments**, with much of the controversy based on differing beliefs about the effectiveness of insecticides and the severity of environmental hazards associated with both insecticides and herbicides.

Forest managers can expect substantial public support for actions designed to protect or restore scenic values, but a concerted public information/environmental education program should be an important precondition for any application of insecticides or herbicides.

PUBLIC PERCEPTION AND ATTITUDES REGARDING SPRUCE BARK BEETLE DAMAGE TO FOREST RESOURCES ON THE CHUGACH NATIONAL FOREST, ALASKA

The spruce bark beetle outbreak on the Kenai Peninsula, Alaska, has had effects on timber resources and on the habitat of some wildlife species. In some areas, wildfire hazard has increased. As the outbreak and its aftermath continues there will be further effects on natural resources important to local communities, the state of Alaska and the nation.[1]

Unequaled scenic landscapes and outstanding recreational opportunities are among Alaska's most important natural resources, and these resources are among those most directly at risk from the spreading beetle outbreak. Management response to the outbreak must, therefore, address the protection and rehabilitation of scenic and recreational resources in affected areas. However, choosing the best management strategies is complicated by the fact that significant parts of the affected area are highly visible to the public. Moreover, Alaska, and the Kenai Peninsula in particular, is the focus of considerable concern by local and national constituencies which often have conflicting goals. Thus, management direction must be carefully designed to be effective and efficient in ecological and economic terms, and at the same time responsive to the perceptions, attitudes and values of the various local and national publics that have a stake in the outcome.

The assessment presented in this report focussed on determining public perceptions of the effects of the spruce bark beetle outbreak on forest scenic values, and on gauging public attitudes toward alternative forest management approaches. Participants for the studies were sampled from residents, visitors and tourists in and near the affected areas of the Kenai Peninsula. Computer generated visual simulations of forest scenic vistas were employed to assess public perception of insect-affected (or threatened) areas, and to determine preferences for possible alternative future forest conditions. Additional questions investigated participants' attitudes toward different insect-targeted management strategies associated with the simulated forest conditions.

Results from two studies are reported. The first study, conducted in the summer of 1990, primarily addressed bark beetle effects on tourists' perceptions of forest *scenic beauty*. A small number of Alaska residents were also sampled, and their attitudes and values associated with the insect outbreak and with alternative management strategies were explored. The second study, in the summer of 1991, focussed on residents of Kenai Peninsula communities directly affected or threatened by the spreading bark beetle outbreak. The primary objective of the second study was to further articulate residents' perceptions of alternative future forest conditions, and their attitudes toward alternative forest management approaches for the *prevention* of outbreaks, the *protection* of stands during outbreaks and the *restoration* of areas already affected by outbreaks.

STUDY APPROACH

Public perceptions of alternative future forest conditions were assessed by having samples of residents and visitors view and rate the *scenic beauty* of forest scenes sampled from bark-beetle affected forest areas on the Kenai Peninsula. Scenes represented the full range of outbreak conditions, from sites with no detectable effects to sites where virtually all of the trees in the scene were dead.

Digital video imaging techniques[2] were used to create simulations of future (hypothetical) forest conditions for a representative sample of scenes. These simulated scenes allowed experimentally controlled manipulation of specific forest features expected to change as a result of the bark beetle infestation and associated management options. This procedure insured that only selected features of the scenes were changed, while other features not associated with the targeted beetle or management actions were held constant. Visual simulations representing expected consequences of alternative management actions (including no action) for up to 50 years into the future formed the basis for the public perceptual assessment process.

In conjunction with perceptual assessments, respondents also indicated opinions and attitudes toward a variety of forest management practices associated with bark beetle outbreak prevention and control, and with restoration of forest stands after severe infestations. Issues addressed in this verbal component of the study included: public awareness of the bark beetle outbreak; values judged to be at risk; the perceived likelihood of the outbreak spreading; and the acceptability of several management options, including forest overstory manipulations by clear cutting or thinning, the use of insecticides, herbicides and fire, and "allowing nature to run it's course."

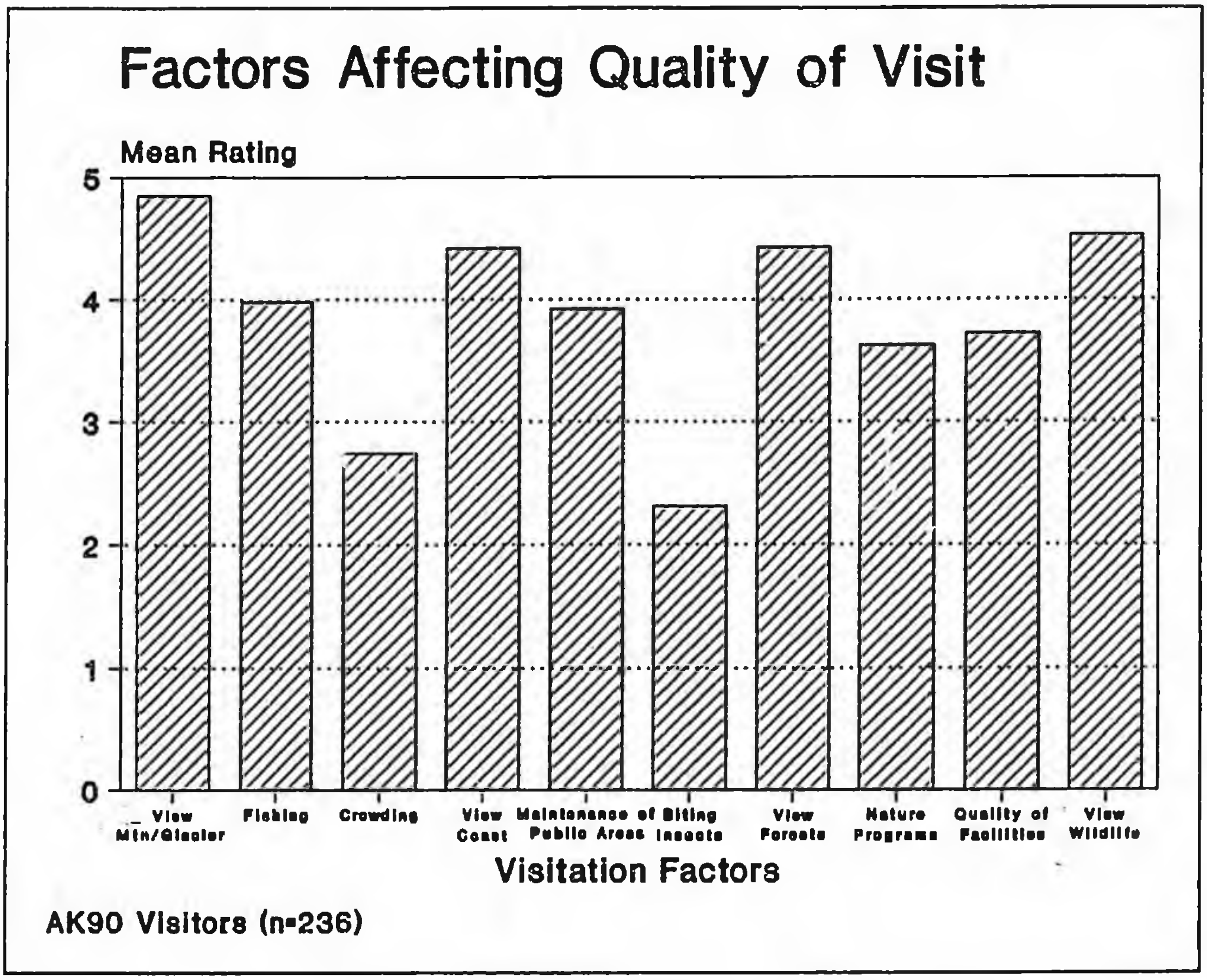
There was no effort to obtain formal random samples, but the study design allowed comparisons of the perceptions and attitudes of tourists/visitors and residents (1990 study), as well as comparisons among residents from different communities in affected and threatened areas on the Kenai Peninsula (1991 study). The relationships between perceptually preferred forest conditions, the desired *ends*, and the acceptability of the various management strategies required to achieve those conditions, the *means*, were also investigated.

RESPONDENTS

A total of 84 Alaska residents and 306 visitors participated in the 1990 study. Participants were recruited at shopping centers and at major tourist/recreation facilities in the Anchorage/Kenai Peninsula study area. The visitor sample included participants from a wide geographic area in the US and abroad. Most of the residents in this "convenience sample" were from the Anchorage area, with smaller numbers from Kenai Peninsula communities.

The 306 visitors represented many of the lower 48 states and several foreign countries. Most of the visitors (73%) were in Alaska for the first time, 94% planned to stay a week or more, and 50% were staying three weeks or more. Planned activities included *sight-seeing* (94%), *wildlife viewing* (75%), *hiking* (61%), *camping* (49%) and *fishing* (47%). Factors reported as having the greatest positive effect on the quality of the visit were (in order of rated importance): *viewing mountains and glaciers*, *viewing wildlife*, *viewing forest scenery*, and *viewing coastal scenery*. *Quality of fishing* was reported as either irrelevant or mildly positive for most visitors. The most negative factor reported was *biting insects*.

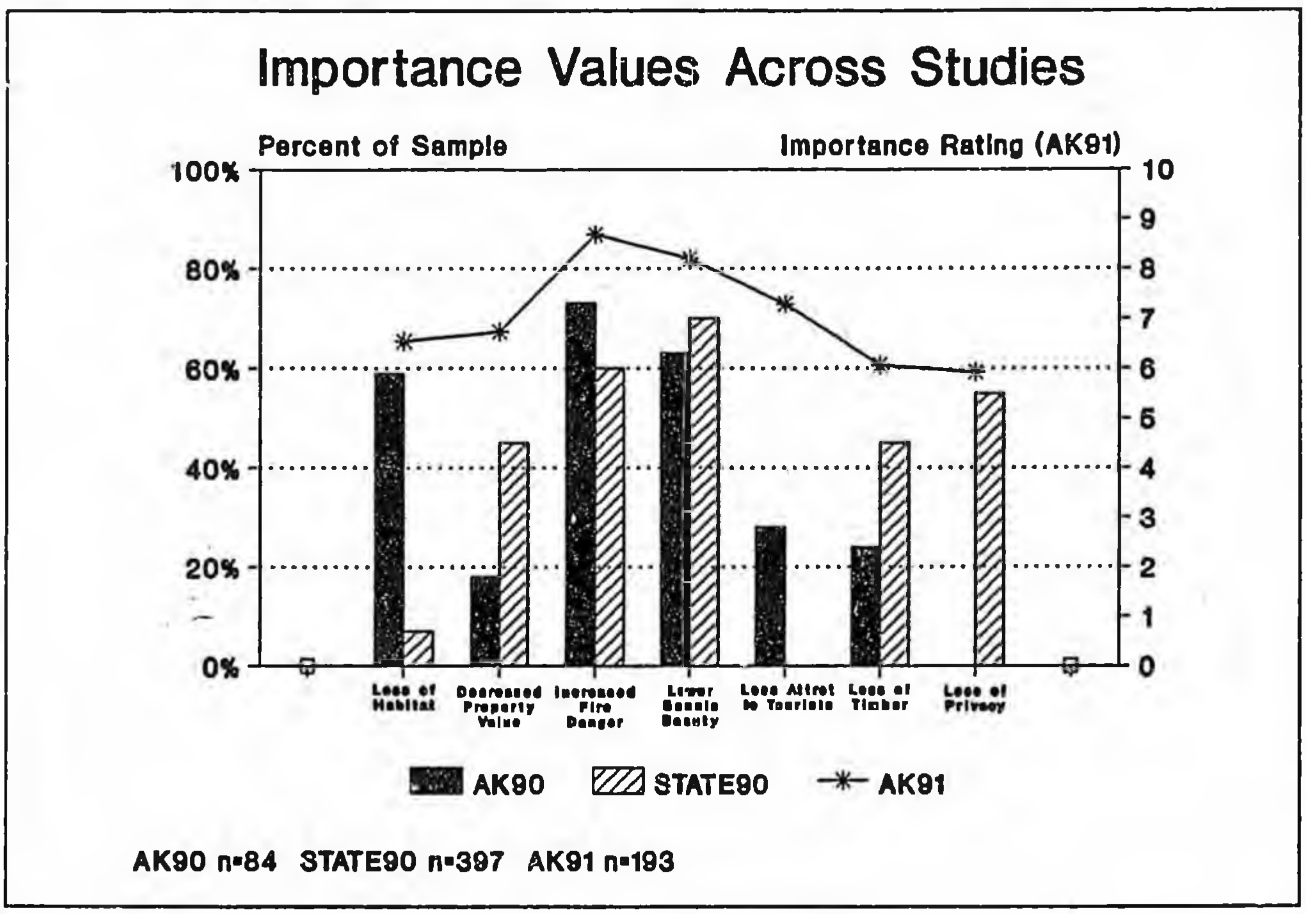
For the 1991 study 166 residents were recruited through civic organizations in targeted Kenai Peninsula communities. Participants responded individually to sets of color prints depicting alternative conditions for representative forest scenes and to management policy questions bound in "photo album" booklets. Participating groups ranged in size from 5 to 35 people.



Awareness of the spruce bark beetle outbreak was very high among respondents in both the 1990 and 1991 studies. Of the residents sampled in 1990, 73% reported *noticing dead* *trees* and 80% reported that they were *aware of the outbreak* prior to the study. For the resident sample in the 1991 study, 58% reported *noticing dead trees near their own community* and 79% *noticed dead trees elsewhere on the Kenai*. Over 80% reported being aware of the spruce bark beetle outbreak prior to the study. These results are very consistent with the Alaska State random telephone survey,[3] where an astonishing 88% of Kenai Peninsula residents cited "dying trees" or "beetles killing trees" in response to an open-ended question regarding the most serious problems with forests on the Peninsula.

For residents in the 1990 study the most important effects of the outbreak were *increased fire danger*, *loss of scenic beauty*, and *loss of wildlife habitat*. Less important effects were *decreased property values*, *decreased attractiveness to tourists* and *loss of timber values*.

The 1991 study produced essentially parallel results; effects rated most important were *increased fire danger*, *loss of scenic beauty*, and *lower attractiveness to tourists*. Judged less important were *loss of privacy*, *loss of timber values*, *loss of wildlife habitat* and *loss of property values*. The same basic pattern of concerns was also found in the Alaska State survey; *loss of scenic beauty* (70%), *increasing fire danger* (60%), *loss of privacy* (55%), *loss of timber values* (45%), *decrease in property values* (45%) and *loss of wildlife habitat* (4%).



Demographics - 1990/1991

1990 Residents		1990 Nonresidents		1991 Residents	
Anchorage	111	California	45	Ninilchik	34
Wasilla	17	Washington	22	Kenai C.C.	26
Eagle River	12	Oregon	19	Cooper Landing	25
Soldatna	11	Florida	16	Anchor Point	21
Fairbanks	6	Canada	13	Hilltop Youth	20
Kenai	5	Michigan	13	Kasilof	12
Girdwood	5	New York	13	Homer	10
North Pole	3	Minnesota	12	Salamatof	8
Homer	3	Arizona	10	Ninilchik Native Association	5
Sterling	3	Indiana	10		
Other	27	Other	122		
Total	203	Total	306	Total	161

Summary

Most visitors to the Kenai Peninsula were there for the first time, as is typical of many major tourist destinations, and they stayed for a considerable period of time, most planning stays of one to three weeks. Sight-seeing and wildlife viewing were the dominant activities reported, and spectacular natural scenery was the most important factor contributing to the enjoyment of the visit. The emphasis on viewing scenery clearly justifies forest managers' concerns about spruce bark beetle effects on visual/aesthetic resources in the area.

Residents in both the 1990 and 1991 studies were very much aware of the spruce bark beetle outbreak and its effects. Reports in the media, special government bulletins and meetings, as well as direct observation all contributed to the high awareness levels.

Major areas of concern to residents were the loss of natural scenic beauty and increased fire danger, with lesser concern expressed for loss of timber values and wildlife habitat. Based on these findings, forest management policies directed at protecting or restoring scenic values and reducing risk of wildfires should be supported by Kenai Peninsula residents.

VISUALIZING FUTURE FOREST CONDITIONS

The visual effects of the spruce bark beetle outbreak on the Kenai Peninsula were represented by a sample of over 500 color slides of forest vistas collected in the summers of 1989 and 1990. View points were sampled from along roads and trails, and within designated campgrounds frequented by visitors to the area as well as from locations within and near developed communities. Slides depicted dramatic as well as common (for Alaska) scenes of forested areas, and included bark beetle impacts ranging from undetectable to essentially 100% tree mortality.

Typical of the study area, over half of the scenes included either lakes or streams, and many exhibited a backdrop of high peaks, some with caps or patches of snow. Scenes dominated by development features (roads, buildings, disturbed areas) were excluded from the sample. A representative subset of the scenes, all meeting high standards of photographic quality, were selected as the basis for the public perception studies.

Digital Video Image Processing

All color slides selected for inclusion in the study were commercially scanned to produce digital computer files. This process allows translation of the color slide into a high resolution image (up to 512 by 482 lines) with over 32,000 different levels of color. When these images are displayed on high quality video monitors, or output as color slides or prints, the quality of the image is essentially equal to that of a good color photograph.

There are several important advantages of the digital format. First, the computer image can be quantitatively analyzed to determine precisely differences in color and other characteristics of features in the scene, e.g., differences between hardwoods and conifer trees, or between living and dead spruce trees. Second, selected features of the scene can be systematically altered to represent changes projected to occur as a result of insect infestation or of forest management activities.

For example, if increasing tree mortality is projected for selected areas in a forest scene, green trees can be "killed" by applying color "filters" to shift their color values from living green to the reddish or grey colors typical of beetle killed trees. If some trees are to be removed or some area is projected to burn, existing trees in that region of the scene can be "cut" out of the scene and replaced by "pasting" in appropriate open or burned area textures. Examples are shown in the color illustrations.

Simulations of the forest conditions that were the focus of the perceptual assessments reported here were developed at the Imaging Systems Laboratory at the University of Illinois. A combination of geographic information system view-modeling techniques and customized digital video image editing routines were used.[4] Different levels of insect damage and a number of alternative future forest conditions associated with selected management scenarios were simulated using image processing and pattern substitution techniques developed for this purpose. Digital image files for unaltered and for simulated scenes were used to produce color prints and slides, or they were directly displayed on a high quality color video monitor. All representations achieved near photographic quality levels for color, resolution and realism.

Selection of representative scenes and the detailed features of each simulation were guided by available forest inventory data, maps of stand boundaries, computer generated "perspective views" and by the expert judgements of forest silviculturalists and pest management specialists working in the area. In addition, the members of a multi-disciplinary citizen/professional panel charged with planning forest management responses to the bark beetle outbreak in the Cooper Landing study area served as expert judges for selecting representative forest scenes, and for validating the simulations of hypothetical forest conditions.

Alternative Future Conditions

Using the selected representative scenes as a starting point, two general types of "future forest" scenarios were created. Some scenarios depicted changes in forest scenes expected to occur over time as a result of a continuing bark beetle infestation, either assuming some preventative actions (e.g., thinning the susceptible spruce trees) or that no action was taken. The *no treatment* scenarios extended from "green" scenes, where very few or no dead trees were detectable, and progressed through scenes of intermediate stages to a condition where virtually all of the spruce trees in the scene were dead.

The infestation scenarios were created retrospectively, beginning with scenes of dead trees and using historic data to progressively "green up" the scene until it appeared as it did prior to the infestation (see color Plates 1 - 3a). Other scenarios were created to depict future conditions expected to occur over a 50-year period as a result of a number of different forest management actions that might be taken to restore areas already severely affected by the bark beetle infestation (color Plates 4 - 9).

Six *base* scenes were selected for modification to represent expected changes in forest characteristics relevant to the spruce bark beetle outbreak. Four of the base scenes were manipulated (retrospectively) to develop scenarios reconstructing the progressive changes that had occurred over the preceding twelve years of the outbreak. Beginning with the scenes as they appeared in the summer of 1990 (unaltered photographs showing over 90% mortality of spruce) simulations were constructed (nominally) representing how each of these four scenes looked 12, 9, 6 and 3 years in the past. These scenarios showed the typical progression from green forest to increasing numbers of dead trees. In addition, an alternative retrospective scenario was constructed covering the same time period for one of the scenes (Kenai River/Schooner Bend), but assuming that the affected stands had been thinned by removing 50% of the spruce (in two separate operations) and encouraging a mixed age forest with a greater proportion of hardwoods (see Plate 3b).

For the 1990 study four of the base scenes were manipulated to depict conditions expected to result at 5, 10, 20 and 50 years in the future from two alternative strategies for managing areas where spruce tree mortality was already severe (90% or more of spruce are dead). Strategies represented were; *no treatment*, postulating a moderately severe wildfire followed by unaided natural regeneration dominated by brush, grasses and hardwoods; and a *treatment* scenario in which dead spruce trees were clearcut and removed followed by a prescribed "site preparation" burn to encourage spruce regeneration (Plates 4 - 7). All other features of the scenes were held constant.

For the 1991 study additional 5-to-50 year scenarios were developed for the Kenai Lake/Snug Harbor base scene. All scenarios postulated clearcutting of the dead spruce followed by:

1. a high intensity burn (achieved by felling and leaving the dead spruce), leading to better spruce regeneration with some hardwoods (Plate 8a);

2. a light intensity burn (after removing the dead spruce), leading to predominately grass and some hardwoods (Plate 8b);

3. no special site preparation or regeneration efforts (only normal disturbance that occurs from summer logging operations), leading to predominately grass with a few hardwoods (Plate 9a); or

4. mechanical ground scarification, leading to better spruce regeneration with few hardwoods (Plate 9b).

Two additional scenarios were developed for one *near-view* scene representing views within the forest canopy, as would be typical in campgrounds or along trails. The near-view scene modification techniques required extensive "cutting and pasting" and relied largely on an artistic process. These simulations were intended only as an exploratory effort not central to the present study and thus they are not shown in the illustrations.

Summary of Visual Simulations

Retrospective Scenarios	3-6-9-12 years	Plate #
Jean Lake	• No Treatment	1
Kenai Lake/S. of Snug Harbor	• No Treatment	2a
Kenai Lake/Snug Harbor	• No Treatment	2b
Kenai River/Schooner Bend	• No Treatment	3a
	• Thinning	3b
Restoration Scenarios	**5-10-20-50 years**	
Cooper Creek Campground	• No Treatment	5a
	• Cut-Remove-Burn	5b
Cooper Creek from Resurrection Pass Trail	• No Treatment	6a
	• Cut-Remove-Burn	6b
Kenai River/Schooner Bend	• No Treatment	4a
	• Cut-Remove-Burn	4b
Kenai Lake/Snug Harbor	• No Treatment	7a
	• Cut-Remove-Burn	7b
	• High Intensity Burn	8a
	• Moderate Intensity Burn	8b
	• Normal Ground Dist.	9a
	• Mech. Scarification	9b
Near-View/Campground	• No Treatment	not shown
	• Thinning/Insecticide	not shown

Public Perception and Attitudes Regarding Spruce Bark Beetle Damage to Forest Resources on the Chugach National Forest, Alaska

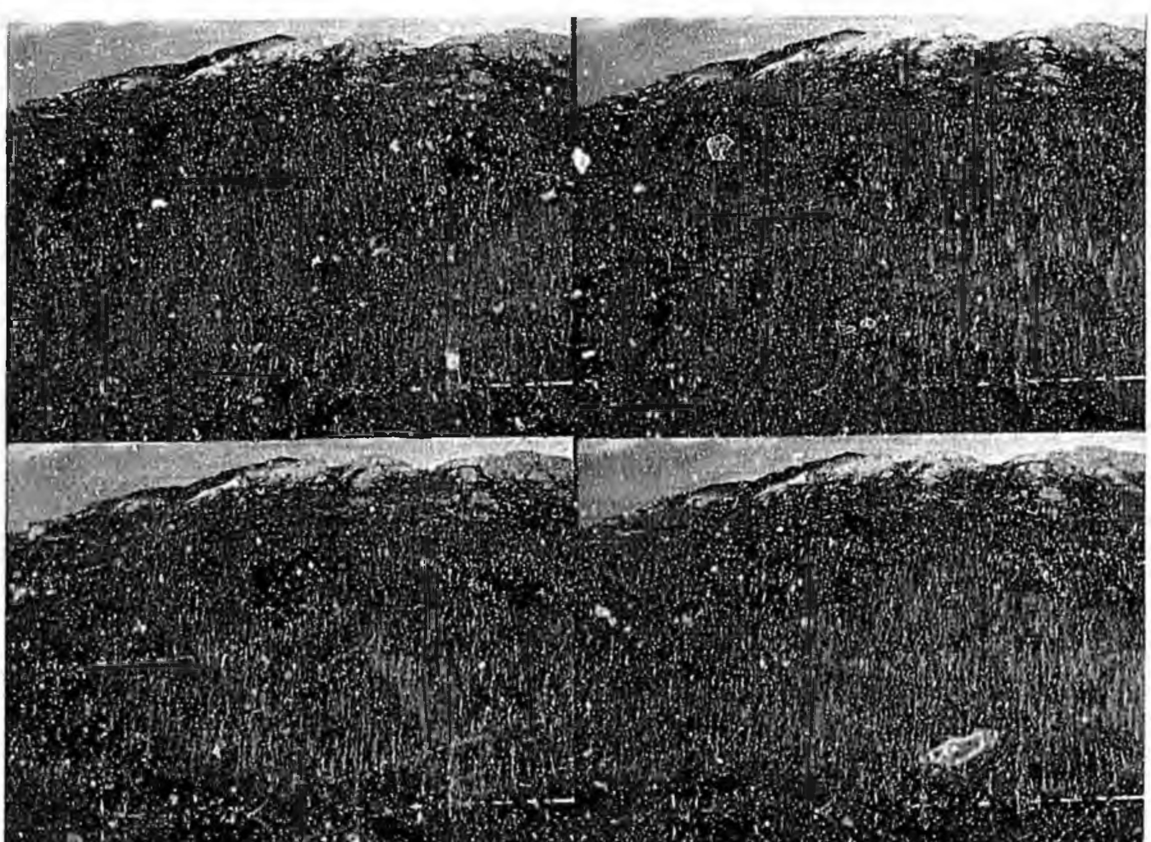
Color Plates

Each of the four-scene sets displayed in the following color plates shows simulations of the effects of a spruce bark beetle outbreak, or of a hypothetical forest management activity on a representative Kenai Peninsula forest scene. Simulations show progressive changes (3, 6, 9, 12 years for some scenarios and 5, 10, 20, 50 years for others) expected as a result of bark beetle infestation and/or some forest management activity. In each case, the image at the upper left represents conditions at the earliest time point (3 or 5 years) and the lower right represents the latest time period (12 or 50 years) after the postulated infestation or management action.

Plate 1

Jean Lake - Scene AJ 1319
3, 6, 9, 12 year scale

Simulations show progressive changes due to spruce bark beetle infestation with no management intervention. Simulations were created "retrospectively"; the year 12 (bottom right) representation shows the scene as it appeared in the summer of 1990.



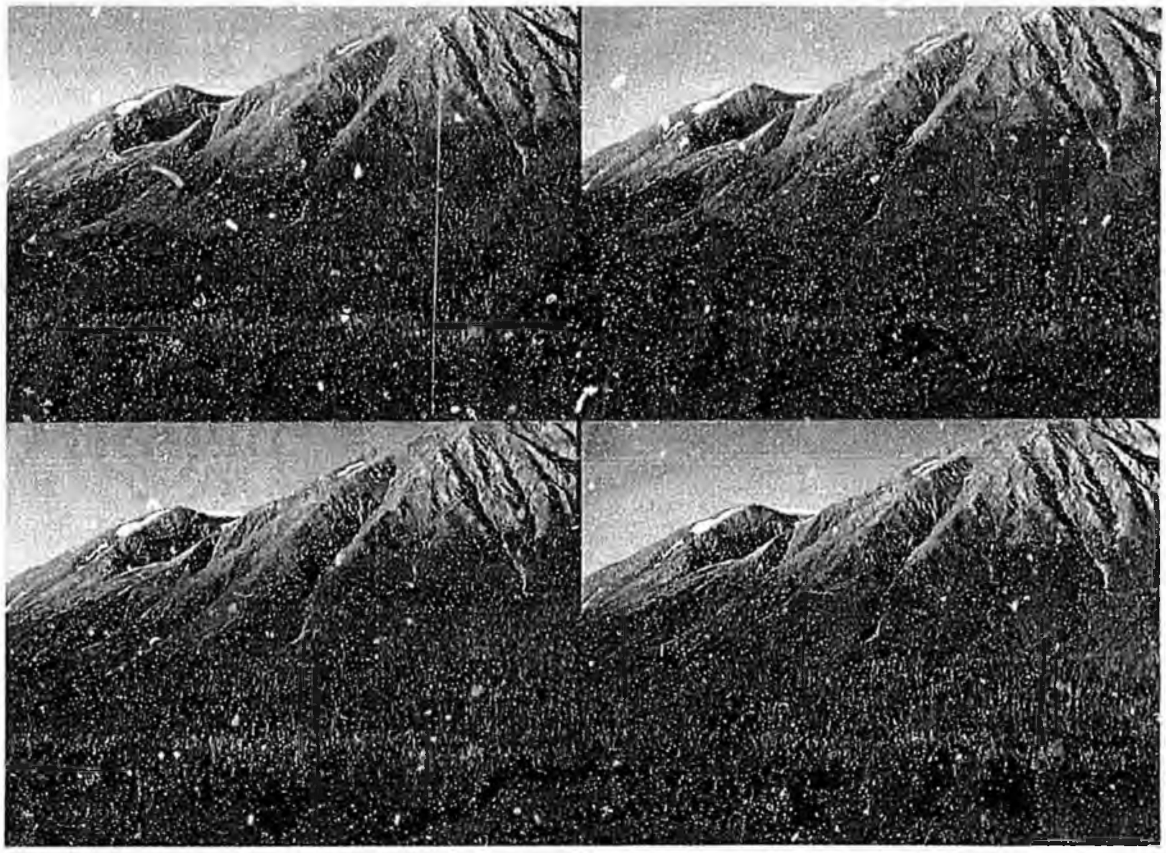


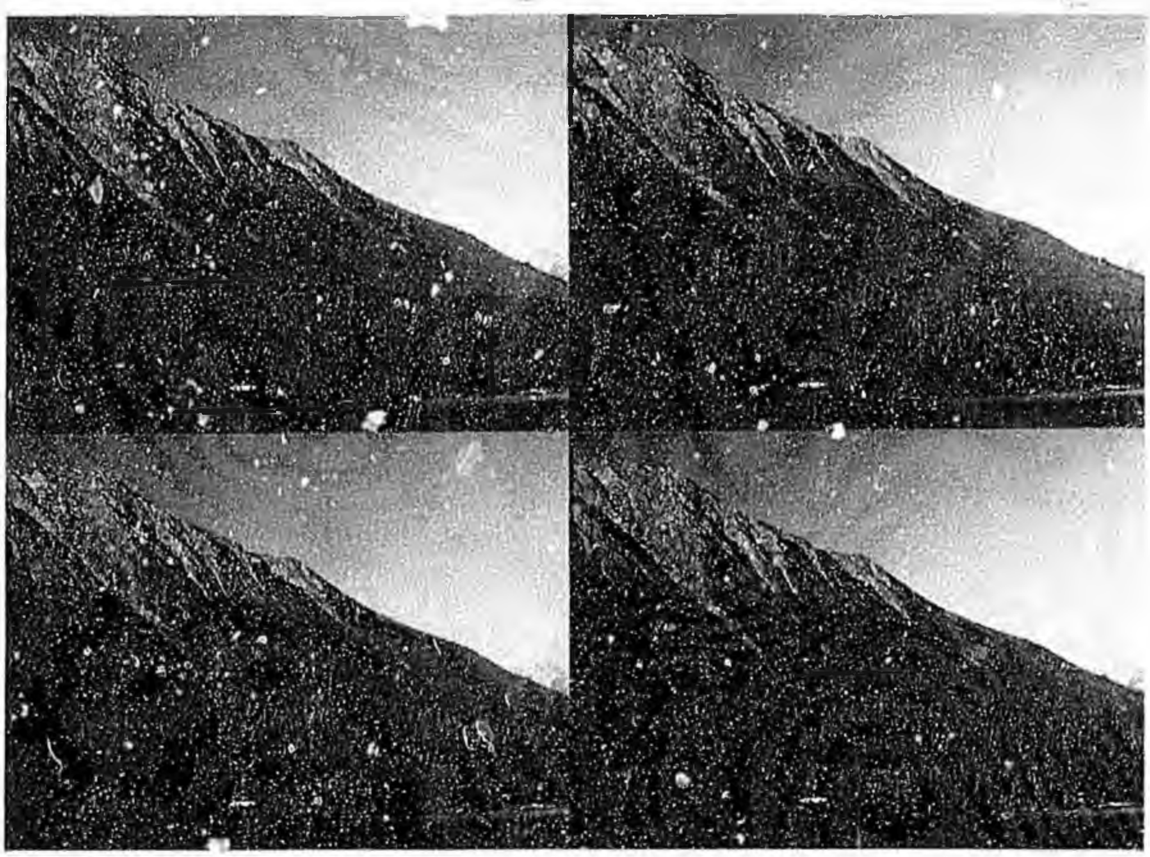
Plate 2a

Kenai Lake/South of Snug Harbor - Scene AI 1531
3, 6, 9, 12 year scale

Simulations show progressive changes due to spruce bark beetle infestation with no management intervention. Simulations were created "retrospectively"; the year 12 (bottom right) representation shows the scene as it appeared in the summer of 1990.

Plate 2b

Kenai Lake/Snug Harbor - Scene AI 1532
3, 6, 9, 12 year scale



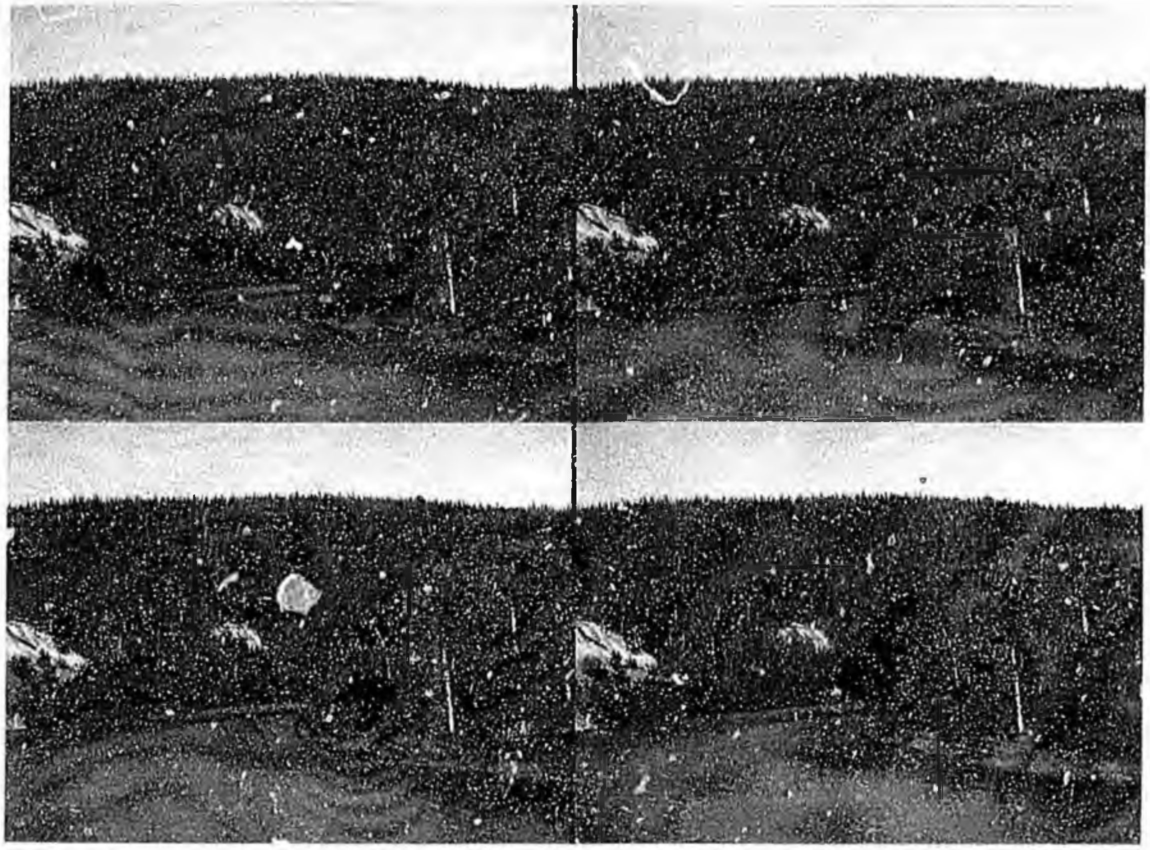
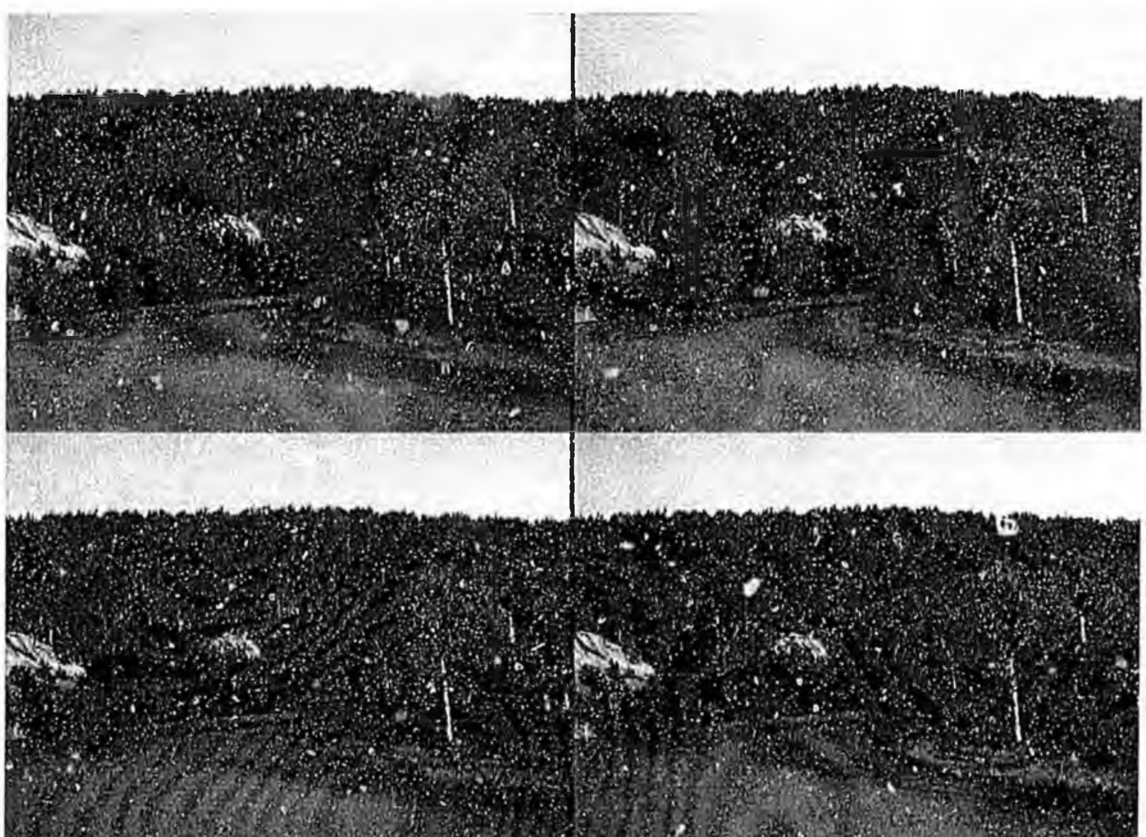


Plate 3a

Kenai River/Schooner Bend - Scene AI 0617
3, 6, 9, 12 year scale

Simulations show progressive changes due to spruce bark beetle infestation with no management intervention (Plate 3a). Plate 3b shows expected results following a pre-infestation thinning (at year 0) of susceptible spruce and subsequent thinning prior to year 9 (total thinning of 50%). The no-treatment simulations shown in Plate 3a were created "retrospectively"; the year 12 (bottom right) representation shows the scene as it appeared in the summer of 1990.

Plate 3b



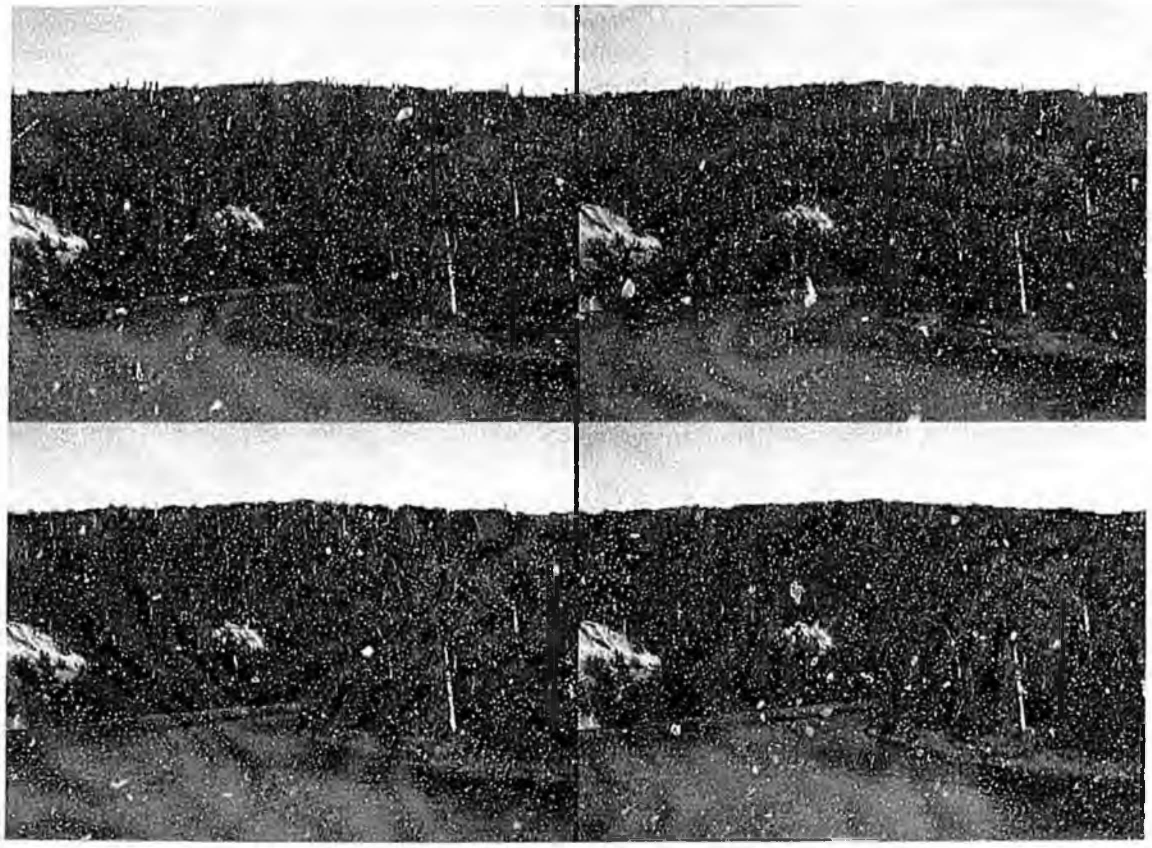
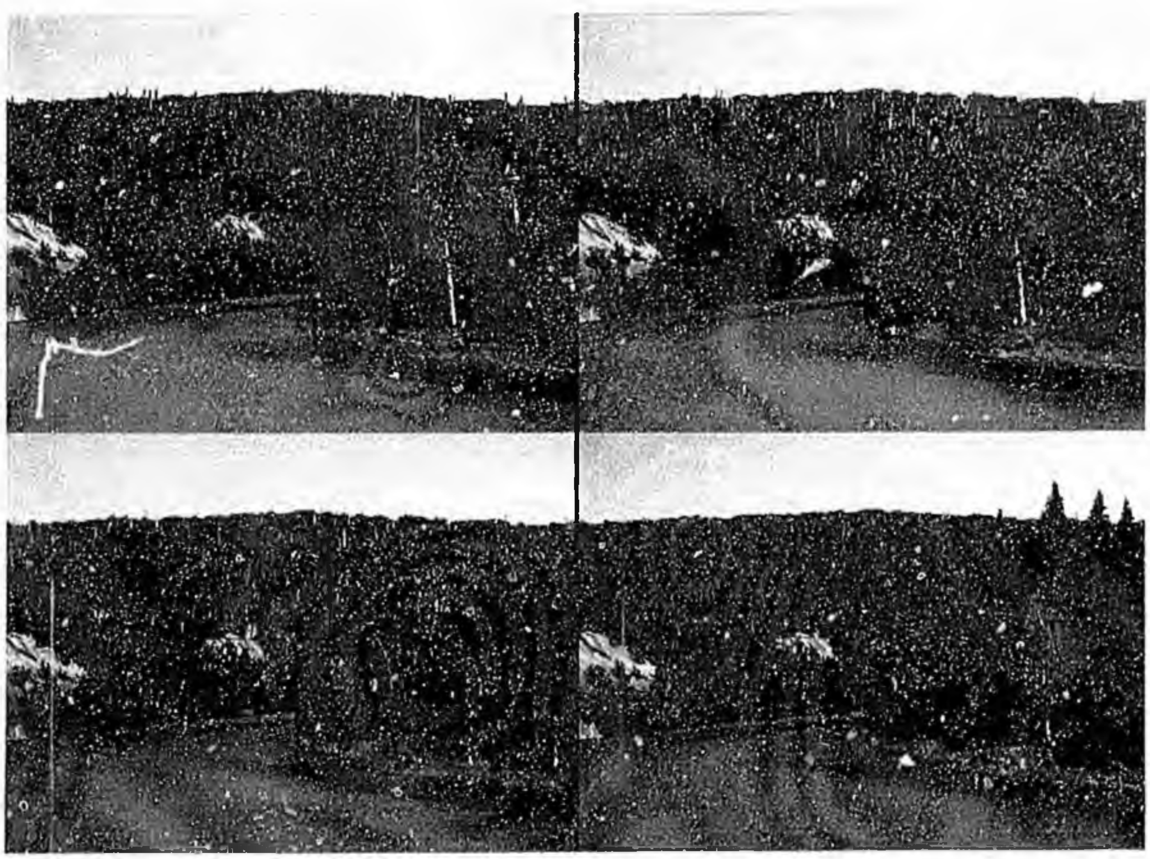


Plate 4a

Kenai River/Schooner Bend - Scene AI 0617
5, 10, 20, 50 year scale

Simulations show conditions as the forest recovers from a spruce bark beetle outbreak. In both cases, an anticipated wildfire occurs on the far slope with natural regeneration taking place over time. Plate 4a depicts natural regeneration in the foreground (along both river banks) as a result of no management intervention. Plate 4b shows natural regeneration in the foreground after an initial salvage removal of dead trees.

Plate 4b



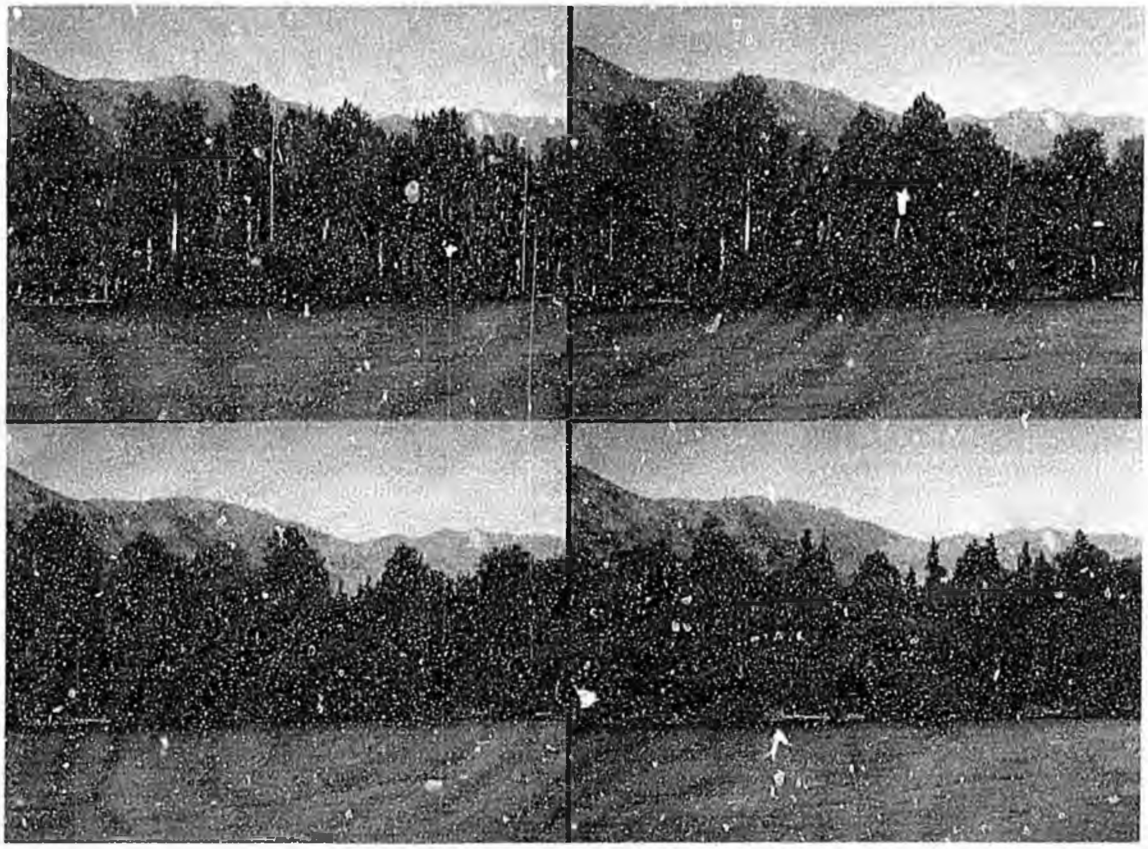
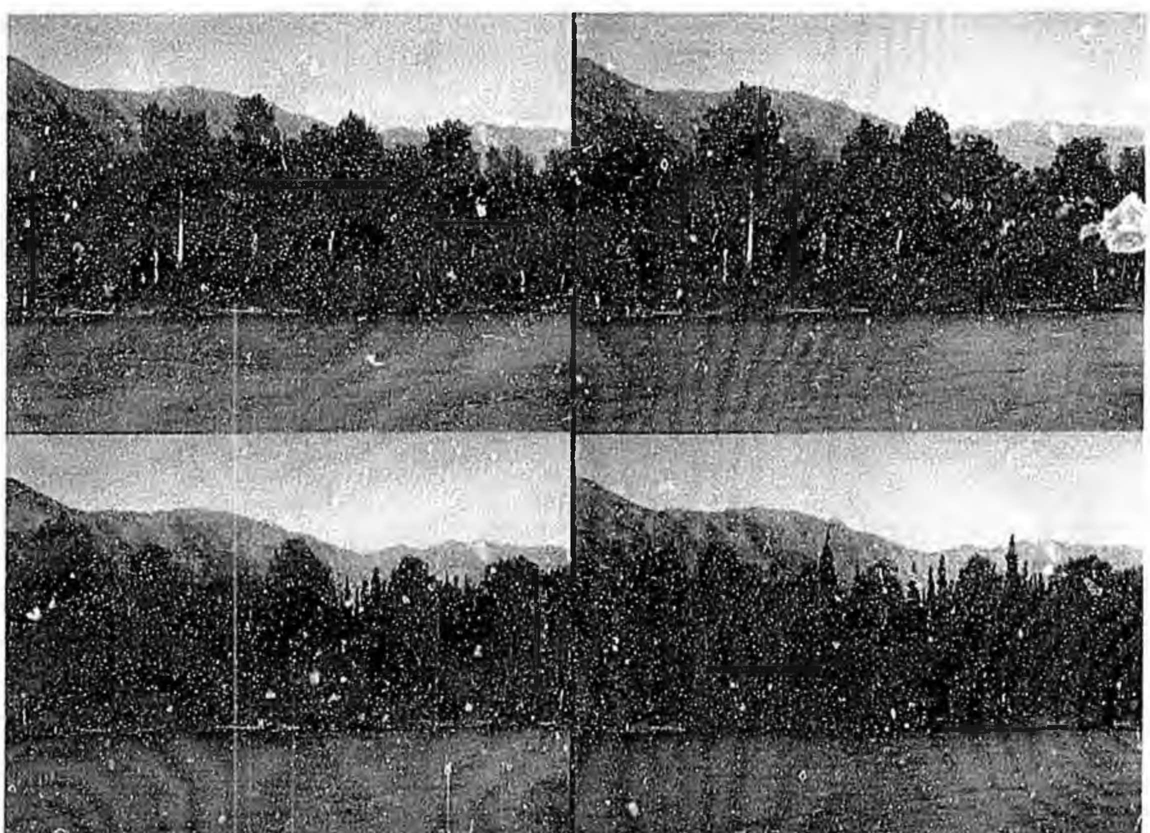


Plate 5a

Cooper Creek Campground - Scene AI 0614
5, 10, 20, 50 year scale

Simulations show conditions as the forest recovers from a spruce bark beetle outbreak. Plate 5a depicts no management intervention and natural regeneration occurs over time. Plate 5b shows natural regeneration after an initial salvage removal of dead trees.

Plate 5b



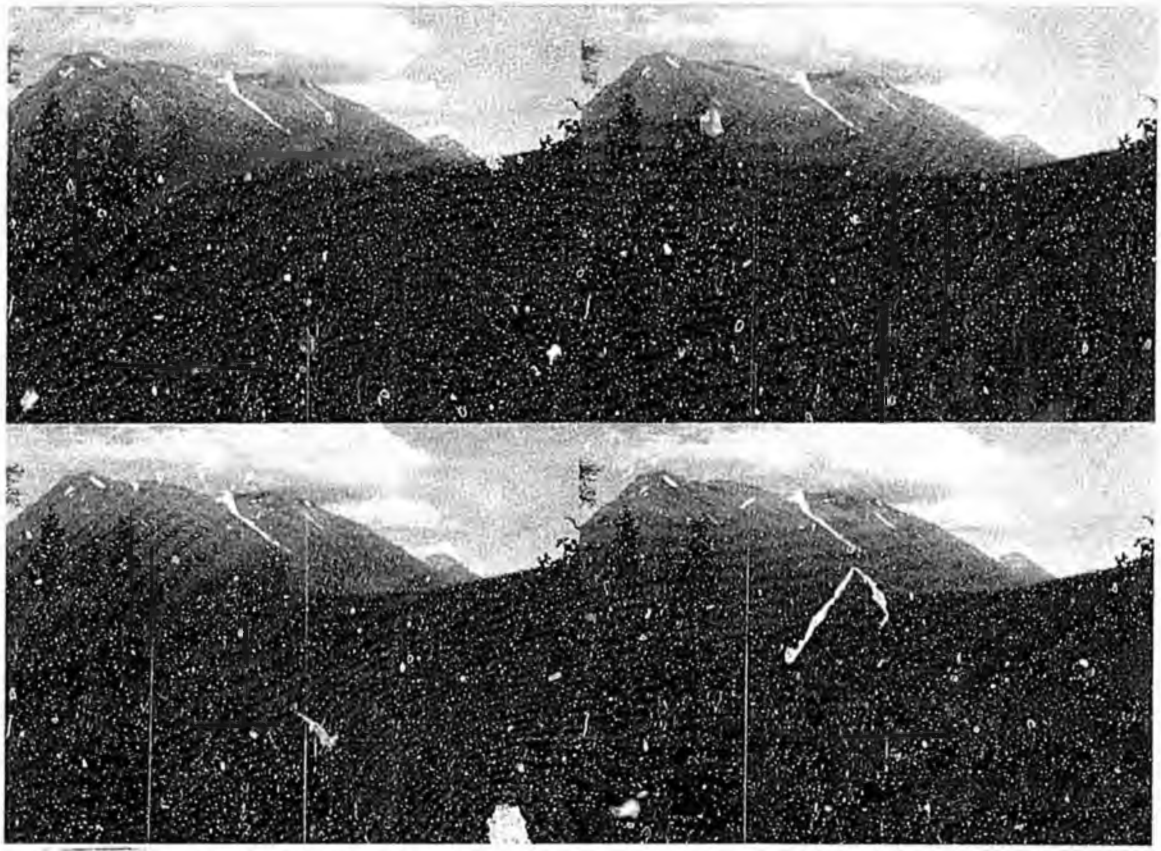
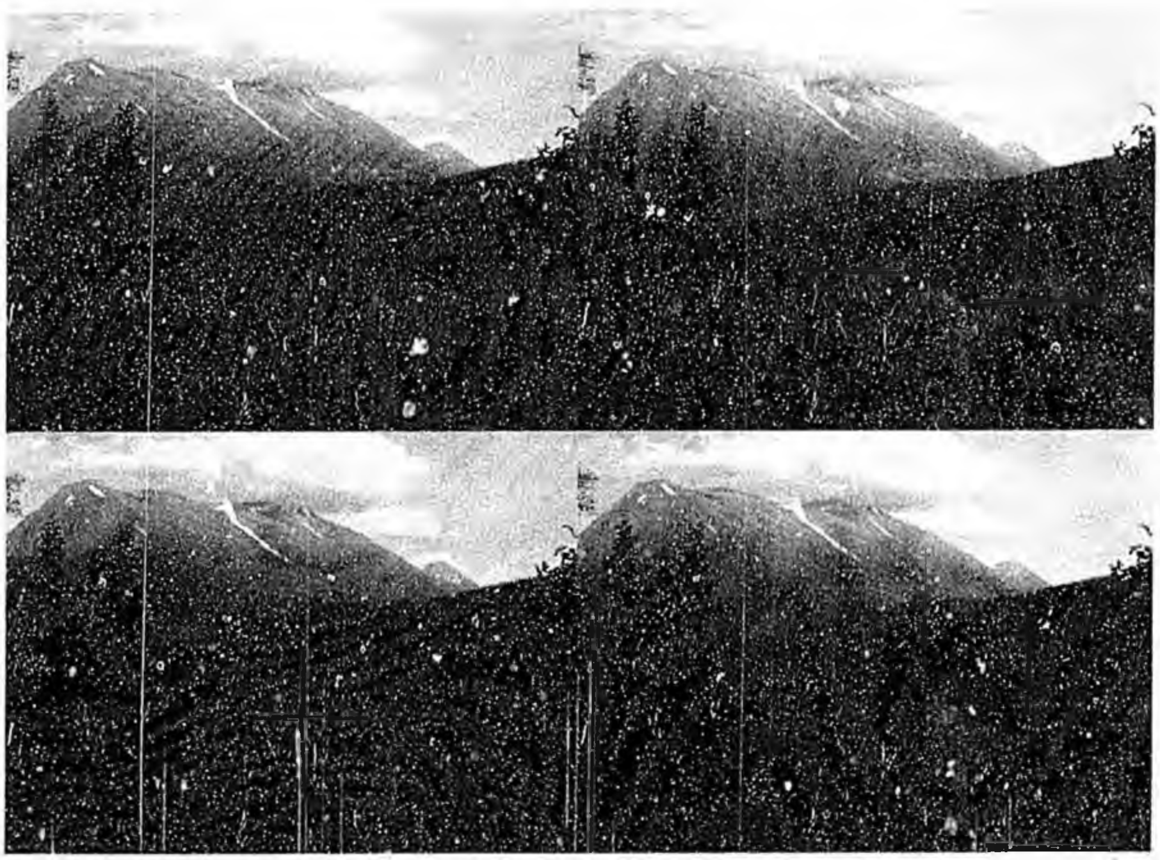


Plate 6a

Cooper Creek from Resurrection Pass Trail - Scene AI 0714
5, 10, 20, 50 year scale

Simulations show progressive changes as the forest recovers from a spruce bark beetle outbreak. Plate 6a shows natural regeneration after an anticipated wildfire. Plate 6b shows conditions after the salvage removal of dead trees on the lower slope and a controlled burn to promote natural regeneration of spruce.

Plate 6b



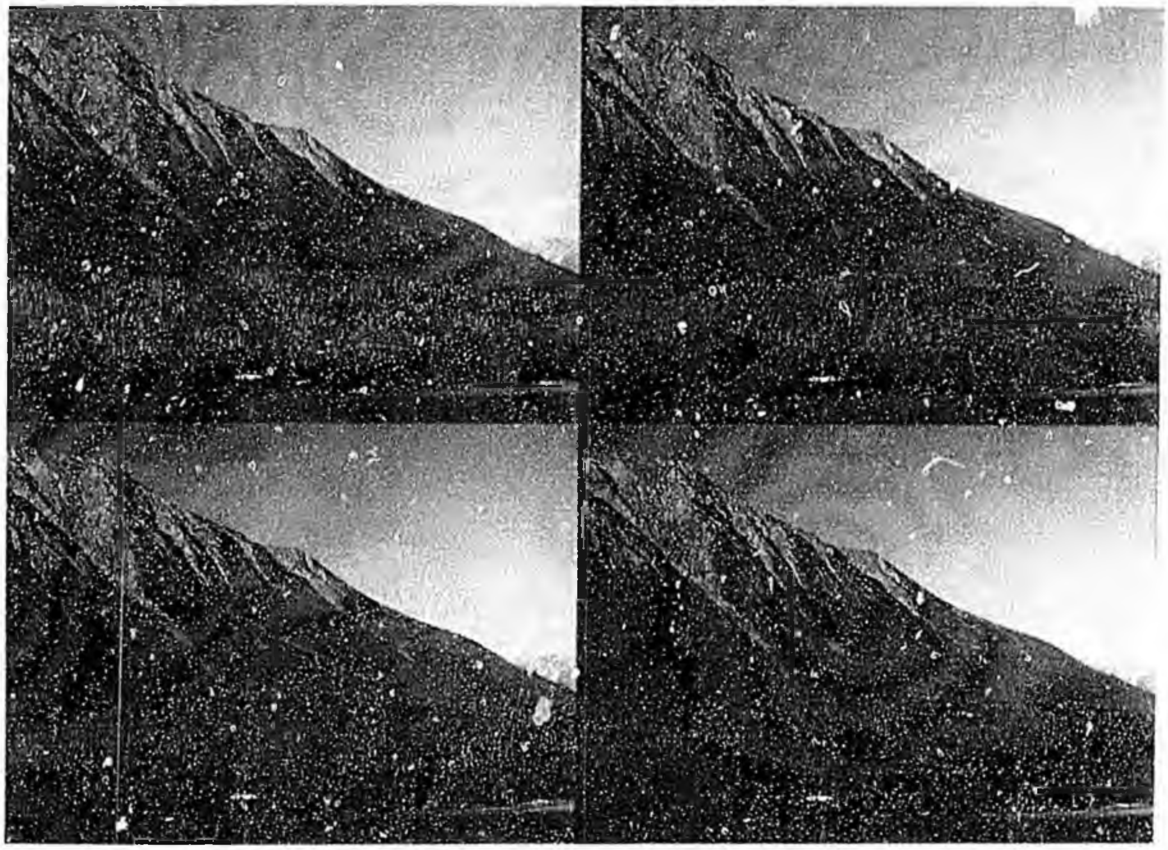
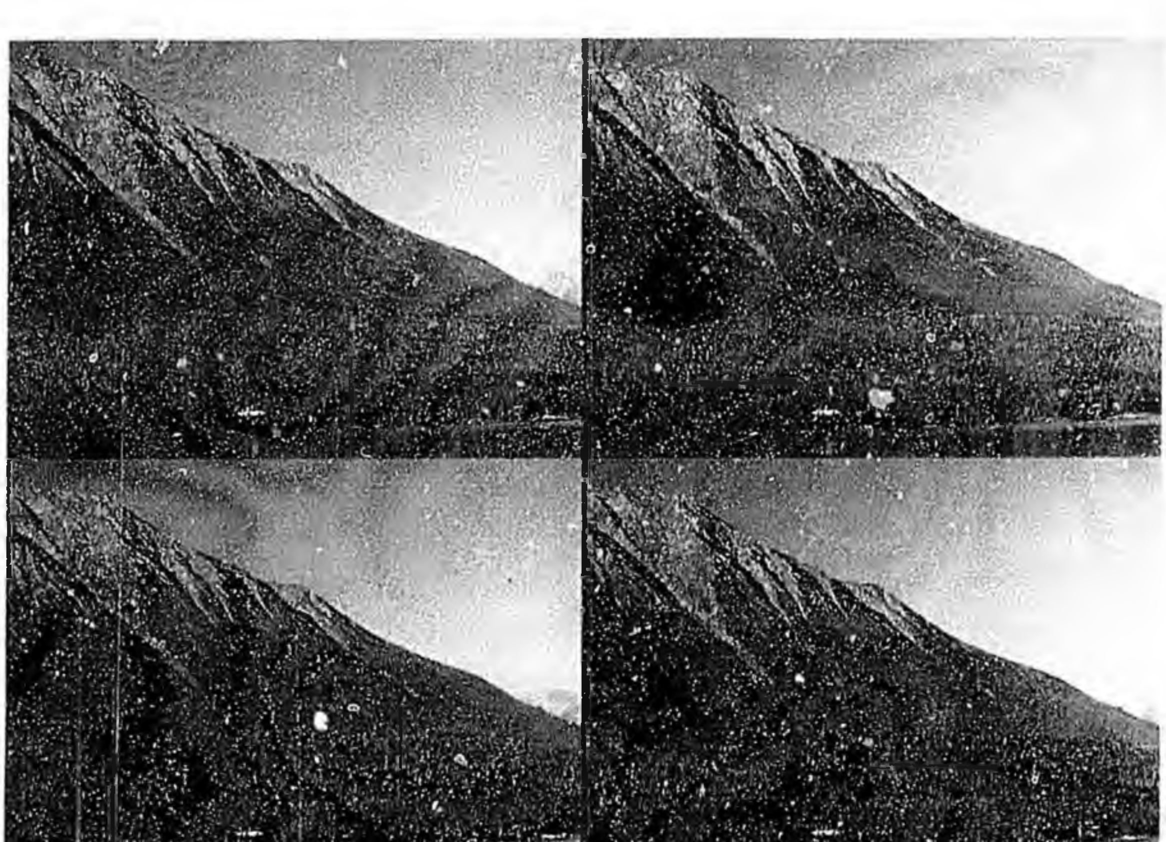


Plate 7a

Kenai Lake/Snug Harbor - Scene AI 1532
5, 10, 20, 50 year scale

Simulations show progressive changes as the forest recovers from a spruce bark beetle outbreak. Plate 7a shows natural regeneration after an anticipated wildfire. Plate 7b shows conditions after the salvage removal of dead trees and a controlled burn to promote natural regeneration of spruce.

Plate 7b



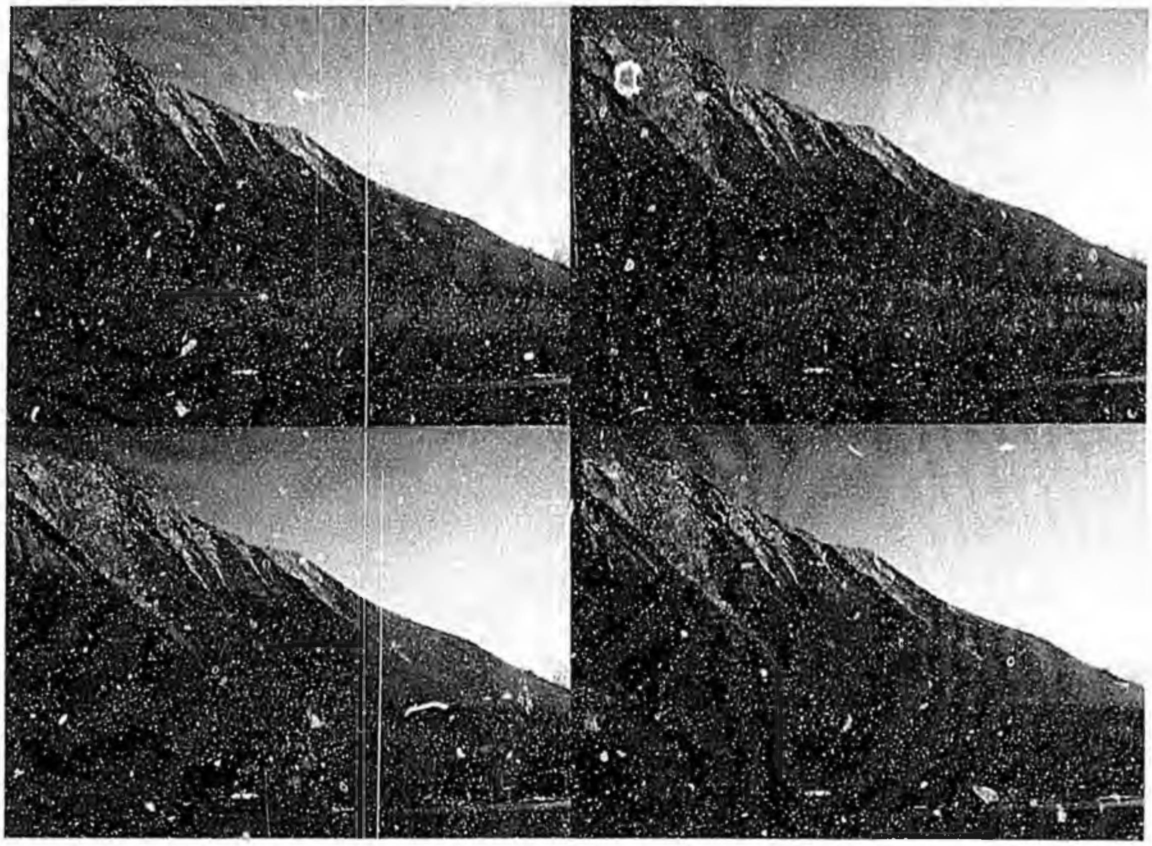
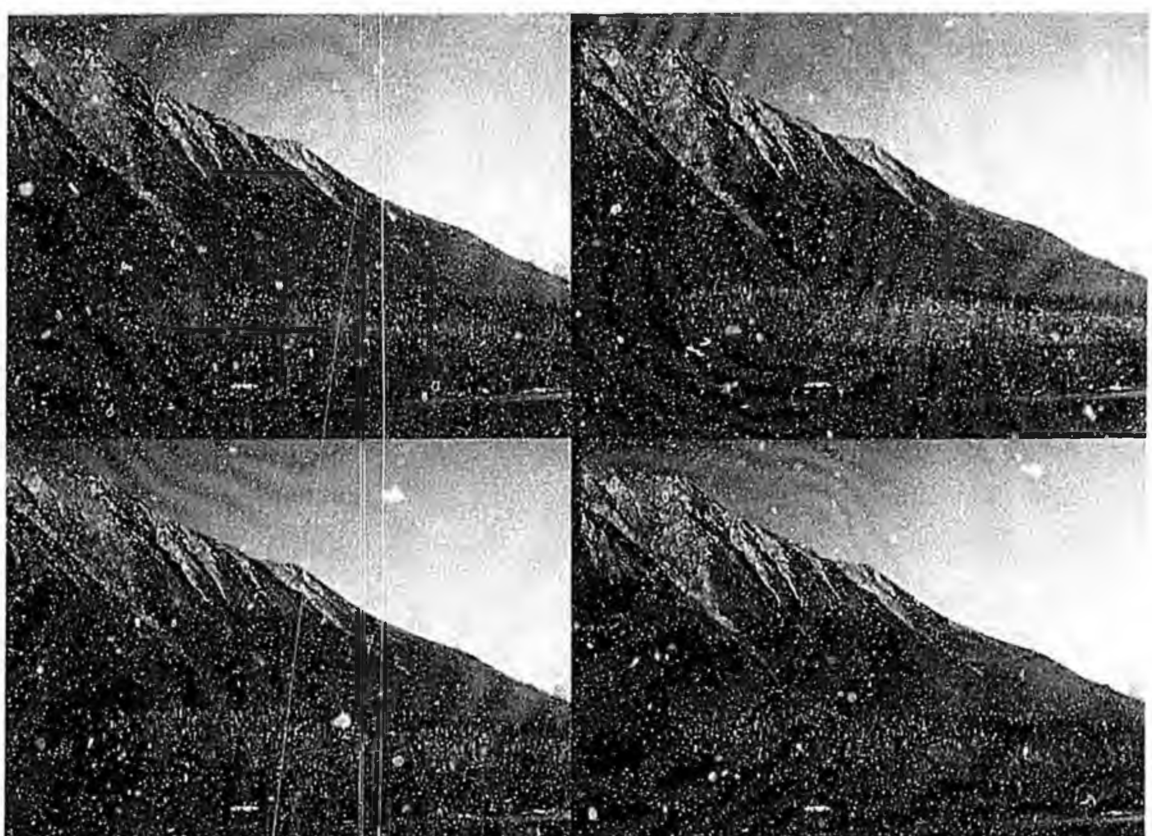


Plate 8a

Kenai Lake/Snug Harbor - Scene AI 1532
5, 10, 20, 50 year scale

Simulations show effects of prescribed burns over time. Plate 8a shows natural regeneration after cutting and burning the dead trees on site which results in a "hot" fire. Plate 8b shows natural regeneration after cutting and removing dead trees before burning which results in a fire of less intensity.

Plate 8b



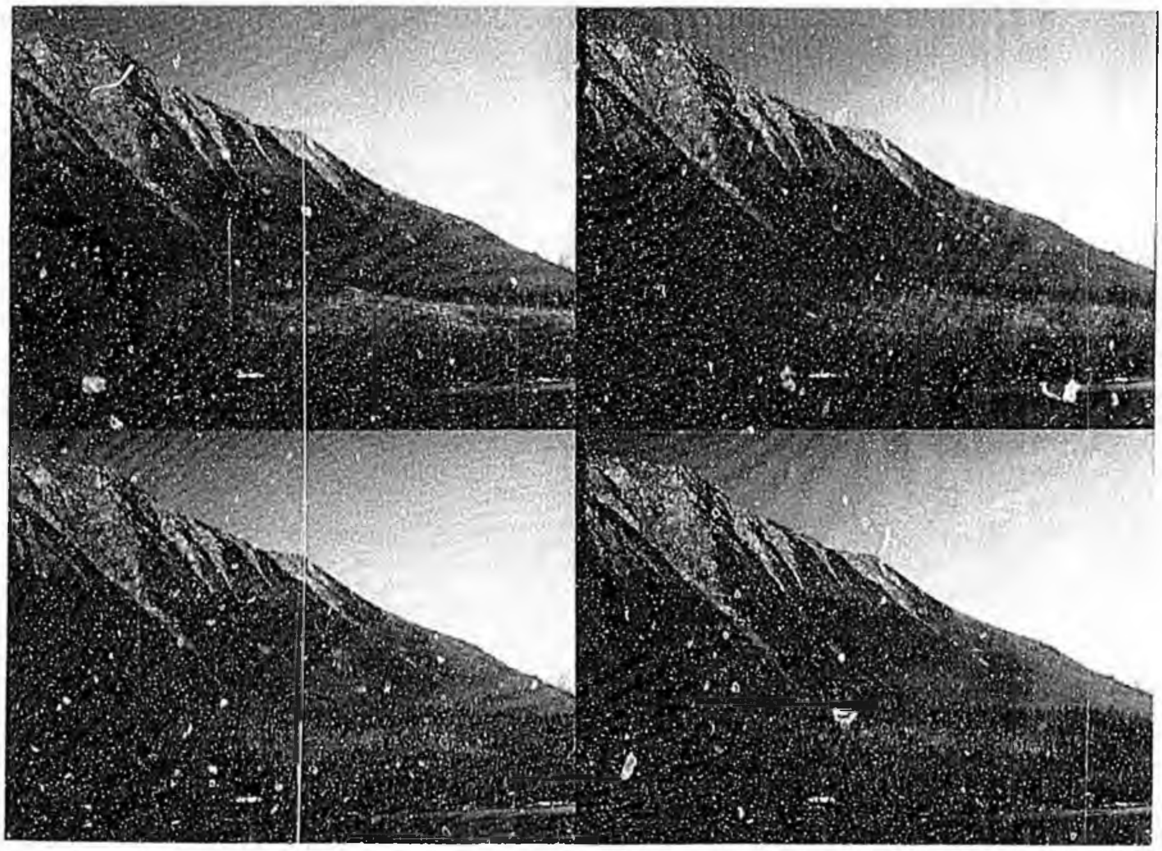
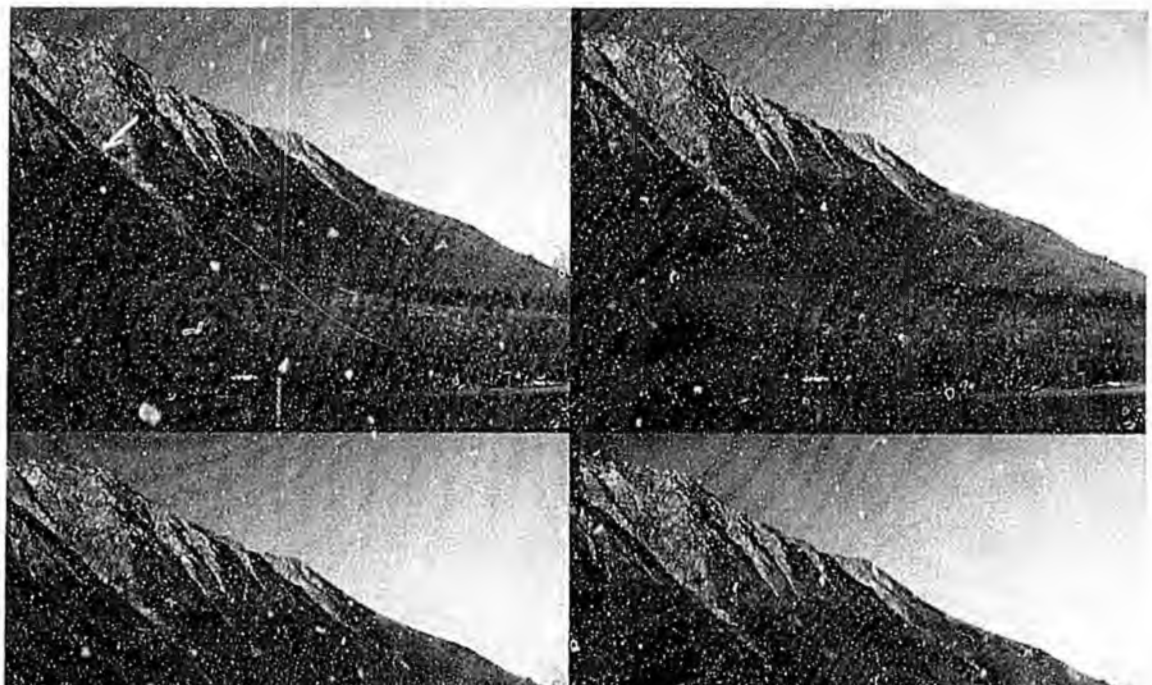


Plate 9a

Kenai Lake/Snug Harbor - Scene AI 1532
5, 10, 20, 50 year scale

Simulations show effects of site treatments following summer salvage removal of dead trees. Plate 8a shows natural regeneration after moderate ground disturbance from salvage removal operations. Plate 8b shows the effects of intense mechanical scarification after salvage removal to stimulate natural regeneration.

Plate 9b



Summary

A total of 48 digital-video simulation images were developed for the 1990 study and 24 new simulations were added for the 1991 study, resulting in 72 different simulation images. Two primary types of simulation sequences were developed: *retrospective* scenarios depicting the historic progression of bark beetle impacts over a 12 year period; and *restoration* scenarios showing alternative futures over a 50 year period following *no treatment* contrasted with one or more forest regeneration *treatment* scenarios.

All of the simulations were selected and developed in close interaction with forestry and pest management experts familiar with the Kenai Peninsula areas represented. Images were repeatedly evaluated and modified until the experts agreed that a high level of accuracy in the representation of the targeted forest conditions had been achieved. Base scenes and the simulation sequences developed for each are presented and briefly described in the preceeding color plates.

PERCEPTUAL ASSESSMENT

The simulation sequences described above formed the basis for the assessment of public perception of the effects of the bark beetle outbreak, and of possible forest management reactions. All responses in the 1990 assessment were collected in interviews with selected individual residents of, or visitors to bark beetle affected areas on the Kenai Peninsula. Two different presentation formats were used: sequences of single scenes were viewed and rated on a 10-point *scenic beauty* scale; and pairs of four-scene displays, each depicting alternative future scenarios for a given base scene, were presented and respondents were required to choose which set of future conditions provided the *best overall scenic quality*. The single scene format was repeated for color slides, prints and digital video images for different subsets of the 1990 respondents. The four-scene format was presented only in the form of color prints to a small sample in the 1990 study and to all respondents in the 1991 study.

Individual Scenes

For the single-scene format four sets of 63 forest scenes each were selected for presentation to respondents. Within each 63-scene set 51 scenes were common to all sets, and included a sample of scenes typical of the study area, as well as two retrospective "greening" sequences (four versions each of Jean Lake and Kenai Lake/South of Snug Harbor). The remaining 12 scenes were unique to each set, and were composed of a sample of the experimentally manipulated sequences (simulations of projected future conditions) for the other four base scenes.

Generally no more than three versions (simulations) of any given base scene were included in any one set of scenes, and these were always distributed among the other scenes in each presentation. Each of the 63-scene sets was organized into three different random orders, with each order being assigned randomly to individual respondents.

The goal of this "mixed" presentation procedure was to make the scene presentations as representative as possible of the conditions typically encountered by a forest visitor. On any given visit to the Kenai Peninsula study area a visitor would be expected to see a variety of different forest scenes, and to encounter several different levels of spruce bark beetle impact, but no specific scene would exhibit multiple levels of insect impact during a single visit.

Most of the participants in the 1990 study rated the *natural scenic beauty* of individual scenes representing a wide range of forest and insect damage conditions. Approximately equal numbers of participants were shown the scenes as color prints (bound in "photo-album" books), projected color slides or as displays on a video monitor. Respondents reported their judgements for each scene using a 10-point rating scale ranging from 1 (very low scenic beauty) to 10 (very high scenic beauty). Ratings were subsequently transformed to *Scenic Beauty Estimates* (SBEs), a standardized interval scale index that adjusts for arbitrary differences in the way individual respondents used the rating scale.[5]

As is typical for similar environmental perception studies, there was very high consensus in the scenic beauty ratings within each of the participant groups sampled. Internal reliability coefficients ranged from .88 to .96 (median = .93) within each of the twelve set-by-presentation medium (slides, prints, video) groups. These reliability measures estimate statistically the expected agreement between the ratings of the tested group and those of any other group that might be selected at random from the same population of respondents; perfect agreement would be indicated by a coefficient of 1.00.

No significant differences were found in ratings of the common base scenes between the different presentation sets, nor among the random orders within each set. Correlations of ratings of common scenes among the four groups of participants judging the different presentation sets ranged from .86 to .90 for visitors and from .87 to .95 for Alaska residents (again, a correlation of 1.00 would indicate perfect agreement between the groups).

Comparison of scenic beauty judgements across the three presentation media (slides, prints and video) also indicated nearly perfect agreement. Correlation coefficients based on the ratings of the scenes that were common to all presentation sets and participant groups (n = 43) ranged from .93 to .97.

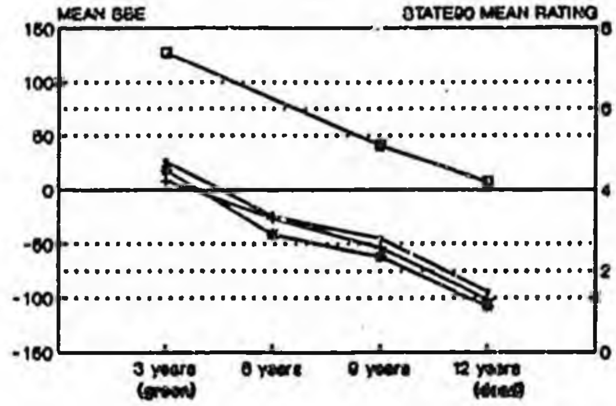
By all these indications there was a very high level of consensus in perceived scenic beauty among the tested groups, and a strong indication that essentially the same results would be expected for any other groups of similar people that might be assessed, as well as for alternative presentation formats. Further, there is substantial environmental perception literature confirming that public scenic beauty judgements based on color slides agree very closely with direct judgements made on-site in the depicted environments. Thus, the results of the studies reported here can confidently be generalized to the direct viewing conditions typically experienced by visitors to the represented forest areas.

Comparison of Residents and Visitors

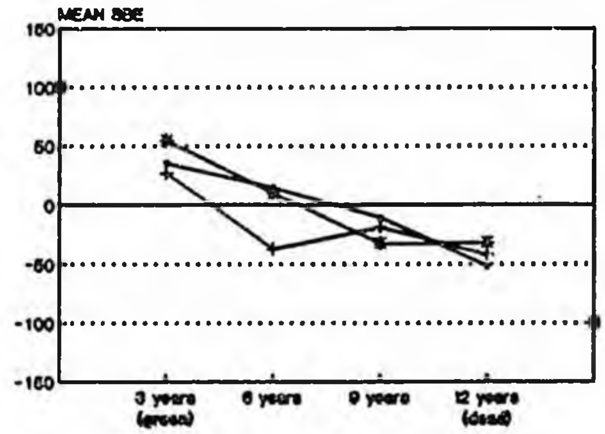
The scenic beauty judgements of residents and visitors were in very good agreement, regardless of the presentation format used. Overall, the correlations between resident and

Individual Scenes - Retrospective

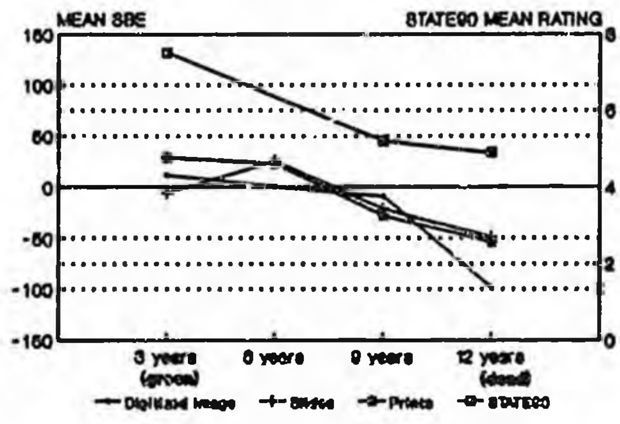
AI1319 - Jean Lake



AI1532 - Kenai Lake/Snug Harbor



AI0817 - Kenai River/Schooner Bend



DI n=135 S n=84 P n=144 STATE90 n=103

visitor ratings was .90. As a further test of the consistency of scenic beauty judgements across different public groups, samples of undergraduate college students at the University of Arizona and the University of Illinois (most of whom had never visited Alaska) also rated the scenes. Ratings by the two college student samples were in very good agreement with each other ($r = .93$), and with the visitors sampled on-site in Alaska ($r = .89$ and .90 for Arizona and Illinois samples, respectively). Correlations between the student samples and the Alaska residents were somewhat lower (both = .73), but still indicated substantial agreement.

The Alaska State survey also included a replication of the perceptual assessment for some of the forest scenes. Color prints of 16 of the 1990 study scenes (including depictions of naturally occurring and computer simulated insect impacts) were mailed to a subset of the randomly sampled respondents, and they subsequently reported scenic beauty ratings for the scenes in a telephone interview. Ratings exactly paralleled those found in the 1990 study. Thus, scenic beauty perceptions were not only shown to be consistent between residents and visitors over different presentation formats, but they were replicated by a random sample of south central Alaska residents, justifying substantial confidence in the generality of the findings summarized in the next section.

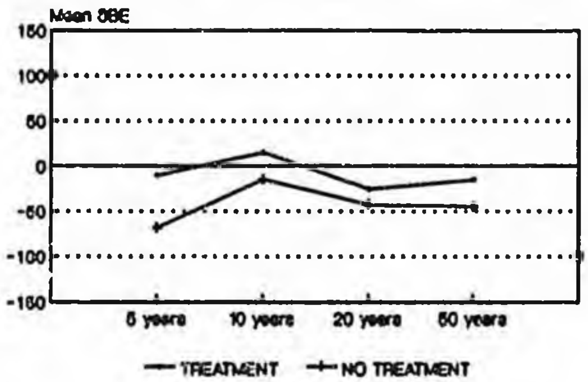
Scenic Beauty Perceptions

The results of the 1990 perceptual assessment, based on individual scene judgements, clearly and consistently showed that scenic beauty values declined significantly as the proportion of bark-beetle killed trees visible in the scene increased. When insect-caused mortality was concentrated in the mid-ground of the scene (Jean Lake and Kenai River/Schooner Bend scenes, Plates 1b, 3 and 4), perceived scenic beauty decreases were especially pronounced. This pattern obtained across unaltered scenes (which included scenes with varying amounts of insect impacts), and was strongly confirmed by the judgement patterns for the simulated scenes where insect impact was systematically manipulated.

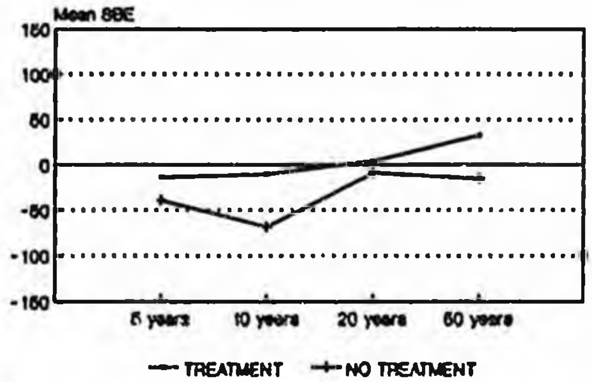
The Cooper Creek Campground scene (Plate 5) depicted a closer, more confined view including only a few bark beetle killed trees, and scenic judgements were somewhat less sensitive to the depicted changes in forest conditions. Insect effects were least noticeable in the most distant scene, the view toward Cooper Creek from Resurrection Pass Trail (Plate 6), and scenic beauty judgements were understandably less sensitive for this scene. The Kenai Lake views (/Snug Harbor and /South of Snug Harbor, Plates 2, 7, 8 and 9) evidenced intermediate levels of scenic beauty sensitivity to the beetle and forest management changes depicted.

For the simulated scenarios representing the effects of various forest management actions, several major trends were revealed. First, for the retrospective infestation *vs* protective thinning scenario (Kenai River/Schooner Bend, Plate 3), the individual scenes depicting the expected effects of protection by *thinning* were consistently rated higher than the associated scenes from the *no treatment* scenario. Second, ratings of the scenes from the alternative restoration treatment scenarios indicated a consistent overall preference for *treatment* alternatives that accelerated recovery to forested conditions. While these trends were evident in the single-scene ratings, whether presented as video, prints or slides,

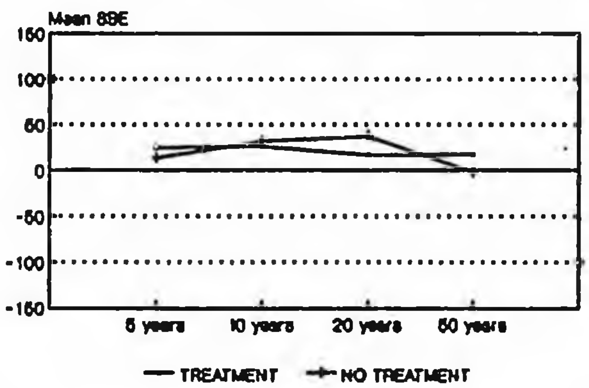
Individual Scenes - Restoration
AI0614 - Cooper Creek Campground



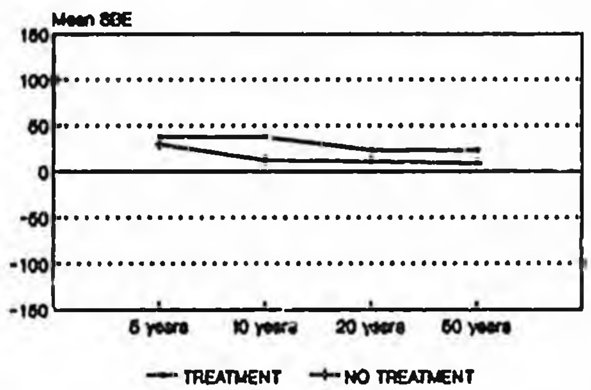
Individual Scenes - Restoration
AI0617 - Kenai River/Schooner Bend



Individual Scenes - Restoration
AI0714 - Cooper Creek/Res. Pass Trail



Individual Scenes - Restoration
AI1532 - Kenai Lake/Snug Harbor



relative preferences for the various forest management alternatives were most clearly revealed in the four-scene, forced choice format discussed in the next section.

Preferred Future Forest Conditions

Some of the residents sampled in the 1990 study and all of the 1991 participants made forced choices between pairs of four-scene sets depicting future conditions expected to result from different possible forest management actions. The four-scene sets were all presented as color prints, with four individual prints arrayed on an 8 x 10 inch page. Most of the individual scenes were the same as those presented in the single-scene format discussed above.

Each of the paired sets presented two different four-scene scenarios (on facing pages of a photo-album book) for a given base scene, e.g., the scenes in Plate 3a *vs* those in 3b. Thus, sets were paired so that each four-scene member of a pair depicted a different "future" for a given base scene. The pairs were bound into photo-album books, with the order of pairs in each book determined by one of two random sequences. Both retrospective and future forest conditions were simulated for each base scene, as described above, and illustrated in the color Plates.

In the 1990 study, each participant made choices between *treatment* and *no treatment* restoration scenarios for each of the four base scenes. The four scenes in each set consisted of visual simulations of a given base scene as the expert panels expected it to look 5, 10, 20 and 50 years following the postulated treatment or no-treatment scenarios. For all four of the base scenes, the *treatment* scenario depicted future forest conditions expected to result from a salvage removal of dead spruce overstory (clear cut), followed by site-preparation burning to encourage spruce regeneration. The *no treatment* scenario depicted the projected consequences of a postulated wildfire (occurring at year zero) followed by natural regeneration, resulting in predominately grass and brush with some hardwood overstory. These scene sets are presented in Plates 3 through 7.

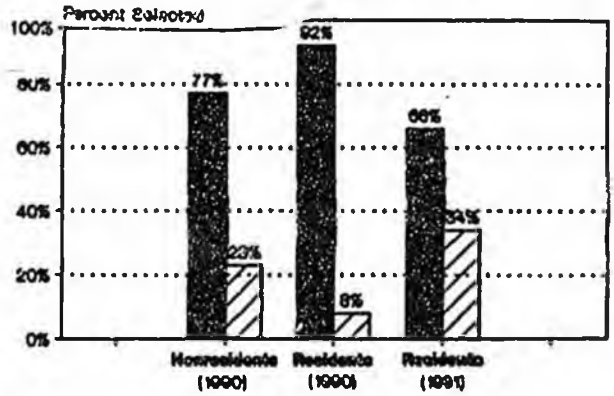
The final pair presented the two retrospective scenarios for the Kenai River/Schooner Bend scene (Plate 3). One four-scene set depicted the progressive stages of bark beetle infestation (from approximately 1978) based on historic data, with the final scene being the unmanipulated (digitized) picture of the scene with virtually all of the spruce dead (1990). The alternative four-scene set depicted the expected progression of the scene over the same years, based on the postulated 50% thinning treatment.

The results of the paired-comparisons among the four-scene sets in the 1990 study were consistent with the individual scene assessments. For the retrospective scenarios, the *thinning* option was consistently preferred over the *no treatment* infestation scenario.

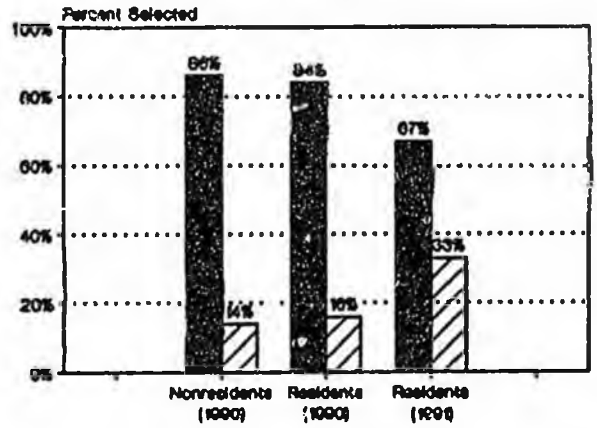
For the restoration alternatives, the *treatment* scenarios, which more quickly and completely restored a predominately spruce forest, were consistently preferred over the *no treatment* scenarios, where recovery was slower and resulted in more grass, brush and hardwoods.

The results of the 1991 paired comparisons mirrored the 1990 findings for the same scenarios. In addition, a more detailed study was conducted comparing four different management options for the Kenai Lake/Snug Harbor scene. Comparisons among the

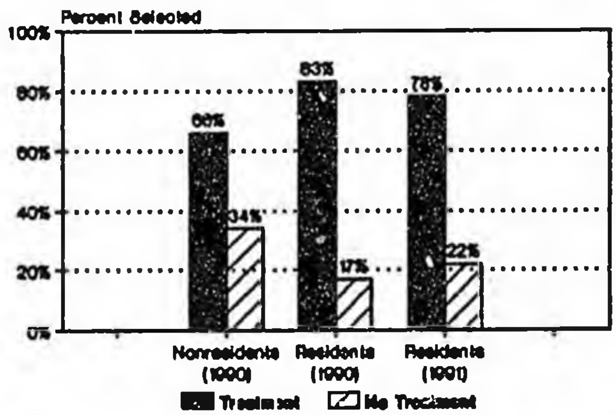
Preferred Future Forest Conditions
Cooper Creek Campground



Kenai River/Schooner Bend



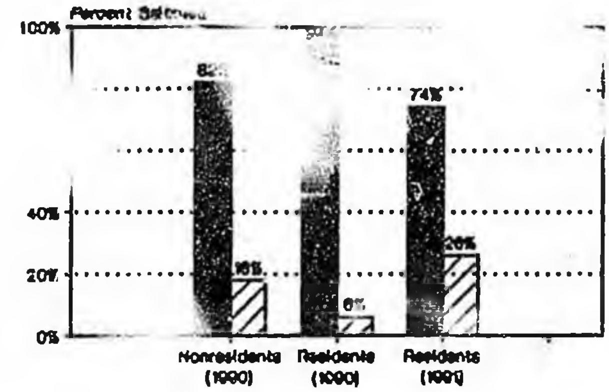
Cooper Creek from Res. Pass Trail



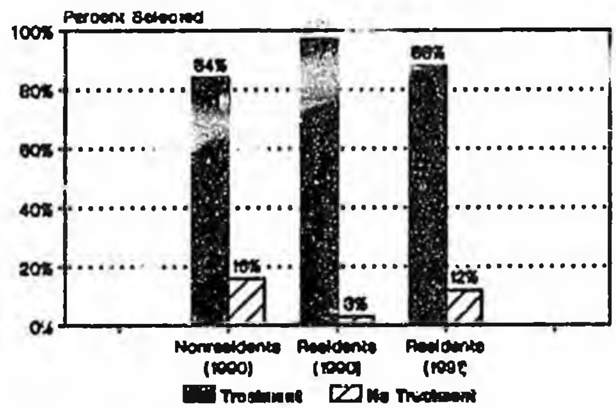
AK90 NR n=70 R n=45 AK91 n=110

Preferred Future Forest Conditions

...Lake/Snug Harbor

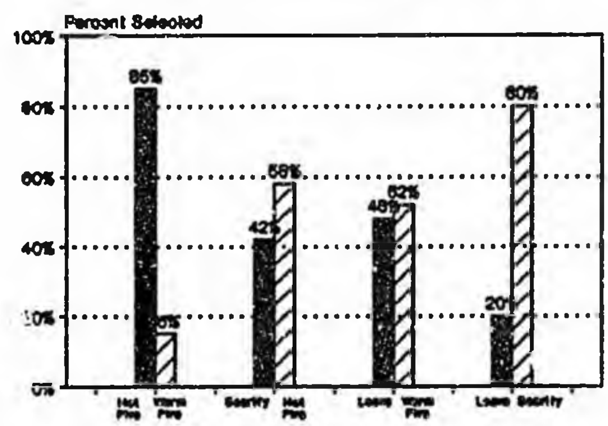


Kenai River/Schooner Bend (Retrosp.)



AK90 NR n=70 R n=45 AK91 n=109

Kenai Lake/Snug Harbor (1991)



AK91 H/W & L/S n=110 S/H n=49 L/W n=58

alternative forest restoration options, following a clearcut of the dead spruce, revealed that the strongest preference was for the *very hot fire* option (where felled dead trees were left to burn). The second most preferred option was *mechanical scarification*, followed closely by *moderately hot fire* (felled trees removed before burning), which was only slightly favored over the no-treatment *leave* option. For the one exploratory near-view scene, the *thinning protection* treatment was consistently preferred over the *no treatment* option.

Summary

The expressed preferences among the four-scene scenarios were consistent with the results of the single-scene assessments. The retrospective simulation of *thinning* spruce prior to infestation was rated higher and chosen more often than the *no treatment* option which resulted in large numbers of dead spruce. The individual scene ratings and choices among alternative restoration scenarios indicated a clear preference for *treatment* options that accelerated the recovery of forest cover, especially those, such as *hot fire* and *mechanical scarification*, that restored a significant cover of spruce. In short, respondents preferred to keep forests green if possible and, when significant numbers of trees were already dead, they preferred scenarios that featured faster recovery of forest cover, especially spruce.

An Important Caveat

While the results of the perceptual assessment were quite clear, it is important to acknowledge two important limitations on their interpretation. First, the "future forest conditions" represented in the computer simulations were based on the best available forest data and expert consensus regarding the most likely outcomes of the management alternatives considered. Still, human ability to predict complex biological processes is significantly limited, and many important factors (such as climate variations, wildfires, etc) can neither be predicted nor controlled. It follows that the specific details of the conditions depicted in the simulations represent "average" conditions based on the experts' "best estimates," and should not be viewed as absolutely certain outcomes.

Finally, the perceptual assessments pertain only to expressed preferences for the *visual* outcomes of the alternative management options evaluated. Many important issues, such as the economic costs of achieving the outcomes and the environmental consequences associated with each, cannot be directly represented by visual simulations, and these factors undoubtedly have significant effects on public reactions to forest management actions. Some of these non-visual issues were more directly addressed in the verbal portion of the assessment, described below.

ACCEPTABILITY OF ALTERNATIVE MANAGEMENT POLICIES

Following the forced-choice evaluations of alternative future forest conditions, some of the respondents in the 1990 study and all of the 1991 respondents answered questions about bark beetle-related forest management policies. Issues addressed in this part of the assessment were identified through individual interviews with forest and pest management specialists in the US, State and local Bureau forest management agencies, local residents, tourist facility operators and recreators and tourists visiting facilities in the study area. The specific statements and format for the assessment were evaluated and refined in a pilot test on a sub-set of the 1990 respondents.

The management policy section of the assessment was introduced by a general description of the life cycle of the spruce bark beetle and how it attacks and kills trees. The outbreak on the Kenai Peninsula was described, including an oblique aerial photograph of a severely affected area just north of the Kenai River near Cooper Landing.

The policy assessment was divided into five sections, each preceded by a brief description. Individual sections included questions pertaining to the acceptability of management policies in different contexts, including:

1. **general policies** regarding whether to allow the outbreak to follow its natural course or to actively try to stop it;

2. **prevention** of the conditions that may lead to outbreaks;

3. **protection** of trees in threatened areas once an outbreak is already underway;

4. **restoration** of forest areas that have already been severely affected by an outbreak; and

5. questions pertaining to **expectations** regarding the future spread of the current Kenai Peninsula outbreak.

A copy of the complete assessment instrument, including introductory information and instructions is provided in the attatched Appendix to this report.

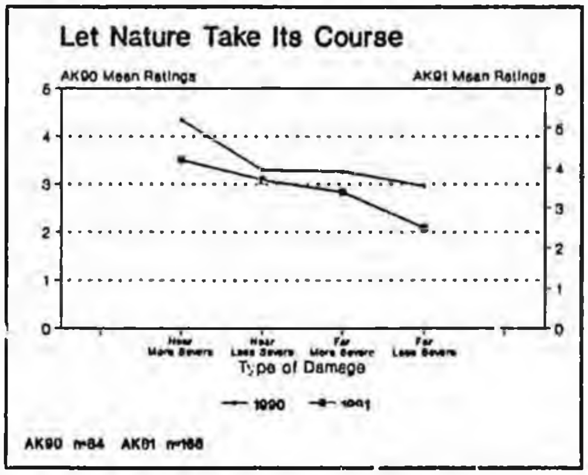
General Policies

This section sought to determine in general the circumstances under which respondents would favor not taking any explicit management action in response to the bark beetle infestation. The introductory statement for this section was:

One response to the spruce bark beetle outbreak is to accept it as a natural process and just "let nature take its course." In remote areas this may be the only possible response. In some Parks and Wilderness Areas it may be the only alternative allowed by law. Where managers have a choice, the best policy is to let nature take its course, so long as the area is:

Four situations were described which differed in the severity of the beetles' effects on the forest and where the effects occurred relative to human developments. *More severe* effects were represented as areas where most of the spruce trees would be killed and "only grass and brush is expected to grow back." *Less severe* effects specified less tree mortality and that "new trees are expected eventually to grow back." The location of the effects was described as *near* or *far away* from homes and recreation areas.

For both residents and visitors in the 1990 study, and for the residents in the 1991 study, the greatest willingness to **let nature take its course** was for areas described as *far away* from developments where damage was described as *less severe.* There was split agreement and disagreement for this policy in *far away/more severe* and *near/less severe* conditions. The majority of respondents disagreed strongly with the **let nature take its course** policy for areas *near* developments where damage was described as *more severe.*



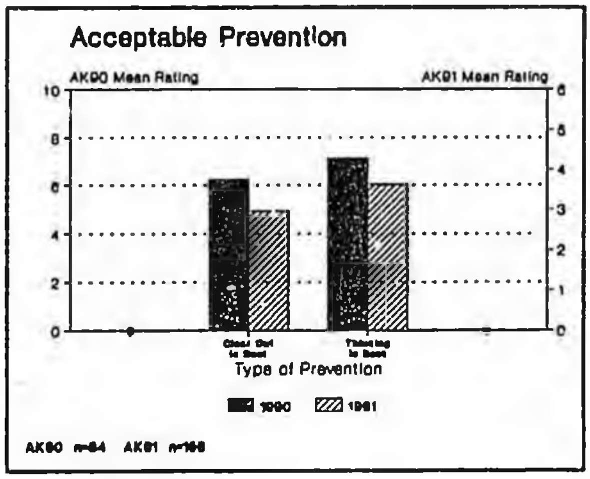
Prevention Before an Outbreak

This section focussed upon actions that might be taken in forest areas that are not currently infested, but are threatened by bark beetle infestation. In particular, this section addressed the acceptability of vegetation management options, such as thinning or clear cutting susceptible spruce stands.

The text that introduced this section was:

One method for protecting forest areas that are threatened by the bark beetle outbreak is to remove about half of the trees. This is intended to reduce the number of places for the beetles to breed and to help the remaining trees grow more vigorously so that they are better able to resist beetle attacks.

There was substantial agreement that removing some trees (about 50%) is an effective and acceptable method for protecting threatened stands. Consistent with the Alaska State survey, residents in both the 1990 and 1991 studies indicated that *thinning* was the most preferred method for tree removal. In both studies there was generally less agreement with *clear cutting small patches*, though about 22% of the 1990 resident sample rated this option as "completely acceptable," and 15% of the 1991 sample "strongly agreed" with this approach.



Respondents in the 1991 study agreed that *cut trees should be sold to private companies*, and that cutting and revegetation treatments should be implemented even if *selling the trees will only pay for part of the costs.*

Protection During an Outbreak

The focus of this section was on forest areas currently involved in an active bark beetle infestation. Based on available pest management options in these circumstances, the only management alternative offered was to spray insecticides. The questions posed addressed the particular conditions under which various spraying policies would be approved.

The introductory statement was:

During a bark beetle outbreak it is possible to protect selected trees by spraying environmentally approved insecticides directly on the bark. Spraying costs about 5 to 10 dollars per tree and lasts for up to three years.

The use of insecticides, even when presented as "environmentally approved," produced very divided responses. The 1990 study yielded a pattern of widely split opinion, with slightly more residents finding insecticide spraying "completely acceptable" (21%) as compared to "completely unacceptable" (14%). Visitors showed a much stronger pattern for this question, with only 2% indicating completely acceptable and 30% completely unacceptable. In the 1991 study 44% strongly or moderately agreed vs 30% strongly or moderately disagreeing that insecticides *are perfectly safe for use around homes and recreation areas*; the middle 25% tended more to mild agreement.

Interestingly, the Alaska State survey found a pattern of greater acceptability for *encouraging property owners to use insecticides* the farther the respondent was from the affected sites; there was 65% approval by residents in the affected areas, 72% by residents of other (unaffected) Kenai Peninsula areas, and 80% by Anchorage residents. At the same time, only 39% of Kenai residents favored the use (by the State) of insecticides to protect trees in campgrounds. The indication is that insecticide use evokes strong reactions, and involves more than one dimension of public concern.

The more detailed pattern of responses provided by the 1991 study indicated that insecticides were generally accepted as the most effective protection method. Defining "agreement" as a rating of 1 through 4, and "disagreement" as ratings 7 through 10), a larger proportion (47%) of 1991 respondents agreed that *spraying insecticides is the best way to protect large trees*, with 36% disagreeing. Only 22% agreed that spraying makes trees *essentially 100% safe from bark beetle attack* vs 42% who disagreed. Objections to insecticides were based on their potential harm to *other insects and animals* (40% vs 30%) and because they are *potentially dangerous to humans* (42% vs 30%). At the same time 57% indicated they would be *willing to use environmentally approved insecticides to protect important trees near your home* as apposed to 31% who would not.

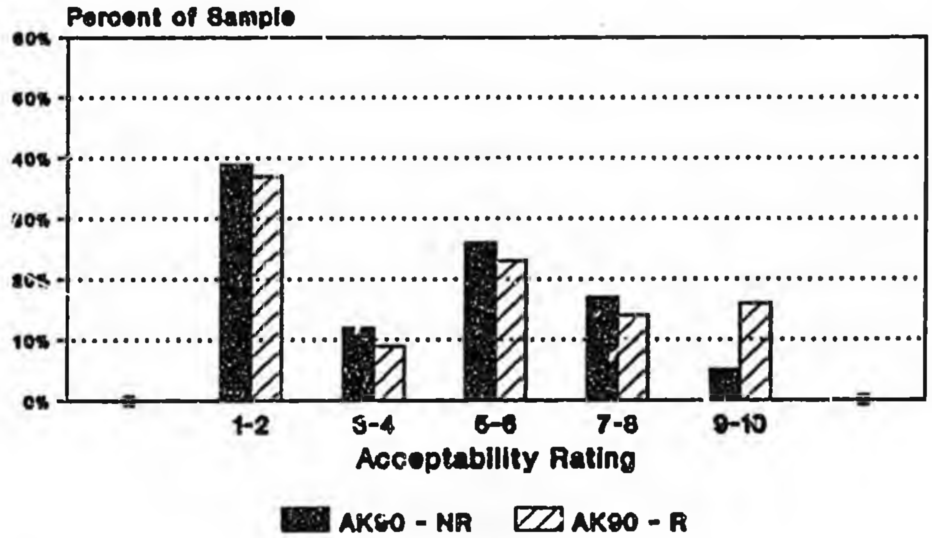
Restoration After an Outbreak

For many parts of the Kenai Peninsula the primary concerns are no longer prevention or even protection, but restoration of large areas of forest already severely affected by the bark beetle infestation. The introduction to this section of the policy assessment stated:

After a major beetle outbreak, a primary concern for forest areas that are frequently visited or seen by people is with how to treat the large areas of dead trees. Often more than 90% of the spruce trees are dead. New spruce trees need bare soil and sunlight to get started, and they need protection against competing grasses and brush for the first few years. The best treatment for beetle-affected forest areas is:

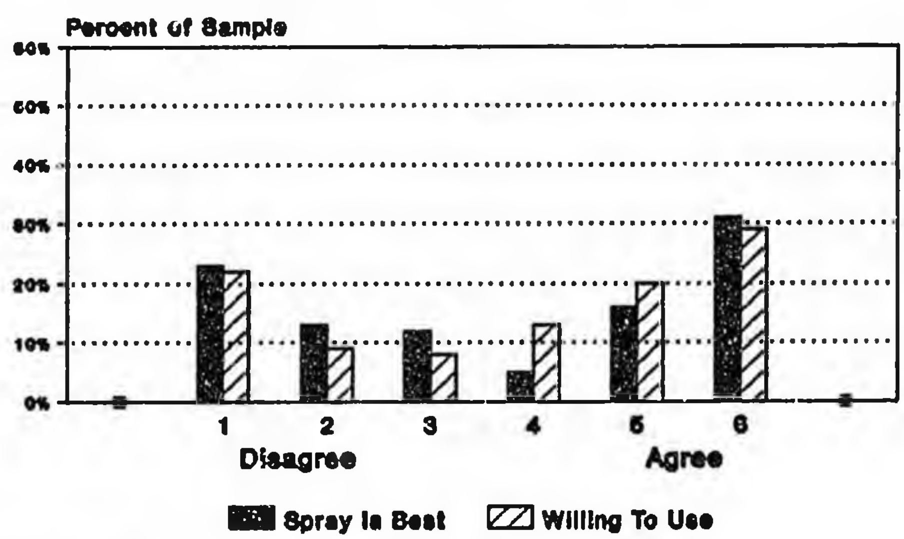
Options offered in this context included methods of dealing with the large numbers of dead trees (*leaving the forest undisturbed*,

Protection During An Outbreak
1990 Sample



R n=84 NR n=67

Protection During An Outbreak
1991 Sample



AK91 n=166

cutting and leaving or *cutting and removing* the dead trees), and with alternative methods of regenerating the forest. Alternatives for getting new trees to grow on affected sites primarily involved reducing competition from grass and brush by use of fire, *very hot* or *moderately hot*, *scraping the ground bare in some areas* (mechanical scarification) or *applying environmentally approved herbicides*.

In the 1991 study there was strong support for "doing something," as apposed to leaving bark beetle affected areas untreated. Less than 1% strongly agreed with a policy of *leaving the forest undisturbed, and allowing it to recover as best it can*. This result is consistent with responses to the *allow nature to take its course* options in the 1990 study and as repeated in the General Policy section of the 1991 study, where treatment of severely damaged areas near developments was consistently strongly favored. *Cut, remove and burn* was the most popular restoration option for Alaska residents in both the 1990 and 1991 studies. In response to a similar set of options, 77% of Kenai Peninsula residents participating in the Alaska State survey favored *cutting and removing the dead trees*, and 67% favored *cutting, burning and revegetating damaged areas along highways*, compared to 29% favoring *leave them as is*.

For areas near homes only 13% of Kenai residents favored the leave as is option. Thus, residents in all three studies generally favored cut and burn options for rehabilitating stands, especially when the trees are removed prior to the burn. Danger of wildfire was not a sufficient reason to preclude burning for most 1991 respondents, 47% disagreed with the policy that burning *should not be allowed because of the danger of starting wildfires* vs 31% who agreed.

Reactions to the herbicide options, like those to insecticide spraying, were widely split with about as many strongly agreeing as strongly disagreeing. In the State survey respondents preferred scraping or the use of mats (an option not offered in either the 1990 or 1991 studies) over chemical treatment (herbicide), whether used with or without fire. Only 23% of 1991 respondents agreed that the side effects of burning *have as bad an effect on the environment as herbicides*, while 44% disagreed. There was, however, a strong split in opinion regarding a complete prohibition against the use of herbicides; 26% of respondents strongly agreed that *herbicides should not be used under any circumstances*, matched by another 26% who strongly disagreed with that prohibition.

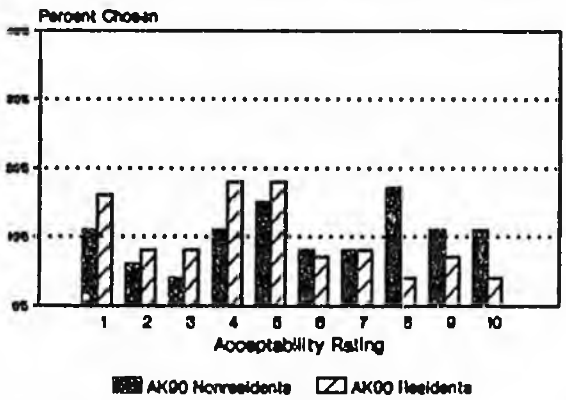
Expectations

This final section of the policy acceptability assessment addressed expectations for the future spread of the bark beetle outbreak. The goal of this section was to determine the extent to which respondents perceived the outbreak as a continuing threat, and whether they believed it might have serious consequences for their own communities. The context for this part of the assessment was set by:

The spruce bark beetle outbreak has now affected over 200,000 acres on the Kenai Peninsula. Biological surveys indicate that the outbreak may be continuing to spread.

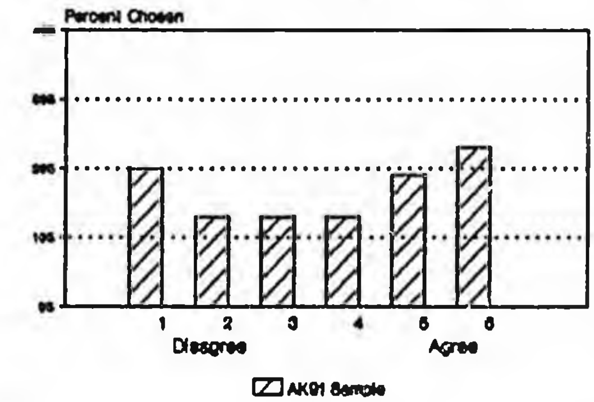
Three statements that followed addressed the likelihood of the outbreak spreading to *other areas on the Kenai Peninsula*, *to the area where you live* and the expected severity of effects should the outbreak spread, *you would not expect more than half of the spruce trees to be lost*.

Restoration - Cut/Leave/Burn - 1990



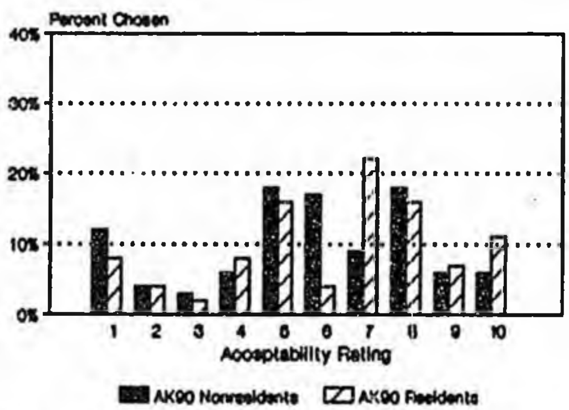
NR n=66 R n=44

Restoration - Cut/Burn - 1991



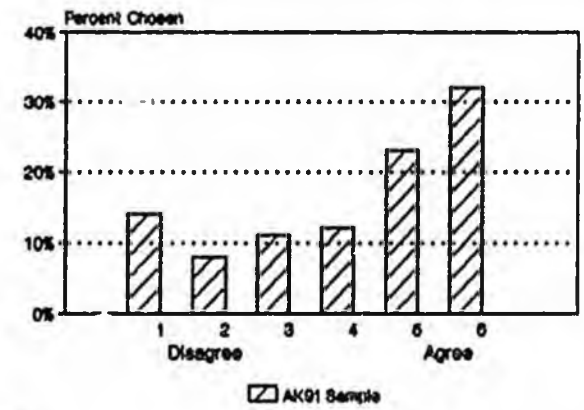
n=79

Restoration - Cut/Remove/Burn - 1990

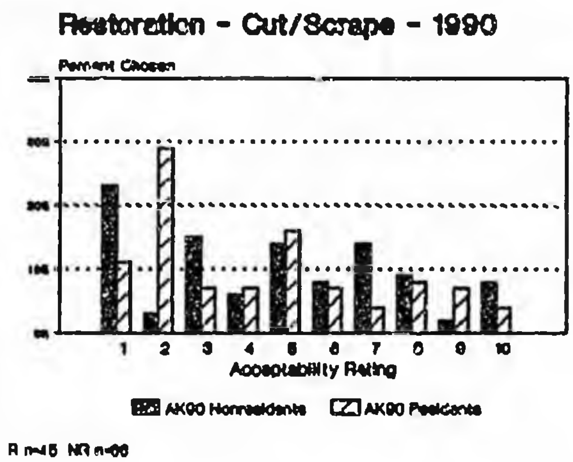


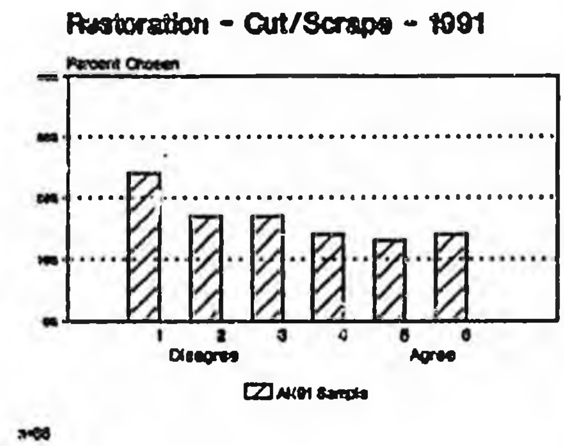
R n=46 NR n=66

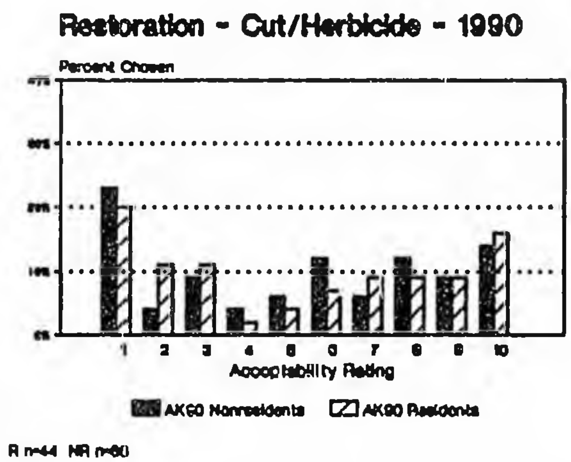
Restoration - Cut/Remove/Burn - 1991

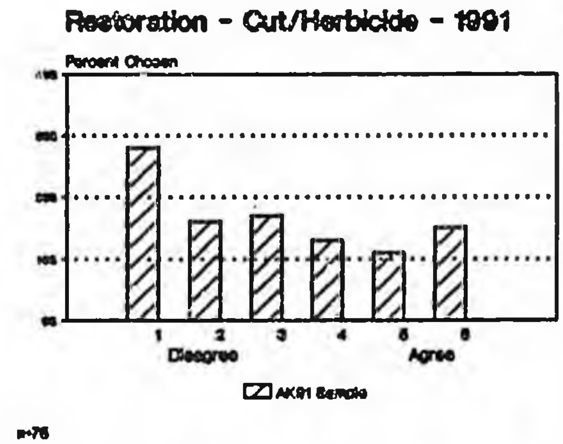


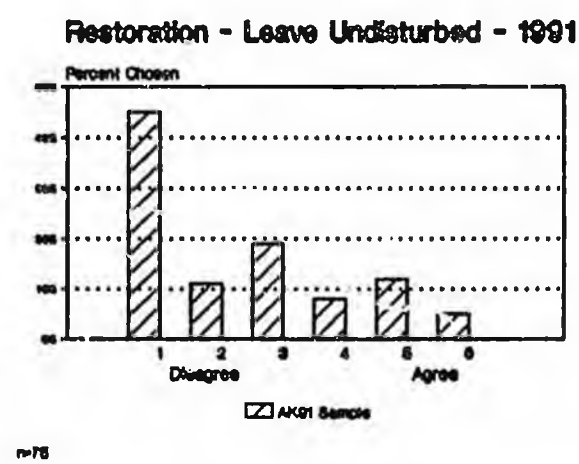
n=73


Restoration - Cut/Scrape - 1990
Percent Chosen
1 2 3 4 5 6 7 8 9 10
Acceptability Rating
AK90 Nonresidents
AK90 Residents

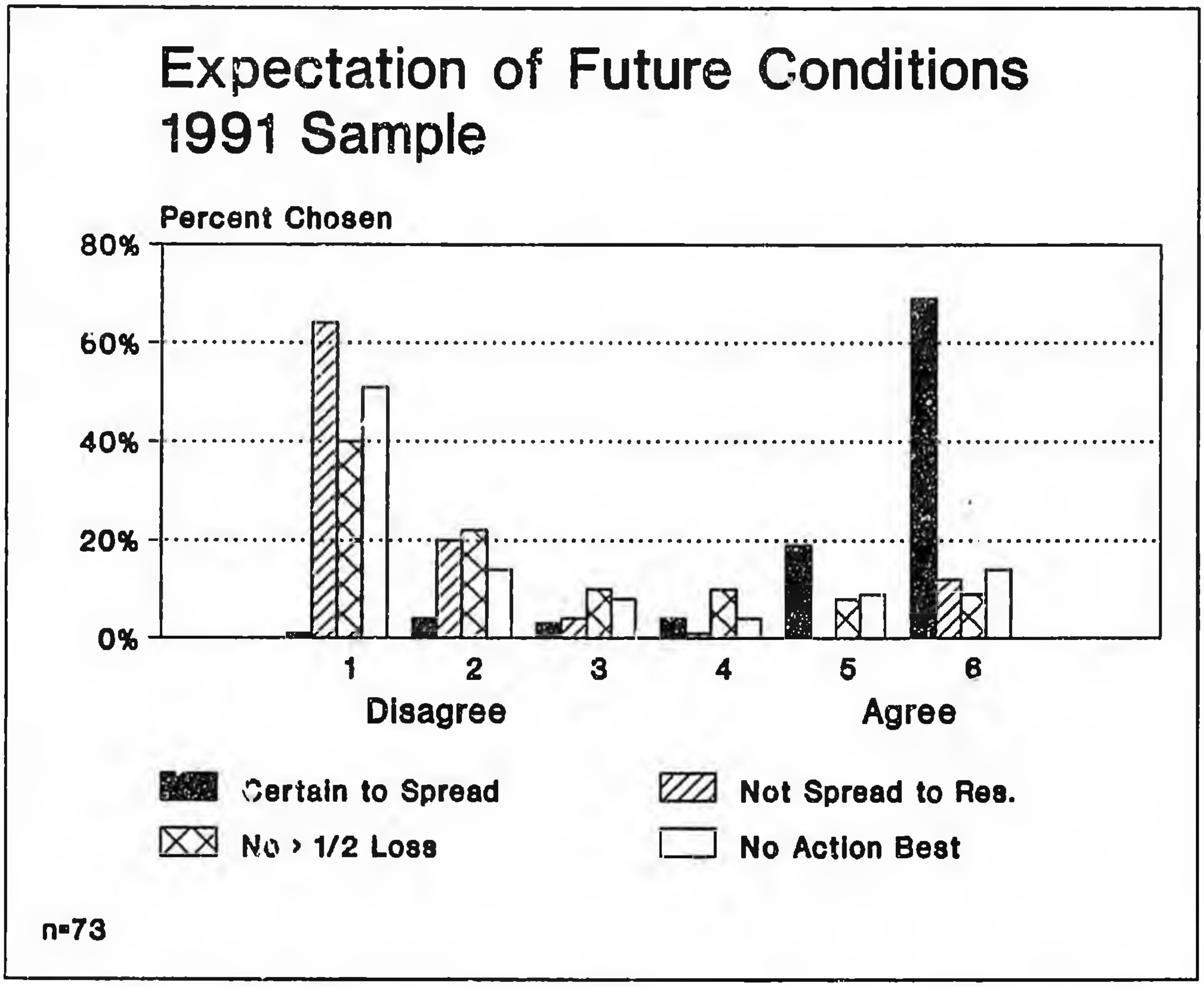

Restoration - Cut/Scrape - 1991
Percent Chosen
1 2 3 4 5 6
Disagree
Agree
AK91 Sample


Restoration - Cut/Herbicide - 1990
Percent Chosen
1 2 3 4 5 6 7 8 9 10
Acceptability Rating
AK90 Nonresidents
AK90 Residents


Restoration - Cut/Herbicide - 1991
Percent Chosen
1 2 3 4 5 6
Disagree
Agree
AK91 Sample


Restoration - Leave Undisturbed - 1991
Percent Chosen
1 2 3 4 5 6
Disagree
Agree
AK91 Sample

The residents sampled in the 1991 study were quite certain that the outbreak *will continue to spread* (89% agreed), that it *will spread to their own properties* (83%), and that substantial damage will result when it does spread to their area; 62% agreed that *at least half of spruce trees will die* in affected areas.



The final statement in the assessment attempted to reach the "bottom line:" *All things considered, you would rather allow most of the spruce trees in your area to be killed by bark beetles than to have the forest treated by cutting and spraying insecticides.*

Overall, 66% of the residents sampled in 1991 disagreed with the policy indicated by this statement.

Summary

A number of consistent policy preferences emerged across the two studies reported. First, there was agreement that some management intervention is preferable to "letting nature take its course," especially for areas near developments when damage is severe. The most preferred ***prevention*** treatment was *thinning* (about 50%) stands in threatened areas, with *clear cutting small patches* garnering less support.

The only ***protection*** option offered was spraying approved insecticides, which produced strongly divided responses. The majority of residents in both the 1990 and the 1991 studies were almost equally split between strong agreement and strong disagreement. This split pattern was repeated for the associated items referring to the effectiveness and safety of insecticide use. Visitors in the 1990 study tended to more strongly oppose the use of insecticides.

There was much greater consensus regarding ***restoration*** options. Generally, there was strong agreement across studies and respondent groups that some active rehabilitation effort should be undertaken in areas of severe beetle damage, and the *cut, remove and burn* alternative was consistently preferred over other options. As with insecticide use, the application of herbicides met with responses that were approximately equally split between strong agreement and strong disagreement; the majority of the 1991 respondents were divided equally between strong agreement and strong disagreement with a complete ban on the use of herbicides.

The observed relationships between the observed patterns of support and non-support for alternative forest management policies and the perceptual preferences expressed by the same groups of respondents reveals a potential dilemma. The forest conditions most preferred in the perceptual assessment--where possible, retain green forests dominated by mature spruce, or where damage has already occurred, re-establish green spruce as quickly as possible--are most readily achieved by management policies that were the least acceptable, or that resulted in strongly split opinion, such as the application of insecticides or herbicides. Thus, the future forest conditions most consistently preferred perceptually may be in conflict with the management options most consistently preferred for achieving those conditions. The next section directly addresses the relationships between individual respondent's preferred perceptual *ends*, and their support for the implied management *means*.

PREFERRED ENDS VS ACCEPTABLE MEANS

The conflict between preferred future forest conditions and acceptable management strategies noted above is based on comparisons among average responses over all respondents. Even with this overall pattern of conflict it is possible that individual respondents could hold consistent perceptual and policy preferences; those who strongly prefer green forest conditions might be more tolerant of management practices required to achieve and maintain those conditions, and *vice versa*.

To further investigate this important relationship, and to further articulate the patterns of agreement and disagreement with the management policies assessed in the 1991 study, a **factor analysis** was conducted.[6] This analysis allows the discovery of consistent patterns of responses across the different policy questions, and provides a better basis for determining the relationships between individual perceptual and policy preferences.

Policy Factors

The analysis revealed several important "factors," defined by consistent patterns in respondents' support (or non-support) for specific sets of management policies. By far the strongest factor (accounting for 37% of the variation in respondents' reactions to the policies offered) was defined by the degree of support (or non-support) for the use of insecticides and herbicides. Respondents scoring high on this ***chemical treatment*** factor tended to support the use of insecticides and herbicides, while those scoring low on the factor tended to be opposed to such treatments. The high end of this factor was associated with strong disagreement (and the low end by strong agreement) with the policies of:

...leaving the (damaged) forest undisturbed; and
...allow most of the spruce trees in your area to be killed by bark beetles (rather) than have the forest treated by cutting and spraying insecticides.

At the same time, the ***chemical treatment*** factor was characterized by stronger agreement (disagreement) with policy statements relating to the use of insecticides for protecting threatened forest areas:

Spraying insecticides is the best way to protect large trees near homes...;
Trees that are sprayed with approved insecticides are essentially 100% safe from bark beetle attack;
Environmentally approved insecticides are perfectly safe...; and

I would be willing to use environmentally approved insecticides...;

while disagreeing (agreeing) with statements that

Insecticides should not be used ... because other insects and animals might be harmed; and
... approved insecticides should not be used because they are potentially dangerous to humans.

With regard to rehabilitation of forest areas already damaged, this factor was defined by stronger agreement (disagreement) with

cutting and removing the dead trees and applying environmentally approved herbicides,

and disagreement (agreement) with

Herbicides should not be used under any circumstances because of possible contamination of the environment.

Following the ***chemical treatment*** factor were four much weaker factors, which achieved minimal statistical criteria for consideration. The second factor (explaining 14% of variance) also involved the degree of support for chemical treatment options, but was primarily defined by the degree to which the continuing bark beetle outbreak was perceived as a ***threat***. Respondents contributing high scores on this factor tended to support chemical treatments, but judged that there was little threat that the bark beetle outbreak would actually continue to spread. The high end of the ***threat*** factor was associated with stronger agreement that:

There is very little chance that the bark beetle outbreak will spread to the area where you *live*; and

... *if the outbreak does spread to your area, you would not expect more than half of the spruce trees to be lost* .

In addition, the *threat* factor included agreement with statements indicating that insecticide spraying is *100 % effective* for protecting threatened trees, and *removing trees* (e.g., thinning) is not effective. For rehabilitation *cutting and removing dead trees and applying herbicides* is preferred, while burning is judged to have *as bad an effect on the environment as herbicides*, and burning *should not be allowed because of the danger of starting wildfires*.

The third factor (explaining 13% of variance) was complex, defined by agreement (disagreement) that the outbreak was *certain to spread* coupled with disagreement with "allowing nature to take its course" (except when damage was *less severe* and *far away* from developments). This factor was also associated with preferences for rehabilitating damaged areas by *cut, remove and scrape* treatments and by opposition to burning because of the *danger of starting wildfires*.

The fourth and fifth factors were very weak (explaining 9% and 7% of variance, respectively), but do suggest other patterns of response to the policy options assessed. Factor four was characterized by agreement that the outbreak was *certain to spread*, coupled with support for protecting threatened forest areas by *clear cutting small patches* and for cutting trees on public lands *even if selling the trees will only pay for part of the costs*.

The final factor, which had minimal statistical power, was defined by acceptance that the outbreak will spread to the respondent's area and will do substantial damage (indicated by disagreement with *little chance that the bark beetle outbreak will spread*, and with *not expect more than half of the spruce trees to be lost*), but a willingness to let nature take it's course *near to homes and recreation areas, even when the damage to the forest is more severe*. For areas already severely damaged, the rehabilitation option associated with this factor was *cutting and removing the dead trees and then burning the site with a moderately hot fire*.

Relationships with Perceptual Preferences

To be consistent, respondents whose expressed perceptual preferences indicated a desire to keep threatened spruce forests green, or to have beetle impacted forests restored quickly, should have also supported forest management actions that can effectively achieve those ends (e.g., preventative cutting, insecticide spraying and herbicide use). Alternatively, individuals who disagreed with these forest management approaches should have been more accepting of the visual impacts of bark beetle infestations in forest scenes. To investigate these relationships individual respondent's scores on the management policy factors described above were related to their perceptual preferences as expressed in the four-scene forced choice section of the assessment.

An aggregate measure of perceptual preferences was computed for each respondent as the percentage of choices in which the *treatment* scene-set was selected over the *no-treatment* set. This measure of preference for treatment-produced forest conditions was related in a multiple linear regression analysis to the five management policy factors described in the preceding section.

Factor Loadings by Policy Item*

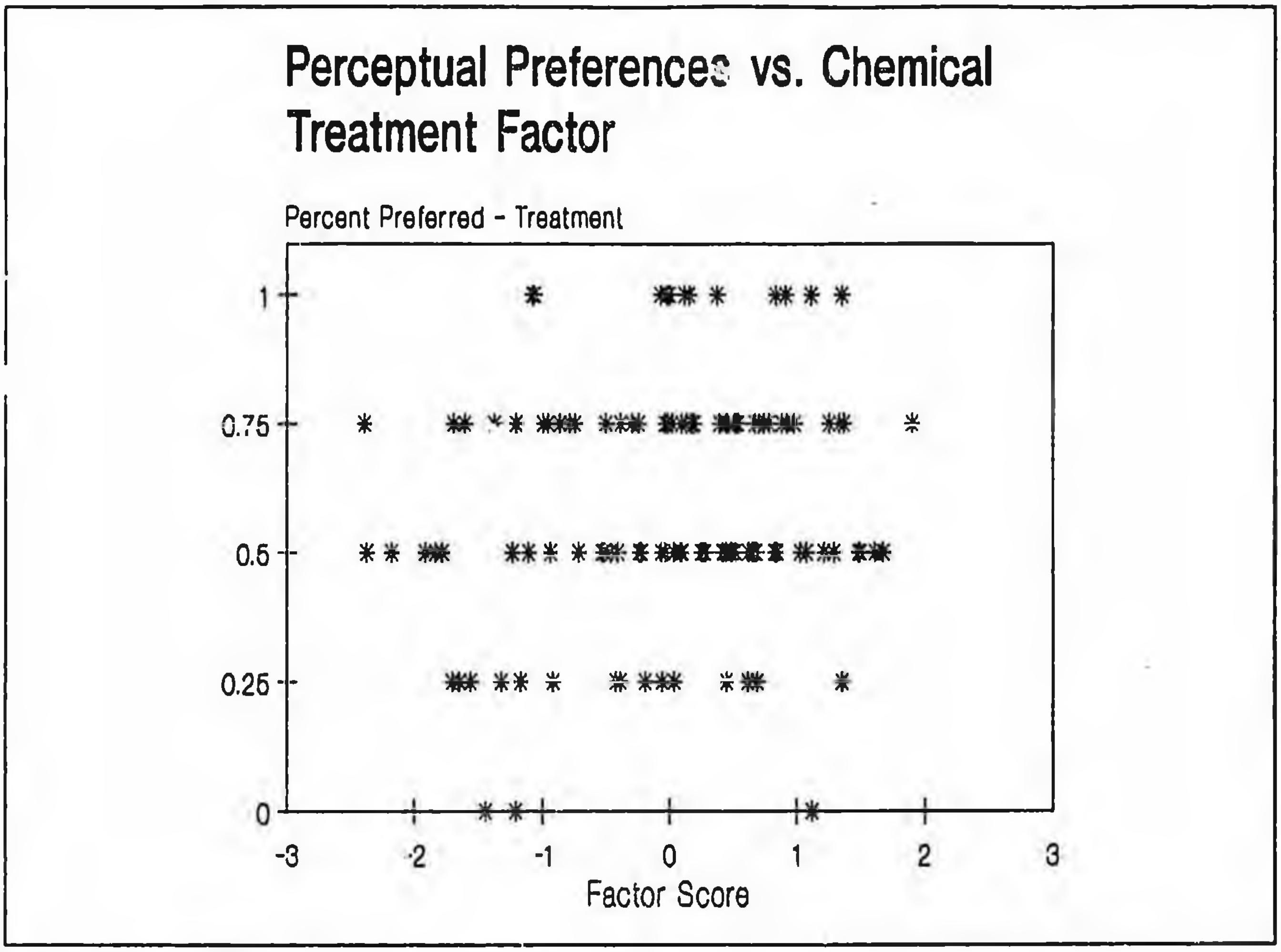
Item #	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
1	.001	-.042	.045	.171	-.166
2	-.134	.024	**-.433**	.252	.070
3	-.142	-.028	**-.403**	.305	.216
4	-.157	.176	**-.452**	.149	**.506**
5	.145	-.098	.331	.279	.023
6	.012	**.402**	-.069	.063	-.104
7	.210	.190	.258	**.386**	-.205
3	-.061	.208	.263	-.069	.293
9	.259	.177	.126	.194	-.086
10	.291	-.178	.084	**.430**	-.037
11	.054	.203	.109	.187	.148
12	**.761**	.135	-.094	-.189	-.071
13	**.558**	**.453**	-.055	.033	.117
14	**.698**	.249	-.183	.090	.058
15	**-.639**	.149	.235	.245	-.039
16	**.794**	.097	-.063	.053	-.026
17	-.259	.051	.114	.044	.128
18	**-.767**	.117	.106	.145	-.075
19	**.418**	.062	.126	.112	.211
20	.336	-.058	.128	.296	**.383**
21	-.036	.244	**.415**	-.078	.053
22	**.504**	**.401**	.085	-.034	.187
23	**-.606**	.174	-.268	.070	.040
24	**-.724**	.015	.198	.074	.221
25	-.395	**.487**	.229	-.262	.125
26	-.285	**.484**	**.396**	-.063	.018
27	.241	-.277	**.434**	**.398**	-.043
28	-.023	**.581**	-.200	.114	-.284
29	-.058	.398	-.246	.213	**-.361**
30	**-.628**	.097	-.228	.227	-.054

* Complete text for Items in attatched Appendix.

The analysis revealed no statistically significant relationships between individual's perceptual preferences and their support (or non-support) for any of the management policy factors, individually or in combination. That is, preferences for the perceptual *ends* were independent of the acceptance of the management *means* most likely to achieve those ends. Further analysis also revealed no consistent differences among the respondent groups sampled (the various Kenai Peninsula resident groups participating in the study) in either perceptual preferences, support for the policy factors or in the relationships between perceptual preferences and patterns of policy support.

Summary

Factor analysis of the agreement and disagreement with the various forest management policies assessed revealed several coherent patterns. The strongest pattern was represented by the ***chemical treatment*** factor. The high end of this factor was defined by higher levels of support for active forest treatments, particularly for the use of insecticides and herbicides, which were accepted as safe and effective methods for prevention, protection, and restoration of the forest. The ***chemical treatment*** factor provided the strongest divisions among the Kenai Peninsula and Anchorage residents who



participated in the 1991 study, but each community represented in the study had effectively equal numbers of individuals at each end of this scale.

The other policy support patterns discovered in the analysis were considerably weaker. A *threat* factor was primarily characterized at the high end by the judgement that the bark beetle outbreak would not spread and would not have very serious consequences if it did. Respondents who scored high on the third factor tended to accept the bark beetle outbreak as a continuing threat, but restricted their support of forest rehabilitation actions to mechanical scarification because of a fear that burning would start wildfires.

The final two factors were both defined by acceptance of the bark beetle as a continuing threat, but those scoring high on the first of these factors tended to support logging as a management approach (including clear cutting and selling trees at a loss), while the weaker of these last two factors was associated with the willingness to accept the consequences of the outbreak and to allow nature to take its course. As for the first factor, there were no consistent patterns of differences among the communities sampled in their scores on these factors.

CONCLUSIONS

The spruce beetle outbreak on the Kenai Peninsula was almost universally recognized as a serious problem by residents of the area. *Increased fire danger* and *loss of scenic beauty* were identified as the most important effects of the bark beetle infestation. Most respondents believed that the outbreak will continue to spread and that their own properties will be significantly affected.

For tourists and visitors to the affected areas sight-seeing was by far the most frequent activity, and the quality of natural scenery was consistently reported as the most important factor affecting their enjoyment of their trip. Clearly, the visual impacts of the bark beetle outbreak are of great concern to both residents and visitors to the Kenai Peninsula, and should be a key consideration in any forest management decisions for the area.

Perceptual Preferences

The assessment of the perceived effects of the beetle outbreak on forest scenery, based primarily on computer video simulations, revealed several consistent patterns. First, whether presented as color slides, color prints or as video images, the greater the proportion of beetle killed trees in a forest scene the lower the rated scenic beauty. This pattern obtained for residents and visitors alike. Second, a hypothetical preventative thinning treatment was consistently preferred to a (retrospective) no treatment infestation scenario which allowed virtually all of the spruce to die. Finally, for forest areas where bark beetle impacts were already severe, respondent's preferred the visual conditions produced by rehabilitation strategies that resulted in more rapid regeneration of forest cover.

The consistency of responses from different respondent groups (residents, visitors and two college student samples), and between the different presentation media employed, strongly supports the conclusion that the results of the perceptual assessments provide a valid basis for predicting the perceptions of residents and visitors who view similar forest scenes directly. The visual impacts of the spruce bark beetle outbreak do significantly affect the quality of resident and visitor experience.

Support for Management Alternatives

The acceptability of alternative forest management responses to the bark beetle outbreak were assessed separately by a series of verbal statements. In areas likely to be seen or visited by people, areas near homes and developed recreation areas, the majority of residents in both the 1990 and the 1991 studies preferred some form of treatment over "allowing nature to take its course." The particular treatment options preferred depended upon the stage of the outbreak.

Prevention in threatened areas: The preferred treatment was to thin threatened spruce stands (by approximately 50%). This preference obtained even though respondents understood that large trees should be taken first and that the costs of treatment (which should include replanting trees) might exceed the revenues likely to result from selling the cut trees.

Protection during an outbreak: Opinion was most divided here, especially with regard to the possible roles of insecticide spraying. At one extreme were individuals who viewed sprays as less than 100% effective, potentially harmful to animals and dangerous to people. Based on these views, they disagreed with use of "environmentally approved insecticides." None-the-less, many of these same respondents indicated that they would use insecticides to protect high valued trees on their own property. At the other extreme was a group of respondents who agreed that sprays are "the best method" for protection. However, many of these respondents did not believe sprays to be "100% effective," and they tended to be divided on whether spraying was "too expensive for most private property owners."

Restoration after an outbreak: The clear message here was **Do Something!** Preferred actions included cut and remove dead trees (even if selling them will recover only part of the costs), then burn the site to aid in the re-establishment of a spruce forest. Danger of wildfire caused by site preparation burning was generally not viewed as a sufficient concern to preclude fire as a treatment option. Scraping the ground was not widely accepted as a regeneration method, though it did appeal to a minority who were concerned that burning treatments might cause wildfires. The use of herbicides, paralleling the results for insecticide spraying, produced wide splits in opinion, and herbicides were generally less preferred than burning.

Ends vs Means

The analysis of individual respondent's perceptual preferences and the management policies they supported revealed no significant relationships. Perceptual preferences and support for management policy options were assessed separately, so the visually presented *ends* were never directly associated or paired with the management *means* which they most likely implied. This opportunity to "have your cake and eat it too" is not unlike the situation created by most of the public participation activities typically associated with forest management planning.

In the "real world," of course, any given set of forest conditions is necessarily associated with a particular, limited set of management options--forest condition ends are generally not separable from their forest management means. In the context of the spruce bark beetle outbreak on the Kenai Peninsula, for example, the combination of maintaining a dense mature spruce forest and adopting a policy of "allowing nature to take its course" is not a realistic option.

In bark beetle threatened areas, cutting some of the spruce trees now (thinning or patch cutting) may be the only cost-effective way to prevent all the trees from being lost later. The use of insecticides and herbicides is clearly controversial and can be relatively expensive. However, chemical treatments are often the only viable means of protecting threatened high-value trees in campgrounds and near residences, or of insuring regeneration of spruce on important sites where forests have been destroyed by bark beetle infestation.

Implications for Management

The assessment studies reported here, along with the results of the Alaska State telephone survey, provide important insights into public perceptions and values regarding Kenai Peninsula forests and forest management policies. Residents are acutely aware of the bark beetle outbreak, and they expect it to continue to spread. Residents and visitors alike are perceptually sensitive to the visual impacts of the bark beetle outbreak, and they are concerned with an array of scenically-based forest values that may be adversely affected.

The highest level of concern is for severely affected forests near residential and recreation developments. Any forest management strategy that is responsive to public values and concerns must address visual impacts of the spruce bark beetle outbreak. At the same time, many forest management actions themselves have visual impacts (especially vegetation management alternatives) which must be taken into account; it is important that the management "cure" not produce visual effects that are worse than the bark beetle "disease."

There is a general consensus that some active forest management response is needed and desired. However, there is considerably less consensus regarding what that response should be. Respondents were particularly divided on the acceptability of using insecticides to protect threatened forest strands or of using herbicides to help regenerate spruce on stands already heavily damaged.

There was inconsistency between the perceptually preferred future forest conditions and the acceptability of forest management practices most likely required to achieve those conditions. This inconsistency derives in part from the fact that perceptual and management policy preferences were assessed separately. There was also an indication, however, that respondent's knowledge and/or beliefs about the various management options may not be sufficient for them to make meaningful means-ends trade offs. For example, a significant number of respondents did not believe that insecticides can provide complete protection (for a three year period) against bark beetle attach. Also, even though both were described as "environmentally approved," significant numbers of respondents apparently were not convinced that insecticides or herbicides are safe. If chemical treatments are thought to be less effective and less safe than they actually are, it is unlikely that the public could properly assess their relative costs and benefits as responses to the bark beetle outbreak.

Overcoming the means-ends dilemma will require attacks on several fronts. First, a concerted "environmental education" effort directed at the concerned publics would seem to be indicated. This would require that the scientific community, in and outside the Forest Service and forestry professions, reach a consensus on the effectiveness and safety of chemical treatment options for protecting beetle-threatened forest stands and for regenerating stands already impacted. Then, this consensus must be effectively communicated to the public. Second, the public should be presented with meaningful forest condition-management policy options; in effect they must be allowed to choose among future forest conditions packaged together with the management policies required to achieve those conditions.

Future Research Directions

Computer visual simulation technology was demonstrated to be very effective in communicating the important visual impacts of the spruce bark beetle outbreak. Visualizations also provided concrete comparisons with the visual effects of alternative management actions that might be required to protect or rehabilitate affected forest stands. Respondents were willing and, apparently quite able, to make consistent choices among alternative future forest conditions that involved changes over as much as a 50-year time period.

Responses to the verbally presented management alternatives produced consistent and coherent patterns of response; the ***chemical treatment*** factor provided the strongest basis for distinguishing among respondent's policy choices. However, there were no consistent relationships between the perceptual *ends* that were preferred and support for the management *means* most likely required to achieve the desired forest conditions.

Based on the outcomes of the two studies reported here, additional efforts are indicated in two important areas. First, visual simulations of alternative future forest conditions should be improved by strengthening the links between forest data, both from inventories and as projected by biological models, and the detailed features of the digital video image representations of those data. Data visualization technology is improving very rapidly, and more refined and consistent algorithms for translating quantitative data into concrete visual representations are being developed. Of equal importance to valid visual simulations are efforts to improve the biological bases for more precisely predicting future forest conditions, including details of the spatial and temporal distributions of projected forest changes.

Second, better formats should be developed for presenting visual simulations together with descriptions and other information about the forest management activities that the achievement and maintenance of those conditions imply. The metric conjoint analysis paradigm[7] and mathematical modeling techniques developed within the marketing research and consumer decision analysis fields offer promising approaches in this regard.

FOOTNOTES

[1] State of Alaska, Department of Natural Resources, Division of Forestry (1992) *Forest health management plan for the western Kenai Peninsula and Kalgin Island*. 40 p.

[2] Daniel, T.C., B. Orland, A. Lynch, J. Hetherington and J. La Fontaine (1990) Integration of GIS and video imaging technology for data-driven visual simulations. In J. Greer (Ed.) *Protecting natural resources with remote sensing*. American Society for Photogrammetry and Remote Sensing, Bethesda, MD, 1990.

[3] Kruse, J. and R. Pelz (1991) *Developing a public consensus on the management of spruce bark beetle on the Kenai Peninsula*. Institute of Social and Economic Research, University of Alaska, Anchorage, AK, 36 p.

[4] Orland, B. (1988) Video imaging: a powerful tool for visualization and analysis. *Landscape Architecture*, 78(4), 78-88.

Orland, B. (1991) Digital image processing aids for visual simulation of forest management practices. In T. Daniel and I. Ferguson (Eds.) *Integrating research on hazards in fire-prone forest environments*, US Man and the Biosphere Program, US Department of State, Washington, DC. 73-83.

[5] Daniel, T.C. and R.S. Boster (1976) *Measuring landscape aesthetics: the Scenic Beauty Estimation Method*. USDA Forest Service Research Paper RM 167, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 66 p.

[6] Gorsuch, R.L. (1983) *Factor analysis*, 2nd Edition, Hillsdale, NJ: Lawrence Earlbaum Associates.

[7] Louviere, J.J. (1988) *Analyzing decision making: metric conjoint analysis*. Sage University Paper series on Quantitative Applications in the Social Sciences, Beverly Hills, CA: Sage Publications. 95 p.

Appendix

Copy of 1991 Assessment Instrument

Environment Perception Assessment

Alaska

ENVIRONMENT PERCEPTION LABORATORY
UNIVERSITY OF ARIZONA

IMAGING SYSTEMS LABORATORY
UNIVERSITY OF ILLINOIS

ENVIRONMENT PERCEPTION ASSESSMENT

The purpose of this study is to investigate public perceptions of the effects of the spruce bark beetle outbreak on the Kenai Peninsula, and to determine what forest management actions are most acceptable to residents of beetle-affected or beetle-threatened areas.

Forests in Alaska are important for many reasons--wildlife, timber, oil and minerals, wilderness and outdoor recreation, and natural scenic beauty to name only a few.

In this study we are interested in the publics' perceptions of the spruce bark beetle outbreak on the Kenai Peninsula. In some places the beetles have already killed most of the trees, and the question is how the affected forests will recover. In areas where the beetle outbreak is now threatening to spread, the question is whether we should attempt to protect the forest and, if so, how.

Responding to the bark beetle outbreak requires the cooperation of a number of federal, state and local government agencies as well as many private land owners. The beetles do not recognize jurisdictions or property boundaries.

It is very important, therefor, that the perceptions and concerns of people who live, work and recreate in the affected areas be considered in decisions about how to respond to the beetle outbreak.

This booklet presents sets of pictures showing how several forest areas could look in the future. The pictures were created with the help of a computer. The conditions shown are based on information about forest conditions and growth patterns, including the effects of bark beetles and forest management actions. You will be asked to judge which of the forest conditions shown you would most prefer. There will also be some questions about the effects of the bark beetle outbreak and about some of the possible ways of dealing with it.

Thank you very much for your help.

FOREST RECOVERY AFTER BEETLE ATTACK

The following sets of pictures show how bark beetle-attacked areas in Kenai Peninsula forests could look in the future. The areas shown have all been affected by the spruce bark beetle outbreak, and now over 90% of the spruce trees are dead.

Pictures are arranged four to a page in this pattern:

5 YR	10 YR
20 YR	50 YR

Each page shows how the scene would be expected to look **five**, **ten**, **twenty** and **fifty years** in the future if certain forest management actions were taken. Each forest area is represented by two pages of scenes, each depicting the expected results of a different forest management approach. Actions might range from simply allowing nature to take its course (no action) to cutting and removing all of the dead trees and planting a new forest. Several of the pages show the effects of fire, either "prescribed" fire used as a management tool, or wildfire.

Some actions result in poorer results in the short term, but better results in the longer term. Other management options may do better in the short term, but not so well in the longer term.

There are fourteen pairs of scene pages. Each pair shows the expected results of two different management actions for the same forest area. We are interested in your judgement of which page of scenes in each pair represents the **best overall scenic quality.**

Please quickly look through all of the pages of scenes, then evaluate each pair of pages one at a time. For each pair, select which page (A or B) represents the best overall results for the forest area shown.

Record your choice for each pair by circling the appropriate letter (A or B) on the answer sheet provided.

PROTECTING THREATENED FOREST AREAS

All of the sets of scenes in the previous pages showed views of forest areas that have already been severely affected by spruce bark beetles. The following two pairs of scene sets show possible future conditions for two forest areas that are just beginning to be attacked by beetles.

As in the previous pages, the scenes represent conditions **3, 6, 9** and **12 years** in the future. In the two forest areas shown, most of the spruce trees are currently alive and uninfested by bark beetles. However, both areas are in the path of a spreading beetle outbreak.

Pictures are arranged four to a page in this pattern:

3 YR	6 YR
9 YR	12 YR

The set of four scenes on each page shows how one forest area is expected to look in the future as a result of taking particular management actions now. Possible actions range from allowing the beetle outbreak to take its own course, perhaps only cleaning up dead and fallen trees later, to thinning out some of the threatened trees and spraying some with environmentally approved insecticides.

Please look at the scenes and then select the page in each pair which represents the **best overall visual quality.** As for the previous sets, mark your choices on the answer sheet by circling the letter (**A** or B) to indicate which page in each pair provides the best overall visual results.

FOREST MANAGEMENT APPROACHES

On the following pages are 30 statements regarding different aspects of the spruce bark beetle outbreak on the Kenai Peninsula and possible forest management responses. Please read each statement and determine how much you would agree or disagree with it.

Record your answers on the answer sheet provided, by marking the appropriate box from

Strongly Agree to **Strongly Disagree**

The statements are divided into five sets. Each set of statements is preceded by a short introduction.

One response to the spruce bark beetle outbreak is to accept it as a natural process and to just "let nature take its course." In remote areas this may be the only possible response. In some Parks and Wilderness Areas it may be the only alternative allowed by law. Where managers have a choice, the best policy is to let nature take its course, so long as the area is:

1. far away from homes and recreation areas, but only when the damage to the forest is less severe, and new trees are expected to eventually grow back in the area.

2. far away from homes and recreation areas, even when the damage to the forest is more severe, and only grass and brush is expected to grow back in the area.

3. near to homes and recreation areas, but only when the damage to the forest is less severe, and new trees are expected to eventually grow back in the area.

4. near to homes and recreation areas, even when the damage to the forest is more severe, and only grass and brush is expected to grow back in the area.

One method for protecting forest areas that are threatened by the bark beetle outbreak is to remove about half of the trees. This is intended to reduce the number of places for the beetles to breed and to help the remaining trees grow more vigorously so that they are better able to resist beetle attacks.

5. Bark beetles prefer to attack larger more mature spruce trees, so it is best to remove the larger trees first.

6. Removing trees from beetle-threatened areas is generally not effective in protecting the remaining trees.

7. Clear cutting small patches is the best way to remove trees and protect spruce forests.

8. Thinning, by removing a few trees here and there, is the best way to remove trees and protect spruce forests.

9. When trees are removed to protect public forests from beetles, the cut trees should be sold to private companies.

10. Managers should cut trees on public lands to help protect beetle-threatened forests, even if selling the trees will only pay for part of the costs.

11. If trees are to be cut on public lands, all logging roads should be closed and disturbed areas should be replanted.

During a bark beetle outbreak it is possible to protect selected trees by spraying environmentally approved insecticides directly on the bark. Spraying costs about 5 to 10 dollars per tree and lasts for up to three years.

12. Spraying insecticides is the best way to protect large trees near homes and important recreation areas.

13. Trees that are sprayed with approved insecticides are essentially 100% safe from bark beetle attack.

14. Environmentally approved insecticides are perfectly safe for use around homes and recreation areas.

15. Insecticides should <u>not</u> be used to protect trees from bark beetles because other insects and animals may be harmed.

16. I would be willing to use environmentally approved insecticides to protect important trees near my home.

17. Spraying approved insecticides to protect trees from beetles is too expensive for most private property owners.

18. Approved insecticides should not be used because they are potentially dangerous to humans.

After a major beetle outbreak, a primary concern for forest areas that are frequently visited or seen by people is with how to treat the large areas of dead trees. Often more than 90% of the spruce trees are dead. New spruce trees need bare soil and sunlight to get started, and they need protection against competing grasses and brush for the first few years. The best treatment for beetle-affected forest areas is:

19. cutting down the dead trees and then burning the site with a very hot fire to clear the ground and kill competing grass and brush.

20. cutting and removing the dead trees and then burning the site with a moderately hot fire to partially clear the ground and temporarily reduce competing grass and brush.

21. cutting and removing the dead trees and mechanically scraping the ground bare in some areas to temporarily reduce competing grass and brush.

22. cutting and removing the dead trees and applying environmentally approved herbicides to temporarily reduce competing grass and brush.

23. leaving the forest undisturbed, and allowing it to recover as best it can.

24. Herbicides should not be used under any circumstances because of possible contamination of the environment.

25. Burning produces smoke and other by-products that could have as bad an effect on the environment as herbicides.

26. Burning forest sites should not be allowed because of the danger of starting wildfires.

The spruce bark beetle outbreak has now affected over 200,000 acres on the Kenai Peninsula. Biological surveys indicate that the outbreak may be continuing to spread.

27. It is almost certain that the outbreak will spread to other areas on the Kenai Peninsula.

28. There is very little chance that the bark beetle outbreak will spread to the area where you live.

29. Even if the outbreak does spread to your area, you would not expect more than half of the spruce trees to be lost.

30. All things considered, you would rather allow most of the spruce trees in your area to be killed by bark beetles than to have the forest treated by cutting and spraying insecticides.

COMMERCIAL TIMBER RESOURCES OF THE KENAI PENINSULA BOROUGH

General Information

Directory of Timber Owners

Attachments

110 S. Willow St., Suite 106 • Kenai, Alaska 99611 • (907) 283-3335 FAX (907) 283-3913

KENAI PENINSULA BOROUGH
ECONOMIC
DEVELOPMENT
DISTRICT, INC.

October, 1992

Dear Timber/Wood Products Colleague:

There are exciting opportunities within Alaska's Kenai Peninsula Borough!

Motivated by the growing world-wide shortage of timber and the increasing prevalence of spruce bark beetles within their vast spruce forests, the Borough, with the unprecedented cooperation of state and federal governments and private timber owners, has created the enclosed catalogue, Commercial Timber Resources Of The Kenai Peninsula Borough.

As an important participant in the timber/wood products industry, you will find the catalogue to be a valuable source of information on most everything you need to know to take advantage of the substantial timber opportunities throughout the Kenai Peninsula Borough.

The catalogue contains summary data on existing and planned infrastructure, socio-economic-cultural conditions in the Borough, regulations, names and addresses of all involved agencies and, most important, a comprehensive directory of available timber resources that have been offered by their respective owners.

The directory is divided in two sections: Public Owners and Private Owners. Each listing details total acreage offered, special harvesting conditions (if any) and the name, address and phone number of the individual to contact for further action.

Please let me know if I can help in any way. We're looking forward to working with you.

Sincerely,

Mike Sims

Mike Sims
Director of Business Development

MS/rjp

Additions to: COMMERCIAL TIMBER RESOURCES OF THE KENAI PENINSULA BOROUGH, Part 2, Directory of Timber Owners

Name and Contact Address	Description
Del Alsop PO Box 2317 Sequim WA 98382 (206) 683-1941 work (206) 681-2548 home	526 acres large timber, 90% spruce, some birch; unimpacted by spruce bark beetle to owners knowledge. located above Anchor Pt.
Genese A. Craddock (Izuno) 2270 35th Avenue San Francisco CA 94116 and Frederick J. Bailey PO Box 4335 Sante Fe NM 87502 (505) 983-9714	40 acres, 80% spruce, 15% birch, 5% aspen/cottonwood; unimpacted by spruce bark beetle to owners knowledge; location: T05SR14WS20, SW1/4 NE 1/4 , CNTG 40.00 acres
Frederick J. Bailey PO Box 4335 Santa Fe NM 87502 (505) 983-9714	40 acres, 80% spruce, 15% birch, 5% aspen/cottonwood unimpacted by spruce bark beetle to owners knowledge; location: SES20, T5S,R14W, S.M. NE1/4 NW1/4, CNT6, 40.00 ac M/L
Robert K. Craddock, Jr. Greenbriar Way Fair Oaks CA 95628 (916) 965-3910 and Frederick J. Bailey PO Box 4335 Santa Fe NM 57502 (505) 983-9714	40 acres, 80% spruce, 15% 5449 birch, 5% aspen/cottonwood, unimpacted by spruce bark beetle to owners knowledge; location: TO5SR 14W S20 NW1/4 CNTG 40.00 ac M
Tammy L. Westover PO Box 84 Kasilof AK 99610-0084 (907) 283-4089	4 acres, 90% spruce, 5% birch, 5% aspen/cottonwood impacted by spruce bark beetle; location: Lot 13 Old Kasilof Subdivision

Gary E. Shaw 8341 Sue Street Anchorage AK 99502-4280 (907) 248-0404 work (907) 243-2926 home	30 acres, type of timber not specified, unknown if impacted by spruce bark beetle; location: Lot 367 Gray Cliff Sub., plat 82-80
Roger Hansen Box 744 Sterling AK 99672 (907) 262-5816	10 acres, 50% spruce, 50% aspen/cottonwood, unimpacted by spruce bark beetle; location: Mile 1, Feudin Lane, Sterling
James R. Van Oss 48750 East End Road Homer AK 99603 (907) 2355-7591	80 acres, 100% spruce, unimpacted by spruce bark beetle; location: S NW 1/4 Sec. 27 T4S R11W, SM
Mary Burt 118 Townsend Drive Florence MS 39073 (601) 845-7280	30.96 acres, type of timber not specified, unimpacted by spruce bark beetle; location: T07N R11 WS 26 KN860203 Kanovolof Lake Subdivision, Amended, TR 50 CNTG 3355.96 AC M/L
Yule F. Kilcher Box 353 Homer AK 99603 (907) 235-8713	400 acres. 99% spruce, 1% birch, property 600 acres west of McNeil Canyon, 1 mile of coast
James Rainwater 47010 Kunz Drive Homer AK 99603 (907) 235-6616	100 acres, 100% spruce, ASLS 77-68 , 22 miles E. Road

COMMERCIAL TIMBER RESOURCES OF THE KENAI PENINSULA BOROUGH

KENAI PENINSULA BOROUGH
ECONOMIC DEVELOPMENT DISTRICT
110 S. WILLOW ST., SUITE 106
KENAI, AK 99611
(907) 283-3335
FAX (907) 283-3913

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10/92

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Alaska Forest Resources and Practices Act - 1990 booklet is attached under separate cover.

Vegetation and land ownership maps are available by request from the Kenai Peninsula Economic Development District, Inc.

PART ONE

GENERAL INFORMATION

INTRODUCTION

The Kenai Peninsula Borough Economic Development District, Inc. (EDD) and the Kenai Peninsula Borough Timber Resource Utilization Task Force (Task Force) are pleased to present this information about the Borough's timber resources for use by forest products companies interested in establishing an operation in an area with an abundant timber supply, a skilled work force and a favorable social and political climate for new business. This publication has been prepared to provide you with background information that will be useful in assessing the business opportunities within the Borough and in answering questions you may have about its timber, governmental structure, regulations, programs and work force. This publication also includes a listing of owners of public and private timber interested in participating in a timber sale program.

Alaska's political subdivision system is unlike the rest of the United States. The State of Alaska is not divided into counties. Portions of the state are unincorporated and have no political subdivision lower than the State level. Areas with two or more cities may organize into Boroughs (in some cases, a combination borough-city). These Boroughs are somewhat analogous to counties but are quite often much larger in geographic area. This is the case with the Kenai Peninsula Borough which comprises some 25,600 square miles of total area, including land and water.

We hope this publication is useful in answering your initial questions regarding the feasibility of conducting a forest products related business within the Kenai Peninsula Borough or with its timber resources. The Kenai Peninsula Borough, the EDD and the Task Force, are looking forward to assisting in the development of your timber related project.

PHYSICAL DESCRIPTION OF THE KENAI PENINSULA BOROUGH

Topography

The Kenai Peninsula Borough is located within Alaska's Southcentral Region, an area normally defined as that part of Alaska lying east of the mountains of the Alaska Range, south of the Talkeetna mountains and west of the Wrangell mountains. Southcentral Alaska is a vast area that covers some 53 thousand square miles and includes the Matanuska, Susitna and Copper River Valleys, the Greater Anchorage Area, Prince William Sound, Cook Inlet and the Kenai Peninsula.

The Kenai Peninsula Borough is located south of the Municipality of Anchorage and encompasses a total area of 25,600 square miles and includes the entire Kenai Peninsula and a large area of land on the west side of Cook Inlet. The total land area of the Borough is 15,500 square miles. The Kenai Peninsula has a land area of 8,125 square miles and the Borough lands on the west side of Cook Inlet cover an area of 7,375 square miles. The topography of the Kenai Peninsula Borough is quite varied and in some locations very dramatic. The east half of the Kenai Peninsula is dominated by the Kenai Mountains. Although not high relative to other mountain ranges in Alaska, the Kenai Mountains are extremely rugged and have great relief. The average elevations range between 3,000 and 5,000 feet with the highest point, an unnamed peak, rising to 6,800 feet. An area of intense active glaciation, the Kenai Mountains include some of the largest ice fields in North America. The mountainous portions of the Kenai Peninsula receive very heavy precipitation during the winter from maritime storm systems which develop in the Gulf of Alaska.

The western portion of the Kenai Peninsula is dominated by a broad lowland plain which is roughly triangular in shape narrowing at the southern tip of the Peninsula. This lowland, actually a piedmont, is covered by glacial deposits and stream and terrace gravels. That portion of the Borough that lies on the west side of Cook Inlet is mostly a lowland very similar in character to the west side of the Kenai Peninsula, but in reverse, bounded by mountains along its western margins. On both sides of Cook Inlet these lowlands are bisected by numerous rivers and dotted with lakes.

Geology

The mountainous portion of the Kenai Peninsula is a geologic extension of the Chugach mountains which lie to the north of the Peninsula and extend in an east-west trending arc for some 300 miles, roughly parallel to the coast of Southcentral Alaska. These mountains are composed predominantly of mesozoic rocks, mostly slates, argillites and graywackes, with minor occurrences of granites and greenstones. They are heavily mineralized. Gold, chromium and copper are the minerals of historic and economic value. The first discovery of gold in Alaska was in 1848 by Russian prospectors at Cooper Creek near the present day community of Cooper Landing.

The basement rocks of the Kenai and the Cook Inlet lowlands are composed of tertiary age sedimentary material. Numerous glaciation episodes have strongly influenced the surficial geology of these lowlands. The existing topography is due to the erosive action of glaciation and to the deposition of numerous moraines, along with more recent deposits of alluvial gravels.

Soils

As is the case in most mountainous areas, soils in the eastern, mountainous portions of the Kenai Peninsula and in the Alaska Range mountains which form the western border of the Borough are thin and not well developed. Tree line is at 1000 to 1500 feet and soils support only simple vegetation communities above tree line, principally grasses, forbs, sedges and brush-form willow and alder.

Soils on the Kenai and Cook Inlet lowlands have been categorized into an association of types that are generally described as loamy with principal components consisting of loess, ash and fine gravels. In areas of good drainage, these soils may be up to 40 inches in depth over a gravelly, glacially originated sub-surface. In areas of poor drainage, fibrous, organically derived soils are present. These soils often consist of laminations of mosses and sedges and tend to retain large amounts of water.

The better drained soils within the region are suitable for cultivation and timber harvesting activities including road construction. it is on these soils that white spruce and birch are the dominant timber types. The high organic content, poorly drained soils may occur in pockets within areas which are otherwise well drained. The occurrence of these wet pockets may limit harvesting activities within certain timber stands. The most practical solution to this problem may be to limit harvesting activities in these areas to winter months when frozen ground will support the weight of equipment.

Climate

The Kenai Peninsula Borough has a maritime climate. In comparison to interior Alaska, and even to those portions of Southcentral Alaska north of Anchorage, summers are cool but winters are warm for the latitude. Annual precipitation ranges between 60 and 200 inches per year. This figure includes rain and water equivalent snow. The high precipitation areas are generally the mountainous regions on the eastern portion of the Peninsula. Average temperatures range from 5 degrees to 65 degrees F. In an average year at the lower elevations where timber harvesting operations would likely occur, freezeup and the first snows occur in middle to late October. Spring breakup normally starts in early to mid-April and lasts four to six weeks.

Timber

Approximately 22% of the total land area of the Kenai Peninsula Borough (9.9 million acres) is forested (2.2 million acres). That portion that is considered to be commercial timberland covers about 645,500 acres. Timberland is usually defined in Alaska as land growing or capable of growing timber at a rate of 20 cubic feet per acre per year. However, 223,000 acres of this commercial timberland is not available for harvest due to its land classification status. These 223,000 acres are located within national parks, wilderness areas or wildlife refuges. In addition to the 645,500 acres above, an additional 45,000 acres (estimated) does not produce 20 cubic feet per acre per year, but has volumes of 800 cubic feet per acre or greater and is operable. Timber on land in this classification is considered to be economically feasible for harvest if it is reasonably accessible. We have termed this land operable/non-commercial in the following forest land area table:

FOREST AND COMMERCIAL TIMBER LAND AREA OF THE KENAI PENINSULA BOROUGH

Location	Area in Acres			
	Total land area	Forest land	Commercial	Operable/ noncomm
Kenai Peninsula	5,200,000	1,900,000	481,700	30,000
W. side Cook Inlet	4,700,000	320,000	163,800	15,000
Total acres	9,900,000	2,220,000	645,500	45,000

Note: This information was derived from several sources. The totals may be off due to rounding. Total land areas were supplied by the Kenai Peninsula Borough Planning Department staff areas of forest land and commercial timberland were taken from timber inventory data by Mr. John Hall, Taiga Resource Consultants, and from the U.S. Forest Service publication, Timberland Resources of the Kenai Peninsula, Alaska, 1987 by van Hees and Larson. Areas of operable/non-commercial timberland are estimates by Mr. Charles Nash, Consulting Forester, derived from aerial photo interpretation and field observation.

Ownership of commercial and operable/non-commercial timberland within the Kenai Peninsula Borough is shown on the following table:

OWNERSHIP OF KENAI PENINSULA BOROUGH COMMERCIAL AND OPERABLE/NON-COMMERCIAL TIMBERLAND

Owner	Acres (estimated) Commercial	Acres (estimated) Operable/non-commercial
Chugach National Forest	79,000	
National Park Service*	28,000	
Kenai National Wildlife Refuge*	195,000	
State of Alaska	94,000	20,000
Kenai Peninsula Borough	30,000	6,000
University of Alaska	4,500	1,000
Native Corporations	195,000	13,000
Private	20,000	5,000
Total acres	645,500	45,000
Less commercial timberland in Refuge and Park*	223,000	
Potentially available total	422,500	45,000

Note: The above information was taken from several sources, including inventory work performed by Mr. John Hall, Taiga Resource Consultants, the U.S Forest Service publication, Timberland Resources of the Kenai Peninsula, Alaska, 1987 by van Hees and Larson, and from inquiries to individual land owners by Charles Nash, Consulting Forester.

The Borough's most predominant tree species is hybridized white spruce; however, birch is also quite common. On the eastern side of the Kenai Peninsula a white spruce - western hemlock type occurs. This is the northern and westward limit of hemlock in North America. Most of the spruce-hemlock type occurs on lands owned and administered by the U.S. Forest Service and is not available for harvest.

The white spruce on the Kenai Peninsula hybridizes with Sitka spruce and is known as Lutz spruce. This hybrid is very similar to white spruce in its appearance; field identification and species differentiation between white and Lutz spruce is extremely difficult. Discussions of species volumes in most Alaska publications combine the Lutz spruce with white spruce in regions where both species occur and call it all white spruce, as has been done here. However, lumber from Lutz spruce has appearance and physical characteristics that are more like low grade Sitka spruce than white spruce.

The spruce stands in the Kenai Peninsula Borough and other parts of Southcentral Alaska are in the midst of a major Spruce Beetle infestation. Normally found only in white spruce, this beetle infestation has spread throughout the Kenai Peninsula and is now established in Sitka spruce as well as the white spruce. A significant percentage of the commercial and operable/non-commercial timberland on the Kenai Peninsula is now impacted to some degree by the beetle infestation. Beetle damage has also been observed within the Kenai Borough on the west side of Cook Inlet.

Wildlife

The Kenai Peninsula Borough provides habitat for a variety of large and small mammals and birds. The Kenai National Wildlife Refuge encompasses some 1.2 million acres and provides habitat for the highest concentrations of moose in Alaska.

Moose range throughout the Kenai Peninsula Borough except in the extremely mountainous areas. The Kenai Peninsula has a small resident herd of caribou and the mountainous regions of the Peninsula provide habitat for mountain goats and Dall sheep. Both black bear and brown/grizzly bear are found throughout the Borough in the more remote areas.

Fish and marine life

The Kenai Peninsula Borough is an area rich in fish and marine life. The rivers of the region produce and support large populations of salmon. Commercial fishing, fish processing and in recent years, fishing related tourism are the basis for much of the Borough's economy.

In addition to fish harvesting, the marine and coastal areas of the Borough support a diverse mix of marine mammals, sea and shore birds, and other marine life.

SOCIO - POLITICAL - CULTURAL DESCRIPTION OF THE KENAI PENINSULA BOROUGH

History

Prior to the arrival of Russian fur hunters to the Kenai Peninsula in the latter part of the 18th Century, the region was populated by native people whose economy was subsistence based, utilizing the resources of the land and of the rivers flowing into Cook Inlet and the Gulf of Alaska. It is estimated that some 3,000 native people lived in the Kenai lowland area at the time of the first recorded contact by white man.

Several Russian trading companies were established, and by the end of the 18th Century had merged into a single large trading company called the Russian American Company. It was this company that controlled the entire region in 1867 when Alaska was purchased from Russia by the United States.

The mainstay of the economy of the Russian American trading company was fur trapping; however, because of poor management practices, the supply of fur-bearing animals was quickly depleted.

Gold was discovered in 1848 and during the late 1800's and early 1900's nearly every creek on the Kenai was prospected by miners.

The gradual establishment of a commercial fishing industry during the early part of the 20th Century brought some stability to the economy of the region.

The Second World War brought many changes to the region. An airport was built in the town of Kenai and a highway connecting the towns of Kenai, Seward and Anchorage was constructed. In 1947 the territory was opened to homesteading and there was an influx of new residents, mainly in the vicinity of the towns of Kenai, Soldotna and Homer. Farming was difficult and a viable agricultural industry did not develop.

In 1951, the U.S. Government built a small Air Force base at the Kenai airport. This created jobs and added economic stability. In 1957, oil was discovered on the north end of the Kenai Peninsula at Swanson River and an oil industry developed. The construction and operation of refineries north of the town of Kenai during the 1960's lead to rapid population growth and the development of a modern community in the Kenai-Soldotna area.

Kenai was incorporated as a city in 1960. Homer followed by incorporating in 1964, as did Soldotna in 1967. During the late 1950's the road system began to take shape. The Sterling Highway was gradually paved and all of the major towns and communities on the main part of the Peninsula were connected. The Kenai Peninsula Borough was incorporated in 1964.

Growth continued through the 1970's and 1980's as the refineries increased capacity and the commercial fishing industry prospered. Tourism became a very important segment of the economy, particularly on the Kenai River where people traveled from all over the world for a chance to catch a Kenai River King Salmon.

A forest products industry also developed. During the post World War Two era when homesteading and commercial fishing were the main economic activities of what is now the Borough, individually owned small sawmills were common in most communities and provided lumber for local construction projects. At Seward, the oldest city on the Kenai Peninsula (incorporated in 1912) and the southern terminus of the Alaska Railroad, Louisiana Pacific built and operated a sawmill and chipping operation during the 1970's. At Anchor Point, north of Homer, United Lumber, an Anchorage based lumber retailer, also operated a sawmill during the same time period. Near Tyonek, in the mid 1970's, a Japanese trading company built and operated a whole log chip mill. However, by the early 1980's, both sawmills and the chip mill had been closed and dismantled. Recently, the Chugach Alaska Regional Native Corporation constructed a large sawmill complex at Seward. This mill ran for 16 months and as of August, 1992, is not operating and is for sale.

Land ownership status

Unlike the rest of the United States, the ownership of a significant portion of Alaska's lands is still being decided. This is due in large part to the youthful age of the state; Alaska was granted Statehood in 1959 and is unique in the way in which land has been divided and ownership transferred through government allocation over a short period of time rather than through gradual settlement over a long period of time. Much of the land area in Alaska is still controlled by government. Within the Kenai Peninsula Borough, the Federal, State and Borough governments own and manage approximately two-thirds of the total land area.

In December, 1971, Alaska's native people (American Indians, Eskimos, and Aleuts) received a unique settlement from the Federal Government. To settle long standing disputes over land claims, 13 regional, four urban and some 200 village corporations were formed. Both the regional corporations and village corporations received monetary compensation and title to land. Any Alaska native person born prior to December 8, 1971, could enroll in both a village and a regional corporation. Most of the Kenai Peninsula Borough falls within the Cook Inlet Regional Corporation, although a portion of the eastern part of the Borough falls within the Chugach Regional Corporation. Eight native village corporations also own land within the Borough. Native land ownership within the Borough is 732,483 acres.

Other major land owners within the Borough include the Chugach National Forest with 900,000 acres, the Kenai National Wildlife Refuge with 1,200,000 acres, the State of Alaska with 600,000 acres and the Kenai Peninsula Borough with 90,000 acres. In addition, there is approximately 240,000 acres of private land within the Borough.

Local and regional government

The Kenai Peninsula Borough is one of 15 boroughs in the State of Alaska. It is empowered to carry out three main governmental functions - education, planning and zoning, and taxation. The Borough has an assembly form of government with an elected mayor along with a school board and a planning commission.

There are six incorporated cities within the Borough: Kenai; Kachemak; Homer; Seldovia; Seward; and, Soldotna. Numerous unincorporated communities and settlements also exist, including three native villages.

Population

The total population of the Kenai Peninsula Borough is 41,400. The most heavily populated region of the Borough is the Kenai-Soldotna area with approximately 25,000 people. The southern portion of the Borough, including Homer and the surrounding area, has a population of approximately 12,000, while Seward and the nearby areas on the east side of the Borough have a population of about 4,000. The population on the west side of the Cook Inlet is extremely low and is centered at the native village of Tyonek which has 248 inhabitants.

The average employment during 1991 indicated an available labor force of 18,799 with employment at 16,438. Unemployment during 1991 ranged from a low of 8.7% in July to a high of 17.5% in December. The annual average unemployment rate was 12.6% (from Kenai Peninsula Borough Economic Development District, Inc. 1991 Situation and Prospects, publication dated July, 1992).

Economy

The economy of the Kenai Peninsula Borough is based primarily on three industries: commercial fishing and processing; oil and gas; and, tourism.

Commercial fishing has been based primarily on the harvest of Cook Inlet salmon and continues to be a very viable industry with an estimated catch value of $16.7 million in 1991. In addition to being home port for a large number of commercial fishing vessels, the Borough also has numerous fish processing and cold storage facilities located at or near its ports. In recent years, a commercial ground fish industry has developed. Part of that fleet is now based in Kenai Borough ports. As on-shore processing facilities develop, the Borough expects to benefit from the growth of this industry.

The oil and gas industry may be characterized as being in its mature phase. Production peaked in the early 1970's and then declined to a stabilized annual production level of approximately l5 million barrels of crude oil and 300 billion cubic feet of gas. Three refineries, located in the North Kenai-Nikiski area, are currently in active production.

Tourism has grown steadily within the Borough. It is now estimated to be a $95 million per year industry. In addition to guided and non-guided sport fishing for salmon and halibut, hunting, backpacking and RV parks generate visitor revenue into the Borough's economy. Recently, cruise ships from several lines have been calling at the Ports of Seward and Homer and this activity is expected to increase.

Schools and colleges

Each city and several of the unincorporated communities have public school Kindergarten through 12, all operated under the central administration of the Kenai Peninsula Borough School District.

Kenai Peninsula College, a part of the University of Alaska Anchorage system, has campuses in Soldotna and Homer. Alaska Vocational Technical Center is located in Seward and provides post-high school vocational training in a variety of fields.

DESCRIPTION OF FOREST PRODUCTS BUSINESS OPPORTUNITY WITHIN THE KENAI PENINSULA BOROUGH

Because of the large scale Spruce Beetle infestation within the Kenai Peninsula Borough, public timber owners with a mandate for multiple use are interested in selling timber to be harvested as soon as possible both to reduce fuel loads and fire danger in areas of high mortality, and to slow the advance of the Spruce Beetle infestation which is moving generally southward on the Kenai Peninsula. Many private timber owners are also interested in selling their timber for the same reasons.

There is also widespread support for new industry within the Borough to create jobs for residents and to add additional stability to the Borough's work force. The effort to attract forest products business to the Borough has been facilitated by the work of the Kenai Peninsula Borough Timber Resources Utilization Task Force, a citizen advisory group made up of local business people, several of whom have experience in the forest products industry. The chairman of the group, Mr. John Torgerson, was General Manager at the Louisiana Pacific Seward operation until its closure in the early 1980's. Mr. Torgerson and the Task Force have been instrumental in providing guidance and ideas to the Borough's Economic Development District and its consultants on matters relating to the development of a viable forest products industry in the Kenai Peninsula Borough.

Up to 690,500 acres of timber are potentially available. Some of this timber is of a very low grade due to its form, roughness and the mortality caused by the bark beetle; however, certain stands of the beetle-kill timber may contain low grade sawlogs, which can be recovered through merchandising at the time of harvest. The utility log component of this timber is, for the most part, sound and makes an excellent chip furnish for pulp or reconstituted panels.

A company specializing in mechanized harvesting and in-woods chipping has secured the cutting rights to approximately 30,000 acres of native owned timber on the south central portion of the Kenai Peninsula. This company and an export trading company plan to construct a chip receiving and ship loading facility on the Homer Spit, which is located at the southern end of the Peninsula. This chip handling facility is to be built on

City of Homer land adjacent to the City's deep water dock and will be available to other users on a fee basis.

In addition to this chip handling facility, other options exist for the shipment of logs, chips and lumber or other finished products out of the Kenai Peninsula Borough. The Port of Homer has a deep water dock and logs have been inventoried and loaded onto ships and ocean going barges. To the north, near the industrial areas of North Kenai and Nikiski, there are existing docks that have the capability to handle chips and logs. The Port of Seward is the southern terminus of the Alaska Railroad. It is the receiving point for many of the containerized and roll-on/roll-off movements to Southcentral and Interior Alaska as well as the loading port for Alaska coal. Log cargos have been accumulated and shipped from the Port of Seward. In addition to these port facilities, there are numerous sites available in applicably zoned areas where chip mills, sawmills, treating plants and other wood product manufacturing plants could be sited.

TECHNICAL FACTORS RELATED TO FOREST PRODUCTS OPERATIONS

Commercial timber and ground characteristics

In terms of operability and equipment selection, the commercial timber within the Kenai Peninsula Borough may be described as being very suitable for fully mechanized harvesting. Most of the ground is flat to moderately sloping and few stems are larger than 24" in diameter at ground line. Volumes per acre of spruce on commercial category lands range from 10-12 mbf (Scribner Dec. C. single segment scale) on the highest site ground downward to volumes of 3.5-4 mbf. In many areas, birch and aspen occur as a component species within spruce stands. Kenai area spruce is generally shorter with more rapid taper when compared to interior white spruce and coastal Sitka spruce. The hardwoods generally comprise less than twenty five percent of the volume of stands typed as spruce and are often clumped, particularly in the case of the birch. Kenai hardwood, while not of an exceptionally high grade may present an opportunity for utilization as a pulp species, as a furnish for reconstituted lumber or panel products, or as bolts for hardwood lumber products.

The ground underlying the commercial timberlands of the Kenai Peninsula Borough does require special consideration. Soft areas of wet, high organic content soils without a firm base can present problems for summertime operations of logging equipment. In general, the solution has been to locate and define each type of area and operate on the wet ground when it is frozen during the winter months.

Road building does not require the high cost rock drilling and blasting techniques often required in Southeast Alaska. Gravel is usually available within reasonable distances to road headings.

In general, the logging and road building considerations within the Kenai Peninsula Borough are similar to conditions in the north central states of the U.S. (Minnesota, Michigan, etc.) but with a different species mix. The area lends itself to modern mechanized harvesting.

Roads and highways

Access to and from the Kenai Peninsula is via Alaska Highway One, the Seward Highway. At a major road junction some 100 miles south of Anchorage, the Seward Highway becomes Alaska Highway Nine and continues to Seward some 40 miles further to the south. Highway One heads west and is called the Sterling Highway. At Soldotna, 57 miles west of the Seward Highway-Sterling Highway junction, the Sterling Highway turns south and runs parallel to the west shore of the Peninsula, terminating at Homer. Also at Soldotna, another highway heads northwest to Kenai and then northward to the North Kenai-Nikiski industrial area. All of these highways are two -lane, blacktop roads with travel surfaces that range in width from 24 to 32 feet. In several locations, passing lanes on adverse grades have been added. A major realignment and reconstruction project is ongoing on that portion of the Sterling Highway between the communities of Sterling and Soldotna.

Some 75 miles of secondary roads accessing the commercial timber within the Borough are in place, but the large scale harvesting program which is being planned by the Task Force and the various timber owners will require construction of additional roads.

Traffic on Kenai Peninsula highways may be described as seasonal, with the heaviest flows corresponding to the visitor season which starts in May and ends in September. The heaviest traffic is on that portion of the highway system that links Anchorage with the Soldotna-Kenai area. Traffic during the summer seasons often includes recreational vehicles and vehicles towing boats. Travel speeds are sometimes slowed due to bunching of vehicles. South of Soldotna, the Sterling Highway has less traffic and in general higher summer average speeds than along the Anchorage to Soldotna corridor.

Night hauling may be one alternative to driving during peak summer traffic flows. Summer night hauling would, of course, be facilitated by the long hours of daylight during this season.

Roads are well maintained all through the winter months. Winter plowing on all Kenai Peninsula Highways is the responsibility of the State of Alaska Department of Transportation. Secondary roads are maintained and plowed by the Kenai Peninsula Borough, generally with an emphasis on school bus access. Roads accessing areas extending beyond residences into the commercial timber areas would have to be maintained and plowed by the operator.

During spring break-up, weight limits and restrictions are usually applied to protect the structure of the roads and prevent damage from traffic. These weight limits are 75% of full load and restrictions usually last four to five weeks.

Truck rules and regulations

Truck length and gross weight restrictions in Alaska are somewhat different and, in most cases, more permissive than other states. The standard width limit is 8'6" and maximum height is 14'0". Maximum overhang is 4'0" rear and 3'0" front. Tractors with trailers have a maximum allowed overall length of 70'0", although overlength permits may be obtained on a case by case basis.

Gross weights are governed solely by wheelbase as measured from center of the front or steering axle to center of the rearmost axle. A typical west coast type log truck permitted to gross 78,000 lbs. in Washington, or 80,000 lbs. in Oregon, with five axles, could theoretically gross up to 89,500 lbs. in Alaska. However, to achieve that weight, the wheelbase would have to be 66' and the overall length 70'. In actual practice, log trucks set up to bunk 35 to 40 foot logs, loaded with 4' of overhang, can haul with allowable gross weights of 84,000 to 86,000 lbs.

Chip trucks using tractors with three axles and trailers with two axles can haul legal gross weights of up to 89,500 lbs. if the wheelbase is 66' and the overall length 70'. An additional axle adds 4,000 lbs. to the allowable gross weight.

Power availability

Electrical power is widely available throughout those portions of the Kenai Peninsula Borough accessible by road. The primary supplier of power on the Kenai to private, commercial and industrial customers is the Homer Electric Association (HEA), a rural electric cooperative. Chugach Electric Association supplies power in the Cooper Landing area and the City of Seward Electric Department supplies power in and around the City of Seward.

Work force

The Kenai Peninsula Borough has a work force of approximately 18,000, with total employment in the 16,500 range. The Greater Anchorage Area has a population of approximately 250,000, with a work force estimated to be 105,000. Within this work force is a large pool of experienced equipment operators, truck drivers, mechanics and welders, due in large part to the labor needs of the numerous construction and resource development projects that have been a significant part of Alaska's economy during the 1970's to the late 1980's. In addition, there is a significant pool of skilled workers available in southeast Alaska. Many of these individuals have experience in the forest products industry of that region and would be willing to relocate to the Kenai Peninsula Borough for a stable employment situation.

Taxes

State of Alaska and Kenai Peninsula Borough taxes that would apply to a forest products operation located in the Borough may be summarized as follows:

1.) Harvesting Operations

   a.) There is not a separate ad valorem tax on standing timber nor a State or Borough timber severance tax; and, b.) There is a personal property tax levied by the Borough and by most cities within the Borough that applies to timber harvesting and construction equipment that is not titled and licensed to travel on public roads. The personal property tax rate ranges from 8.55 mils to 16.3 mils with an average rate within the Borough of 12.0 mils;

2.) Transportation

a.) There are no road use taxes levied by the State or Borough on commercial trucks transporting goods or commodities on Alaska roads; and,

b.) Truck licensing fees are assessed in two parts - an annual registration fee, which is $156 for each truck or trailer with an unladen weight of 12,001 to 18,000 lbs., and $221 for 18,001 lbs. and over. There is also an annual tax which ranges in approximately $20 increments per year downward from $150 for 12,001 to 18,000 lb. weight category vehicles and $200 for 18,001 lb. and over vehicles which are new ('92 - '93) to $20 for 1985 and older trucks or trailers;

3.) Conversion Facilities

Conversion facilities, such as sawmills, stationary chip mills and other processing equipment, will be taxed as real property if permanently installed, or as personal property, if mobile, at rates which are the same as those discussed in I.b., above;

4.) Wages and Salaries

Alaska does not have a state personal income tax at this time;

5.) Corporate Income

The State of Alaska taxes corporations at the rate of 9.4% of corporate taxes paid to the federal government; and.

6.) Sales Tax

The State does not have a sales tax, but the Kenai Peninsula Borough and most cities within the Borough levy sales tax on retail sales of goods and services. The Borough rate is 2% and the city rates are 3 to 3 1/2%. Sales tax is collected only on the first $500 of each transaction.

Alaska Forest Resources and Practices Act and other laws related to timber harvesting

Enacted in 1978, and in effect since January 1, 1979 the Alaska Forest Resources and Practices Act (FPA) covers all matters related to timber harvesting, log movement, road construction and reforestation. The Act was revised by the Alaska legislature in 1990 .

In general, the Act requires that prior to commencement of operations an operating plan be submitted to the Division of Forestry. The Division reviews the plan and acts as the lead agency for the purpose of contacting other applicable agencies. In most cases, response time is thirty days or less and start-up may begin upon notice from the Division of Forestry or the expiration of 30 days.

The Borough falls within two regions under the FPA; Region #1 - the Moose Pass/Seward area and the south side of Kachemak Bay, and Region II - the remainder of the Borough.

Partial cut areas must meet a minimum stocking level or a combination of residual trees and seedlings to meet the reforestation requirements. Clearcut areas must be restocked to at least 200 seedlings per acre in Region I within five years of harvest, and to 450 seedlings per acre in Region II within seven years of harvest. Variations from these requirements can be applied for on a site specific basis.

Harvesting of stands that are "significantly" composed of insect killed trees are exempt from the reforestation requirements. The Division of Forestry is still defining the situations where this exemption will apply.

Other agencies with jurisdiction over timber harvesting and road construction are the Alaska Department of Fish and Game which has jurisdiction over the wetted perimeter of streams and other waters and the Department of Environmental Conservation which has jurisdiction over water quality, solid waste and air quality. Fish and Game is the agency responsible for reviewing culvert and bridge design criteria and placement, primarily to insure fish passage. Environmental Conservation is primarily concerned about sedimentation and spills of hazardous or toxic materials. This agency also has jurisdiction over disposal of log yard debris.

Permits for centralized processing facilities such as chip mills or sawmills would be handled by the State of Alaska Office of Governmental Coordination, which assists applicants proposing to construct new industrial facilities within the State where a variety of permits are often required.

ADDRESSES OF LOCAL, BOROUGH, STATE AND FEDERAL AGENCIES

Local

City of Homer
491 E. Pioneer Ave.
Homer, AK 99603
(907) 235-8121

City of Kenai
210 Fidalgo
Kenai, AK 99611
(907) 283-7530

City of Seward
5th & Adams
Seward, AK 99664
(907) 224-3331

City of Soldotna
177 N. Birch
Soldotna, AK 99669
(907) 262-9107

Borough

Kenai Peninsula Borough
144 N. Binkley
Soldotna, AK 99669
(907) 262-4441

Kenai Peninsula Borough
Economic Development District, Inc.
110 S. Willow Street, Suite 106
Kenai, AK 99611-7744
(907) 283-3335

State

Alaska Department of Commerce & Economic Development
Division of Economic Development
3601 C Street, Suite 724
Anchorage, AK 99503
(907) 563-2165

Alaska Department of Commerce & Economic Development
Division of Commerce - Weights & measures
Soldotna Office (907) 262-3853
Sterling Weigh Station (907) 262-5400

Alaska Department of Environmental Conservation
35390 Kalifonsky Beach Rd., Bldg. E
Soldotna, AK 99669
(907) 262-5210

Alaska Department of Fish & Game
34828 Kalifonsky Beach Road
Soldotna, AK 99669
(907) 262-9368

Office of Governmental Coordination
3601 C Street, Suite 307
Anchorage, AK 99503
(907) 561-6131

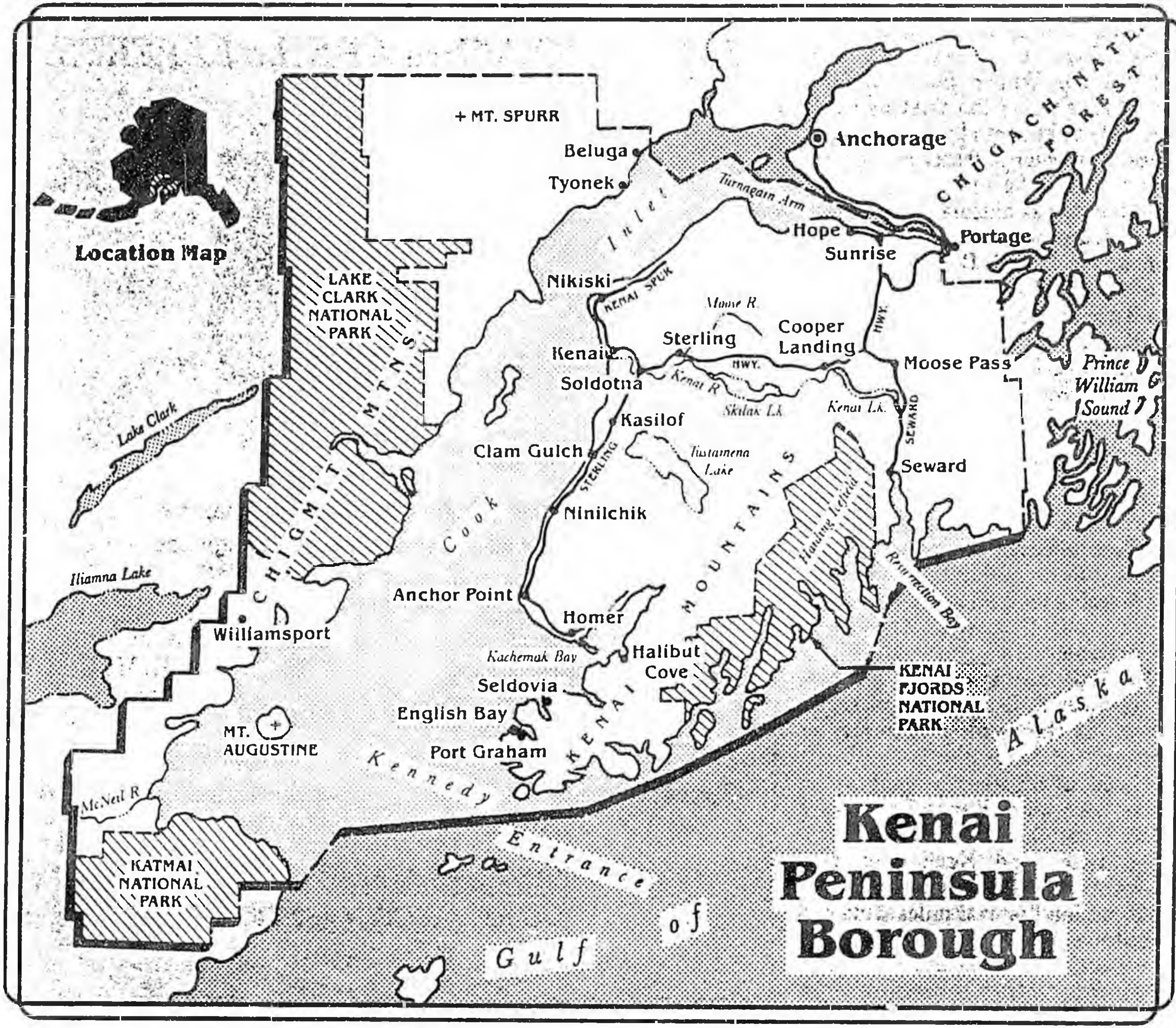
Alaska Department of Natural Resources
Division of Forestry - Kenai Area Office
HC1, Box 107
Soldotna, AK 99669
(907) 262-4124

Federal

Chugach National Forest - Seward Ranger District
P.O. Box 390
Seward, AK 99664
(907) 224-3374

Chugach National Forest - Supervisor's Office
201 E. 9th Avenue
Anchorage, AK 99501
(907) 271-2500

Map provided courtesy of Alaska Business Monthly magazine, (c) 1992



PART TWO

DIRECTORY OF TIMBER OWNERS

DIRECTORY OF TIMBER OWNERS WITHIN THE KENAI PENINSULA BOROUGH

This listing of timber owners is presented in two sections: the Public Owners Section, which includes governmental entities within the borough with management authority over the commercial timber; and a Private Owners Section which includes all private owners of commercial timber who have expressed an interest in being contacted. These listings are designed to be a starting point for a buying program. In the case of most of the public owners, preparations for timber sales are ongoing and will be completed during the fall of 1992 with sale offerings late in 1992 and during the first half of 1993. Private owners interested in listing timber for sale were identified after responding to direct contact by the Economic Development District. The listing of a private timber owner in this Directory in no way obligates the timber owner to sell timber nor does it obligate anyone to contact the timber owner. This Directory was prepared as a service to public and private timber owners within the Kenai Peninsula Borough, and to facilitate the establishment of timber harvesting operations within the Borough in an effort to stop the spread of the Spruce Beetle infestation.

This Directory was compiled by the Kenai Peninsula Borough Economic Development District, Inc. (EDD) from information provided by timber owners. The accuracy of this information, e.g., total acres of ownership, acres of timber, volume, quality, species composition, has not been checked by the EDD. It is likely to vary depending upon actual knowledge and interpretation by each timber owner.

NOTE: Vegetation and Land Ownership maps are available by request from:

Kenai Peninsula Borough
Economic Development District, Inc.
110 S. Willow St., Suite 106
Kenai, AK 99611-7744
Phone: (907) 283-3335
Fax: (907) 283-3913

PUBLIC TIMBER OWNERS

NAME AND CONTACT ADDRESS	DESCRIPTION
USDA FOREST SERVICE CHUGACH NATIONAL FOREST SEWARD RANGER DISTRICT P.O. Box 390 Seward, AK 99664 (907) 224-3374 Duane Harp, District Ranger	The Forest Service is preparing a sale of approximately 2 mmbf of beetle-killed spruce in the Cooper Landing area. Bidding will be by sealed bid. Marine line access roads are currently under construction. A sale of approximately 12 mmbg in the same area is planned for June, 1993. Most of this timber has been dead for 8+ years and suitable only for chips or hog fuel. Additional beetle-killed timber in the Cooper Landing area may become available by the summer of 1993. In addition to this salvage sale program in the Cooper Landing area, the Chugach National Forest has an annual allowable cut of .5 mmbf, although most of this volume is allocated to personal use firewood sales.
STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES DIVISION OF FORESTRY HC 1, Box 107 Soldotna, AK 99669 (907) 262-4124 Jim Petersen Area Forester	30,000 acres available. Property is located in the Kasilof, Clam Gulch, Ninilchik, Fox River, and Kalifin Island areas. For specific location contact the Area Forester. Any sales must be developed according to State law. State will not guarantee volumes available. State will not provide access. Purchaser will prepare a project harvest plan and an annual operating plan which must be approved by the division prior to road construction and harvest. Purchaser must comply with the Alaska Forest Resources and Practices Act. Purchaser would be responsible for locating State property boundaries.
KENAI PENINSULA BOROUGH 144 N. Binkley Soldotna, AK 99669 (907) 262-4441 ext. 267 John Mohorcich Land Management	33,700 acres available. Locations are scattered throughout the Borough with portions accessible by road.

U.S. DEPARTMENT OF INTERIOR
FISH AND WILDLIFE SERVICE
KENAI NATIONAL WILDLIFE REFUGE
P.O. Box 2139
Soldotna, AK 99669
(907) 262-7021
Dan Doshiere
Refuge Manager

The Kenai National Wildlife refuge does not have a timber sale program at this time; however, Fish and Wildlife Service resource specialists are working with the Kenai Peninsula Borough Timber Resource Utilization Task Force to determine if a limited sale and harvesting program could be useful in reducing the spread of the Spruce beetle infestation.

UNIVERSITY OF ALASKA
2221 E. Northern Lights Blvd.
Anchorage, AK 99508
(907) 346-1455

The University of Alaska has management authority over its lands. It has approximately 15,000 acres of commercial timber for sale within the Kenai Peninsula Borough. Location information available on request. Land is accessible by road and is spruce/birch.

PRIVATE TIMBER OWNERS - NATIVE CORPORATIONS

NAME AND CONTACT ADDRESS	DESCRIPTION
NINILCHIK NATIVE ASSOC., INC. 2600 Cordova, Suite 204 Anchorage, AK 99503 (907) 277-2527	Various parcels, over 50,000 acres; spruce, birch, aspen/cottonwood; accessible by road; impacted by spruce bark beetles. Contact owners for details.
SELDOVIA NATIVE ASSOC., INC. P.O. Drawer L Seldovia, AK 99663 (907) 234-7625	50,000+ acres; 60% spruce, 30% birch, 10% aspen/cottonwood; non-accessible by road; non-impacted by spruce bark beetles.
TYONEK NATIVE CORPORATION 1689 C Street, Suite 219 Anchorage, Ak 99501 (907) 272-0707 (907) 274-4125	1500-2000 acres; various locations; Kenai Wildlife Refuge; spruce, birch, hemlock; accessible by road; non-impacted by spruce bark beetles. Contact owner for further details.

PRIVATE TIMBER OWNERS - OTHER PRIVATE

NAME AND CONTACT ADDRESS	DESCRIPTION
DOUG ANDERSON Rt. 1, Box 109 Kenai, AK 99611 (907) 776-8121 ext. 3824 (907) 283-4163	17 acres; Lot 298, Moose Mt. Sub; spruce, birch, hemlock aspen/cottonwood; non-accessible by road; impact by spruce bark beetle unknown; must leave access road or trails in place and minimize disturbance to landscape.
SHIRLEY ANDERSON P.O. Box 91886 Anchorage, AK 99509 (907) 333-0341	159+ acres; TO6NR11WS06, Gvmt Lots 1 & 2 & S1/2, NE 1/4, CNTG 15; partially accessible by road; impact by spruce bark beetles unknown.
GORDON L. BAILEY 2006 Ashland Avenue Santa Monica, CA 90405 (310) 450-7717	85 acres; Tax ID #s 16572009-5, 16572006-7; 95% spruce, 5% aspen/cottonwood; accessible by road; some impact by spruce bark beetles; desires selective cutting, small amount of clearcutting with owner's permission.
RAY BOUWENS 3307 Boniface 9A Anchorage, AK 99504 (907) 337-1099	Two parcels: parcel #1 near existing timber access roads of Ninilchik Native Assoc.; T01SR12WS27 SE 1/4 NW 1/4 N. of seismograph R/W exc. streets cntg 36 acres. Parcel #2 parents homestead; Bouwens Sub.; tract 9 cntg 10 acres. 75% spruce, 20% birch, 5% cottonwood. Non-impacted by spruce bark beetle. Selective cutting and damage control; possible trade for permanent improvements.
ROBERT C. BOYLES 840 Noles Drive Mt. Holl, NC 28120 (704) 827-7171 (704) 827-0860	Lot 139, Graycliffs Subd. 15.8 acres consisting of spruce, birch, hemlock and aspen/cottonwood; impacted by spruce bark beetle, unknown; three acres that immediately surround existing cabin to be left untouched.
AMELIA & HARRY CHRISTIAN 901 W. Tudor Anchorage, AK 99503 (907) 561-0927	Approximately 160 acres T4N, R11W, S10, NW1/4; Tax #13104113-9; 80% spruce 10% birch, 10% aspen/cottonwood. Impact by spruce beetle unknown.

JENNIE T. COBURN, CECIL THAD COBURN & MADISON CHRISWELL COBURN 120 Boulevard Shreveport, LA 71104-2504 (318) 222-4044	12.53 m/l. Parcel #T10NR08WS27 KN840065 Moose Point sub; lot 159. Parcel TCA53 Nikiski, Parcel #025-443-0100. Kinds of timber unknown; non-accessible by road; non-impacted by spruce bark beetles.
MR. & MRS. CHESTER H. CONE P.O. Box 263 Kenai, AK 99611 (907) 283-7950	100 acres; NW 1/4 of NW 1/4, S10, T5N R11W, & Tracts 6 & 7 of River Bend Sub., Sec. 11, T5N R11W. 60% spruce, 30% birch, 10% aspen/cottonwood; impacted by spruce bark beetles; accessible by road: no clearcutting; cut only beetle killed spruce, some birch and some cottonwood.
ALEXANDER CONNORS 2001 Stonegate Circle Anchorage, AK 99515 (907) 269-4773 (907) 344-3270	30 acres timbered land; S3, TS45, R10W, Seward Meridian; 38 acres on bluff above the Fox River; this lot is almost in the middle of Sec. 3; 90% spruce, 5% aspen/ cottonwood; non-impacted by spruce bark beetles; access is difficult.
LOUISE CRANE 4101 University Drive Anchorage, Ak 99508 (907) 569-2273 (907) 563-0228	175 acres; S1/2, NW1/4, N1/2, SW1/4, Sec. 28. S1/2, NE1/2, SE1/4, Sec. 29, T4S, RNW, Seward Meridian. 100% spruce; accessible by road; unknown if impacted by spruce bark beetle.
MARY MABRY DEPAOLI 1275 S. Marsh Avenue Reno, NV 89509 (702) 322-0522	Approximately 280 acres; T06S, R27W & T06SR2SW, Silver Creed M5869, CNTL 140 ac m/1. Half property in Kenai Borough; kinds of timber unknown. Contact owner for details.
GAIL DUNCAN 3081 Brookview Anchorage, AK 99504 (907) 338-1700	100 acres; +/-90% spruce, +/-10% birch & aspen/cottonwood.
AUDREY ANNETTE GATZ & JOAN KAY HASHIMI R2-1513 Adams Rd. East Troy, WI 53120 (414) 495-8616	80 acres; Parcels #T05SR13WS18 & #T05S13WS17; spruce and birch; non-accessible by road; spruce bark beetle damage unknown
A.M. GRANAT P.O. Box 5542 Bellingham, WA 98227 (206) 592-2456 (206) 676-9635	40 acres; T04SR14W505 SE 1/4 NE /14 cntg. 75% white spruce; hemlock; impacted by spruce bark beetle; non-accessible by road.
ESTATE OF A.M. EVANCOE 109 Melvin St. Washington, Ill. 61571-2612 (309) 444-3824 Eugene or Olive Evancoe	115 acres Homer; 40 acres at Kenai; Several tax ID #'s available; some accessible by road; 90% spruce, 5% birch, 5% aspen/ cottonwood; requires professional tree removal. Contact owner for details.

LEO & MARGUERITE FRELIN 3737 W. 100th Avenue Anchorage, AK 99515 (907) 344-2430	110 acres; tax ID #159-140-2200 & 159-140-2100; T3SR14WS19 E 1/2, NW 1/4 & Gvmt Lots 2 & 3 W. of Sterling Highway (81 acres W. of Sterling Highway & 53 acres E. of Sterling Highway.
IRENE GIRVES Box 327 Soldotna, Ak 99669 (907) 262-1846	Halcyon Sub., Addn. 3, 4, 5, 7, Soldotna; 200 acres; mixture of spruce birch, aspen/cottonwood; accessible by road; non-impacted by spruce bark beetles.
PETER O. HANSEN P.O. Box 1390 Kenai, AK 99611 (907) 283-4611 (907) 283-4615	160 acres; 80% spruce, 10% birch, 10% aspen/cottonwood; non-impacted by spruce bark beetles. Contact owner for details.
WILLIAM P. JAMES 19111-H-DesMondes Way So. Seattle, WA 98148 (206)246-7989	1/2 40 acres; T4S, R15W, S11, SM, NE 1/4, SE 1/4; accessible by road; impact by spruce bark beetles unknown.
RANDEL JONES 33525 East End Road Homer, AK 99603 (907) 235-6284	25 acres; mi. 18 East End Rd., Homer; accessible by road; impacted by spruce bark beetles. Contact owner for details.
THOMAS E. KELLY The Highlands Seattle, WA 98127 (206) 546-8982 (206) 367-7005	600 acres; 70% spruce, mixture birch, hemlock, aspen/cottonwood; non-accessible by road; tributaries of N. Fork of Anchor River head on property and are salmon spawning streams; non-impacted by spruce bark beetles. Contact owner for more details.
BERNARD & ELIZABETH LA MOTTE 4510 58th Avenue, N. #109 Brooklyn Center, Mn. 55429 (612) 535-8743	Several locations; Sec. 4, T5S, R15W, SM, PTN SW 1/4, NW 1/4, lying NW of Intern Island County 00.57 ACM/L. Parcel #169-330-0300 mineral rights on this property; SW 1/4, NW 1/4, lying easterly of Silver King Wayside; Intern Island located in Section 4; Township 5 South; Range 15 West, Seward Meridian. Contact owner for details.
JOHN W. LEONARD P.O. Box 285 Kasilof, AK 99610 (907) 262-5679	30 acres, spruce, Mouse Pt. Sub. #86, Kenai Rd.; non-accessible by road; impacted by spruce bark beetles. Contact owner for details.

W.A. LESHER HC 67, Box 902 Anchor Point, AK 99556 (907) 235-7954	Approximately 9.5 mi. from Anchor Point by North fork Road; approximately 500 full length green logs limbed and stacked in '91 and '92; accessible by road; non-impacted by spruce bark beetles; logs must be paid for in full before leaving property; take all or part.
MARVEL J. & ISIDORA KOBS 5391 Tudor Top Circle Anchorage, AK 99507 (907) 562-7595	60 acres; 80% spruce, 10% birch and hemlock; 159-012-4300 NE 1/4 of S9, R14W, Homer Rec. Dist; accessible by road; impacted by spruce bark beetles; leave good amount of young trees; leave some sections of trees standing as designated by owners.
JAMES L. LOWERY ROYCE V. CANTRELL P.O. Box 653 Highland, CA 92346 (714) 864-2480 (714) 884-2082	33 acres; Parcel #066-340-2000; TR 3 House Sub Tract 3 K84-91; accessible by road; timber involved unknown; non-impacted by spruce bark beetles.
LINDA & MICHAEL MCLANE P.O. Box 769 Kasilof, AK 99610 (907) 262-4613 (907) 283-4218	100-120 acres; Loon Lake Sub.; 60% spruce 20% birch, 20% aspen/cottonwood; some accessible by road; impacted by spruce bark beetles; special considerations listed as none.
DOROTHY L MORRIS 2816 Essex Circle Woodward, OK 73801 (405) 254-3976	Not sure of acreage; tax code area 65, #15713005-5; timber involved unknown; contact owner for details.
CLYDE & KATIE MOREHOUSE 17 Marborough Rd. Shalimar, FL 32579 (904) 651-1144	Approximately 30 acres; Grey Cliff 358; 90% spruce; non-accessible by road; non-impacted by spruce bark beetles; see owner for details.
MICHAEL E. MURPHY P.O. Box 10281 Fairbanks, AK 99710 (907) 873-1132 (907) 895-4234	40 acres of 80; NE 1/4, SW 1/4, NW 1/4, SE 1/4, S20T5S, R14W, SM; non-accessible by road; non-impacted by spruce bark beetles.
THEOPHILUS G. MUMCHUCK P.O. Box 100940 Anchorage, AK 99510 No phone listed	Spruce, birch, aspen/cottonwood; non-accessible by road; impact by spruce bark beetles unknown.
CURTIS OLSON Box 9-1364 Anchorage, AK 99509 (907) 561-1651 (907) 235-7396/5107	30 acres spruce/birch; T07NR12SS34 Lots 18, 19, 20, 21, 22 and those PTNS of Lots 16, 17, 23 lying E. of N. Kenai Rd.; accessible by road; impact of spruce bark beetle unknown.

GARY OSKOLKOFF P.O. Box 63 Ninilchik, AK 99639 (907) 567-3313 (907) 567-3955	76 acres, various locations, 90% spruce; 10% birch; accessible by road; non-impacted by spruce bark beetles. Contact owner for details.
PACIFICCORP 700 NE Multnomah, Suite 700 Portland, OR 97232 (503) 731-2046	133 acres; various lots 1-24, B10 & B9, Parcel G, all Bayview Addn; some N. of Seward High School site, some W. of Forest Acres Sub; accessible by road; impact by spruce bark beetle unknown. Contact owner for details.
DONALD G. PRIOR 203 S. 77th Ave. Yakima, WA 98908 (509) 966-3926	Unsure of acreage. NE 1/4 SW 1/4 sec. 12, T6N R12 WSM; birch and pine; unsure of impact by spruce bark beetle. Lot listed for sale by RE/MAX.
HERBERT D. & CAROL J. STICKNEY 10920 Katlian Dr. Eagle River, AK 99577 (907) 564-3010 (907) 694-8982	13 acres; Gray Cliff Sub., Lot 225; spruce/birch; non-accessible by road. Contact owner for further details.
ERV TERRY, PARTNER P.O. Box 190228 Anchorage, AK 99519 (907) 243-1380 (907) 333-8268	Approximately 75 acres; spruce; located next to Sear Elementary School, Kenai; impact of spruce bark beetles unknown. Contact owner for further details.
JESSE B. & MARY E. TOOKE 380 W. Rockwell Avenue Soldotna, AK 99669 (907) 776-8197 (907) 283-6262/2264	30 acres; spruce; Tax #18549606-4; non-accessible by road; non-impacted by spruce bark beetle; stumps & brush to be pushed into one pile.
RONALD J. & MARILYN L. WELLS 790 S. Juniper St. Pineville, OR 97754 (503) 447-5710 (503) 447-1410	10.5 acres, 1147, Gray Cliff Sub., Kenai; timber involved unknown; non-accessible by road except by beach; impact of spruce bark beetles unknown. contact owner for further details.
WALTER E. & MONA L. WENTZEL Box 39182 Ninilchik, AK 99639 (no phone listed)	Two 40 acre blocks; spruce/birch; several locations, Ninilchik; accessible by road; impacted by spruce bark beetles. Contact owner for location and details.
BILL B. WILLIAMS, JR. 23003 E. Eudie Otis Orchard, WA 99027 (509) 926-6000 (509) 929-8005	90 acres; E. of Tract D of Doyle Estates, 1st addn; mixture spruce, birch hemlock, aspen/cottonwood; accessible by road; impact by spruce bark beetles unknown; no damage to property.

BRUCE & LINDA WILLARD
40520 Waterman Rd.
Homer, AK 99603
(907) 235-8830

500 acres; varioius locations; 95% spruce; non-accessible by road; non-impacted by spruce bark beetles. Contact owners for details.

MARION E. WILLIAMS
P.O. Box 287
Kasilof, AK 99610
(907) 262-1210

3.5 acres; Assessor Parcel #R-137-022-38; spruce; accessible by road; impacted by spruce bark beetles.

PRODUCT & MARKET FEASIBILITY REPORT FOR COMMERCIAL TIMBER RESOURCE UTILIZATION PROGRAM

PREPARED BY:

ASK* Marketing and Research Group
and
University of Alaska Anchorage
Alaska Center for International Business

FOR:

Kenai Peninsula Borough
Economic Development District, Inc.
110 South Willow Street, Suite 106
Kenai, Alaska 99611-7744
Tel: (907) 283-3335
Fax: (907) 283-3913

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Alaska Department of Commerce and Economic Development, Division of Economic Development; and
Kenai Peninsula Borough Economic Development District, Inc.

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KENAI PENINSULA BOROUGH
ECONOMIC
DEVELOPMENT
DISTRICT, INC.

TO REPORT READERS:

The enclosed report was prepared by a consultant for the Kenai Peninsula Borough Economic Development District, Inc. (EDD) to be used in the work of the Kenai Peninsula Timber Resource Utilization Task Force. While the findings and recommendations of the report are those of the authors, this material was intended for use in formulating strategies and recommendations of the Task Force to be reported to the Borough Assemoly and in the design and development of the EDD's work program. The newly formed Timber Resource Utilization Committee of the EDD intends to use these documents to continue the work toward the accomplishment of this mission.

James A. Elson

James A. Elson, Chairman

PRODUCT & MARKET FEASIBILITY REPORT FOR COMMERCIAL TIMBER RESOURCE UTILIZATION PROGRAM

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1. SUMMARY AND RECOMMENDATIONS

1.1 Background

ASK* Marketing and Research Group and the University of Alaska Anchorage Alaska Center for International Business (ACIB) were engaged by the Kenai Peninsula Borough Economic Development District, Inc. (EDD) to provide information concerning product and market opportunities which may be available in connection with the Timber Utilization Program.

Information was gathered through extensive literature searches, international trade data, and personal discussions. A partial bibliography is included in the Appendix.

An extensive list of domestic and international forest and wood product manufacturers has been submitted separately from this report.

1.2 Resource Base

In 1987, the total timber resource on the Kenai Peninsula was estimated to be approximately 3.67 billion board feet. (van Hees and Larson, 1987.)

Research is now underway to determine the extent of dead and spruce beetle-infested timber. Actual product opportunities will depend much on the quantity and quality of the available timber. In addition to extensive timber resources, the Kenai Peninsula has excellent utility, truck, rail, and port access. It is also in close proximity to two-thirds of the state-wide population base which resides in Southcentral Alaska.

According to one recent estimate based on acreage, out of 3,249,959 acres of forestland (excluding major bodies of water), 409,045 acres, or 12.6% of the total acreage, were considered infested. (Summer 1992; Alaska Department of Natural Resources for the Western Kenai Peninsula and Kalgin Island)

1.3 Highlights of Findings

Domestic and international markets present good opportunities for Alaska-based producers.

Likely increases in demand, in combination with reduced Lower-48 and Canadian supplies and subsequently increasing prices, suggest good opportunities for Alaska timber products to be sold to paper companies, furniture manufacturers, log home builders, and retailers of gift and decorative items.

Low stumpage rates may be needed to help make Kenai Peninsula products more competitive.

To be competitive in U.S. markets, Kenai Peninsula processors must manufacture high value products that offset the impact of high freight rates.

In 1991, Alaska wood product exports totaled $537.8 million. They consisted of $161 million in pulp, $293.7 million in logs, $68.7 million in lumber, $7.9 million in chips, $4.7 million in pulpwood, and $1.8 million in other wood products.

Despite its small population base, Alaska has a sizeable in-state market for dimensional lumber and related products, estimated at $57 to $71 million in 1991. Most of this is served by Pacific Northwest and Canadian suppliers.

Data from the mid-1980's show an estimated 138 million board feet (MMBF) of lumber imported into Alaska and 167 MMBF exported. This suggests there may be an opportunity for another sawmill of similar or smaller scale to that of the Chugach Forest Products (CFP) Seward sawmill. Products would include a full range of kiln-dried dimensional lumber.

In-state and export markets for high-quality chips are likely to remain strong.

With an established Alaska export base of $70 to $80 million of rough sawn lumber, it should be possible to develop additional export business.

Given transportation costs, the CFP Seward sawmill may not be in a position to use much of the available East Cook Inlet Kenai Peninsula timber. Depending on what uses are found for the timber, it may be feasible to establish an integrated mill complex of comparable capacity elsewhere on the Kenai Peninsula. The complex could feature centralized sorting and grading, kiln operations, a treatment plant, possibly secondary mills, and sites for small-scale manufacturers of finished products for commercial and consumer markets. Such a complex could include a forest product technology and business development center.

If 70% or 80% of the wood which is harvested is processed into chips or pulp, then there may not be a sufficient volume of timber to support such a sawmill and manufacturing center.

To build a "critical mass," it may be necessary for producers in the Railbelt area to form a cooperative marketing and technical assistance organization. Such a cooperative could be set up in a format similar to that used with tourism marketing councils in Alaska. Seed money from the State of Alaska and private industry could be used for start-up funding. The organization could handle marketing, technical assistance, quality control, and act as a funding agency.

Taking a cue from Canada, the development of Alaska quality standards, a grading system, and a cooperative marketing program will be essential to the future success of a local wood products industry.

House logs and log homes represent an excellent opportunity for local producers given their acceptance by Alaskan, U.S., and overseas customers. Wood products such as railroad ties, timber bridge materials for public works, docks, and local lumber represent an important opportunity for one or two major suppliers and several small-scale remanufacturers.

The market for new construction in Alaska will remain limited. However, based upon acceptance by housing agencies, there is the potential for one or two manufactured housing companies. Using in-state sales for their base, it may be possible for these firms to find markets for panelized or other types of construction systems outside of Alaska.

There appears to be potential for wood fuels for energy development. There are many processes which have been developed which may make otherwise unusable spruce feasible for energy applications.

The following opportunities may exist for Southcentral timber industry development. They can be categorized into three levels of complexity:

Least complex:
- Visually-graded white spruce lumber
- Preservative-treated timbers
- Roof and/or trusses of graded white spruce

Moderately complex:
- I-joists utilizing graded white spruce with 2"x2" or 2"x3" flanges
- Glue-laminated timbers
- Finger-jointed lumber

Most complex:
- Plywood
- Oriented strandboard (OSB)
- Laminated veneer lumber (LVL)
- Sandwich or stressed skin panels

The following table summarizes likely markets by product and species for four species of trees found on the Kenai Peninsula. These products are expanded upon in this report.

	Alaska	Lower-48	Int'l.	Paper Birch	Quaking Aspen	Black Spruce	White Spruce
Raw material products							
Stumpage	x	x	x	x	x	x	x
Logs	x	x	x	x	x	x	x
Primary Processing							
House logs	x	x	x			x	x
Rough green lumber	x	x		x	x	x	x
Kiln dried lumber	x	x	x	x	x	x	x
Beams and timbers	x	x					x
Wood chips							
Landscaping	x	x		x	x	x	x
Feed stock	x	x		x	x	x	x
Pulp and paper		x	x	x	x	x	x
Composite panels							
Mat board		x	x	x	x	x	x
MDF		x	x	x	x	x	x
Secondary processing							
Treated lumber							
RR ties	x					x	x
Mine props	x					x	x
Bridge stock	x						x
Surfaced lumber							
Paneling	x	x	x	x	x	x	x
Furniture blanks	x	x	x	x	x		
Decking	x					x	x
Trusses							x
Crating & packaging							
Roe boxes	x	x	x		x		x
Pallets	x					x	x
Shipping crates	x						x
Log structures							
Recreational	x	x	x			x	x
Commercial	x	x	x				x
Residential	x	x	x				x
RTA products							
Furniture	x	x	x	x	x		x
DIY packaged product	x	x	x	x	x		x
Handicrafts							
Turned	x	x	x	x			x
Milled	x	x	x	x	x	x	x
Energy							
Firewood	x			x	x	x	x
Chips	x			x	x	x	x
Pellets	x					x	x
Presto logs	x					x	x
Cogeneration	x			x	x	x	x

1.4 In-Depth Research Needed

From our extensive review of research reports and discussions with various experts, it is clear that there has never been a detailed analysis of wood production and consumption in Alaska. The 1986 report by Gunnar Knapp and Karen Foster provided useful estimates, but lacked the detail necessary to facilitate a wood products industry strategic plan. Such research is needed and should include private and all levels of governmental procurement.

A survey of available technologies for fuels, fiber processing automation, and other applications is also needed.

Funded by the Alaska Science and Technology Foundation, Ed Packee and Kevin Curtis at the University of Alaska Fairbanks have begun studies aimed at improving utilization of Alaska species. These studies include evaluation of the physical properties of spruce and other species and research into appropriate preservative treatment processes for spruce.

1.5 Wood Products Industry

Throughout Alaska there are approximately 200 wood products suppliers, most of whom are in retail and wholesale trade. Among those manufacturing products, the majority are one or two person owner-operator shops making handicraft and custom-built goods.

In 1987, there were estimated to be 200 sawmills in the In[illegible]r and Southcentral regions producing 5-6 million board feet (MMB[illegible] per year, about 3% of their average reported capacity (200 MMBF). A 1989 Alaska Department of Commerce directory of all commercial sawmills in the state estimated total capacity to be 525 MMBF. The average capacity utilization, for those which reported production data, was 50%.

The estimated average employment for the timber and wood products industry in 1991 for Alaska was 2,400 persons, plus another 900 in pulp and allied manufacturing.

The only full-time sawmill plant in Anchorage has opened a second mill in the Matanuska-Susitna Borough across Cook Inlet from Anchorage to handle logs and rough sawn lumber for export.

There are nearly three dozen wood products suppliers on the Kenai Peninsula. Roughly a third manufacture wood products, typically rough sawn lumber, handicrafts, and house logs. The balance are primarily wholesalers or retailers.

The largest mill in Southcentral Alaska is the Chugach Forest Products' (CFP) Seward sawmill. This 100 MMBF (two shift) capacity sawmill is currently closed but is expected to resume operation late in 1992, making it the largest Kenai Peninsula consumer.

In addition to the CFP Seward sawmill, a chipping operation to export material from the Kenai Peninsula has recently received financing. However, other than the CFP Seward sawmill, there are no established and operating companies on the Kenai Peninsula with the design, production, and marketing capacity from which to grow quickly. Thus, without an adequate commercial base, external assistance will be needed to assist local companies in moving up the learning curve and establish a stable sales base. This assistance should include opportunities for financing and development of networking cooperatives.

1.6 Developing an Alaska-based Wood Products Industry

Whatever wood products industry development strategies are employed, much attention should be paid to fostering a locally-owned and operated sector.

One strategy to help define the potential for an integrated wood products industry would be for the EDD, Alaska Department of Commerce and Economic Development, U.S. Economic Development Administration, and other interested agencies to sponsor a Railbelt-wide wood products opportunities workshop which would bring together wood product producers, industry experts, and government and private procurement managers.

The second part of this event would be to hold confidential, private meetings between experts and local entrepreneurs. The purpose of these private sessions would be to provide an initial opportunity for feasibility assessment and to explore specific requirements for development. Information developed through these confidential sessions would be assembled by a private consultant for presentation in a strategic planning document.

Other goals of the workshop could include:

a. Determine the feasibility of a wood products cooperative. Such a cooperative would address buying, marketing, and technical assistance needs for all participating businesses. The cooperative could be organized as a non-profit economic development corporation which could receive public and private funds for the purpose of making grants and loans to members. It may be possible for the cooperative to work toward self-support with public monies used for its seed funding.

b Under strict confidentiality agreements, the EDD would coordinate the next stage of planning and technical/financial assistance for those parties who desire it.

c. Define a state-wide wood product quality assurance and Alaska brand identification program.

A healthy in-state industry requires adequate financing to move from concepts or cottage industry production to the next level of commercial production. Capital for modern equipment and operating expenses is of great importance since small producers lack the cash flow to support necessary marketing and related activities. Local commercial banks generally consider the wood products a high risk business. Also, most small producers will need ongoing help with technical, financial, and marketing assistance. It may be possible to address these needs through a producers' cooperative.

The most likely source for such assistance would be the State of Alaska and outside investors. Prospects for attracting investment have been improved by high stumpage rates in the Pacific Northwest and Canada and dwindling supplies of uncommitted old growth timber resources. Nevertheless, it may be important that the State provide additional support in connection to stumpage prices, reforestation costs, and road construction.

The essence of marketing is the ability of an organization to understand and exploit the relationships between consumers and various industry segments in a strategic framework. Developing an integrated timber industry on the Kenai will require a farsighted marketing approach to be truly successful.

1.7 Wood Products Industrial Park

The concept of co-locating facilities in an industrial park improves margins considerably. This approach is being taken at the CFP Seward sawmill location. A timber manufacturing complex will reduce handling, inventory, and shrinkage costs as well as facilitate communication. The timber complex also insures that each log goes to its highest and best use. Other advantages of the industrial park concept include cooperative marketing and sharing of technical resources.

Such an industrial park would feature a cogeneration facility, central sorting and grading operation, primary mill, and kiln. Small-scale mills and remanufacturers could co-locate with one large primary mill or other processing operation, such as a pulp mill.

It could be advantageous for any mill complex to implement a cogeneration system for kilns and other heating requirements and to produce electricity from its own waste wood. From industry reports, this can increase profit margins by 10% or more, depending on local energy costs. Alternatively, a wood fuel manufacturer may find it attractive to co-locate with a primary mill or industrial park. Possibly, significant quantities of low grade spruce will need to be sold as woodchips to achieve a high utilization of the resource.

1.8 Existing Alaska Business Incentives and Assistance

Freight costs play a critical role in the price competitiveness of Alaska's forest products. The transportation cost of bringing lumber into the Railbelt market from Seattle is about $70 per thousand board feet (MBF). This gives Alaska processors a cushion in local markets but puts them at a disadvantage in West coast markets. Alaska sits about three days closer to Asia than the Pacific Northwest, resulting in a transportation advantage of approximately $7,000 per day for chartered vessels from the Port of Anchorage.

To encourage the formation and expansion of manufacturing in Alaska, the Anchorage Economic Development Corporation established an agreement with Sea-Land for special "backhaul" rates to Alaska producers shipping new products. This incentive could be beneficial to the timber industry. These rates are 20% to 25% less than Sea-Land standard rate and apply only for goods shipped from Anchorage to Tacoma or Dutch Harbor.

Throughout Alaska, there are regional development organizations, such as the EDD and the Anchorage Economic Development Corporation. There are also a number of other organizations able to provide technical assistance, including the University of Alaska Anchorage/Alaska Center for International Business (ACIB), Community Enterprise Development Corporation (CEDC), University of Alaska Fairbanks Cooperative Extension Service, USDA Soil Conservation Service (SCS), University of Alaska Anchorage/Small Business Development Center (SBDC), and USFS Office of State and Private Forestry in Anchorage. Financial assistance is available from State agencies such as the Alaska Industrial Development and Export Authority (AIDEA).

The Alaska Department of Commerce and Economic Development (DCED) has established a product preference program in connection with state procurement:

Alaska Forest Product Preference Program - 3% to 7% price preference
Alaska bidder's preference - 5% preference
Recycled Alaska Product Preference Program - 5% preference

According to one Anchorage producer of high-quality, competitively-priced office furniture, he finds it difficult to overcome established relationships outside suppliers have with State agencies. Given the extent of State government purchases of wood products, it is suggested that the State of Alaska establish additional incentives and directives for public agency procurement personnel. These could include substitution of wood for steel products and thorough consideration of local suppliers of specialty products over national catalog sales.

1.9 Kenai Peninsula Timber Resources

In 1987, the total timber resource on the Kenai Peninsula was estimated to be approximately 3.67 billion board feet. The total area of the Kenai Peninsula inventory unit was estimated at 5,215 thousand acres. Forest land made up about 1,909 thousand acres, nonforest 3,094 thousand acres, and water the remaining 212 thousand acres. Of the forested acres, 487 thousand were classified as timberland.

An additional 163,800 acres of commercial timberland lie on the West side of Cook Inlet and are on lands which are part of the Kenai Peninsula Borough.

Timberland is defined as forest land producing or capable of producing crops of industrial wood. Areas qualifying as timberland can produce more than 20 cubic feet per acre per year of industrial wood at culmination of mean annual increment. (Mean annual increment is a measure of the volume of wood, in cubic feet, produced on 1 acre during 1 year.) The following table illustrates the potential timber volume and distribution of selected species.

Kenai Peninsula - Net Volume of Timber, 1987
(thousands of board feet)

	White Spruce	Sitka Spruce	Mtn. Hemlock	Quaking Aspen	Paper Birch	Total*
Private Lands:						
Pole Timber	5,183	0	352	1,544	16,678	23,757
% of tot spec	1.0%	.0%	1.6%	100.0%	29.6%	2.0%
Saw Timber	4396,530	609,177	21,019	0	39,758	1,169,624
% of tot spec	98.8%	100.0%	98.4%	.0%	70.4%	97.7%
Total	502,754	609,177	21,371	1,544	56,436	1,197,622
% of total	42.0%	50.9%	1.8%	.1%	4.7%	100.0%
Total All Ownership						
Pole Timber	49,784	0	5,755	19,594	146,223	221,357
% of tot spec	3.1%	.0%	1.7%	100.0%	38.6%	6.0%
Saw Timber	1,534,028	1,266,866	339,720	0	232,112	3,424,032
% of tot spec	96.0%	100.0%	98.3%	.0%	61.4%	93.3%
Total All	1,598,400	1,266,866	345,475	19,594	378,335	3,671,308
% of total	43.5%	34.5%	9.4%	.5%	10.3%	100.0%

*Includes Miscellaneous species
(Note: Row totals may not sum since other species, such as Black Cottonwood and Black Spruce, are not shown. Column totals do not sum to totals since seedlings/saplings and other growth are not included in this table.)
Source: W. van Hees and F. Larson; 1987; percentages calculated from their data.

Excluding peak harvests of nearly 70 MMBF in 1989, and 13 MMBF in 1987, the annual harvest volume from the Chugach National Forest averaged nearly 1 MMBF throughout the 1980's. It should be noted that the Chugach National Forest extends well beyond the political boundaries of the Kenai Peninsula Borough.

Chugach National Forest Timber Harvest
(thousands of board feet)

1980	1,565	1986	563
1981	1,814	1987	13,031
1982	679	1988	1,185
1983	751	1989	69,516
1984	545	1990	1,000
1985	354		

Source: USFS Pacific Northwest Research Station, 1992.

Individual timber sales have been infrequent for a number of reasons including a lack of processing facilities and the inability of the local market for green lumber to accommodate large volumes.

1.10 Examples of Investment Requirements

To illustrate the scale of investment and enterprise size for different types of manufacturing operations, some estimates of the capital and wood resources required to establish various levels of processing capacity are presented in the following table:

Option	Capital Cost ($000)	Annual Wood Required (Cubic Feet)	Manufacturing Employment (Persons)
Small Sawmill	$150	42,000	2-4
Small-Med. Sawmill	400	150,000	4-5
Medium Sawmill	1,900	750,000	10
Large Sawmill	18,500	5,000,000	30
Plywood	20,000	3,500,000	80
Panelboard	30,000	3,500,000	100
Container Ply.	6,000	3,500,000	60
BCTMP Pulp	300,000	10,000,000	135
Kraft Pulp	600,000	29,000,000	500
Paper Mill	1,300,000	NA	500
Med. Pellet Mill	2,000	90-120,000 (tons)	20
OSB/Waferboard	45,000	295,000 (cords)	180
MDF Mill	40,000	72,000 (BDU)	70
Mfd. Housing	300 +	NA	8-12
Small Log Home	600 +	2 (MMBF)	10-15
Small House Log Profiling Mill	100-200	2 (MMBF)	4-5
Large Log Home	1,500 +	4 (MMBF)	20-30
Large House Log Profiling Mill	500-1,000	4 (MMBF)	8-12

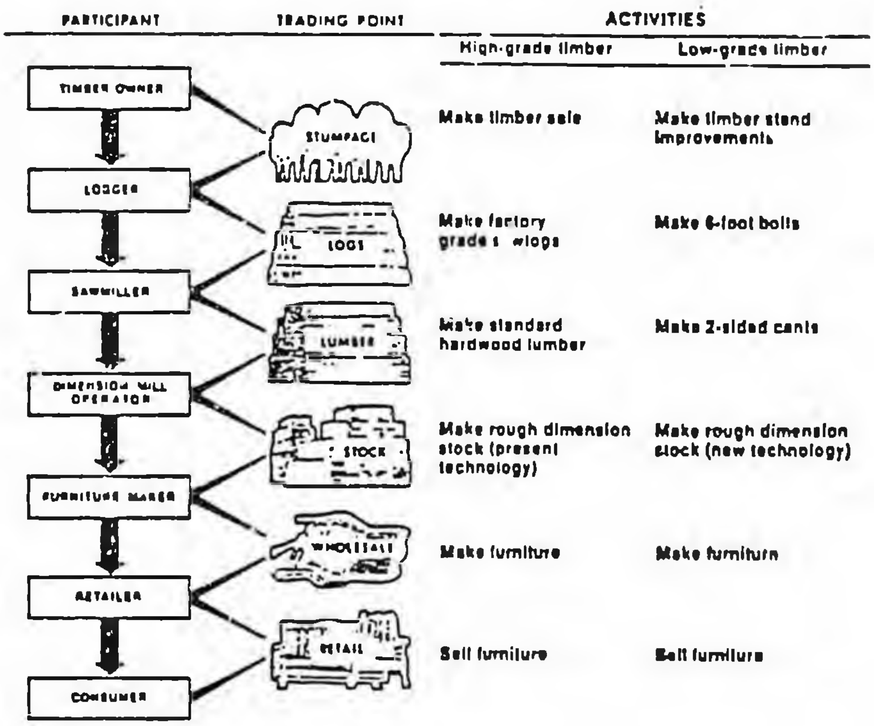
Sources: Cal Kerr, Matanuska-Susitna Borough Forest Management Plan, June 1989; Dr. Edmond Packee, unpublished research; ASK* Marketing and Research Group unpublished research; Dr. Pete Koch, Proceeding: Development of Alaskas' Boreal Forestry, 1988.

2. INDUSTRY STRUCTURE

Most advanced timber supply regions have been in the business for generations and have gradually developed a high degree of specialization and integration. Specialization is the process that allows efficient production of resources. Integration is the process that allows efficient handling and distribution of each log to its highest and best use. The markets for each product have different requirements and different channels of distribution that are difficult for any single company to meet. Often a log can pass though as many as 6 to 10 owners before ending up as a cabinet in a kitchen. Each of these owners provide a vital function that serves to add value to the end product.

Often an experienced and diversified company is able to perform a few of these functions in-house to capture greater margins; the inability of a company to perform each one of these functions well can erode profit margins.

The following diagram illustrates the overall structure of the wood products industry:



2.1 Timberland

The first stage of production is the timberland owner The land owner must provide sufficient information on the raw material and the sale terms to the logger so that the logger is able to reasonably estimate all of the costs and project a profit. Profits for the landowner are achieved by proper management of the forest resource and by providing accurate information on the resource and the costs of extraction. Logging operators who are unable to accurately project costs and value will always bid down a timber sale to reduce their risk. Support activities for the landowner include timber sale planning and layout, supervising road building and infrastructure development, monitoring logging activities, environmental and regulatory compliance, tree improvement and reforestation.

2.2 Logging

Loggers perform the first market-related function. They determine whether they should haul tree-length logs, or which log length will bring the highest prices from various buyers. Usually this sorting begins in the forest so that each type of log is directed to its highest value buyer. Loggers add or diminish value by their handling and bucking procedures.

Without taking title to the logs, graders expand on the specialization process by attaching a relative value to each log by specifying the characteristics of the log.

2.3 Sorting and Grading

The logs are taken to a log concentration yard or a transfer facility where they are sorted further. One facility can have up to 60 different log sorts. The sort yard can be in a sawmill staging area or at an intermediate point where different logs are sold to different buyers. Each time a log is handled it can lose up to 5% of its value due to scrapes, splits, and wastage.

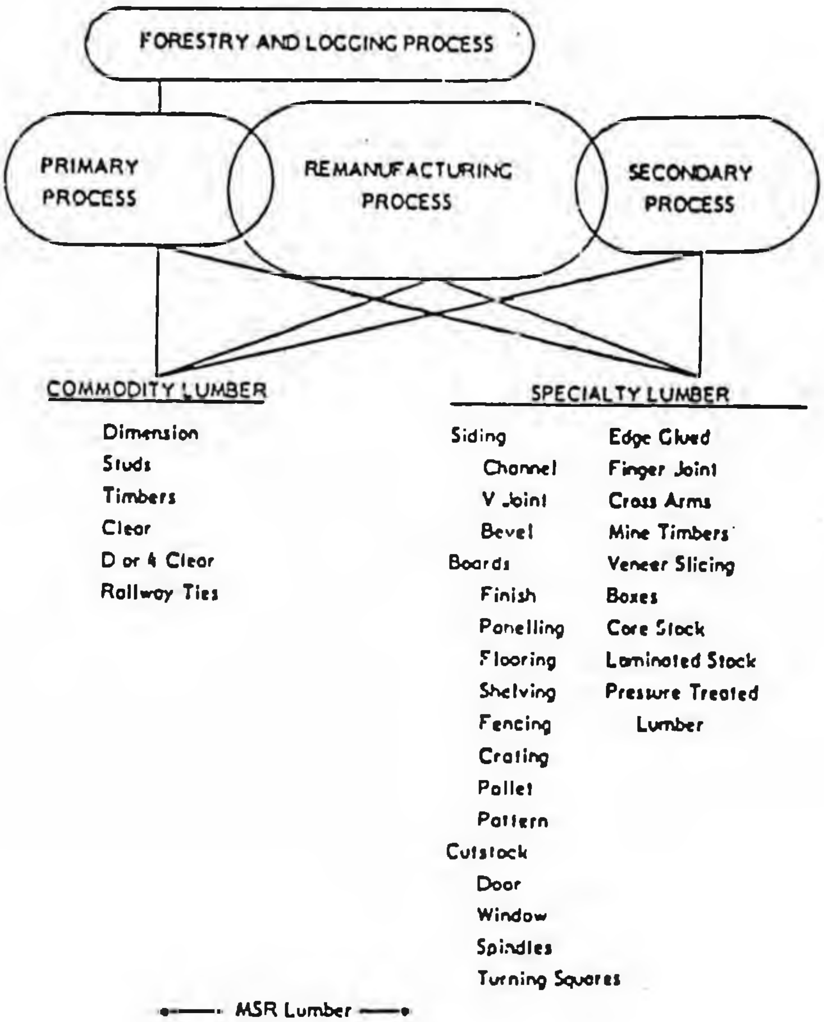
Often a broker will purchase or facilitate the sale at the log sorting areas. An example of this is seen with the Japanese trading companies who buy all saleable logs and sell them to lumber mills, chip mills, Korean sawmills, and Taiwanese mills. The broker or buyer often re-sorts the logs based on each customer's unique product needs. They are able to extract the highest price from each customer because every customer gets only what they need and do not have to spend money to dispose of unnecessary raw material.

2.4 Sawing and Milling

The primary sawmill produces commodity lumber products. Profits are generally made by volume production based on high throughput and maximizing product recovery, which varies by as much as 70%. Additional profits are achieved by knowing exactly what products to make. Technology is increasing the flexibility of sawmills, but flexibility is still limited because of volume requirements. The product is often graded again at this point, and value is based on this grade.

Again, brokers often perform the specialization function. They distribute the products to many different customers based on individual requirements. Their ability to make a profit (or the sawmill's ability to make additional profits) depends on the ability to meet individual customer specifications on a continuing basis. The customer may be a wholesale or retail lumber yard or another intermediate processor of finished product.

The secondary sawmill produces paneling, siding, furniture stock, stock for toys, utensils and instruments, or any number of custom products that have unique shapes, characteristics, and markets. While flexibility can decrease profits for the primary processor, flexibility is the key to profits for the secondary processor. Dimensioning mills usually do not work with a broker in sales of stock because close communication with the final buyer is essential for meeting their needs accurately. These mills may work with brokers or building supply stores and contractors for the sale of siding, paneling, and flooring. The following diagram illustrates the function and value created by a secondary sawmill.



Source: Carroll-Hatch, 1988.

A secondary sawmill must be willing to rapidly shift the dimensions of lumber that is manufactured, change the moisture content, change the species, or any number of adaptations to meet the needs of the product manufactures. The secondary sawmill, in turn, will be willing to pay a higher price to the primary sawmill if the primary sawmill can deliver products that minimize the work required to meet the product manufacturers' needs. Proper log handling, sorting, and bucking in the woods and the concentration yard will make it easier for the primary sawmill to make the commodity products that bring the highest price. Proper marketing requires that the feedback from the consumer reaches all the way to the logger in the woods. At any stage of this process, one participant can perform the tasks of upstream or downstream stages through vertical integration. Shortening this chain will increase margins and knowledge of consumers but each task must be performed well if value is to be maximized at each stage.

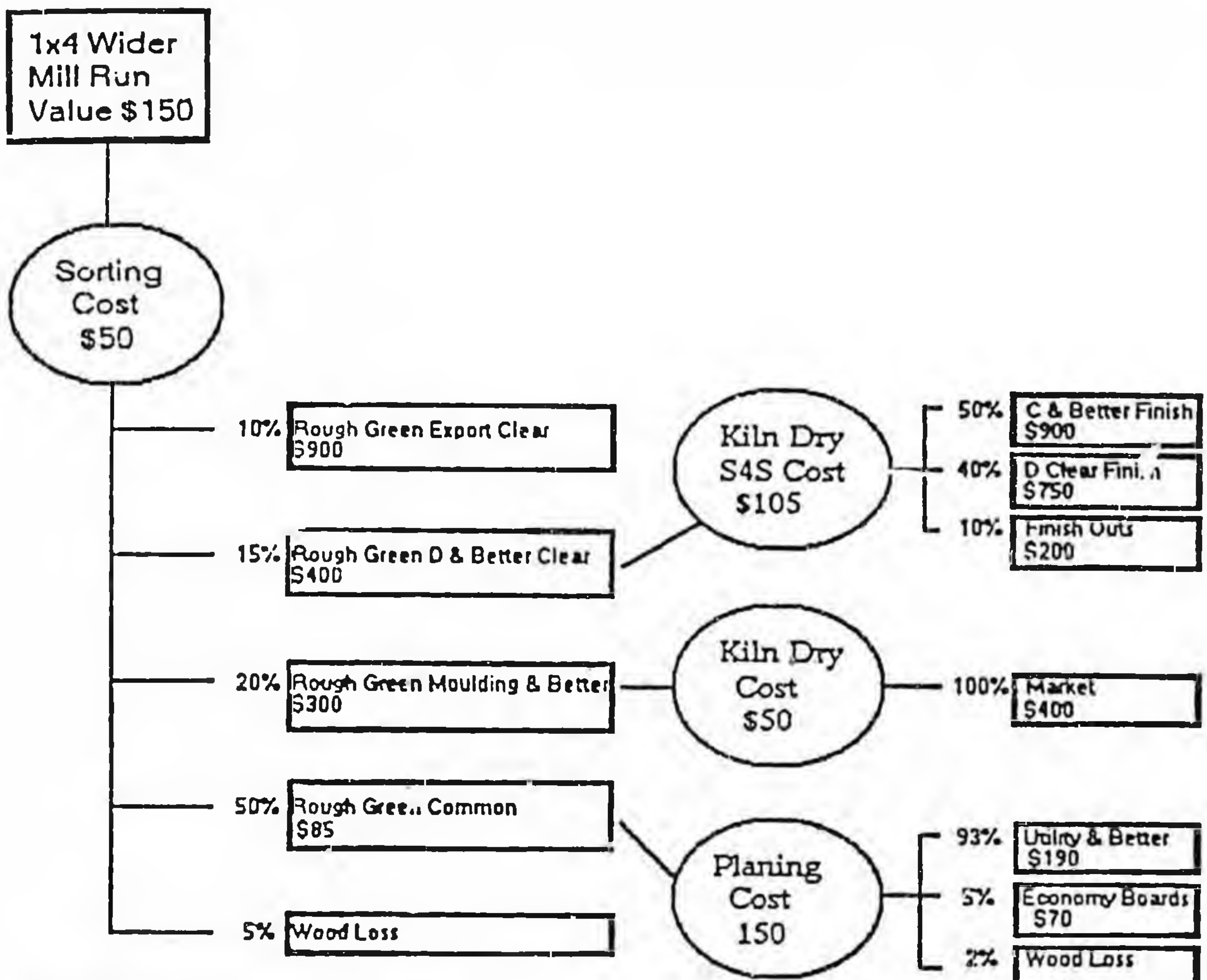
2.5 Manufacturing and Remanufacturing

The furniture manufacturer or other remanufacturer turns the lumber into consumer products. These products sell in consumer markets through retailers and must meet the ultimate test of the end-user. Key to the ability of make a profit is matching the product with the consumer. The furniture maker is likely not interested in the sawmill business because it is too difficult to estimate sawmill production costs and establish product prices.

The remanufacturer is forced to constantly adapt the product in anticipation of, or in response to, changes in the market. Constant feedback from consumers, retailers, and wholesalers is the only way to adapt to market changes in a timely fashion. The remanufacturer, in turn, must redesign products to meet the changing needs.

The following graphic illustrates the remanufacturing process. Although unit values are outdated, the relationships remain essentially unchanged.

ONE EXAMPLE OF REMANUFACTURING PROCESS ANALYSIS



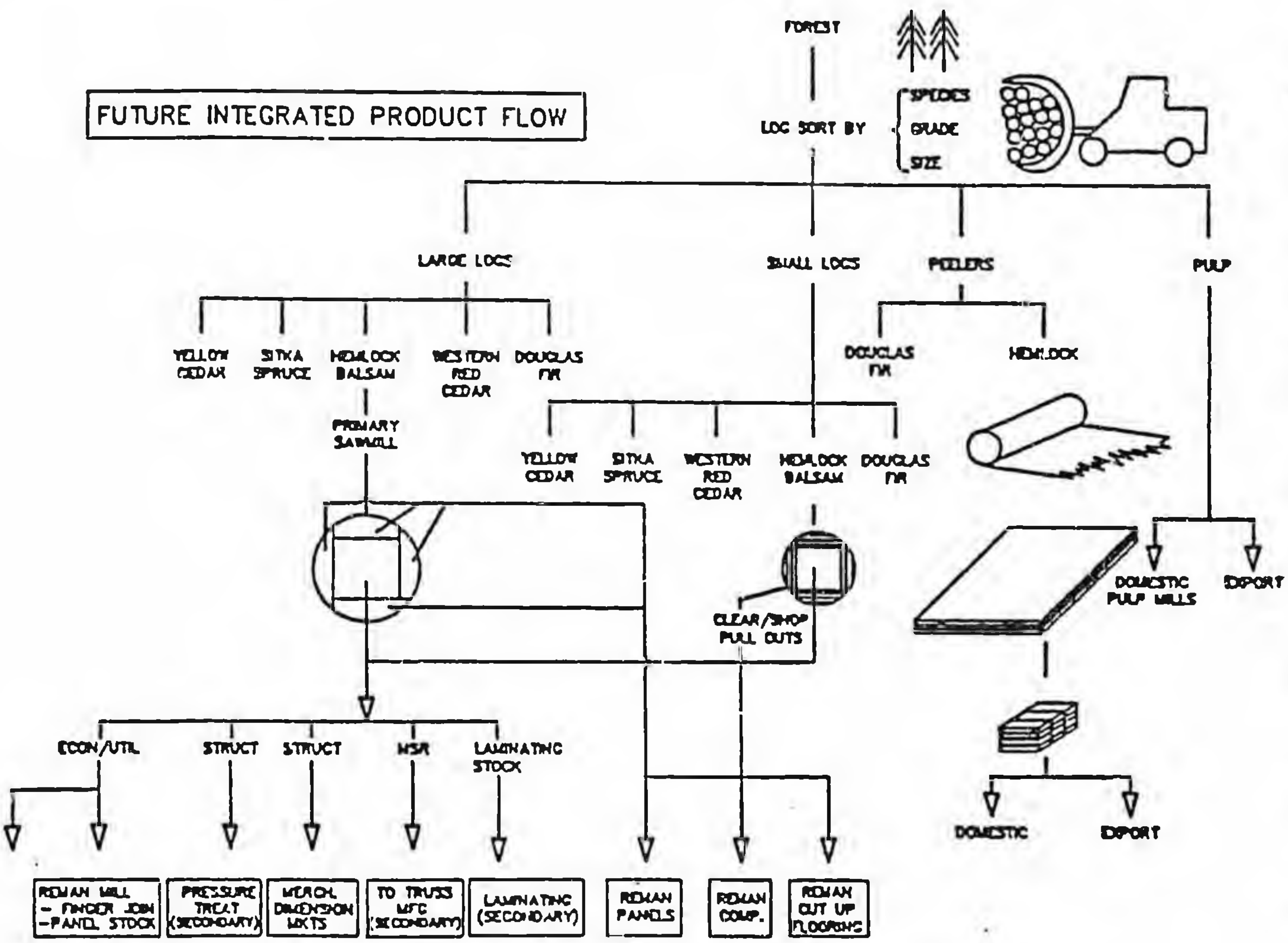
Finished Value	$375.60
Total Costs	$300.75
Potential Profit	$ 74.85

Source: Carroll-Hatch, 1988.

2.6 Waste Wood and Shrinkage

Waste wood is created at each stage of the manufacturing process, and disposal represents a significant cost. The ability of each producer to meet the needs of the buyer has a profound effect on profit recovery and the amount of wood waste that is generated. For example, one firm was supplying 3 inch ladder stock to a ladder manufacturer, but the ladder manufacturer was only getting 50% recovery from the lumber. Both companies increased margins and reduced costs when the supplier cut the ladder stock more accurately for the ladder manufacturer. Proper management of waste wood can make the difference between profitability and bankruptcy. Waste wood can be better utilized in an industrial complex because the companies can share a boiler or cogeneration facility, or provide a stable supply of pulp chips.

The diagram below shows a model proposed for the Western Canada wood products industry to achieve the greatest efficiency through integration. This model can be applied to the problem of developing an integrated wood products industry in Alaska.



Source: Carroll-Hatch, 1988

3. WOOD PRODUCTS

The total value of Alaskan wood product exports was over $537.8 million in 1991. Log exports were valued at $293.7 million, lumber at $68.7 million, and pulp at $161 million.

3.1 Round Log

3.1.1 Alaska

With Native corporations liquidating timber inventories, Alaska exported 520 MMBF of logs in 1988. (Berman and Hull, 1989.)

In 1990, a total of 1.03 billion board feet of timber was harvested throughout Alaska, 474 MMBF feet came from the Tongass Forest in Southeast Alaska and 547 MMBF from private lands.

In 1991, 528.9 MMBF were exported from Alaskan ports. Roughly 27% of this left through the Anchorage port. Alaska spruce exports totaled 218.6 MMBF of which 44% passed through Anchorage.

Log Exports from Alaska, 1986-1992*
(Thousand Dollars)

	Spruce	Hemlock	Western Red Cedar	Softwood**	Birch	Total
1986	64,044	59,496	6,582	7,422	0	137,543
1987	96.592	86,985	13,526	16,745	0	213,849
1988	112,789	106,992	25,576	19,824	0	265,180
1989	155,909	120,361	29,942	22,706	17	328,935
1990	166,618	114,949	27,507	27,695	0	336,769
1991	156,816	95,182	21,987	19,742	0	293,727
1992*	37,157	21,935	3,439	7,461	8	70,001

* 1992 is for Jan.- April.
** Species not specified.
Source: U.S. Bureau of the Census, compiled by ACIB.

Tight timber supplies in Southeast Alaska and the Pacific Northwest have caused firms in these regions to reach as far north as Afognak Island, Prince William Sound, and Kenai Peninsula for logs. The Alaska Pulp Corporation sawmill in Wrangell is using these supplies to feed its sawmill operation (Bradner, 1992), and James River Corporation is purchasing pulpwood from Afognak and Homer to feed pulp mills on the Columbia River.

3.1.2 Kenai Peninsula

The Kenai Peninsula contains significant stands of old growth white spruce mixed with white birch, Sitka spruce, Lutz spruce (a hybrid white-Sitka spruce), and western hemlock. The forest type is a cross between the mixed wood boreal forest of Interior Alaska and the western hemlock-Sitka spruce forest of the Southeast rainforest.

White spruce has excellent properties for most lumber and pulp uses. It has a very high strength-to-weight ratio, glues easily, dries well, machines well, and has excellent resonance properties for use in musical instruments. There are typically a large number of small, tight knots in the wood, making the percentage of clears lower than Sitka spruce. The only limiting property of the wood is that it does not accept most wood treatments. White spruce will accept copper sulfate treatment as a preservative. White spruce is the dominant softwood used in Canada for pulping. The wood has long fibers that separate easily and bleach well.

The CFP Seward mill had significant problems with the occurrence of compression wood (accumulated internal stress developed during the growing process) from some spruce stands located on the Kenai Peninsula. After processing the logs into lumber, it tends to warp and twist which may bind saws during production. However, for sizes greater than 4"x4", this problem is minimized in that it will not bend or twist noticeably if compression wood is present. The presence of compression wood could hinder quality control and competitiveness in joinery work, furniture stock, and small dimension lumber. Since it is difficult to detect before a log is sawn, it will also affect the quality of round logs for export.

Sales of round logs from the Kenai Peninsula have generally been limited to local suppliers of firewood, rough lumber, and houselogs.

Historically, the lack of consistent and predictable timber sales from public lands has limited the establishment of any major processing facilities. Klukwan Forest Products exported about 50 MMBF of spruce logs from the Homer Spit in the 1990-1991 period. The operation ceased in 1991 due to a downturn in the Japanese market and the small size of a number of the logs. Klukwan initially sorted the logs for Sumitomo and Nichimen but abandoned the log sorts in favor of sales of camp run (all merchantable timber) material.

3.2 Dimensional Lumber

3.2.1 Alaska

According to the most recently available information, in 1989 total production from all sawmills in the Anchorage Bowl was estimated to be 2 to 4 MMBF of rough green lumber. By-products (such as slabs and landscaping chips) accounted for another 1 MMBF-equivalent. No detailed lumber production data for the rest of Alaska is readily available.

The CFP Seward mill captured at least 15% of the Alaskan consumption of finished hemlock and Sitka spruce lumber and, according to Frank Seymour (Forest Products Specialist, Alaska Department of Commerce), could easily have grown to 50% had operations improved.

Nearly running to daily capacity, Valley Sawmill of Anchorage opened a second mill this year across Cook Inlet from Anchorage and is expected to handle 5 to 8 MMBF per year. In 1991, Alaska exported 170 MMBF of lumber.

Alaska Exports of Lumber
(Millions of board feet and average value in $ per MBF)

Year	Volume (MMBF)	Average Value ($ per MBF)
1988	167.4	$359.27
1989	183.8	380.04
1990	212.0	397.56
1991	170.3	412.31

Source: U.S. Bureau of the Census, compiled by ACIB.

In 1983 and 1984, each year, approximately 155,000 short tons (or approximately 138 MMBF) of lumber were brought into Southcentral Alaska harbors. Of this amount, 100,000 short tons (or roughly 90 MMBF) came through the Port of Anchorage. (source: U.S. Army Corps of Engineers, Waterborne Commerce of the U.S. cited by Gunnar Knapp, ISER Alaska Railbelt Lumber Markets 1986.)

Trade statistics show that 15 MMBF of softwood lumber were imported into Alaska from Canada in 1990. This amount declined to 7 MMBF in 1991, probably due to the start-up of the CFP mill in Seward. The average value of Canadian lumber imports has been increasing, from $183 per MBF for spruce-pine-fur (S-P-F) lumber in 1990 to $238 per medium density fiberboard (MBF) in 1992. The appendix shows imports from Canada in detail.

3.2.2 Kenai Peninsula

In 1982, there were twenty eight full-time sawmills on the Kenai Peninsula with an estimated annual production capacity of 120 MMBF. The majority of those mills were small circular sawmills producing up to 1 MMBF year of timbers, green lumber, and houselogs. There were also thirty five mobile dimension sawmills in various locations. Today, there are four or five regularly operating sawmills on the Kenai Peninsula, (excluding the CFP Seward sawmill) none of which are operating near capacity (the total capacity is estimated at only 250 MBF per year).

The 100 MMBF CFP sawmill in Seward is currently not operating but is expected to resume operations in late 1992, making it the largest Kenai Peninsula customer for logs. The CFP mill relies primarily on Native corporation timberlands but also purchases logs on the open market. Reactivation plans for the CFP mill call for feedstock from public timber sales as well as privately owned timber.

Until the Seward sawmill opened, virtually no kiln dried lumber was produced in Alaska. The mill produced mainly kiln-dried and green lumber for in-state and export markets. Most of the export product consisted of "baby squares" and chips.

3.3 Pulp, Paper, and Woodchips

The pulp industry plays a critical role in an integrated forest products industry. Pulp mills generally utilize the low grade trees and sawmill residues, allowing only the high value trees to go to the sawmill. Lumber mills have a recovery rate of 45-65% for the logs that they process. Pulp mills provide an outlet for a tremendous amount of waste that otherwise would be expensive to dispose. Pulp mills also contribute to the economy of the communities where they are located by providing from 120 to 500 direct manufacturing jobs and placing $300 million to $1 billion in fixed capital investment.

Pulp and paper are the highest value commodity products made from wood fiber. Chemithermomechanical pulp (CTMP) has a 90% fiber recovery rate, making this process an excellent use of low-grade timber.

The CTMP process is twice as efficient in utilizing wood fiber as the kraft process. Kraft pulp yields only 45-55% of the raw material in finished product while the CTMP process boasts a 90-95% yield on fiber input (one ton of CTMP pulp requires about 95 cubic feet of raw material). CTMP mills also have lower scale economies than kraft mills. A CTMP mill can be built for as low as $300 million while a kraft mill needs a $600 million facility to be economically feasible. A CTMP mill requires a much smaller forest area to provide sustained raw material. This is important in areas with low annual allowable cuts or long rotation cycles.

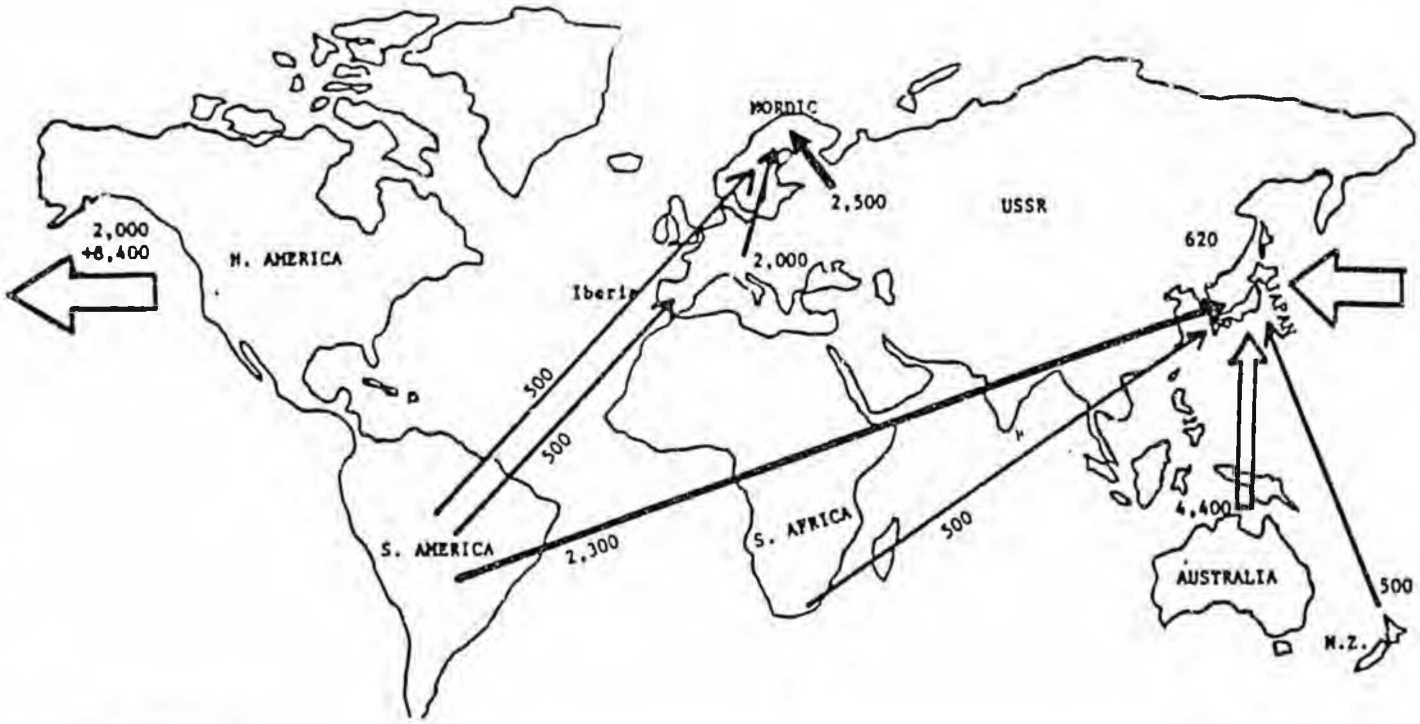
With the discovery of dioxins and chlorinated furans in bleached pulp, the industry has developed a method of using oxygen instead of chlorine-based chemicals to break down the fibers without creating dioxins (Hunt, 1988). Experimental designs of pulp mills with a closed loop water system have been developed. Any considerations of pulp mills should consider the latest in environmental technology.

Logging restrictions in the Pacific Northwest will create sharp reductions in the supply of woodchips in the near future. Marubeni Corporation projects that supplies from this region will drop by about 4 million bone dry units (BDU) (1 BDU is roughly equal to 2,400 lbs.) (PRWMR, 1992). Plywood mills in the Pacific Northwest are relocating to the Southeast U.S. where stumpage prices are lower. The loss of plywood capacity also will decrease the amount of fiber available for pulp mills in North America and Asia. Alberta Canada's expansion of pulping capacity in the late 1980's also has placed a strain on chip supplies, although the effect has not been dramatic.

The following graphic illustrates the general flow of world wood fiber flow for paper or pulp manufacturing from 1990.

WORLD WOODCHIP/PULPLOG FLOW 1990

(1,000M^3/Yr)



3.3.1 Alaska

In 1991, Alaska exported $161 million worth of paper pulp from two pulp mills located in the Southeast region. That same year, $7.9 million worth of chips and $4.7 million worth of pulpwood were also exported. There are no paper mills in Alaska.

Pulp Exports from Alaska, 1986-1992*
(Thousand Dollars)

	Dissolving	Sulphite Bleached	Sulphate Bleached	Sulphate Unbleached	Total
1986	86,643	2,375	330	0	89,348
1987	118,737	10,231	668	1,411	131,047
1988	166,746	15,173	645	0	182,564
1989	217,172	13,863	293	894	232,222
1990	171,655	7,783	0	12,188	191,627
1991	153,932	4,066	0	2,952	160,950
1992*	62,610	1,504	0	0	64,114

*1992 is for January - April only.
Source: U.S. Bureau of the Census, compiled by ACIB.

Given the capital investment required, the cost of meeting environmental quality standards, and associated litigation costs, it is not likely that a pulp or paper mill would be feasible on the Kenai Peninsula. Assuming the needed volume of feed stock was present, such a plant could be located elsewhere in the Railbelt, at a site more central relative to timber supplies.

One concept for a world-scale paper mill in Alaska has been suggested by a Canadian expert. This proposal would involve an investment in the $1 to $1.5 billion range and would likely require joint financing with a major international paper company. Two products have been suggested: 1) Light Weight Coated (LWC) such as that used in glossy magazines or 2) Uncoated Free Sheet which is used in computer paper, envelopes, xerographic, and other bond papers. Markets would include U.S. West Coast as well as Pacific Rim countries.

The Uncoated Free Sheet contains 10% to 20% softwood pulp and 80% to 90% hardwood pulp. The Light Weight Coated contains 50% bleached kraft softwood pulp (66% softwood) and 50% bleached mechanical hardwood pulp (33% hardwood). The plant would require approximately 30 to 40 million gallons of water per day, adequate land, access to tidewater, rail or truck access, 100 to 120 megawatts of electricity, and infrastructure support (such as training). It would likely employ 500 people. The plant could be located on a 200 mile radius (preferably with direct rail access) from its wood fiber sources.

The key economic question concerning a plant of this size is the availability of sufficient wood fiber to support the plant's operation over its expected economic life.

3.3.2 Kenai Peninsula

Given the excellent pulping properties of White Spruce, the potential for the production of chips on the Kenai Peninsula is very good. CFP's Seward sawmill developed stable markets for its spruce woodchips in Japan. Chip exports from Alaska jumped from $2 million in 1990 to $8 million in 1991. Almost all of the gain was attributed to the CFP mill. A new joint venture between Circle DE Lumber Company (Klamath Falls, Oregon) and Kenai Pacific Lumber Company (Anchorage, Alaska) has announced plans this year for chipping operations with sales to Pacific Rim customers shipped from the Port of Homer.

Quality requirements for woodchips are very tight. Generally, buyers will not accept chips with over 0.5% contaminants (bark, rot, dirt, etc.) and 0.5% fines. Export markets often have tighter quality requirements than domestic markets. The ideal chip size is 20 millimeter (mm) long in the direction of the grain and 4 mm thick. Good quality chips are between 10-30 mm long and 2-5 mm thick. Oversize chips are sent to a rechipper while fines are burned for heat or energy.

One of the reasons for the success of the CFPs' chip sales was that the mill built its own chipping facility and did not rely on portable chippers in the woods. It is very difficult to maintain quality standards when using a portable chipper, particularly in winter when the bark is frozen. Portable chip operations should be carefully examined for quality control.

The beetle-killed spruce trees have perfectly acceptable properties for kraft pulping as long as decay has not set in. A kraft pulping study by Werner, Elbert, and Holsten (1983) on beetle-killed white spruce in Southcentral Alaska showed no loss in pulp yield from trees dead as long as 50 years. (See appendix for complete paper.) The kraft pulp market is a natural fit for the dead Kenai spruce. Other pulp markets may or may not have the same results. The kraft pulping process breaks down each fiber. Other processes that maintain the integrity of each fiber may not get such a high pulp yield. Tests should be made to determine the properties for different pulping methods.

Due to its smaller scale, the chemithermomechanical pulp (CTMP) process is likely to be the most feasible method for the Kenai Peninsula. A 1990 report by Edmond Packee of the University of Alaska Fairbanks outlines the following profile of a small-scale CTMP plant:

Mill Size	300 tons per day, current minimum design
Annual Production	106,500 tons (300 tons per day x 355 days)
Value	$750-$800 per ton (Nov. 27, 1990 prices)
Annual Gross Value	$82,537,500 ($775 x 106,500 tons)
Mill Employment	125 to 135 (direct)
Number of Loggers	50 based on a 220-day year; exclusive of truckers and service personnel

3.4 Preservative Treated

There are no preservative treatment facilities in Alaska. Plans call for the addition of a treatment facility to the CFP Seward sawmill.

Substances used in treating wood against rot commonly include creosote, copper arsenates, and other copper-based organic chemicals, but these are considered toxic or hazardous materials and require special handling. Alternatives (such as copper phosphate/copper sulfate double diffusion and borate treatments), are now being researched in Alaska.

In-state consumption of treated lumber is estimated to be 2 to 3 MMBF, total in-state consumption of all treated wood, excluding railroad ties is estimated at 4 to 5 MMBF. Principal products include poles, residential decking, bridge work, posts, and other dimensional stock. Annual use by the Alaska Railroad is estimated at 2 MMBF.

Smaller size landscape ties are commonly not preservative treated, but are dipped in a dark stain and sold at prices in the $5 to $10 range.

Of Alaska state agencies, the Alaska Railroad is likely the single largest user of wood. The Alaska Railroad purchases treated ties (7"x9"x8.5'), switch ties (up to 16' in length), car stakes (6"x6"x10'), tapered at each end), wedge blocks (24"x4'), car decking (varies per need), timbers and decking for bridges (typically Douglas fir), and other miscellaneous materials. While they have in the past had contracts with local suppliers for treated ties, it was at a time when no treatment facility existed in the state and timber supplies were erratic. Ties were cut in Alaska, sent to the Seattle area for treatment and shipped back to Alaska. With an adequate timber supply and promising preservative alternatives to creosote and arsenates, it could, if treated locally, be possible for Alaskan producers to be awarded contracts to supply ties and other products to the Alaska Railroad.

The Railroad presently uses creosote treated ties. As a hazardous or toxic waste material, creosote possesses a long-term disadvantage. Although they are evaluating alternative tie materials such as steel, there may be an excellent opportunity for local producers to work with technical experts and state officials to secure 3 to 5 year contracts with the Railroad. Timing is crucial since it is likely that purchasing decisions will be made before the end of 1992 or early 1993.

A local treatment plant with adequate capacity is essential, in that it is marginally economical to ship wood outside for treatment and re-ship it to Alaska. Given the increased mass of treated material, Alaskan producers, using an in-state treatment facility would be able to save on shipping costs which would be incurred by outside suppliers. Once a suitable alternative treatment to creosote is accepted by the Alaska Railroad, it should be possible to establish a local treatment facility. Such a facility could be used by a number of wood product producers. A local treater could also consider producing fire retardant products for building applications outside of Alaska.

3.5 Other Value-Added Products

Many value-added products can be produced with relatively little capital investment. With a high-volume operation producing dried and graded stock, small-scale remanufacture of specialty products can be supported.

Repair and remodeling products should continue to do well in Alaska, as in the Lower-48.

3.5.1 Alaska

Located mainly in the Southcentral and Interior regions of Alaska, there are a number of small producers of value-added products. These products include:

- Rough-sawn and planed green lumber
- Chips
- Architectural woodwork, moulding, etc.
- Paneling and flooring
- House logs
- Landscaping materials
- Pallets, moving crates
- Custom log homes
- Commercial and residential furniture
- Custom home building (stick built)
- Cabinetry
- Bowls, vases, planters, and other decorative/handicraft products
- Firewood
- Picture frames

Examples of Alaskan companies' product lines for wholesale or retail trade include: 1) The Valley Sawmill, has been making rough and planed lumber in Anchorage for a number of years; they have recently opened a new mill across Cook Inlet from Anchorage. 2) A Thorne Bay company makes cedar shingles from sawmill residues, employing 12 people. 3) One Fairbanks producer of wooden bowls (mainly birch) produced approximately 10,000 turned bowls during its first year (1991-1992) of operation. 4) Two Wasilla companies, no longer in business, produced paneling and flooring for the Southcentral Alaska market, employed 13 people; and an Anchorage company produced log cabin kits for export to Japan from 8" notch logs, with cabinets, interior partitions and additional lumber included in the kits.

No detailed sales, production, or employment data is available for this these small manufactures in Alaska.

3.5.2 Kenai Peninsula

Examples of products being produced by roughly 15 companies on the Kenai Peninsula:

- Crafts
- Dogsleds
- Bracelets, carvings, wood figurines, and other decorative items
- Burl clocks
- Wood bowls and vases
- Toys
- Dimensional lumber, posts, planks, decking
- Furniture (stools and tables)
- Chips
- Cedar planters
- Custom cabinets
- Kitchen cabinets
- Spruce logs
- Glue laminates
- Log homes
- Picture frames

The estimated total value of these products is about $7.8 million for 1991. Of this, roughly $7 million was attributed to the CFP Seward sawmill.

3.6 Log Homes and House Logs

Prefabricated log home kits are one of the most attractive industry options for utilizing small amounts of beetle-killed spruce. Forest disease and pest outbreaks in lodgepole pine stands in the Rocky Mountains helped to create a sophisticated and growing log home manufacturing industry in that region. We can expect the same type of activity to occur with the spruce beetle epidemic if the industry is nurtured and allowed to grow. Capital costs for a manufacturing plant total about $0.5 to $1 million and can expect to employ 8-15 people in direct manufacturing jobs. Such a plant would likely use 2 to 4 MMBF per year.

A log home company could also be in a position to develop sales of profiled logs for other log home builders inside and outside of Alaska. Interest has been expressed by large-scale U.S. log home builders in producing both finished home kits and profiled logs on the Kenai.

House logs and log homes are generally the highest value product that can be made from beetle-killed trees once checking has started. The industry in Idaho, Montana, Eastern Oregon, and Wyoming became well developed after an outbreak of forest pests killed large quantities of ponderosa pine. The spruce beetle infestation could spur similar development of a log home industry on the Kenai Peninsula.

The activities in local log home manufacturing for domestic and export markets is increacing. The methods used for these log homes range from hand hewn to turned logs.

A homebuilders association survey found that people buy log homes for the following reasons, in order of preference:

1. Exterior appearance;
2. High quality construction;
3. Interior appearance; and
4. Saving money by helping with construction.

The same survey found that the resale value and appreciation of log homes exceeded those of conventional single family detached homes by more than 15%. The survey implies that a log home will sell before a frame house when the buyer is offered a choice. The sale value of log homes is supported by an anecdote from a Soldotna developer who built 20 homes in 1990. The developer built six log homes in the subdivision, and all log homes sold before any of the other conventional (frame) speculative homes.

3.7 Housing

The need for low and moderate income housing in Alaska could support manufactured housing products as well as cabinet and interior finishing wood products. Extensive investigation is needed concerning codes and regulations, obtaining approval by lenders and public agencies, and in developing appropriate designs.

3.8 Tongue and Groove Paneling (T&G)

With the availability of graded lumber, small scale producers can remanufacture products such as T&G with or without surface finishing or sealing. The do-it-yourself (DIY) market in Alaska is still mainly served by outside sources who package complete kits as well as bulk finished stock.

3.9 Glue-Laminates

As an alternative to solid wood or steel beams, glue-laminated (glue-lam) beams and laminated veneer lumber offer a way to use smaller sized trees to produce high-value products, typically for roof and floor applications.

These products have a high strength-to-weight ratio and have very consistent strength characteristics, making them a viable substitute for solid wood and metal products. Trusses represent an extension of basic glue-lam beam manufacture.

As glue-lam products are relatively new, strong marketing by producers to designers and buyers not familiar with glue-laminate beams have proven necessary to succeed.

While this represents a high value-added product, it requires significantly more technical expertise and capital investment than T&G paneling. This includes testing and quality control processes as well as specialized production expertise. This may be a good joint investment opportunity with experienced manufacturers.

For structural applications, a common substitute is laminated veneer lumber (LVL). LVL uses lower grade lumber pieces that are laminated together to form the core of the post. A veneer of appearance-grade old growth is glued to this core stock to create a post that meets both appearance and strength requirements. Significant market opportunities have arisen from this technology, and new markets for core stock and clear veneers are growing in Japan.

LVL is also being used for furniture, cabinetry, and many speciality products and is an alternative to particleboard covered with wood veneer or plastic.

3.10 Specialty Wood Products

Architectural woodwork and specialty products (such as gift products), are all excellent value-added products which do not require extensive capital outlay. Few in-state companies produce these products. What is needed is a detailed market research effort to sort out the most feasible products from the myriad of possibilities.

Through investment in computer-controlled processing mills, a wide range of products can be produced without the risk associated with dedicated equipment.

Products such as turned bowls and vases require technical knowledge as well as one to two years of marketing work to develop a satisfactory customer base.

Interest has been expressed by the Great Alaska Bowl Co. (Fairbanks) in obtaining high-quality green spruce wood blanks for their unique turning operations.

3.11 Furniture and Cabinetmaking

Spruce can be used to produce simple and decorative furniture such as stools, simple tables, and outdoor furniture. With an ample supply of timber, a favorable transportation situation, and access to major Pacific Rim markets, there may be excellent opportunities for experienced manufacturers to consider the Kenai Peninsula.

For efficient, small-scale operations, there may be some excellent opportunities in the Alaska market for economical furniture, as well as high-end and custom furniture. Competition from major chain stores, however, will have to be taken into account in pricing.

The value of wood furniture products from U.S. suppliers in 1991 was $7.6 billion and is expected to increase another 6.3% to $8.1 billion in 1992. The growth in furniture manufacturing is expanding into the Mexican Maquiladora districts. Overall growth in the furniture industry in Mexico totaled 54% for the period 1984-1990. The growth was fueled by U.S. companies moving into Mexico to take advantage of lower labor costs. Many of the furniture manufacturers are relatively small, and their lumber dimensions and species requirements are somewhat unique. This type of fragmented industry requires a specialized marketing program to build confidence in each buyer that a stable and reliable supply of quality product is assured. Buyers often place their confidence in a supplier based on their track record, which makes it difficult for a new supplier to enter the business. Two approaches for gaining access to the market are entering into a joint venture with an existing supplier or using a specialized broker to handle all sales for a period of time.

Local cabinetmakers could consider taking advantage of local market opportunities for do-it-yourself products and could sell to builders of log and manufactured housing as well as retailers. The added value component of kitchen cabinet manufacture in Alberta, Canada around 1980 averaged 60% over four year period, according to a survey of manufacturers by Statistics Canada.

There are a number of local cabinet manufacturers supplying commercial and residential customers, most doing so for small custom orders.

3.12 Ready To Assemble Furniture (RTA)

This is a strong and growing market in the U.S., estimated at nearly $2 billion in 1987 and expected to continue at a very strong growth rate. Most furniture imported into the U.S. is RTA with most manufacturers outside of the U.S. In Europe, the majority of cabinets are RTA, while in the U.S., the opposite is true.

According to an industry report in 1988, what would not sell for over $50 in 1977, rose to $250 in 1987 and was expected to continue rising well past $500. Although prices are increasing, a survey in 1986 shows that 25% of the market was priced in the $50 to $100 range, 40% in the $100 to $200 range, 25% in the $200 to $300 range with products priced over $300 accounting for 10% of the market.

Typically, RTA products use particleboard with melamine or wood veneers. Without a particleboard manufacturer in-state, one challenge may be to develop a line of competitively priced solid wood RTA products. These could command a relatively higher price to the particleboard, based on consumer preferences for natural wood products. A modestly-scaled manufacturing plant can be established for $1 to $1.5 million. Another option would be to develop furniture stock for RTA manufacturers.

Co-located with a particle board manufacturer, RTA furniture manufacturing could represent one of the higher added-value products.

Flexible designs allow for flexible manufacturing. Starting with one or two similar products, such as book cases, an RTA producer can develop other products, taking advantage of their established marketing distribution channels.

Markets include discount mass merchandisers, electronic and computer stores, home improvement centers, large department stores, warehouse clubs, specialty furniture stores, and catalog showrooms.

It is likely that any company planning to go into the RTA furniture business would have to acquire computer design and computer controlled milling capacity to assure high quality and low production costs. At present no Alaska manufacturer of wood products has integrated such capability. One way to begin would be to arrange a tour of the Northern Michigan Cooperatives and Technical Centers for those Alaskan producers serious about such work.

Discounters and manufacturers that cater to the mass merchandise trade agree that customers are becoming more interested in the top-end price level of furniture. Frank Aquila, National Sales Manager for Affordable Furniture, believes the strength of the volume will remain between $49 and $79 priced furniture but that higher priced furniture will also sell well. One manufacturer says that a ready-to-assemble piece probably will not do well if it is more expensive than a pre-assembled piece.

RTA furniture is gaining in popularity for use in both the home office and small business settings, a trend that manufacturers attribute to a better definition of the category by retailers and the increasing number of consumers who require this merchandise. Jeffrey Houseman of the Charleswood Corporation noted that home office users are more particular about their requirements than the customers for other RTA furniture products. This difference is because it is not only important that the RTA merchandise fit with office equipment, it is also important that the customer fits. Style is a major selling point, and manufacturers are introducing new colors and finishes to stay competitive. The major difference between home office and small business settings is that the home office consumer needs more of a compact design and function, according to Bill Agnew of Armstrong Furniture. Ben Levy of Soundesign Corp.'s RTA Furniture Division predicts that retailers will be offering lower price points on their RTA offerings as a result of the recession. (Chanil, Debra,1991.)

In Anchorage, there are two manufacturers of office furniture, employing about 25 people. These companies import truckloads of unsurfaced particleboard and that which has been veneered. Careful attention is paid to design, quality of fasteners and fittings, and the manufacturing process. At present, they use small quantities of Alaska and imported hardwoods for trim. Although they use RTA manufacturing methods, they usually take responsibility for final assembly and do not package their goods as RTA.

One of the main problems these companies face is the lack of attention by government purchasing departments to their products, favoring outside suppliers through direct sales and area sales representatives.

3.13 Fish Roe Boxes

Roe boxes are usually made of clear white spruce - no knots acceptable in the Japanese market, typical 5 Kilogram (Kg) boxes measure 2 3/4" x 9 1/16" x 12 7/16" and are usually made of 7/16" white spruce stock. They are generally lined with 4 mil polyethylene plastic film.

Based on industry interviews, it is estimated that 80% to 90% of the roe boxes coming into Alaska originate in B.C. Canada. The acceptance of plastic containers is increasing. Plastic possibly accounts for 30% of the boxes used in packing roe and is increasing.

The major suppliers of wood boxes provide additional value for their customers by sourcing salt, nails/staples, rolls of perforated liner film, and rolls of pre-printed top sheet film. They also provide plastic containers. In effect, they provide one-stop shopping.

Most of the roe boxes are die-marked with the customer's name on them. A die costs $700 to $1000. Prices for 5 Kg boxes start at $148.50 per 100 for ready to assemble boxes and $183.50 per 100 assembled. The 10 Kg size costs processors $205.00 per 100 un-assembled and $240.00 per 100 assembled.

Based on fish egg export data, over 25,000,000 Kg of salmon and other fish eggs were exported from Alaska in 1991. This would easily support informal estimates valuing Alaskan consumption of roe boxes at $5 million. Based on these quantities, it could represent 5 to 6 MMBF of white spruce. Specific follow-up with all roe suppliers in Alaska is needed.

3.14 Pallets and Crating

The U.S. market for pallets and skids was essentially flat in 1991 due to the downturn of the U.S. economy. U.S. producers' shipments were valued at $1.7 billion in 1991, down less that 1% from 1990. However, over the past 10 years, U.S. wooden pallet production has increased by almost two-thirds.

The industry primarily uses hardwood lumber, logs and cants, consuming an estimated 5.1 billion board feet (17.6 million cubic meters) in 1991. The industry also used an estimated 1.7 billion board feet (4.0 million cubic meters) of softwood lumber and 2.3 billion square feet (2.0 million cubic meters) of softwood plywood and oriented strand board/waferboard (3/8" basis) in 1991.

The pallets and skids industry is composed mainly of small operators employing an average of 18 workers per establishment. Roughly 2,000 firms produced an estimated 460 million wooden pallets and skids in 1990.

In Anchorage there is only one full-time manufacturer of pallets and a few wholesale suppliers of these products. They make pallets, moving crates, and other shipping containers. All of their lumber was bought from Chugach

Forest Products when the mill was operating. Depending on demand, there may be one or two more companies that can produce pallets and boxes. A typical breakdown of materials would include plywood from Oregon, 80-90% lumber from B.C., and the balance from Washington and Oregon.

3.15 Coffins and Caskets

Although most fine hardwood types will continue to be imported, ones made from local wood represent a small-scale manufacturing opportunity. From research done in Alberta, Canada, the value-added component to casket manufacturing averaged 50% over a 4 year period for which statistics were gathered.

From a 1986 Anchorage survey, it was determined that one-third of those interviewed preferred burial. According to a local funeral home, at that time roughly 60% were being buried, 40% were being cremated. Nationally, wholesale prices for caskets were in the $400 to $600 range. In Alaska, the low-end prices ranges from $325 to $525.

The chief barriers include: 1) product liability insurance, (estimated at $5 million with over $10,000 in annual premiums); and 2) Alaska Department of Health and Human Services specifications for coffins which favor outside suppliers.

The state-wide market for low-end caskets is estimated at 100 to 200 units per year. Given the limited nature of the Alaska market for softwood caskets, local mills could produce blanks for final manufacture to a wholesaler, as one Everett, Washington company presently does.

3.16 Musical Instruments

With Alaska's large visitor industry and the interest in folk art and handicraft products, manufacture of traditional and non-traditional musical instruments is another example of value-added products which could be supported. Detailed product and market research is needed.

The global (free world) demand for all pianos is about 375,000 units per year. The market for high grade pianos tends to be very stable and is rising slightly while the market for low-end pianos is declining.

The market for pianos in Northern Europe is near saturation but demand in Southern Europe is still increasing. The U.S. market for pianos is declining because it is approaching the saturation level of 20% to 25% of households.

The piano industry in Japan is an important market for Sitka spruce from Southeast Alaska. While Japan is no longer the leading manufacturer of pianos, it still dominates the high quality piano segment. This high quality segment is very stable and does not fluctuate with global economic conditions.

Korea is now the largest manufacturer of pianos in the world. Korean manufacturers have dominated the market for medium-to-low grade pianos. They have gained a strong position in the manufacturing of other musical instruments as well. Korean manufacturers use a "variety of spruces, mostly from North America." (Kim et al. 1988).

According to Yamaha Piano Group in 1989, there is only one manufacturer of piano soundboards in the U.S., Posey Manufacturing in Hoquim, Washington.

The soundboard, keyboard and other parts of pianos are made from Sitka spruce. The wood properties for high quality pianos are among the most exacting in the world. Romanian spruce from Germany is considered the best species, followed by Sitka spruce from Alaska and Canada. Only about 40% of a select Sitka spruce log is acceptable for soundboards in high grade pianos. The wood must be totally free of knots, have straight grains with 3-10 grains per centimeter, and have few pitch pockets. The piano blanks must be seasoned for 6 months (low grade pianos) to 5 years (concert pianos) before they can be kiln dried. Blue stained wood is unacceptable as piano stock. The blanks must come from quarter sawn boards, not full sawn boards, in order to get the proper grain alignment.

For low-end pianos the ability to substitute other species for Sitka spruce increases. Yamaha now uses strictly Sitka spruce but is testing the use of sugar pine and other species in low grade upright pianos. Basswood from the U.S. is often used in lower grade pianos made by other producers.

The use of white spruce in instrument manufacturing is unknown, but clears from butt ends of logs conceivably have the properties acceptable for lower grade pianos, guitars, violins, and other string instruments.

3.17 Energy

Most integrated sawmill operations need to plan for burning hogfuel for electricity and cogeneration of steam for kiln heating.

Assuming that a wood processing center could not utilize a sufficient quantity of its wood waste by-products, material could be sold for firewood or processed into pellets by a co-located pellet mill.

While wood fiber fuels, such as presto logs or pellets appear to be best suited to the residential market, securing institutional or commercial customers for pellets is essential to the feasibility of pellet manufacturing in Alaska. The residential market is the most accessible market given its lower sensitivity to BTU costs and aesthetic factors. The single largest consumer market in Alaska, Anchorage has approximately 75,000 households, 55% of which have at least one fireplace and 9% have woodstoves (source: ASK* Marketing and Research Group for the Municipality of Anchorage, Department of Health and Human Services, Division of Environmental Services, 1991).

3.17.1 Firewood

A December 1985 market report for the Alaska Power Authority indicated the total Alaska market was 51,000 cords per year with 17,500 (35% of total) purchased and 33,600 cords cut by individual householders (65%). Average purchase price per cord was $85, for a total purchased firewood market of $1,488,000. (Cal Kerr, 1989.)

Current prices for firewood range from $75 to $125 per cord.

3.17.2 Fuel Pellets

A pellet mill located near a wood processing center would buy waste products, including bark, chips, sawdust, etc. and process them into residential and commercial grade fuel.

Currently there are no wood pellet producers in Alaska. However, pellet stoves are being sold in the state and pellet fuel is shipped from producers in the Pacific Northwest and sold at prices 75% to 100% higher than in local Pacific Northwest markets. Shipping costs can amount to half of the price consumers pay for the pellets. Prices for a ton of wood fuel pellets in Alaska ranged from $185 to $250, depending on transportation costs. In 1988 the Village of Kake switched from fuel oil to wood pellets for heat. (source: Nov. 1990 Bioenergy News, Alaska Energy Authority)

With favorable shipping rates, it may be possible to tap the Japanese market for fuel pellets -- initially northern and Hokkaido areas. In these areas the use of wood fuel pellets is already established. Shipping costs will need to be carefully explored.

The State of Alaska could help a pellet plant get started by facilitating contracts for commercial scale accounts. These could include prisons, generating stations, office building heating plants, etc.

Pellets are generally uneconomical when gas is available. Cost per million BTU can generally be comparable to fuel oil.

3.17.3 Presto Logs

These represent an alternative to pellets and may find a wider market, initially, since no retrofitting of stoves is needed. The advantage of Presto logs over solid wood logs includes a higher BTU content; one log can burn all night in an airtight stove.

It is possible that one plant could produce both products.

3.17.4 Chips

Green wood chips - cost per million BTU is substantially cheaper than pellets. Properly designed stoves produce very little ash and tar residue. Chips can also be mixed with coal to improve emissions (they cannot cost more than coal).

3.17.5 Alcohol Synthesis

There are a number of processes which breakdown cellulose for processing by biochemical means into methanol and other by-products. A recycling plant designed to accommodate large quantities of paper pulp (as well as wood chips, bark, etc.) would require substantial capital investment.

Given the Federal mandate for clean air fuels and the roughly 9 million gallons of gasoline consumed in the Anchorage area, producing alcohol from wood fiber needs a close look. Earlier studies for grain-based ethanol production show that without waste by-product sales the project would not be profitable.

One or two Anchorage companies have seriously considering alcohol from recycled waste cellulose.

3.18 Other Waste By-products

3.18.1 Road Fill

Chunk wood road fill and newer substances such as "Chunkcrete" have possible applications in Alaska for low-use roads. Chunkcrete, which is a mixture of cement, sand and wood chunks less than 3" in size is being developed by the Houghton Michigan Laboratory of the USFS. Some investigation needs to be done to determine its feasibility for low use rural roads and logging roads on the Kenai Peninsula.

3.18.2 Animal Bedding

Anchorage retail prices for white wood shavings in partially densified 8 cubic foot bags is $10 to $11. In Fairbanks, sales of this waste stream product have been demonstrated at the Great Alaskan Bowl Co. If the price was in the $4 to $6 range, closer to that of cleaned, shredded newsprint ($3.50 to $4.00 per bag), then a market for small and large animal bedding would become available. The advantage shavings have over newsprint is the lack of dust. Its disadvantage is a relative lack of absorbency. This disadvantage is not a great one, however.

The present Southcentral Alaska market for animal bedding use can be estimated at $0.5 to $0.8 million.

4. DOMESTIC MARKETS

4.1 Lower-48 Market

National housing starts are expected to increase through 1993 with a stronger increase in remodeling and repair work estimated to grow to $130 billion in 1993. These factors will continue to drive up the price for wood products as well.

Alaska wood products have traditionally been noncompetitive in Canadian and Lower-48 U.S. markets due to high operating and transportation costs in Alaska. The only products that were competitive in the U.S. market were logs and lumber from Sitka spruce for specialty products, and cedar shingles for roofing markets. Due to the low cost sawmills and low stumpage rates in the Pacific Northwest and Canadian lumber, products from Alaska have not been competitive in the Lower-48.

This situation has changed for the better in 1992. The Alaska Pulp Corp. sawmill in Wrangell now sells 30% of its output in Washington building markets and James River Corp. shipped 2 or 3 shiploads of pulpwood to its mills in the Pacific Northwest. These market shifts are occurring even though the lumber markets in the U.S. are relatively stagnant.

Washington, Oregon, and Northern California are known as the "fiber basket" of the U.S. The timber industry's contribution to the economy and the development of the region is well documented. However, the listing of the Northern Spotted Owl as a threatened species under the Endangered Species Act has contributed to a significant reduction in available timber supplies.

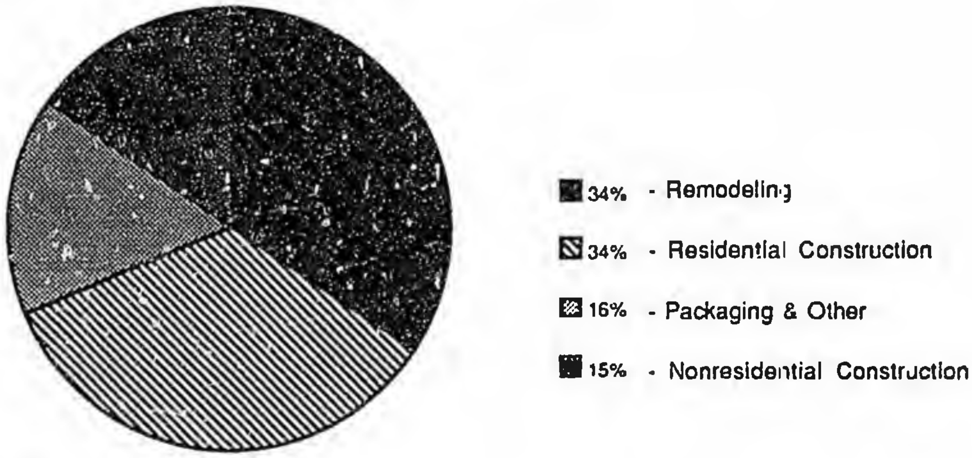
Likely increases in demand in combination with reduced Lower-48 supplies and subsequently increasing prices suggest good opportunities for Alaska timber products to be sold in the future to paper companies, furniture manufacturers, log home builders, and retailers of gift and decorative items.

4.1.2 Lumber

Through 1992, total U.S. lumber production is expected to increase by about 9%. Wood chip production also is expected to rise slightly. Softwood lumber imports are projected to rise substantially in 1992, based on expectations of a substantial increase in demand and only a moderate increase in U.S. production.

U.S. softwood lumber consumption is expected to increase to 48.27 billion board feet in 1992, below the peak level of 50.55 billion board feet in 1987. While current lumber prices did not change much over the 1990-1991 period, prices for S-P-F random lengths are projected to increase to $240 per thousand by 1996.

Lumber Consumption in the U.S. by End-Use



Source: Widam Managment, 1992.

Use of softwood lumber in residential construction markets has declined from nearly one-half to about one-third of the total softwood lumber consumption. Repair and remodeling markets now account for the largest single use of softwood lumber. By 1996, U.S. housing starts are forecast at 1.6 million units, which represent a strong market.

Consumption of panel products in the U.S. and Canada is expected to grow, supporting production levels of nearly 30 billion board feet in 1996.

According to various experts, there is likely to be an increase in demand for softwood lumber at a time when available supplies of timber from the Pacific Northwest, West Coast, and western Canada are being reduced. Estimates of the softwood lumber shortfall for the U.S. market range from 5 to 9 billion board feet.

"As demand for lumber increases and U.S. Pacific Northwest production falls during 1992 and 1993, the market prices received by sawmills in all U.S. and Canadian regions will improve substantially over 1990 levels. As a result, efficient mills with access to timber will again be able to cover the higher wood costs that characterize all producing regions in North America, including British Columbia. ...there can be no question that the supply of softwood lumber products will shrink relative to the increase in consumption that will take place by the second half of 1992 and during 1993. Although total demand in the United States will be less than the record consumption set in 1987, each producing region outside the U.S. Pacific Northwest will enjoy a larger share of the market." (source: J. Douglas Smyth, Research Director IWA, 1991).

In the first half of 1991, more mills closed in Oregon and Washington than had ever closed before in an entire year. This trend was expected to continue through 1992. Improvements in domestic and international markets, coupled with adequate supplies of Alaska timber, suggest opportunities for development of a value-added wood products industry, rather than low-value recovery of the resource represented by sales of round logs.

The following table is taken from J. Douglas Smyth's report, "The Impact of Changing U.S. Timber Supplies on the U.S. Countervailing Duty Action Against Canadian Softwood Lumber Imports."

U.S. Softwood Lumber Consumption
1987 and 1991-1993
(billion board feet)

1987 (record)	50.6
1991 (preliminary)	43.1
1992 (preliminary)	44.3
1993 (preliminary)	48.5
1991 exceeds 1987	-7.5
1992 exceeds 1991	1.2
1993 exceeds 1991	5.4

Source: U.S. Department of Commerce projections, Western Wood Products Association, and various forecasters, unpublished).

About 95% of the U.S. lumber industry's imports come from Canada. Imports in 1990 were about $2.8 billion, compared to $3.2 billion in 1989, a decline of more than 12%. About 90% of the imports were softwood lumber.

The price of framing lumber increased during the second quarter of 1991 to more than $300 per MBF and is expected to level off to a year-end average of $240 MBF, the same as in 1989.

According to Widman Management Consultants and Forest Industries publications, over 90% of U.S. production remains within the U.S. while the majority of Canadian production is exported. Canadian mills still supply over 90% of their country's lumber consumption.

The value of the U.S. lumber industry's exports rose about 5% in 1990 from $2.4 billion in 1989 to $2.5 billion. Softwood lumber exports in 1990 were valued at more than $1.3 billion, down 4.7% from 1989, while the quantity exported decreased 13% to 2.9 billion board feet, or almost 6.9 million cubic meters.

Value of U.S. Production from Sawmills and Planing Mills
(Value in millions of dollars (1987))

	Exports	Imports	Shipments
1990	$2,498	$2,804	$16,284
1991	$2,523	$2,327	$15,470
1992	$2,645	$2,606	$15,934 (forecast)

Source: U.S. Department of Commerce, 1992.

In 1991 softwood lumber exports increased about 1% in value, while hardwood exports increased 1.5%. Softwood lumber exports to Canada, which was in the midst of a recession, decreased about 25% while exports to Japan rose slightly.

For the first time since statistics have been gathered, wood consumption by the remodeling and repair sector has exceeded that of the residential construction industry. According to an industry source, the U.S. do-it yourself (DIY) market for wood and wood products was $22.7 billion in 1989 and was expected to grow to $25.3 billion in 1993. (Am Paint 90/06/04 p.59).

Recent estimates peg wood consumption by the repair and remodeling sector at 14.78 billion board feet lumber. The share of softwood used in this sector has risen from 21% in 1976 to 34% in 1991. From 1992 through the foreseeable future, this share is anticipated to plateau at 15.28 billion board feet.

The following table from Western Wood Products Association and Widman Management Consultants shows the trend in lumber consumption in the U.S. for repair and remodeling.

U.S. Repair and Remodeling Lumber Consumption
(Million Board Feet)

Year	Volume	% Change from Previous Year
1977	7,474	1.6
1978	8,089	8.2
1979	8,170	1.0
1980	8,111	(0.7)
1981	7,900	(2.6)
1982	8,012	1.4
1983	8,978	12.1
1984	11,325	26.1
1985	16,363	9.2
1986	13,350	9.4
1987	15,383	13.7
1988	15,132	(1.6)
1989	14,911	(1.5)
19[illegible]	15,153	1.6
[illegible]*	14,775	(2.5)
Forecast		
1992	15,275	3.4
1993	14,650	(4.1)
1994	14,260	(2.6)
1995	14,320	0.4
1996	14,400	0.6

* 1991 is an estimate.
Source: Widman Management Consultants, 1992.

4.1.3 Treated Lumber

Through the mid-1980's market growth for treated lumber averaged 10% per year. U.S. sales by region were estimated from a 1990 survey of U.S. treaters:

	North-east	North-central	Rocky Mtn.
Dimension	14.58	20.09	1.0
Poles	1.17	7.50	3.92
Posts	0.09	4.17	0.75
Plywood	1.00	0.42	n/a

(millions of cubic feet, converted from board feet)

Source: Industry Survey.

Consumer demand for preservative treated decks, fences, and landscape ties has the greatest impact on treated lumber sales. Treated products used in the construction of patio decks and fences appear to be the dominant force in this market. Although volumes of wood for decks and related structures are connected to housing starts, many sales are being made to homeowners as DIY projects both as new additions and replacements market where decks are not large enough or are rotting.

4.1.4 Pulp, Paper, and Related Products

According to Standard & Poor's May 1992 Industry Survey of Paper and Forest Products, "improved productivity, slower capacity growth, and restricted fiber supplies should lead to higher profits for the paper companies this year." The survey also predicted "improved demand from a stronger economy will cause explosive earnings growth in 1993."

Some grades, such as coated paper board are in limited supply. The market for paper pulp is expected to remain strong with prices increasing. Anticipated increases in demand for paper are expected to exceed current and newly added national capacity for pulp.

From a national survey of 69 publishers, representing 356 magazines, paper usage was projected to increase 2.8% in 1992 over 1991 figures, and 3.7% in 1993 over 1992. This represents 1.67 million tons of paper.

Exports of chips reported increased more than 7% in 1990, to $361 million.

4.1.5 Hardwoods

Although it will require further investigation, there are markets for birch and other hardwoods, a market which has improved greatly since the mid-to-late 1980's. According to Frank Seymour, Forest Products Specialist for the Alaska Department of Commerce, given an adequate supply of birch logs, there may be opportunities for approximately 4 MMBF per year in the Southern

California area for Alaska white "paper" birch kiln-dried lumber graded to National Hardwook Lumber Association (NHLA) standards. The Puget Sound and San Francisco areas would also be likely markets. This would be for select or better and number one grades, in rough planed dimensions.

In-state use of milled birch and other hardwoods has remained low due to a lack of an adequate supply of sawn, kiln-dried, material.

Most of the growth in the wood furniture industry has come from particleboard and medium density fiberboard products, but solid wood furniture has seen growth as well. There are opportunities to supply these manufacturers with furniture stock on a regular basis.

4.1.6 Log Homes

The National Association of Homebuilders Research Center estimates that the 420 log home producers in the U.S. produce 25,000 units annually, or about 1 home for every 10,000 home buyers. Ninety percent of these homes are primary residences.

Demographics of U.S. log home buyers show that they are likely to be between 25 and 45 years old, married with children, employed as a manager or professional, and have a household income of $40,000 per year. The home is being built as a primary residence, and is located in the outer ring of the suburb. Buyers use words like "homey," "cozy," and "natural" to describe why they bought their home. Other reasons include energy efficiency, low maintenance, and ease of construction. Most buyers work with the manufacturer or contractor to design and/or construct their homes, but some buyers do small parts of the job themselves. The do-it-yourself homebuilder is a small minority.

4.2 Alaska and Kenai Peninsula

Freight rates play a critical role in the competitiveness of Alaska's forest products. The cost of bringing lumber into the Railbelt market from Seattle is about $70 per MBF. This gives Alaska processors a cushion in local markets but puts them at a disadvantage in West coast markets. Low stumpage rates could help to make Kenai Peninsula products more competitive. To be competitive in U.S. markets, Kenai Peninsula processors must manufacture high value products that offset the impact of high freight rates. Many lower value products can be competitive in-state.

Freight rates from Anchorage to various destinations are listed below. These are published tariffs and should be considered a high estimate. Negotiated rates would naturally be lower. Additionally, many forest products would be shipped by chartered vessel.

Anchorage - Tacoma	$875 per 40' container
Anchorage - Los Angeles	$1,900 per 40' container

Roughly two-thirds of Alaska's population resides in the Railbelt area, which encompasses the Kenai Peninsula, Matanuska-Susitna, Fairbanks, and Anchorage areas plus small communities along the rail lines. Thus, physical access to local consumer markets is assured.

4.2.1 Round Logs

ITT Rayonier is using Seward as a trans-shipment point to load logs harvested near Fairbanks that are destined for Japanese markets. Logs from the Kenai Peninsula could be cost competitive with this existing venture.

Sales of round logs from the Kenai Peninsula have generally been limited to local suppliers and markets for firewood and rough lumber. Small quantities of houselogs have been used by local log home builders. If log home companies invest in profiling or final manufacturing plants, then an additional in-state and export market for logs would be available.

Although the CFP Seward sawmill is currently not operating, it is expected to resume operations in late 1992, making it the largest local customer for logs on the Kenai Peninsula. The CFP Seward sawmill previously relied on Native corporate timberlands but also purchases logs on the open market. Reactivation plans for the CFP mill call for feedstock from public timber sales as well as privately owned timber.

Remote rural markets will continue to be difficult to access. However, if shipping costs from Anchorage to Dutch Harbor can be reduced enough to compete with Seattle costs, then coastal and inland villages located in the western and northwestern regions could become new (albeit small) markets for lumber, manufactured housing, and other manufactured wood products. Alaska Commercial Company presently is the major supplier of wood products to these areas.

Round logs, although providing a poor net economic return when exported, are products which can be supplied by large and small logging operations. However, until the CFP Seward sawmill reopens and additional in-state capacity for processing various stock is developed, export markets will continue to be the mainstay for logs.

Sales of logs along with rough and finished dimensional stock may be necessary to facilitate access to new customers overseas.

4.2.2 Lumber

From various sources, the in-state lumber market can be estimated at 130 MMBF to 150 MMBF. At $300 per MMBF (composite price), the Alaska lumber market can be valued at $40 to $45 million. This number would seem low, based on interviews with a number of companies in wholesale and retail trade.

A sales-based estimate of the 1991 in-state lumber and wood products markets would appear as follows:

(1991 - $ Millions)

Lumber	$45.0	to	$52.8
Panels (plywood, waferboard, particleboard)	8.0	to	12.0
Misc. posts, etc.	4.0	to	7.0
Total	$57.0	to	$71.0

Source: ASK* Marketing and Research Group, unpublished estimates.

Softwood lumber imports to Alaska from domestic and foreign sources have averaged 100 MMBF annually through the late 1980's. In 1990, $2.2 million of softwood lumber were imported from Canada, with $1.5 million in 1991. This represented an estimated 15.1 MMBF and 7.3 MMBF respectively. The following table shows the most recently available detail on wood product shipments into Southcentral Alaska:

Net Shipments of Wood Products
into Southcentral Alaska Harbors

	1983	1984
Lumber		
Short tons	159,421	152,395
MBF	145,073	138,679
Posts, Poles, Pilings, and Other Rough Wood		
Short tons	--	28,067
MBF	--	5,613
Veneer, Plywood, and Other Worked Wood		
Short tons	--	342,852
000's sq. ft.	--	42,944
Other Wood Manufactures		
Short tons	--	106,008

Source: G. Knapp and K. Foster, 1986.

The estimated 1980 per capita consumption of imported lumber for the Railbelt area was 267 board feet and 85 square feet of plywood. Locally produced lumber per capita consumption was estimated at 33 board feet. The resulting total for 1980 per capita lumber consumption was 300 board feet. At the time, the U.S. per capita consumption was 141 board feet. (source: Reid, Collins, Kenai Peninsula Timber Supply and Marketing Opportunities June 1982). One explanation for the high ratio would be oil field use and the fact that relatively little stone and concrete is used in Alaskan residential construction, compared to national usage rates.

In contrast, the USDA Forest Service's 1982 national model (medium consumption level) was applied to Alaska's population base of 550,000:

Hardwood lumber	22.8 MMBF
Softwood lumber	107.8 MMBF
Softwood plywood	53.4 MM SQ FT 3/8" basis
Particleboard	34.4 MM SQ FT 3/8" basis
(includes composite, flake, MDF, wafer boards)	
Fuelwood	2.5 MM CU FT

Source: George Sampson, 1988.

Use of particleboard in Alaska was estimated to be well below the consumption rate based on the model. In addition to the products listed above, timbers, posts, pilings, poles, railroad ties, and paper products are used in the state. (source: USFS George Sampson Aug. 1988, Potential for Forest Products in Interior Alaska)

According to a 1982 Reid/Collins study, demand for lumber in the Railbelt area was estimated to be 64 MMBF and was expected to increase to 82 MMBF by 1986. Based on per capita estimates, Alaska Railbelt lumber consumption was estimated to be 76 to 88 MMBF. (source: Reid, Collins/Cal Kerr; Kenai Peninsula Timber Supply and Marketing Opportunities June 1982). At the time of that study, approximately 2500 housing units were permitted for construction in Anchorage in 1981 - roughly twice the estimated new construction anticipated for all of Alaska for 1993.

Tight timber supplies in Southeast Alaska and the Pacific Northwest have caused firms in these regions to reach as far north as Afognak Island, Prince William Sound, and Kenai Peninsula for logs. The Alaska Pulp Corporation sawmill in Wrangell is using these supplies to feed its sawmill operation (Bradner, 1992), and James River Corporation is purchasing pulpwood from Afognak and Homer to feed pulp mills on the Columbia River.

4.2.3 Log Homes

The Alaska market for log homes has some demand which has not been realized because production, marketing and legal requirements have not been fully developed as with out-of-state suppliers. Out-of-state suppliers, several of which have sales representatives in Alaska have model homes, color catalogs, backed by a substantial design and manufacturing capacity. The potential for this market requires additional research.

The major market for log structures in Alaska is the visitor industry. Rapid growth in the visitor industry combined with the shortage of bed space makes prefabricated log homes an attractive alternative for expanding overnight capacity. Many lodge owners will purchase a number of units at one time, along with a central lodge. Others find that adding a single log home is an effective way to moderately expand. Bed and breakfasts are growing in popularity as an alternative to crowded and expensive hotels. Log homes are well suited for this use. Kenai Peninsula manufacturers have received inquiries and sales from all of these types of buyers. The size of the market is difficult to estimate but it is apparent that a market exists. In all cases, a log home projects a frontier lifestyle that closely matches

Alaska's image in the minds of residents and visitors alike. Based on national consumption and local estimates, the annual demand in Alaska for homes is 50 to 75 units per year, plus another 25 to 50 for recreational cabins.

4.2.4 Housing

The State of Alaska is expected to invest $15.4 million in new housing construction and $54.6 million in homebuyer assistance for 1993. Federal funding for Indian Housing Authorities in Alaska is expected to be about $118.8 million, of which $14.5 million will be spent on new construction with another $36.0 million for homebuyer assistance.

Although there is no firm information on projected new housing in Alaska, anticipated funding programs and conventional financing could support approximately 1,500 to 1,700 new housing units for 1993-1994. This would be based on 500 federally-funded units, 500 privately-financed construction, and another 500 to 700 State-assisted low-to-moderate income units.

Using a factor of 9,200 board feet of wood products for a 1,200 square foot manufactured home, an in-state demand of over 20.7 MMBF for 2,250 homes per year was projected in a 1992 report for the CFP Seward sawmill. (It should be noted, that the average size of rural Alaskan homes is closer to 900 square feet.)

Most manufactured housing being placed in Alaska is barged up from suppliers in the Pacific Northwest. The U.S. average is approximately 12,000 board feet per conventional dwelling unit. This should contribute to the development of local lumber, cabinetry and manufactured housing businesses. With the cooperation of the U.S. Bureau of Indian Affairs, U.S. Housing and Urban Development, and Alaska Housing Finance Corporation, this demand could support one or two manufactured housing plants. Recreational cabins could also be manufactured by these companies and sold through local retailers or directly from the factory.

On the Kenai Peninsula, there is the potential for an estimated 50 log recreational cabins. If the Princess Lodge expands its capacity for 1993, another 50 log cabins could be required.

4.2.5 Treated Wood Products

Alaskan in-state markets, including ports, railroad, and public transportation departments could provide a good basis for treating of other wood products, such as pilings, etc. for in-state and possible export markets. Each year, the Alaska Department of Transportation and Public Facilities purchase bridge timbers, decking, and rails for ongoing bridge maintenance. They prefer 3"x12" Douglas fir in random lengths in the 10' to 20' range. Spruce and hemlock are often acceptable, depending on price and requirements. Some specifications require pentachlorophenol treatment. Depending on new highway construction and the results of bridge resurfacing tests, a modest in-state market for decking and other bridge components could increase. They usually stockpile 3,000 to 5,000 board feet of this sawn lumber. Each bridge project uses 10,000 to 15,000 board feet.

Also, the USFS anticipates funding at least one new timber bridge project to be awarded in Alaska in 1993.

In 1988, the Alaska Railroad committed to a multi-year contract for 120,000 ties. These were produced by Trapper Creek Mill and Wrangell Forest Products. Problems which they encountered included erratic timber supplies and lack of an in-state treatment facility which required shipping ties to Seattle for treatment and shipping them back. The contracts were only partially fulfilled and the Railroad purchased ties from various suppliers in the Lower-48 and Canada. At that time, locally sourced wood had to be sent to Seattle for treating and then shipped to Southcentral Alaska to the Railroad. At that time prices for ties fluctuated between $18 and $24.50 each.

Recent projections by the Railroad call for 30,000 to 40,000 ties per year over the next 5 or 6 years. They also purchase about 500 switch ties (double the length of standard ones). In addition to the softwood ties, the Railroad has purchased hardwood ties, about one-third more expensive.

Estimating at 40 to 50 board feet per tie, purchase of 120,000 ties by the Alaska Railroad would represent 4.8 to 6.0 million board feet over the life of a 5-year purchase contract. At an expected selling price of $25 per tie, this represents at least $3 million dollars. (In 1991, 114 MBF, valued at $56,639 of railroad ties were imported from Canada with another 309 MBF valued at $158,297 imported from Canada from January to May of 1992.)

Some examples are provided here of other treated products which could be produced in Alaska for local customers. These will depend on the technical feasibility for substituting spruce for Douglas Fir and in the acceptability of alternative treatment processes: From a 1986 report, the Port of Anchorage had in place 164 "fender pilings" or poles (these are 45' long, 18" diameter at the heel, and 12" diameter at the toe). These are made of Douglas Fir, as required by American Standards and Testing Measures (ASTM) standards. The pilings are backed up by 300 12" x 12" timbers up to 44' in length. At the time of the report, the Port paid between $200 and $250 each for the fender pilings and between $90 and $100 for the timbers. Similar configurations exist at each Alaska Marine Highway and port terminal throughout the state. Where ports have direct rail access, additional pilings are in place at the end each of rail spur. Over recent years, steel pilings have been popular. However, the preferred material has been wood.

There are a few large scale mining projects underway in Alaska, many of which have need for support timbers. It is also possible that many small scale mines may not require treated timbers. Although most mining in Alaska is placer or surface mining, there are a number of mines which require support timbers. At present, most of these are sourced from outside of Alaska. No reasonable estimates of the potential market can be made at this time. As a recent CFP Seward sawmill report mentioned, one miner purchased 500 support timbers from outside sources.

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4.2.4 Housing

The State of Alaska is expected to invest $15.4 million in new housing construction and $54.6 million in homebuyer assistance for 1993. Federal funding for Indian Housing Authorities in Alaska is expected to be about $118.8 million, of which $14.5 million will be spent on new construction with another $36.0 million for homebuyer assistance.

Although there is no firm information on projected new housing in Alaska, anticipated funding programs and conventional financing could support approximately 1,500 to 1,700 new housing units for 1993-1994. This would be based on 500 federally-funded units, 500 privately-financed construction, and another 500 to 700 State-assisted low-to-moderate income units.

Using a factor of 9,200 board feet of wood products for a 1,200 square foot manufactured home, an in-state demand of over 20.7 MMBF for 2,250 homes per year was projected in a 1992 report for the CFP Seward sawmill. (It should be noted, that the average size of rural Alaskan homes is closer to 900 square feet.)

Most manufactured housing being placed in Alaska is barged up from suppliers in the Pacific Northwest. The U.S. average is approximately 12,000 board feet per conventional dwelling unit. This should contribute to the development of local lumber, cabinetry and manufactured housing businesses. With the cooperation of the U.S. Bureau of Indian Affairs, U.S. Housing and Urban Development, and Alaska Housing Finance Corporation, this demand could support one or two manufactured housing plants. Recreational cabins could also be manufactured by these companies and sold through local retailers or directly from the factory.

On the Kenai Peninsula, there is the potential for an estimated 50 log recreational cabins. If the Princess Lodge expands its capacity for 1993, another 50 log cabins could be required.

4.2.5 Treated Wood Products

Alaskan in-state markets, including ports, railroad, and public transportation departments could provide a good basis for treating of other wood products, such as pilings, etc. for in-state and possible export markets. Each year, the Alaska Department of Transportation and Public Facilities purchase bridge timbers, decking, and rails for ongoing bridge maintenance. They prefer 3"x12" Douglas fir in random lengths in the 10' to 20' range. Spruce and hemlock are often acceptable, depending on price and requirements. Some specifications require pentachlorophenol treatment. Depending on new highway construction and the results of bridge resurfacing tests, a modest in-state market for decking and other bridge components could increase. They usually stockpile 3,000 to 5,000 board feet of this sawn lumber. Each bridge project uses 10,000 to 15,000 board feet.

Also, the USFS anticipates funding at least one new timber bridge project to be awarded in Alaska in 1993.

In 1988, the Alaska Railroad committed to a multi-year contract for 120,000 ties. These were produced by Trapper Creek Mill and Wrangell Forest Products. Problems which they encountered included erratic timber supplies and lack of an in-state treatment facility which required shipping ties to Seattle for treatment and shipping them back. The contracts were only partially fulfilled and the Railroad purchased ties from various suppliers in the Lower-48 and Canada. At that time, locally sourced wood had to be sent to Seattle for treating and then shipped to Southcentral Alaska to the Railroad. At that time prices for ties fluctuated between $18 and $24.50 each.

Recent projections by the Railroad call for 30,000 to 40,000 ties per year over the next 5 or 6 years. They also purchase about 500 switch ties (double the length of standard ones). In addition to the softwood ties, the Railroad has purchased hardwood ties, about one-third more expensive.

Estimating at 40 to 50 board feet per tie, purchase of 120,000 ties by the Alaska Railroad would represent 4.8 to 6.0 million board feet over the life of a 5-year purchase contract. At an expected selling price of $25 per tie, this represents at least $3 million dollars. (In 1991, 114 MBF, valued at $56,639 of railroad ties were imported from Canada with another 309 MBF valued at $158,297 imported from Canada from January to May of 1992.)

Some examples are provided here of other treated products which could be produced in Alaska for local customers. These will depend on the technical feasibility for substituting spruce for Douglas Fir and in the acceptability of alternative treatment processes: From a 1986 report, the Port of Anchorage had in place 164 "fender pilings" or poles (these are 45' long, 18" diameter at the heel, and 12" diameter at the toe). These are made of Douglas Fir, as required by American Standards and Testing Measures (ASTM) standards. The pilings are backed up by 300 12" x 12" timbers up to 44' in length. At the time of the report, the Port paid between $200 and $250 each for the fender pilings and between $90 and $100 for the timbers. Similar configurations exist at each Alaska Marine Highway and port terminal throughout the state. Where ports have direct rail access, additional pilings are in place at the end each of rail spur. Over recent years, steel pilings have been popular. However, the preferred material has been wood.

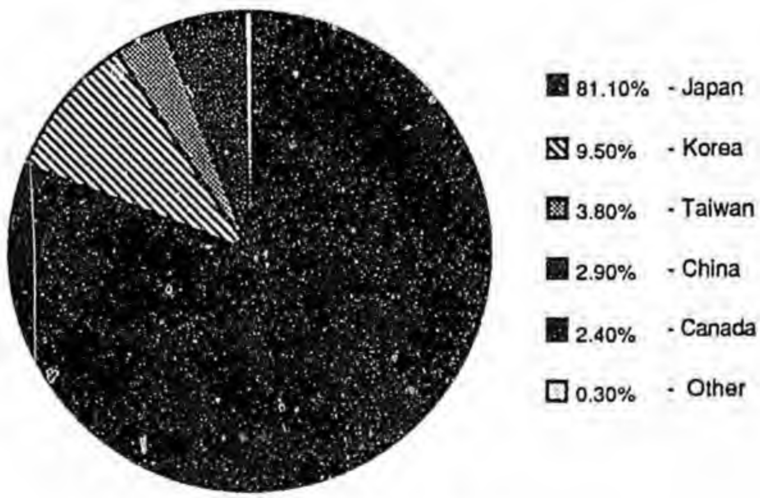
There are a few large scale mining projects underway in Alaska, many of which have need for support timbers. It is also possible that many small scale mines may not require treated timbers. Although most mining in Alaska is placer or surface mining, there are a number of mines which require support timbers. At present, most of these are sourced from outside of Alaska. No reasonable estimates of the potential market can be made at this time. As a recent CFP Seward sawmill report mentioned, one miner purchased 500 support timbers from outside sources.

5. INTERNATIONAL MARKETS

5.1 Introduction

As mentioned in the previous section, the outlook for Alaska producers has changed for the better. Despite these developments, the Alaska timber industry relies heavily on foreign markets, particularly the Japanese market. The graph below shows that in 1991 over 80% of the value of wood products exports, excluding pulp, were destined for Japan. Such a heavy reliance on the Japanese market places Alaska in a precarious position when the Japanese market softens. The current slump in Japanese demand has not greatly affected the Alaska industry because prices have not dropped as sharply as volumes.

Value of Alaska Solid Wook Exports, 1991



Source: U.S. Census of the Bureau, compiled by ACIB.

Japanese companies have been purchasing Alaska logs and lumber for over 30 years and are very familiar with the tree species and industry in Alaska. Japan is the largest and most affluent timber market in Asia, and sets the price for all Asian markets. The trading companies provide break bulk services and other marketing functions that Alaska processors often cannot afford to do on their own. Often the Japanese trading companies will take Alaska lumber to Japan and sort it for Taiwanese customers who buy by the container. It is not economical for an Alaska supplier to ship rough lumber by container to Taiwan, given the low cost position of Pacific Northwest mills. Rising stumpage rates in the Pacific Northwest are improving the economics of Alaska production. Only high value products can bear the burden of high transportation costs. Therefore, the key to diversification lies in adding value to wood products.

This is plainly evident in the two pulp mills in Southeast Alaska, who serve global markets. Pulp is generally the highest value wood product, and the

Southeast mills are competitive in markets such as Norway and Russia.

As log and lumber prices rise in the Pacific Northwest, Alaska timber is now starting to be competitive in that region. The growing scarcity of old growth timber in other regions should increase the attractiveness of old growth spruce from the Kenai Peninsula.

In 1986 the European market for DIY kits was expected to be worth about $3.4 billion at the retail level. (source: Frost and Sullivan E822 86/03/14). In 1984, it was estimated that the United Kingdom accounted for 22% of European market, France 23%, West Germany 32%, and Italy 13%. Generally, the DIY industry performs better than new construction during moderate economic recessions.

Korea and Taiwan are developing markets for log homes. These markets are just starting to develop, and the manufacturer typically determines the design and styling. Korea is generally a price sensitive market but rapid income growth has created a class of wealthy people who stress quality over price. Log homes are also more expensive than standard housing. Korea had a $1 million market in 1990, in spite of the 13% duty on log homes. Construction workers in Korea are not trained to build log homes, and close supervision is usually necessary.

Taiwan has some unique construction and maintenance problems due to the high humidity and the monsoon season. Wood housing is generally not preferred for these reasons but log homes, carefully weather-proofed, are being sold primarily as resort dwellings. The Taiwanese must be sold on quality, safety, durability, and construction method. As with Korea, the Chinese in Taiwan are not familiar with log homes. The manufacturer determines the product specifications and also must supervise construction. It is important to build supervision costs into the package price as a whole, rather than breaking the cost out separately. If costs are broken out, the buyer typically declines the supervision services and proceeds to make errors in construction. This hurts long-term market development. Despite a 10% tariff on log homes, Taiwan is expected to have a $5 to $15 million market in 1993.

5.2 Transportation Costs

As with the domestic markets, freight rates play a critical role in the international competitiveness of Alaska's forest products. Alaska sits about three days closer to Asia than the Pacific Northwest, giving it a slight transportation advantage when using chartered vessels of about $7,000 per day.

Freight rates from Anchorage to various destinations are listed below. These are published tariffs and should be considered a high estimate. Negotiated rates would naturally be lower with many forest products being moved by chartered vessel. Also, low stumpage rates can help to improve Kenai Peninsula producers' competitive position.

Anchorage - Japan	$135/ MBF
Anchorage - Korea	$219/ MBF
Anchorage - Vancouver, BC	$1,325/ container
Anchorage - United Kingdom	$4,089/ container

5.3 Asia and Pacific Rim

International markets are improving as Indonesia and the Philippines start banning the export of lumber. Other South Pacific countries are expected to follow suit. In British Columbia, the annual harvest of 90 million cubic meters is expected to drop off to 75 million cubic meters in the next three years. Sawmills are closing due to fiber shortage. Round log exports are restricted. Planting has been increased 400% in the past 4 years. South Korea has been seeking long term supplies of timber or wood fiber for their mills.

Taiwan has been looking for new supplies of timber. Their volume and value of imports is expected to continue to expand rapidly. Log imports declined from$600 million in 1979 to $467 Million in 1988 and lumber imports increased from $45 million in 1979 to $312 million in 1988. Their wooden furniture exports expanded from $321 to $887 million in that same time period. The U.S., Japan, and Europe are their major markets. In the People's Republic of China (PRC), housing is the most pressing need for their 1.1 billion people. The volume of imported North American wood is expected to increase, mostly in logs. (source: Dec. 1989 Alaska Forest Products Newsletter from University of Alaska Fairbanks Cooperative Extension Service; Frank Seymour)

The following table shows one set of demand forecasts for Pacific Rim countries over the current decade.

Pacific Rim Solid Wood Demand Growth
from 1989 to 2000

Country	Cubic Meters	Board Feet
U.S.A.	No Change	No Change
Indonesia	18 million	3.98 billion
Malaysia	5 million	1.1 billion
Japan	No change	No change
Thailand	2 million	0.44 billion
China	13 million	2.87 billion
Taiwan	1 million	0.22 billion
Korea	6 million	1.33 billion
Total	45 million	17.39 billion

Source: Jaako Poyry, Pacific Rim Wood Market Report, 1/92

5.3.1 Japan

About two-thirds of Japan's land area is classified as forest land. The proportion of forest land ranks among the highest in the world but in per capita terms, Japan stands at only 40% of the world average. The abundance of wood in Japan has led to a strong traditional use of wood products. Japan's Shinto religion is closely connected with nature, and this is evident in the use of wood products. The practice of using wood and other natural products in the home is referred to as "borrowed nature", and the use of natural products makes the people feel closer to the spirits. The Japanese use a great quantity of exposed and hidden wood in their houses, they enjoy wood furniture, they use plywood as paneling in their homes and offices, and wood is being promoted by the government for use in public places.

Despite the abundance of forests in Japan, the country still relies on imports to satisfy about 65-75% of its demand. Japan's steep forested slopes (combined with the scarcity and high cost of labor) make production costs high relative to foreign supplies. Because of Japan's affinity for it's domestic species, buyers prefer to purchase species that have similar characteristics to its domestic cedar and cypress. Western hemlock, Douglas fir, yellow cedar, spruce, and larch have properties that closely resemble Japanese species. The forests of the U.S. Pacific Northwest, Canada, and Alaska are a logical and continuing source of product for Japan. The industry in Japan is well developed and has a deep knowledge of the specific wood properties in each of these supply regions.

The housing industry in Japan consumes about 90% of all Alaska log and lumber exports. The consumption of wood products in Japan is surpassed only by consumption in the United States and the former Soviet Union. The total Japanese demand for all wood products in 1992 is expected to total 106 million cubic meters (23.5 billion board feet). Just under half of this total, 10.9 billion board feet, is used in lumber-related industries. Pulping and plywood are the other dominant uses. The following table describes total demand in further detail.

Timber Demand in Japan, 1986-1992*
(Million cubic meters)

	Lumber	Plywood	Pulp/Chip	Other	Total
1986	44.9	10.9	33.6	5.1	94.5
1987	47.9	13.5	34.7	7.1	103.1
1988	53.7	13 0	38.3	1.3	106.3
1989	56.5	14.7	42.2	1.4	113.9
1990	53.9	14.5	41.3	1.4	111.2
1991	51.9	14.2	43.8	1.5	111.4
1992 *	49.1	13.2	41.9	1.6	105.8

* 1992 is forecast
Source: Japan Lumber Journal, Vol. 33 No. 8. 4/30/92.

The next table shows a breakdown of Japanese wood imports by major trading partner:

Japanese Imports of Wood Products, 1987-1991
(Logs & lumber, million cubic meters; chips, million metric tons)

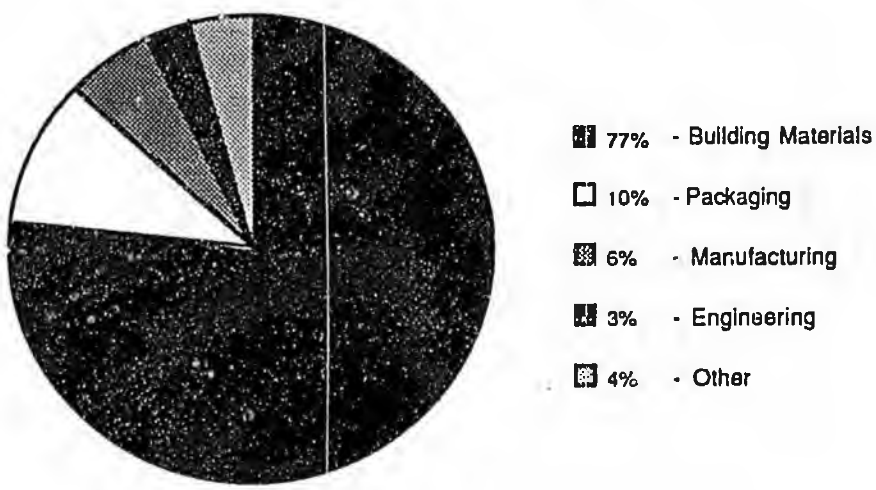
	1986	1987	1988	1989	1990	1991
LOGS						
Southsea	12.1	13.5	11.8	12.4	11.2	10.3
N. America	9.8	11.6	10.7	11.9	10.9	9.6
Russia	6.3	6.1	5.8	5.2	4.9	4.3
NZ-Chile	0.5	0.6	0.9	1.5	1.8	2.1
Others	0.2	0.4	0.4	0.5	0.3	0.4
Total Logs	28.9	32.3	29.6	31.3	29.0	26.4
LUMBER						
Southsea	0.9	1.3	1.5	1.7	1.3	1.3
N. America	3.9	5.2	5.8	6.7	6.5	6.9
Russia	0.2	0.2	0.2	0.3	0.3	0.3
NZ-Chile	0.2	0.3	0.5	0.4	0.6	0.7
Others	0.3	0.4	0.5	0.5	0.4	0.3
Total Lumber	5.5	7.4	8.4	9.6	9.1	9.4
CHIPS						
Softwood	2.84	3.11	5.50	3.84	3.74	4.10
Hardwood	3.40	4.03	7.29	5.79	6.47	7.66
Total Chips	6.24	7.14	12.79	9.63	10.21	11.76

Source: Japan Lumber Journal, Vol. 33, No. 9. 5/20/92.

Lumber used as building materials in residential construction accounts for 70% of all lumber consumption. Non-residential construction accounts for 7% of lumber demand. Engineering (lumber used in bridge building and other non-applications) accounts for only 3% of consumption. New housing starts drive the demand for lumber in Japan.

The following graph shows lumber consumption in Japan.

Lumber Consumption in Japan by End-Use

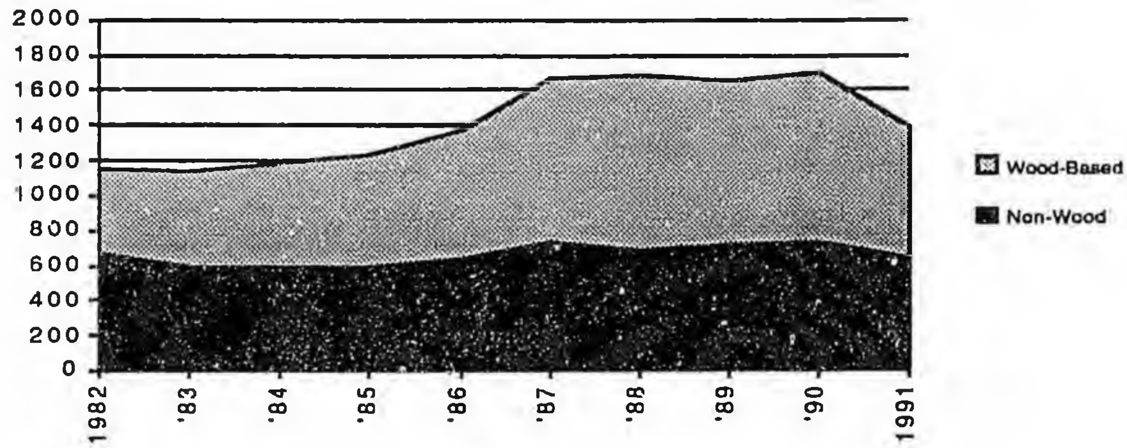


Source: Kim et al, 1989.

The rapid growth of the log and lumber market in Japan during the late 1980's is attributed to the rapid growth in housing starts. Japan's unprecedented economic growth through the late 1980's is now followed by the bursting of the "bubble economy." Housing starts, and demand for lumber, have dropped accordingly.

Much of the growth in housing starts came from multi-family housing and prefabricated housing, which do not use a great deal of lumber. The dominant reason for this trend is the high cost of land and the high cost of labor. The high cost of construction labor and the scarcity of labor are creating new market growth in finished lumber imports and imports of prefabricated windows and door casings. Growth in finished product imports should continue in the 1990's due to labor shortages.

Housing Starts in Japan, 1982-1991



Source: Japan Lumber Journal

Japan's traditional housing construction method is wood-based post and beam construction. The number of traditional housing starts has remained somewhat stable over the past decade. A wide variety of lumber products with specific applications are used in this style of housing. The most common imported product is the "baby square," a 90mm x 90mm or 105mm x 105mm square length of lumber used either as posts or remanufactured into other products.

Due to labor cost increases in Japan, there is a trend to import more of the precut specialized dimensions. British Columbia and the U.S. Pacific Northwest are taking advantage of this movement by targeting this market. Some Japanese trading companies are working with North American mills to develop stable sources of dimensional lumber that meet Japan's exacting quality standards. Some industry leaders say that the dominance of baby square imports is passing, in favor of kiln dried dimensional lumber imports.

A diagram and list of dimensional products used in a traditional Japanese house is provided in the Appendix to further identify the use of these products.

Each of the products used in traditional housing have unique applications and product specifications. Only certain species are generally accepted for certain applications. A summary of products, species, and characteristics are presented below.

Grand Sill -
*Port Orford cedar, Alaska yellow cedar, hemlock, larch.
*Strength; water and rot resistant; Port Orford cedar used in expensive homes, yellow cedar used in medium priced homes, hem-larch used in lower class homes.

Long Post -
*Cedars, Douglas fir, hemlock, Russian spruce, Sitka spruce.
*Strength; clears for exposed surfaces; domestic cedar preferred.

Post -
*Cedars, hemlock, Sitka spruce.
*Strength; 3 sides clear; old growth, tight grain, white color wood; trend toward using laminated veneer lumber with an overlay of clear.

Hidden Beams -
*Domestic pine, Douglas fir, hemlock, larch.
*Strength of domestic pine preferred; trend toward using D. fir but high cost of D. fir allows substitution of other species.

Joists -
*Domestic fir and pine, hemlock, larch.
*Strength and cost important; hemlock is now dominant species.

Window Sills and Frames, Door Frames, Molding, Shoji Screens -
*Domestic-Sitka-White spruce, hemlock, Douglas fir.
*Strength; Appearance grade; old growth with 8-12 grains per inch, straight grain, clear, white wood; finger jointing from high grade scraps is common.

Lumber grading in Japan is accomplished in compliance with Japan Industrial Standards (JIS). It is exceedingly difficult for a foreign lumber manufacturer to gain approval to produce JIS grade-stamped lumber. Selling ungraded products to lumber retailers will limit product applications and market acceptance. A more efficient strategy would be to work with an importer or sawmill in Japan to produce the lumber stock and allow grading and some finishing in Japan.

The Japanese have a strong preference for using old growth timber with no knots in exposed uses. Some of these uses, such as molding and shoji screens (rice paper windows), require appearance grade wood that does not have to meet strength requirements. Other uses, such as exposed posts and beams, must meet both appearance and strength requirements. The loss of available old growth timber has increased the price of these materials to the point where substitution is taking place.

In structural applications, the most common substitute is laminated veneer lumber (LVL). LVL uses lower grade lumber pieces that are laminated together to form the core of the post. A veneer of appearance grade old growth is glued to this core stock to create a post that meets both appearance and strength requirements. Significant market opportunities have arisen from this technology, and new markets for core stock and clear veneers are growing in Japan.

The other major use of lumber in Japan is the packaging industry, which accounts for 10% of consumption (2.2 billion board feet). The demand for lumber in the packaging industry has remained relatively stable over the past decade, despite overall growth in the use of packaging, crating, and wooden boxes. The reason for the loss of share for lumber packaging is that new crating designs have increased the use of plywood, steel, and plastic. New technologies in the manufacture of packing boxes have made them stronger, and the boxes can be re-used a number of times. Wood, however, is often preferred because of its ease in workmanship and because third world users (recipients of the packing crates loaded with goods) salvage the wood for use in construction.

Packaging is an important outlet for lower grade lumber that does not meet construction specifications. As such, many different species are used in the crating industry. Hemlock and radiata pine are the dominant species used in packaging. Radiata pine from New Zealand is used heavily in Western Japan where transportation costs from New Zealand are low. When transportation costs rise, radiata usage drops sharply. Hemlock and Russian larch are preferred in the Tokyo area because radiata is viewed as weak and susceptible to growing mold. Hemlock does not promote the growth of mold. This is important because the appearance of the package is a large factor in the presentation of the product to the customer. White spruce is an acceptable substitute for any of the other species used in packaging, provided the price is competitive.

Pallet factories buy material cut to length. They produce standard size pallets as well as many special orders. A pallet manufacturer will produce as few as 10 custom order pallets for a customer. Because of the high proportion of special orders, pallet manufacturers order their materials on a spot basis. Domestic mills are able to respond much quicker than foreign suppliers. Some producers use Korean suppliers to save money and keep the response time low. Some product specifications for packaging materials in Japan are listed below.

Pallet Stock	Standard Dimensions	19 x 120 x 1200mm
		19 x 150 x 1200mm
		50 x 90 x 1000mm

Japan's imports of furniture have been growing rapidly in recent years. The growth is due to a combination of rapid overall market growth and an increasing diversity in consumer tastes that are not satisfied by domestic manufacturers. Growth also is being fueled by contractor demand to furnish hotels, commercial facilities, office buildings, and resorts. Imports totaled 178 billion Yen ($1.3 billion) in 1990, or about 28% of the market. While the level of imports has grown 30% annually during the 1987-1990 period, the share of imports has remained relatively stable at around 30%.

The recent decline in Japanese housing starts will probably lower the demand for furniture in the near future.

The domestic industry is characterized by a large number of small regional manufacturers that specialize in a certain type of furniture, such as footed furniture, beds, or cabinets. Over 5,000 manufacturing enterprises share the market, and only seven of the 48 prefectures (boroughs) in Japan produce over 5% of domestic output. These companies produce mostly mid-range furniture for the domestic market. Storage cabinets and footed furniture are the largest segments of the market. Some softwoods are used in the manufacture of furniture, particularly domestic larch and imported hemlock. Hardwoods are the dominant lumber stock, and the main species are oak, beech, alder, domestic birch, and tropical hardwoods.

The table below shows that Taiwan and the U.S. are the dominant foreign furniture suppliers. Taiwan supplies both low price and high price furniture while the U.S. supplies mid-range and high price furniture. The most rapid growth among suppliers has come from Western countries and low wage regions.

Japanese Furniture Imports in 1990

	Share of Imports	Percent Change
Taiwan	22%	-14%
U.S.A.	20%	56%
Italy	14%	53%
Thailand	12%	37%
Indonesia	11%	90%
Korea	7%	3%
Germany	6%	40%

Source: JETRO, 1992.

Western exporters have achieved considerable success by selling upscale furniture and "theme" furniture that is marketed by associating the furniture with a particular lifestyle. Consumers are becoming increasingly knowledgeable about interior coordination, furniture styles, and materials. Marketers have capitalized on this by displaying complete room sets and emphasizing cultural traits at trade fairs and permanent display areas. The diverse tastes among consumers has opened many new niche markets that can be exploited using this strategy. Furbig AB, a Finnish pine furniture manufacturer, used this strategy to great effect by teaming up with exporters of log homes from Finland to provide a turnkey second home with a consistent theme (JETRO 1992; WWPA 1986). Due to the small size of rooms (12'x12' or 9'x9') in Japan, furniture must be compact, and imported furniture often blends Japanese product use characteristics (low tables) with Western styling.

Most furniture manufacturing facilities are located in timber industrial parks, which historically were centered around a local supply of timber. As timber supplies grew scarce, imports became more popular. Furniture manufacturers prefer to purchase kiln dried (KD) lumber cut exactly to specification width, thickness, and length, directly from a local sawmill. If they sawed their own lumber, it would be difficult for them to calculate their costs and their selling price. It also would be difficult to export finished lumber directly to the manufacturer, at least initially. The best opportunity may lie in supplying either finished furniture, or supply rough sawn blanks, to the sawmill while working in conjunction with the manufacturer. After some time, the exporter would learn to cut and dry the lumber to specifications.

Below are some specifications for imports of rough blanks provided by a manufacturer of knotty pine and spruce cabinets, wardrobes, and chests of drawers. Each buyer will have its own specifications; these are offered as an example.

Initial export - Kiln-Dried pine or spruce lumber
Thickness - 25 mm
Random widths
Random lengths

Finished blank export - KD pine or spruce to 10%
35mm x 38mm x 1050mm
35mm x 38mm x 715mm
29mm x 45mm x 1250mm
24mm x 115mm x 700mm
24mm x 70mm x 740mm
24mm x 60mm x 720mm

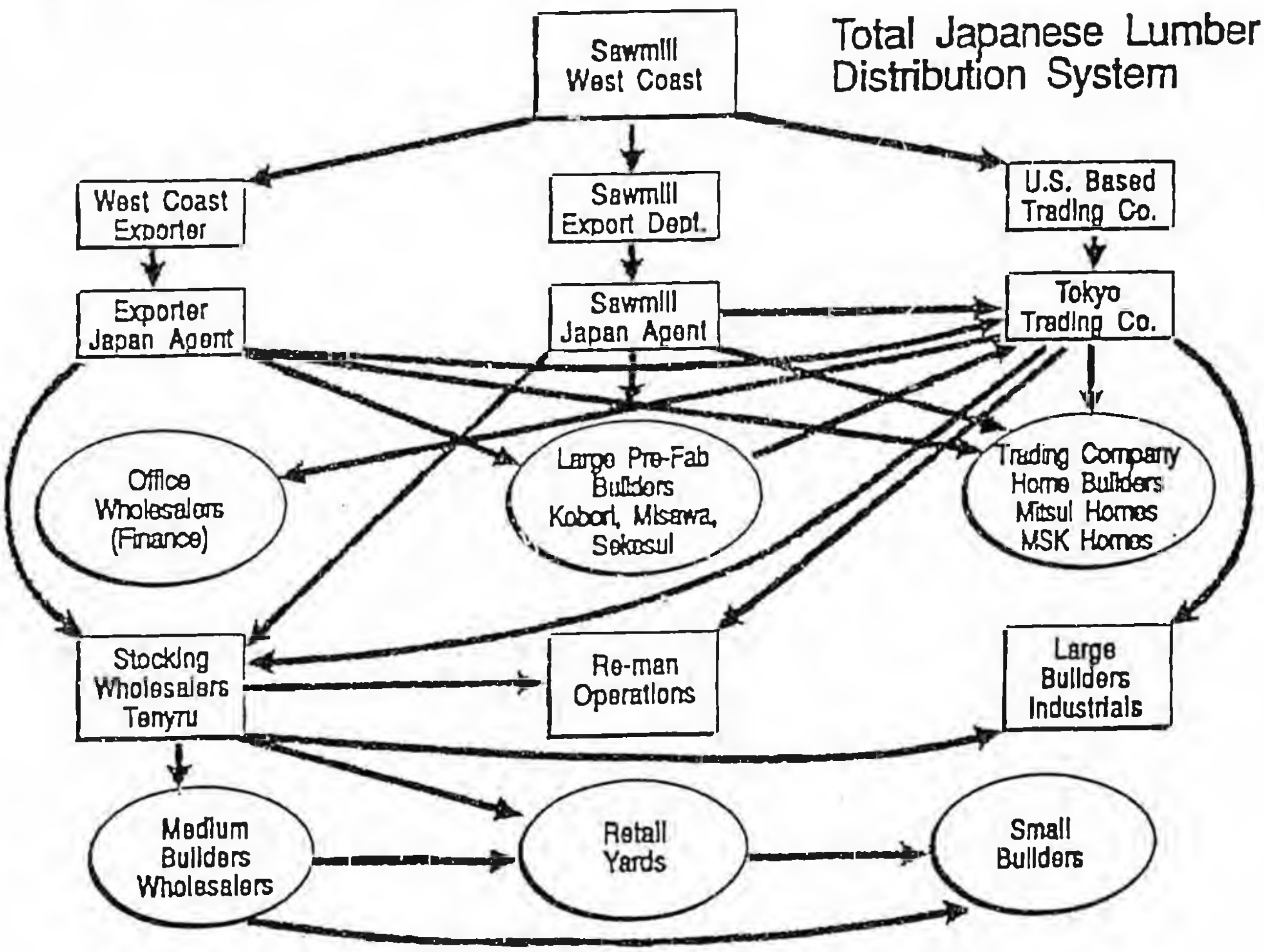
Source: Widam Management LTD. 1982.

This manufacturer recognized that the traditional rejection to knots in wood furniture is changing toward an acceptance of knots. He saw growth in the acceptance of knotty pine furniture. This acceptance would be hastened by lifestyle marketing. The aversion of many manufacturers to process their own lumber stock gives rise to a tremendous opportunity for remanufacturing industry exports if the firm was dedicated to tight specifications and close communications with buyers.

Channels of distribution in Japan are often long, complex, and rigid. Many of the Japanese processors are part of a keiretsu, which are related or sister companies in various stages of the distribution chain. The keiretsus are typically centered around a major trading company and a bank. The companies may have a cross-ownership of stock and interlocking directorates. The trading company offers the downstream companies short-term financing, technological and market assistance, and an assured supply of materials. The trading company may dictate price, terms of delivery, and quality of product in the case of small suppliers. In return, the downstream companies stay loyal to the trading company as a source of supply. The downstream company may also favor supplying another downstream company in the keiretsu.

In other words, market entry is often controlled at the first step in the distribution channel. While finished products may be imported that reach beyond the sawmiller, the finished product may be sold by a keiretsu wholesaler. A foreign seller may negotiate product specifications directly with a wholesaler but the trading company will handle the mechanics of the sale. If a keiretsu member purchased from outside the keiretsu, it may be denied credit or technical assistance from the trading company. While illegal in the U.S., the keiretsu system provides some stability in volatile markets. Additionally, the keiretsu compete fiercely with one another so many competitive forces are still at work. There is little incentive for a company to leave a keiretsu and operate independently because many foreign suppliers are not committed to the market. Not all firms, however, are affiliated with a keiretsu. Firms should seek direct relationships where possible.

The following graphic illustrates the distribution relationships which exist within the Japanese lumber industry.



The shortage of U.S. Pacific Northwest supplies of paper pulp has been offset to some extent by the expanded use of recycled paper as a fiber source. Japan is leading the way in recycling, with a targeted recovery rate of 55% in 1995. This equates to 17.5 million tons of fiber per year. Marubeni projects the demand for paper in Japan in 1995 will be 32 million tons, leaving 14 million tons of fiber to be sourced as pulp or chips for pulp. Given current Japanese pulp capacity, approximately 40 million cubic meters of chips will be required. Imported chips will account for 23 million cubic meters of this amount, up 3.6 million cubic meters from present levels.

Over half of the demand for chips in Japan is for hardwood chips, 19.3 MM million cubic meters (cum), while softwood chips totaled 8.6 MM cum in 1991. Imported softwood chips totaled 8.5 MM cum in 1991, with 5 MM cum originating in the U.S. West coast. Supplies from the U.S. West coast (including Alaska) are projected to decline by 700 M cum in 1992. Japan will likely source this supply from the U.S. South, Australia, and other nations. This represents a significant window of opportunity to provide softwood chips to Japan from the Kenai.

There is a similar opportunity for the export of hardwood chips to Japan. Japan imported 11.3 MM cum of hardwood chips in 1991, and that figure is expected to grow by 2.6 MM cum by 1995. The most likely alternate sources for these chips are the U.S. South, Chile, Australia, South Africa, and other nations. Low grade birch from the Kenai is already gaining the attention of major Korean importers. Japanese importers are currently committed to purchasing Kenai Peninsula softwood chips. Viable opportunities may exist for additional chip exports to Japan.

Log homes are becoming very popular in Japan. The Japanese have always enjoyed the Western lifestyle, and a variety of factors have led to the expansion of the market. The high cost of homes in suburban Japan is often prohibitive, making a second home in rural areas a viable alternative. Prefabricated log homes are not labor intensive to construct, making construction costs low. Japanese people have a natural affinity to wood products because natural objects are an extension of their Shinto religion. Relaxation of building codes in Japan has provided the greatest impetus for market growth.

The market has grown tremendously in the past five years. Recent estimates were not readily available but the total number of units constructed in 1990 was about 3,000. No official statistics are kept on log home starts. The recent increase in interest rates, the Japanese stock market crash, and tight capital in Japan may have reduced the growth rate in 1992. Still, exporters and contractors feel that the log home boom is not a passing fad. People are spending more time outdoors and now have two day weekends to enjoy a second home.

The demographics for Japanese buyers are similar to American buyers. Japanese use of log homes is somewhat different than American uses, however. Second homes accounted for about 60% of the market in 1989. Other uses include corporate recreation and training facilities, large scale facilities for club houses, lodges, golf courses, ski resorts, restaurants and offices. The fastest growing segment of the market is resort-related uses. The following breakdown of uses was current in 1989. Current statistics were not readily available but have probably changed significantly.

Second homes	60%
Stores & restaurants	10%
Small hotels & lodging	10%
Offices & gathering halls	5%
Other	15%

Domestic log home manufacturers once occupied 60% of the market in Japan but imports have gained the majority of the market. The prices for log home kits vary widely, from under $20,000 to over $100,000 depending on the size and styling. Imported kits are about 20% less expensive than domestic kits, and are priced about 25% above comparable prices in the U.S.

The rapid growth in sales has created some problems in the new market. Many Japanese contractors and buyers were not aware of product specifications, quality attributes, and construction techniques. Additionally, many foreign manufacturers did not initiate a good quality control program. As a result, inferior products entered the market and tarnished the reputation of the whole industry. Japanese consumers and contractors are now quite sophisticated in their knowledge of the industry and have exacting specifications that must be met.

The distribution channels for imported log homes is relatively short and simple. The foreign manufacturer sells to an importer or contractor, developer, or home builder. Manufacturers used to determine the product specifications but now the level of market sophistication has grown to the point where the developer works with the manufacturer to determine the design and styling.

Sales efforts of the manufacturer are targeted toward both the developer and the consumer, with emphasis on the developer. The manufacturer should develop a small sales brochure in Japanese for casual inquiries, as well as an in-depth brochure and building manual for the developer. The developer will typically do most of the mass marketing to the consumer market.

5.3.1. Japan Trade Barriers

The trade barrier most commonly mentioned in Japan are Japan Agricultural Standards, the Japanese wood product grading regulations. While these standards are not formal trade barriers because Japanese firms have to comply with them, they are often very difficult for foreign companies to meet. As a result, foreign lumber can be downgraded, resulting in a loss of value. Thus these effectively function as barriers to trade. Building codes in Japan restrict certain uses of wood, such as in dwellings over three stories high. The building codes have the effect of limiting the total size of the wood market, but they do not hinder individual wood shipments from foreign countries.

The greatest barriers to entry in the Japanese market are the unique product specifications and the tight quality control requirements that are demanded by Japanese buyers. In addition to these barriers, Japanese buyers prefer to build long term relationships with stable suppliers who are willing to commit to the Japanese market. The buyers seek suppliers who have established track records and the financial resources to survive during periods of depressed prices. Small suppliers and newly established businesses find it difficult to attract buyers and develop relationships for these reasons. Working through a broker is one effective method for entering the Japanese market and building a good reputation with buyers.

5.3.2 Korea

Korea's economy experienced rapid growth in the late 1980's. As a result, inflation surged and wages grew over 30% in two years. Rising wages made Korean manufactured goods noncompetitive in many foreign markets, leading to a trade deficit. The deficit was fueled by rising imports and an appetite for imported goods. The government of Korea initiated austerity measures to realign the economy. As a result of these measures, some imports were restricted and housing starts were reduced from 750,000 units in 1990 to an estimated 500,000 units in 1992. The table below shows the decline in exports of wood-related products in 1991.

Korean Exports of Manufactured Wood Products
(Million Dollars)

	1987	1988	1989	1990	1991
Furniture	115	186	186	172	156
Musical Instruments	146	203	155	141	141
Shipping Containers	429	752	1,043	1,025	937

Source: USDA-FAS, 1992.

The rising wages in Korea have made the import of softwood lumber economic, despite the 9% duty. The table below shows that lumber imports, along with most other wood products, have recently increased.

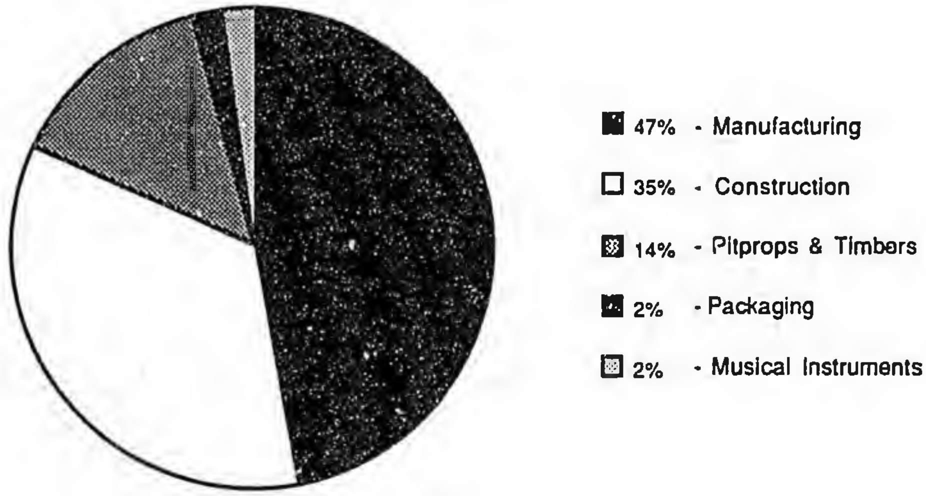
Timber Imports into Korea, 1989-1991
(Million Dollars)

	1989	1990	1991
Wood Chips	20	12	12
Logs	960	990	1,040
Lumber	170	167	228
Veneer	23	26	31
Finished Lumber	21	15	24
Particleboard	45	74	75
Fiberboard	33	27	25
Plywood	173	256	358
All Others	21	40	64
TOTAL	1,466	1,607	1,857

Source: USDA-FAS, 1992.

Most of Korea's imported timber is used in manufacturing processes. Housing construction is mostly apartment style housing made of steel-reinforced concrete. Construction lumber is used primarily as concrete forming. Korea also manufactures standard lumber products for the Japanese market, but lumber exports to Japan have declined as wages increased.

Lumber Consumption in Korea by End-Use



Source: Kim et al, 1989.

Unlike Japan, a significant proportion of Korea's furniture production is exported. Exports climbed by over 300% during the 1985-1988 period to $150 million but have slowed considerably. Current exports are declining and this trend is expected to continue due to exchange rates and rising wages in Korea. Thailand, China, Indonesia, Mexico, and other low wage nations are more competitive in Korea's traditional export market niche, low price furniture. The use of medium density fiber board (MDF) and radiata pine have increased in an effort to control costs.

Domestic furniture sales continue to grow rapidly due to a recent housing boom and increasing wages. Many Koreans desire to upgrade their housing but the government is currently limiting new housing starts to check inflation. This action is causing apartment dwellers to buy furniture and other furnishings to improve the appearance of their apartments. Tropical hardwoods have a traditional use in Korea for furniture, and acceptance of other species is limited. As costs rise, however, other low cost species are being substituted.

A large particle board mill and a large MDF mill have been built in the past 2 years in Korea. These facilities are greatly increasing the demand for softwood and hardwood chips, as well as logs for chips.

Korean firms have already taken one shipment of birch logs from the Susitna Valley in 1992. The birch will be used as veneer and lumber for furniture and chips. The buyers expressed interest in continuing the relationship over a 10 year period.

Demand for chips in Korea totaled 2 MM cubic meters in 1990 and is now starting to increase to feed the new capacity investments in particle board and medium density fiberboard plants. Economic growth in Korea also is creating growth in the paper industry. Much of this demand is domestic-led, as exports are generally declining. Korean chip buyers have expressed interest in purchasing birch and spruce chips from the Kenai Peninsula. Securing a source of timber and negotiating a reasonable price are the main barriers to a successful deal.

5.3.2.1 Korea Trade Barriers

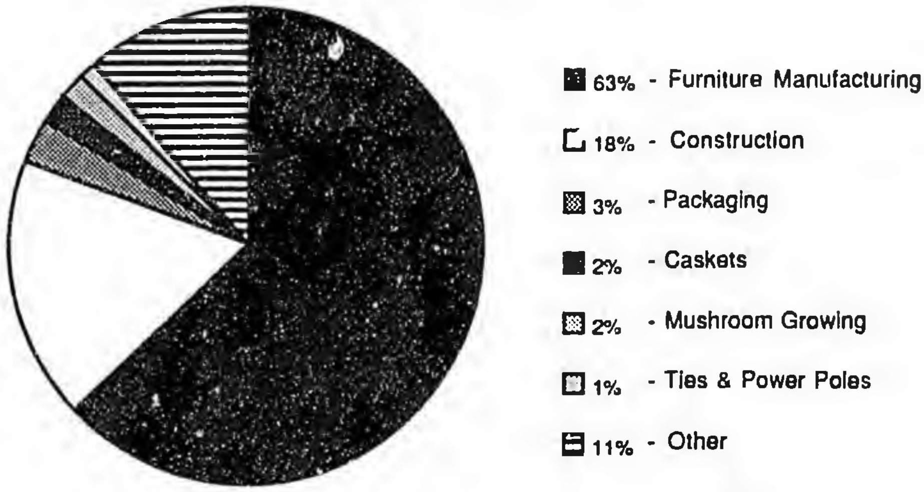
Korea maintains a number of tariff and nontariff barriers to imports, particularly value-added products. The large majority of timber imports into Korea are logs. Korean buyers have long maintained that U.S. lumber was priced about 10% too high while the duty on lumber products has been kept at 9%. The tariff on lumber is particularly significant in Korea because of the price-sensitive nature of Korean buyers. Rising costs in Korea are now starting to make U.S. lumber more competitive in Korea despite the 9% duty.

The nontariff barriers to trade in forest products in Korea can pose greater difficulties than tariffs. Government works closely with industry in Korea, and a series of "hurdles" have been established to prevent the domestic timber processing industry from foreign competition. The most significant of these barriers are high port of entry taxes and levies, import licensing requirements, subsidies and price supports to domestic firms, import restrictions and quotas, and low cost financing for domestic firms. The easiest way to get around these barriers is to sell to Korean buyers FOB Kenai or other U.S. points. The buyers will attend to the process of importing.

5.3.3 Taiwan

Taiwan is a major manufacturer of furniture, mostly for export markets. Furniture manufacturing is the largest use of lumber in Taiwan. Furniture for the domestic market is usually made from tropical hardwoods, and substitution of Alaska species would not be very successful. The Taiwanese manufacturers usually produce private label furniture for large retailers and other importers and manufacturers in the export markets. There is very little branded product exported from Taiwan. Because of this, the manufacturers build to specifications provided by the customer. The customer decides what species of wood will be used. The large majority of furniture stock are temperate and tropical hardwoods.

Lumber Consumption in Taiwan by End-Use



Source; Kim et al. 1989.

White spruce from Alaska would be a good source of knotty pine furniture stock. Penetrating the furniture market with white spruce and birch would require convincing the buyers in the U.S., Europe, and Pacific countries to specify that white spruce or paper birch be used. The furniture buyers would then instruct the Taiwanese manufacturers to use these species. Most major furniture manufacturers attend trade shows in the U.S. each year to meet with buyers. This would present a good opportunity to make contacts and present the benefits of Alaska species.

The structure of the furniture industry and timber industry is fragmented. There are many small manufacturers and sawmills that work independently of each other. Most of the sawmills buy lumber and logs by the container because the volumes used by them is relatively small. The industry is so competitive that sawmills do not join cooperatives to buy timber by the shipload; they do not want their competitors to know what volume of timber they are processing. Many U.S. companies have been reluctant to ship by the containerload because of the high costs and low volumes.

Japanese trading companies often supply the Taiwanese processors because the trading companies import shiploads and perform the sorting and break-bulk functions, and they also provide short-term financing. Many Taiwanese processors would prefer to buy containerloads directly from the U.S. Communications with U.S. suppliers can be difficult, and the Taiwanese are not familiar with U.S. grading standards. Smaller U.S. companies are often more successful in exporting directly to Taiwan because they are committed to the buyers and are willing to be more flexible than the larger U.S. companies.

Taiwanese mills prefer to process cants and rough lumber rather than logs because shipping containers will hold more lumber and because handling and wood waste are minimized--important factors in the cramped small sawmills.

5.3.3.1. Taiwan Trade Barriers

Taiwan has little forest resources of its own and is forced to import timber to feed its furniture and construction industries. Despite the reliance on imports, tariffs only recently have been brought down from previously high levels. Other barriers do not pose insurmountable challenges to the exporter, but should be mentioned. Import licensing requirements, port of entry taxes and levies, domestic monetary restrictions, and price supports to domestic firms are among the barriers to forest products trade.

A greater challenge for Kenai exporters in gaining a presence in Taiwan is that the Taiwanese are traditionally a hardwood consuming people. Softwoods are just recently gaining market acceptance due to short supplies of tropical hardwoods. The Chinese in Taiwan are not familiar with U.S. grading standards, product uses, and pricing. Often, much education and market development work is necessary to close a sale. A few Taiwanese buyers are familiar with softwoods, and these firms should be sought out to minimize the exporter's market development costs.

5.3.4. China

The timber industry in China is run by the central government. China has a shortage of wood products, and the country is experiencing tremendous growth despite the global recession. The government has instituted a wood substitution policy to lower the demand for wood products by requiring that other building materials be used. The centralized allocation of foreign currency is used to limit the amount of wood that is imported, and barter trade often becomes necessary to conclude a sale. Local governments are allowed to earn and keep a portion of their own foreign currency. Local provincial governments also are allowed to freely spend this foreign currency, and these provinces are often good niche markets for hard currency sales.

Import licensing requirements, import quotas, the wood substitution policy, and the large bureaucracy of the centralized wood procurement system are all significant trade barriers. The State of Alaska is currently establishing a joint forestry commission with the timber-rich province of Heilongjiang. Working through this commission to supply other Chinese Provinces may be the best method for small Kenai exporters to penetrate the Chinese market.

5.4 Southsea Nations

The Southsea nations (Indonesia, Malaysia, Papua New Guinea, Philippines, etc.) provide tropical hardwoods to Asia, Europe, and North America that are used mostly in the manufacture of plywood, packaging, and furniture. Many Southsea nations have banned the export of round logs in an effort to support their plywood industries. Indonesia, in particular, has been very effective in this strategy, and the result has been a strong decline in Japan's plywood industry.

Tropical hardwoods are not seen as a strong competitor to North American softwoods in most markets. Softwoods have been gaining some acceptance as substitutes for tropical hardwoods in some uses, mainly plywood and packaging. Attention to global deforestation has been focused primarily on tropical rainforests. There is a groundswell of support in the European Community for a requirement that all tropical hardwoods be labeled by country of origin. This will facilitate a growing boycott and potential ban on purchases of tropical hardwoods. A similar movement is gaining momentum in the United States. These developments could expand the demand for temperate hardwoods as well as softwoods.

5.5 Chile and New Zealand

Chile and New Zealand both produce radiata pine that is grown on plantations. The trees grow very fast in the temperate climate, reaching maturity within 20-30 years. These plantations are just starting to reach maturity, and their presence as a competitor will only increase in the future. Growth prospects for the next five years are limited because many trees will not reach maturity before the year 2000. The total harvest potential of these countries is expected to rise from 20 million cubic meters in 1990 to about 55 million cubic meters in 2005. Domestic demand is not expected to increase substantially during this period, leaving export markets to absorb this capacity.

The rapid growth rate of radiata pine results in very wide growth rings and a corresponding lack of structural strength. This limits the use of radiata in many structural applications where strength is an important attribute. Chile (and to a lesser extent New Zealand) have attempted to overcome this by heavy research expenditures and marketing efforts. Chile has diversified its market base to include the Middle East, Europe, the U.S., and Japan. Chile's market development in the U.S. is succeeding in replacing some ponderosa pine clear lumber markets for use in furniture blanks, finger-jointing material, and doors. Growth is expected to continue because U.S. buyers are satisfied with the product. Radiata pine from Chile has been approved in Japan for use in plywood and some construction uses. Over the next decade, radiata pine from Chile and New Zealand could dominate the market for toys, molding, and other non-structural lumber uses as well as be a serious competitor in global softwood plywood markets.

5.6 Europe

The major lumber markets in Europe are the United Kingdom, Italy, and Germany. Italy imports almost strictly clear lumber, and most softwood supplies come from East and West European countries. Other important markets are the Benelux countries because they serve as intermediaries for distribution throughout Europe. The global recession has hurt demand for forest products in Europe, and the recent high interest rates in Germany are further depressing demand for building products. European demand, with the exception of Germany, is expected to remain in a depressed state for the next three years. The European Economic Community (EEC) is an important market for North American lumber producers but the U.S. and Canadian position is being threatened by import barriers. About 90% of the lumber shipments to Europe from North America are in the form of green lumber. The EEC has placed a ban on the import of green softwood lumber due to fears of pinewood nematode infestation. The U.S. and Canada are contesting this ruling and have won a temporary reprieve from this restriction. The pinewood nematode is very rare in Western North America.

The restriction would not normally be prohibitive except that building codes in Europe do not favor kiln dried lumber. Therefore, the premium paid for KD lumber is low and does not justify the added cost. In the short term, the European market is expected to remain flat due to poor economic conditions. In the longer term, Germany is expected to experience rapid growth. It remains to be seen whether North American producers will survive the application of the nematode import barrier to be competitive in Europe. Tropical hardwood producers may face a similar fate. The EEC, under pressure from the Green Party and consumers, is considering placing a ban on the import of tropical hardwoods. Such a ban may expand markets for temperate hardwoods.

Canadian companies have been the most successful firms in penetrating the European market. The United Kingdom is a primary market because of its desire to import softwood lumber. Exports to the United Kingdom (UK) from Western Canada totaled 680 MMBF in 1991 and are forecast to hover below 500 MMBF for the next three years (Widman 1992). Exporters from Western Canada face similar transportation costs as potential Kenai Peninsula exporters, and stumpage rates on the Kenai Peninsula will probably be lower than in Canada. The forecast of Western Canadian exports which appears later in this section shows potential markets for Kenai Peninsula lumber. Small Canadian companies in Alberta and Interior British Columbia have established relations with British furniture and ladder manufacturers. These niche markets could possibly be pursued by processors on the Kenai that are willing to develop close relationships. Shipments are cut to specification, containerized, and typically not kiln dried.

The market in the UK has product specifications that are as stringent as those in Japan. Sweden is a dominant supplier to the UK softwood lumber market, with exports totaling 550 MMBF in 1991 (Gozalbez, 1992). All other suppliers are expected to match the quality of Swedish product. The Canadians are able to match Sweden's quality, and the high cost of stumpage in Sweden makes up for the high transportation costs from British Columbia through the Panama canal.

Opportunities for exporting softwood lumber products to Sweden and Finland are very limited. The countries import almost no softwood lumber, and they have a ban on importing non-kiln dried softwood from pinewood nematode countries. Also, Sweden and Finland are members of the European Free Trade Association (EFTA). EFTA member countries include Sweden, Finland, Austria, Switzerland, Iceland, and Liechtenstein. The EFTA and EEC countries will soon join together into a larger customs union, the European Economic Area. Common tariff and nontariff barriers, including the potentially disastrous pinewood nematode barrier, will apply to all EEA countries. The pinewood nematode is not known to exist in Southcentral Alaska. If Alaska could obtain a variance from the restrictions placed on green lumber imports, a large and potentially lucrative market could be created. A variance for Alaska would allow the government to attract sophisticated processing companies, and the value of stumpage would increase significantly. Much legal and diplomatic efforts would have to be expended to secure a variance.

Opportunities could exist in the future for the export of birch woodchips to Sweden. Sweden is constantly looking for birch chip opportunities in North America to feed their pulp mills. Currently, transportation costs are too high to service the Scandinavian market from Alaska. However, if a Northern sea route opens up, direct Alaska-Sweden trade may become profitable.

5.7 Russia

Russia holds about one-half of the world's softwood timber inventory. The primary export species from the Russian Far East include larch, white fir, silver fir, and red pine. Some of these species are of relatively low value, and the high density of the wood often creates problems in millwork applications.

Russia is an active exporter in Pacific Rim timber trade, supplying Japan with 1 billion board feet of logs and lumber in 1991. Russia has maintained a presence in the Japanese market for 30 years. Russian wood is processed into construction products in the small sawmills in Northern and Western Japan, where the species are similar to local trees. South Korea has a few new joint ventures in Russia targeted for housing and concrete forming in Korea, but the logging operations in Russia have not been successful to date. U.S. companies are exploring forestry opportunities in the Russian Far East, primarily with the goal of selling into Asian markets. One U.S. log home company contacted for this study recently secured agreements for Russian timber and is considering manufacturing operations there as well.

Russia is generally seen as the "wild card" in Pacific Rim timber trade but there are many impediments to expanded competition from Russia as a timber supplier. These impediments include: 1) a chaotic distribution system, 2) problems with grading and sorting standards, 3) environmental concerns, 4) a huge and unmet domestic demand in Russia, 5) low value species, 6) a lack of infrastructure, and 7) an aging capital stock.

The characteristics of Russian Far East softwoods are somewhat similar to those of the Kenai Peninsula and Southcentral Alaska, although Kenai Peninsula white spruce has broader applications than Russian timber. Sellers of Kenai Peninsula products may do well by targeting existing users of Russian timber in Northern and Western Japan as well as Korean trading companies. Companies who are considering investment in the Russian timber industry should be persuaded to invest in the Kenai Peninsula due to the higher quality timber and lower risk.

5.8 Canada

Alaska currently exports pulpwood logs to Canada, and the opportunities for supplying Canadian pulp mills are increasing. However opportunities to sell finished products to the Canadians are limited because of the large number of efficient processing facilities that exist throughout Canada. Sales of semi-finished products and raw materials may become more and more likely as Canadian supplies diminish.

The Canadian industry is a likely target for attracting investment into the Kenai because supply constraints have limited the opportunities for Canadian companies to expand. Canadian companies are prime investment candidates because they could bring their processing technology, market channels, and grading systems. The Kenai Peninsula would offer a stable supply of timber and proximity to tidewater and Asian markets.

Canada, in particular British Columbia, is a significant competitor in the forest products trade. The Canadian forest products industry is market oriented, and market development efforts by government and industry have achieved considerable success. The federal and provincial governments are committed to the success of the timber industry; seven percent of employment in Canada is related to the industry. In 1989 timber exports contributed C$19.5 billion to Canada's balance of trade--more than agriculture, fishing, mining, and energy combined (Myles 1992).

The following two tables quantify Canada's success in foreign lumber markets. The second table of forecasts of Western Canadian exports provides an indication of the markets where an efficient Kenai producer could be successful.

Total Canadian Lumber Exports by Country, 1988-1991
(Million Board Feet; source: U.S. Dept of Agriculture, FAS)

	1988	1989	1990	1991
Belgium & Luxembourg	112	86	135	117
Denmark	0.2	0.4	1	1
France	90	69	123	68
Germany	50	38	58	46
Greece	0.3	0.3	0.4	0.4
Ireland	29	32	15	13
Italy	36	33	49	52
Netherlands	18	22	25	30
Spain	6	17	28	20
United Kingdom	939	799	748	531
Other Europe	15	4	3	7
Middle East	39	35	90	136
Other Africa	108	224	179	93
Japan	1,453	1,670	1,669	1,904
Other Asia	123	70	47	80
Australia	171	162	114	85
Other Oceania	7	9	13	7
Latin America	3	1	1	3
Caribbean	2	1	1	1
USA	9,167	8,902	7,426	7,285
Puerto Rico	42	43	NA	NA
TOTAL	12,410	12,220	10,726	10,479

Source: USDA-FAS, 1992.

Forecast of Western Canadian Lumber Exports, 1991* - 1996
(Million Board Feet)

	1991*	1992	1993	1994	1995	1996
Japan	1,600	1,435	1,295	1,240	1,140	1,020
U.K.	680	470	480	490	535	585
Middle East/ N. Africa	200	190	190	160	150	140
China	40	40	40	40	40	40
Australia	120	155	165	170	165	165
France	90	90	100	100	100	100
Belgium/ Luxembourg	140	90	90	100	100	100
Germany	50	60	65	70	65	65
Netherlands	25	14	15	20	15	15
Italy	30	29	30	30	30	30
Caribbean	40	30	35	40	45	45
Other	20	25	35	35	40	40
Total	3,035	2,628	2,540	2,495	2,425	2,345

* 1991 is an estimate.
Source: Widman Management Consultants, 1992

Timber supplies in British Columbia are declining due to over-harvest and set-asides. Canada's system of long-term contracts with evergreen clauses are a critical component of their strategy to retain value-added processing facilities. The program has been so successful, however, that most timber supplies have been committed. It is difficult to develop new processing capacity in Western Canada due to a lack of available timber resources. It may be possible to attract new investment to the Kenai Peninsula with its available timber that is close to major markets in the U.S., Canada, and the Asian Pacific.

The success of Canadian companies in developing foreign markets makes them attractive investment partners in developing Kenai Peninsula forest resources.

Over half of Canada's timber industry is concentrated in the pulp and paper sector. Raw materials for the pulp industry generally come from sawmill residues in British Columbia and other places. As timber supplies decline in Canada, the amount of chips generated by the sawmill industry will decline. Canada's pulp mills could prove to be an economic outlet for low grade material from the Kenai Peninsula, particularly the beetle-killed spruce.

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PRODUCT & MARKET FEASIBILITY REPORT FOR COMMERCIAL TIMBER RESOURCE UTILIZATION PROGRAM

APPENDICES

Appendices available at the Kenai Peninsula Borough Economic Development District, Inc., 110 South Willow Street, Suite 106, Kenai, Alaska 99611
(907) 283-3335

REPORT

to

KENAI PENINSULA BOROUGH ECONOMIC DEVELOPMENT DISTRICT, INC.

for a

MASTER TIMBER HARVESTING PROGRAM PLAN DEVELOPMENT

for the

KENAI PENINSULA BOROUGH, ALASKA

from

Project Manager, John L. Hall
Taiga Resource Consultants

October 26, 1992

110 S. Willow St., Suite 106 • Kenai, Alaska 99611 • (907) 283-3335 FAX (907) 283-3913

KENAI PENINSULA BOROUGH
ECONOMIC
DEVELOPMENT
DISTRICT, INC.

TO REPORT READERS:

The enclosed report was prepared by a consultant for the Kenai Peninsula Borough Economic Development District, Inc. (EDD) to be used in the work of the Kenai Peninsula Timber Resource Utilization Task Force. While the findings and recommendations of the report are those of the authors, this material was intended for use in formulating strategies and recommendations of the Task Force to be reported to the Borough Assembly and in the design and development of the EDD's work program. The newly formed Timber Resource Utilization Committee of the EDD intends to use these documents to continue the work toward the accomplishment of this mission.

James A. Elson

James A. Elson, Chairman

FACT SHEET

Spruce Bark Beetle Impact and Issues

FACT SHEET
Spruce Bark Beetle Impact and Issues

CATEGORY: INFESTATION

FACT: Since 1954 annual surveys have been done by the USDA Forest Service. Results of these surveys show 1.2 million acres of the 2.2 million acres of forest land in the borough have been infested from the 1950's to 1992.

FACT: The 1992 aerial survey showed that there were 365,000 spruce beetle infested acres in the borough. It is estimated that out of the 365,000 currently infested acres, there are over 125,000 acres of new infestation. This reflects the relative increase in infestation from 1991 to 1992. Infested acres are those with spruce trees showing red tops (last year's hits.)

FACT: It is important to consider that the increase and/or decrease from year to year reflects the <u>relative</u> level of infestation. The beetle life-cycle is generally two years—so it is to be expected that the infestations will ebb and flow. In addition, once trees show red tops it indicates that they have already been hit the previous year and are dying this year. Subsequent surveys will only inventory <u>new</u> red tops. However, the effect on the forest is cumulative—while the exterior boundaries of an infestation may or may not expand—the devastation within can go on until it is complete.

FACT: The spruce beetle infestation is spreading in the following areas of the borough: Kenai, Soldotna, Kasilof, Happy Valley, Anchor Point, Crescent River (West Side Cook Inlet), Homer East-End Road, Fox River, Kachemak Bay, Hope, Sunrise, Six-Mile and Moose Pass

FACT: The spruce beetle also kills Sitka spruce in the coastal or maritime forest. Therefore, infestations are possible in the Seward and Kachemak Bay areas. For example, Afognak island 80 miles south of the borough, had a major infestation on 100,000 acres in the mid-30's which resulted in a loss of 150 million board feet of timber.

CATEGORY: TIMBER HARVEST & TRANSPORTATION

FACT: The total area of the borough is 16,384,000 acres. The land area is 10,048,000 acres. The forest land is 2,220,000 acres.

FACT: There are 646,000 acres of commercial forest land in the borough.

FACT: Thirty-four percent or 224,000 acres of this commercial forest land is in the Kenai National Wildlife Refuge and the Kenai Fjords and Lake Clark National Parks and is currently unavailable for harvest.

FACT: There are an estimated 3 billion board feet of total available timber, the majority is white or Lutz spruce. Of this total, approximately 800 million board feet are currently under contract from large private land owners. The percent of hardwoods present (birch, cottonwood and aspen) varies from 5 to 5 percent except in the Tyonek area where it reaches 50 percent.

CATEGORY: REFORESTATION

FACT: The report to the KPB Timber Task Force titled; Master Timber Harvesting Program Plan Development, recommends that when a full harvest program is implemented a fully staffed Reforestation Center and Nursery be established. Staffing would include: Silviculturist, Fisheries and Wildlife Biologist, Nurseryman, Fire Control Specialist and other team members.

FACT: Initial cost of investment for the Reforestation Center is estimated to be in the range of $1 million to $1.5 million. The operation of the center would be in phases, with existing personnel from the agencies involved, providing the above services until the full center is needed,

FACT: The major detriment to reforestation in the boreal forests of the borough is Blue Joint Grasses of the genus *Calamagrostis*. According to the experts the best strategy to combat this smothering grass is: to plant early (one year after harvest), plant big (two-year old seedling or large wild seedlings), use mats to reduce competition, and scarify the soil for increased temperature and exposure of the mineral soil. With this strategy, reforestation efforts are likely to be successful the first time and will reduce the need for second efforts.

FACT: The harvest of the forest can be done properly and professionally with coordinated input of wildlife and fisheries biologists, fire control specialists, forest entomologists, silviculturists, forest engineers and other forestry personnel.

FACT: Each individual landowner or manager in the borough will determine the method and extent of their timber harvest program.

FACT: Forest insect control programs for the spruce beetle are only economically feasible on small, high value residential tracts.

CATEGORY: RECOMMENDATIONS

Key Recommendations from Master Timber Harvesting Program Plan Development Report

• Action could result in the harvest and utilization of the 800 million to 1.5 billion board feet of spruce timber recently infested and on the verge of destruction by the spruce bark beetle.

• Aggressive action includes: forward funding of roads, reforestation and pursuing financing through government entities who are currently empowered to provide loans for these types of projects (Alaska State Legislature, Dept. of Commerce & Economic Development, Dept. of Transportation, Alaska Industrial Development & Export Authority.)

• In addition, aggressive action requires: a timber harvest program and accompanying transportation plan for the major spruce forest units of the borough; immediate coordinated timber harvest programs for KPB and State lands in the central and southern peninsula; and that the KPB should assume a leadership role by encouraging the potential purchasers of public and private timber to install value-added forest products complexes which would complement the existing industry operations.

CATEGORY: OWNERSHIP

FACT: Table

The Estimated Ownership and Volume

of the

Available and Possible Commercial Forest Land (CFL)—Entire KPB

Owner	Area-CFL Acres	%	Volume MMBF	%
KPB	30,000	9	255	9
State	99,000	29	795	26
Large Private Corp	195,000	57	1752	58
Other Private	20,000	5	207	7
TOTAL Available	344,000	100	3,009	100
Chugach NF -Possible	79,000	-	641	-
GRAND TOTAL Available + Possible	**423,000**	**100+**	**3,650**	**100+**

Note: CFL in Kenai National Wildlife Refuge and Kenai Fjords-Lake Clark National Parks are not included

Report

to

Kenai Peninsula Borough Economic Development District, Inc.

for a

Master Timber Harvesting Program Plan Development

for the

Kenai Peninsula Borough, Alaska

from

Project Manager, John L. Hall
Taiga Resource Consultants

October 26, 1992

Credit Page

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-Executive Overview-

The spruce forests of the Kenai Peninsula Borough are being devastated by the spruce bark beetle. In 1992, aerial surveys detected 365,000 acres of recently infested forest land. The infestation is expanding in the Moose Pass, Kenai, Soldotna, Kasilof, Ninilchik and Fox River areas on the Kenai Peninsula and on the west side of Cook Inlet at Cannery Creek, Crescent River and Tyonek.

The history of major spruce beetle infestations indicates that once an infestation starts in an area and the weather conditions are favorable, the majority of the spruce trees eventually become infested and die. Past infestations have impacted 1.2 million acres of the total 2.2 million acres of forest land in the borough.

This Master Timber Harvest Program presents options for the Kenai Peninsula Borough to consider. The first would be "No Action" by the Borough. The second would be limited involvement with a harvest program for Borough lands. The third option would be a coordinated effort with small and corporate land owners, the State lands (Mental Health, University, DNR and ADF&G) and the Chugach National Forest lands. The Fish and Wildlife Service would be asked to join this effort. The Kenai Peninsula Borough would be the lead agency, administrator, and coordinator of this effort.

Option three recommends a fully staffed Reforestation Center and Nursery with a Silviculturist, Fisheries and Wildlife Biologist, Nurseryman, Fire Control Specialist and other team members. In addition, it recommends: a timber harvest program and accompanying transportation needed in the major spruce forest units of the borough; immediate coordinated timber harvest programs for Borough and State lands in the central and southern peninsula; and that the Borough take the lead in encouraging the present harvest of corporate lands and potential purchasers of public and private timber to install a value-added forest products complex which could complement the existing industry operations.

The third option is encouraged due to the need to revitalize the forest health of 365,000 acres of the infested forest land (the spruce trees currently infested will deteriorate and be unusable in 3-5 years), to make the spruce timber useable for the world market, and to improve the socioeconomic and environmental resources of the borough.

The spruce bark beetle epidemic within the Kenai Peninsula Borough is a dire threat to all borough forested land, and impacts both natural and human resources. The "No-Action" alternative has proven to be, by experience, expensive in terms of government efforts to mitigate the potential fire hazard—witness the Cooper Landing fire hazard control project. Left untreated, infested forests have seriously degraded wildlife and fisheries habitat and scenic, aesthetic and recreation values. An important commercial timber resource and a healthy forest are being compromised for this generation and for generations to come.

The spruce beetle epidemic within the Kenai Peninsula Borough should be considered an incident equal in scope and impact to a large wildfire and dealt with in the same sense of urgency and damage control.

1.0 Introduction

The purpose of this report is to present three options for the Kenai Peninsula Borough (KPB) to consider and evaluate for maintaining a healthy spruce forest, promoting scientific land management, saving valuable forest products, promoting value-added forest products facilities and improving other social, economic and environmental resources of the borough. Full implementation could result in the harvest and utilization of the 800 million to 1.5 billion board feet of spruce timber recently infested and on the verge of destruction by the spruce bark beetle. Timely utilization of the timber within one to two years after the deadly beetle attack becomes visible is critical for a healthy forest, for full utilization of the resource, and to extract the highest commercial value.

The Draft Forest Health Management Plan prepared by the Division of Forestry and the report prepared by the Kenai Peninsula Borough Economic Development District titled Commercial Timber Resources of the Kenai Peninsula Borough were researched extensively and yielded vital data for the creation of this plan.

This plan is not a detailed harvest plan for private, Borough, State or Federal lands. From the annual Forest Service aerial forest health surveys, estimates have been made of the projected spread of the spruce bark beetle infestation and the forest resource impacted. The plan recommends those areas where the Kenai Peninsula Borough can take the leadership role. Also included are estimates of timber volumes and volumes impacted on potential timber sales, miles of road needed and draft coordinated road cost share and easement agreements. An estimate of the reforestation needs of each option is also outlined.

Note: **Borough**, when capitalized, and KPB refer to the Kenai Peninsula Borough municipality and the specific lands under municipal ownership. When not capitalized, **borough** is used as an inclusive term for everything within the KPB's legal boundaries.

In order for the various land owners (Federal, State, KPB, University, ANCSA Corporations and private) to combat and minimize the long-term damage to the borough's forest resources, a strategic harvest plan has been formulated. This plan addresses many facets of the unique and various natural and human resources of the borough.

In a separate section, this plan also addresses the acres, volume, value and environmental degradation of the spruce beetle infested forests on the Kenai National Wildlife Refuge.

2.0 Options

The following options should be considered by the Kenai Peninsula Borough.

Option I—No Action.

The current status quo would remain in effect. Timber harvest would continue to occur at the present level primarily on private and corporate lands currently under contract. Salvage harvest would occur at moderate rates on public land, mostly to supply the local markets for house logs and firewood. It is expected that most ANCSA Corporations would sell their timber not currently under contract as market demand increases. Most of the timber harvested would be standing live, green spruce cut for export or chips. Modest investment in value-added production and most new infrastructure would be provided by the private sector in the form of new roads and a few timber transfer facilities. Forests, either beetle infested or threatened with beetle infestation, would likely continue to be impacted at an accelerated rate with little impetus or funding for larger scale reforestation.

Advantages: Timber industry continues modest growth with little pubic opposition or controversy. Governments risk little capital and reap moderate increases in tax base.

Disadvantages: Fire danger increases. Potential for expensive fire suppression in future. 1990 Tok fire cost state approximately $25 million, for example. Wildlife habitat and fisheries values decline.[1] Tourism possibly negatively impacted by loss of recreation facilities and aesthetics from fire and/or danger from falling beetle killed trees. Important timber resource is lost and not likely to be replaced unless large scale catastrophic fires occur in beetle killed areas. Reforestation of harvested lands primarily ensured through enforcement of provisions in Alaska Forest Resources and Practices Act (FPA).

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[1]. Cooper Landing Draft EIS, USFS, Warren Oja

Option II—Moderate Action

Coordinated promotion of borough timber resources results in accessible beetle killed timber being harvested prior to decay. Concentrated reforestation efforts are limited due to lack of dedicated funding or facilities. P ssible long-term commitment by public and private sectors for forest products complex for value-added processing.

Advantages: Same as I, with increased borough employment and economic activity.

Disadvantages: Fire danger increases moderately in most areas and highly in unharvested areas.

Option III—Coordinated Action Plan:
Joint Private, Borough, State & Federal

Long-term investment by both timber industry and governments for harvest and value-added processing. Majority of commercial timber available is harvested under accelerated action plan prior to decay and loss of value. Green commercial timber at high risk also harvested as preventive measure for future beetle outbreaks. Large-scale reforestation occurs from private/public commitment to natural regeneration or replanting beetle killed/harvested acres. Non-commercial forests replanted or revitalized by an aggressive site specific prescribed fire treatment.

Advantages: Employment and economic activity increases substantially within borough. Numerous year-round, well paying jobs are created. Infrastructure expanded. Tax base increases. Fire danger is mitigated especially in human influenced areas of borough. Reforestation efforts result in increase in quality habitat for most herbivores and predators. Increased access to larger land base decreases pressure on developed recreation sites. Increased opportunities for fish and wildlife habitat enhancement.

Disadvantages: Large areas of the borough become roaded with associated increased maintenance costs. Potential loss of invested capital in infrastructure if market demand for spruce declines or beetle impact becomes unmanageable, with an uneconomic timber salvage program as only viable option.

To increase the effectiveness of Option III and to streamline management, the state could assign management responsibility for State timber on certain State lands to the Kenai Peninsula Borough. Further study of this strategy is necessary to fully explore the political ramifications.

3.0 Reforestation

3.1 Reforestation Center

In view of the reforestation effort which will be necessary on a variety of public and private lands due to the enormity of bark beetle devastation, two distinct solutions have become apparent.

Option I—Utilize DNR Tree Nursery, Palmer

Obtain all white/Lutz spruce from new State-DNR nursery in Palmer. This new nursery will be able to provide several million seedlings per year at a cost of $0.25 for 1/0 (one year old) seedlings. Transportation from Palmer will be required. Distance to Soldotna is 200 miles.

Advantages: No additional investment required.

Disadvantages: Distance from nursery to planting sites. Lack of control over quality and quantity of stock. Necessary for borough's reforestation needs to compete with other reforestation efforts in the state. No local (Kenai Peninsula) involvement. Reforestation needs might outstrip current capacity of nursery (400,000 seedlings/year, 1 crop, max. capacity 1.2 million). Borough would have to compete with other areas of state with reforestation needs for seedlings.

Option II—Establish Joint Borough, State, Federal Reforestation Center and Nursery within Borough

Draft an ordinance through the Kenai Peninsula Borough (KPB) legal department authorizing the construction of a reforestation center which would include a reforestation staff, nursery, greenhouses, research facilities and, possibly, a home base for a prescribed burn team for natural reforestation efforts in remote areas. Initial cost of investment for the nursery would be in the range of $1 million to $1.5 million. The Palmer nursery has had a construction budget of $1 million for a 10,000 square foot facility. Detailed construction costs of this facility are included in the Appendix for reference. The KPB and State own numerous patented sites in the Soldotna/Kenai area which would be suitable for this center and could be dedicated by the Assembly. A facility which could be integrated with education in the borough would be ideal. The KPB should be the lead agency with financial support and participation from state and federal agencies and in addition encourage active participation involving both personnel and financing from large private landowners and timber harvesters. Staffing would consist of a reforestation technical team, on assignment, from the entities just mentioned, including fire behavior specialists, wildlife and fisheries biologists, silviculturists and nursery managers—all with a mission to protect and enhance the forest health of the borough.

Proposed Reforestation Center Staffing

Personnel	Cost/yr	Agency	Overhead
Director/Manager	$60,000	KPB	$30,000
Office Staff	$45,000	KPB/PVT	$30,000
Forester/Silviculturist	$60,000	DNR	$30,000
Wildlife Biologist/Ecologist	$60,000	ADF&G	$30,000
Fisheries Biologist	$60,000	ADF&G	$30,000
Nursery Specialist	$60,000	DNR	$30,000
Technicians (2)	$60,000	PVT	$30,000
Fire Behaviorist	$60,000	FED/DNR	$30,000

For further information on detailed cost analysis of reforestation center, see Appendix-Reforestation.

Advantages: Control over growing, quantity and quality of stock. Close proximity to reforestation efforts over 16 million acre borough. Enhanced educational opportunities. Combines technical forestry, wildlife and fisheries expertises—to promote a healthy forest while enhancing the wildlife and fisheries resources. Shows serious commitment to revitalizing forests.

Disadvantages: Substantial investment. Could be viewed as competition for funding by Palmer Nursery, DNR, etc. Possible need for public subsidies. Potentially controversial for reasons above.

Additional Possibilities: Facility could be built with public funds but operated as a joint venture with private interests to manage the facility. Another possible option is to model the operation of the center after the numerous aquaculture associations. Some labor could be provided by volunteers, military on assignment or prison laborers.

Siting: A central location within the borough is highly desirable. A technical site study should be undertaken to ensure the site takes advantage of climate and soils in addition to political and economic considerations.

Criteria: Publicly owned land, either state, KPB or community. On site utilities and access to all forms of transportation. There are several parcels owned by the KPB in the Kenai/Soldotna area which would be suitable.

Additional considerations: Reforestation needs within the borough are already acute due to the thousands of acres deforested by the beetle. With increased harvest and increasing devastation by the beetle, the need for this reforestation center is presently substantial and will only increase—perhaps dramatically.

Hardwood Reforestation: Areas where the emphasis will be on reforestation by hardwoods (birch, willow & poplars) will probably not need actual planting of seedlings but instead rely on modern silvicultural techniques. Natural reforestation will be more than adequate if proper planning, harvest and scarification occur, along with leaving mature hardwood trees for a seed source.

Advantages: Enhanced habitat for browse dependent species (moose, hares, etc.) with resultant increased food sources for predators. Birch could be the commercial forest species of the future for the borough. The work done by Dr. Bill Collins, ADF&G on the Matanuska Moose Range should be referenced for further information on this subject.

Disadvantages: Future forests would have decreased or delayed softwood production capabilities; increased time for rotation of spruce.

3.2 Seed Collection

The most cost effective and efficient method of seed collection is to enlist the support and cooperation of local citizen groups to collect cones. In 1990, Ninilchik Native Assoc., Inc. and Klukwan, Inc. collected seed for their reforestation efforts on the Ninilchik sale. Local students were given instructions on how to collect cones and which trees to target. They were offered a bounty per bag/pound of seed (3.5 bushels per tree avg.) and responded by collecting far more seed than required. Helicopters can also be used, but at over $500 per hour costs quickly exceed the manual collection. Seeds should be collected and catalogued as to site specific for replanting from on-site wild seedlings or nursery stock.

Dominant "mother spruce" seed trees for each unique harvest site should be identified prior to harvest. Seed collection needs to be accomplished in the fall. Storage should be in a cool dry warehouse or at the nursery(ies). Seventy-five pounds of quality seed should yield 2.1 to 2.5 million seedlings.

Seed collection for 1992 is no longer possible due to the onset of winter. Planning for 1993 should encompass the areas identified for harvest in the near-term and immediate reforestation.

3.21 Alden Recommendations

For reference, guidelines developed by John Alden of the Institute of Northern Forestry, Forest Service-USDA on the subject were researched and are included in the Appendix.

3.3 Reforestation Issues

Strategy for reforestation success: A major problem facing resource managers contemplating reforestation (whether required after timber harvest, fire or other natural disasters like the spruce bark beetle epidemic) is competition from other plant species. The major competitor of the boreal forests of the borough is Blue Joint Grasses of the genus *Calamagrostis.* According to the experts the best strategy to combat this smothering grass is to plant early (one year after harvest), plant big (two-year old seedlings or large wild seedlings), use mats to reduce competition, and scarify the soil for increased temperature and exposure of the mineral soil. With this strategy reforestation efforts are likely to be successful the first time and will reduce the need for second efforts or the use of highly controversial but effective herbicides.

Reforestation incentives: Possible incentives for ensuring adequate reforestation include requiring reforestation bonds be posted on public lands scheduled for harvest; planting one year after harvest and planting inspection, with a refund of half of bond; after three years, refunding the other half of the bond if sufficient stems per acre are verified; directly reflecting cost of planting by private contractor with size of bond. On private lands, create tax incentives for planting. See 4.6 Borough Ordinance for proposed regulations.

4.0 Regulations/Ordinances

4.1 State/Federal Disaster Area, other Designations and Funding

For a federal declaration of disaster to occur, a measurable threat to communities and people—and not to just natural resources—would have to be established. At present there are insect and disease infestations in other areas of the U.S. which are far larger in scope than the bark beetle problem within the borough. However, a federal declaration of disaster would result in the temporary suspension of the National Environmental Protection Act (NEPA) process and allow additional harvest on federal lands currently protected in the Kenai National Wildlife Refuge (KNWR) and Chugach National Forest (CNF). A Presidential directive has recently (9/15/92) authorized emergency salvage sales of up to one million board feet with construction of an accompanying one mile of road without going through the NEPA review process and by only using data already available. Application of this directive to the Chugach National Forest lands needs further analysis, but possible areas for harvest are in the Trail Lakes, Hope and Six-Mile areas of the borough. Obtaining a similar directive on KNWR may or may not be worth pursuing through the congressional delegation, e.g: potential backlash or negative publicity affecting the entire program. However, the economic impacts of the continued spreading epidemic and the related loss of value on adjacent private land should be considered as a possible reason to pursue this further.

State disaster regulations: Regulations have been drafted by the State Division of Forestry under Title 38 to amend regulations (11 AAC 71.010.) for the expedited sale of emergency, salvage or small volume state-owned timber sales. These sales will not have to be advertised for two years in a five-year plan as is presently required. Expedited sales will be made under the following conditions; loss of market value due to fire, storm, blowdown or insect and disease (acts of nature), and, to create fire breaks. As these are draft regulations, necessary action should be taken by the KPB to ensure that they receive proper review and are approved.

4.2 S & P F Forest Service Programs

Under the federal "America the Beautiful" program grants are available for reforestation efforts. The private land owners with bark beetle infested forest land are excellent candidates for receiving funding. In addition, under the Forest Stewardship Initiative planning funds are available for land owners who desire to actively manage their land.

DNR is currently assigning personnel to the Kenai Peninsula to work with land owners to draft stewardship plans with funding applications provided by this initiative.

4.3 State Forest Practices Act Revisions

The Alaska Forest Resources and Practices Act (FPA) places restrictions on the harvest of private and KPB timber, it is also the master operating document for harvest on State lands. In regard to the special conditions created by the spruce bark beetle epidemic, the following sections of the FPA should be examined for possible suspension or revision.

Sec. 30 Land use conversion. The five year restriction could be extended or suspended due to the massive reforestation effort needed after the harvest of all the beetle killed timber in the borough.

Sec. 150 Riparian zone. Advocate harvest of beetle killed spruce in riparian zones with immediate replanting of large seedlings for streambank stabilization and shading (for fisheries values).

Article 3. DNR required to list timber for sale for two years of a five year harvest plan before sale. Can be exempted by emergency regulation (AS 38.05.113 (b) & (c). Six months should be adequate notice. Pool as much land as possible under a single notice.

Sec. 500-30 Reforestation 11AAC 97.500 B(4). Required stocking levels after 7 years might be unrealistic with amount of reforestation necessary.

4.4 Export Restrictions from Federal Lands, Value-Added Incentives

The timber on federal lands (CNF and KNWR) requires primary manufacture before it can be exported. The existing Chugach Alaska sawmill and chip facility at Seward and the Circle DE chip facility at Homer are ready to begin full-time operation this winter. Based on the above, the beetle killed timber from federal lands can be harvested and primary manufacture can take place in the borough at these facilities. Therefore, there is not a need for this project to request export restrictions be waived from timber harvested from federal lands.

4.5 Road and Port Funding Prospects

Forward funding of roads, ports and other infrastructure (timber transfer facilities) should be pursued through government entities which are currently empowered to provide loans for these types of projects (Alaska Industrial Development & Export Authority, Dept. of Transportation, Alaska State Legislature, Dept. of Commerce & Economic Development).

Port projects to consider: Dock at Ninilchik with capacity to load chips, logs or finished products for export. Preliminary engineering already accomplished. Would be accompanied by a boat harbor. Log transfer facilities at Polly Creek-Crescent River, Red Glacier and Iniskin—needed for harvest of estimated 500 million board feet of available CIRI village corporation owned timber. Dock at Port Graham—needed for sea transport of logs, chips for reprocessing or value-added processing prior to in state use or export. Recent Port Study should be referenced and studied prior to pursuing any new projects.

4.6 Kenai Peninsula Borough Ordinances for Full Timber, Resource and Land Management

Draft ordinances concerning:

Land and Resource Management-4.6.1. Establishment of a Kenai Peninsula Borough (KPB) Professional Resource Manager. The KPB Assembly could establish a Professional Resource Manager (PRM) to implement emergency salvage sales of timber on KPB and KPB managed lands. The Professional Resource Manager would provide stewardship for these lands for all important values and resources in association with other resource mangers (Federal, State and private). The primary focus of these regulations is the long-term forest health and stewardship of KPB forest lands, and to ensure successful reforestation on spruce bark beetle impacted lands.

Reforestation-4.6.12. Authorizes establishment/funding of a KPB Reforestation Center. KPB could seek to obtain funding for a KPB Reforestation Center, including a tree nursery. Staffing would consist of a nursery expert, silviculturist, wildlife and fisheries biologists. Cooperative agreements from all affected land owners would be secured and cost share agreements for operations would be secured. Also establishes Prescribed Burn Team. As a part of the Reforestation Center, a Prescribed Burn Team would be established and staffed to carry out the goals of reforestation where planting is uneconomical or unfeasible.

Emergency Salvage Timber Sales-4.6.2. Authorizes emergency timber sales regulations to be administered by KPB Professional Resource Manager. Amends 17.50.30. Forest resources impacted by the spruce bark beetle would have reduced fire risk while salvaging some value.

Value-Added Incentives-4.6.3 and Export Authorization-4.6.4. Establishes requirements for primary manufacture. Contains exceptions for surplus of supply or extraordinary market conditions.

These ordinances will be enabling legislation for the Kenai Peninsula Borough to fully manage its land to combat the beetle epidemic and ensure healthy forests for the future. Full drafts are included in a separate document.

5.0 Forest Area Infested by the Spruce Beetle

Since the spruce bark beetle epidemic became a cause for concern, there has been some contention of the degree and range of the infestation. Since 1954 annual surveys have been done by the USDA-Forest Service. Results of these surveys show that on the Kenai Peninsula alone 1.2 million acres have been infested since the 1950's to 1992. The 1992 aerial survey showed that there were 365,000 acres in the entire borough that had trees that were infested in 1991 and showed up as red tops or recently dead.

With this type of annual survey, the Forest Service personnel determined the area and spread of new infestations. In order to accomplish this, they reviewed the maps to determine the amount of overlap of previous years infestations which are currently showing up as new infestations. They estimated that out of the 365,000 currently infested acres that there are over 125,000 acres of new infestation in 1991 (1992 survey). Another important consideration is to research and analyze past spruce beetle infestations and forecast the spread of the spruce beetle in recently infested areas. The acreage and location of the infestations recorded in the 1992 survey are shown in the following table. In addition, past infestations from 1950 to 1992 are shown with the major infestations noted by location and severity.

Note: It is important to consider that the increase and/or decrease from year to year reflects the relative level of infestation. The beetle life-cycle is generally two years—so it is to be expected that the infestations will ebb and flow. In addition, once trees show red tops this indicates that they have already been hit the previous year and are dying this year. Subsequent surveys will only inventory new red tops. However, the effect on the forest is cumulative—while the exterior boundaries of an infestation may or may not expand—the devastation within can go on until it is complete.

5.1 Area Infested by Spruce Beetle—Tables

1992 U. S. FOREST SERVICE/ ALASKA DIVISION OF FORESTRY AERIAL SURVEYS of the KENAI PENINSULA BOROUGH

AREA	LOCATION	INFESTED ACRES
Kenai Peninsula	North	86,561
	Central	184,799
	Southern	37,209
	Kachemak Bay, Seldovia & Port Graham	12,922
	Chugach NF Hope & Six-Mile	16,736
	Chugach NF Cooper Landing, Moose Pass to Seward	19,071
Sub-Total Kenai Peninsula		**357,298**
West Side Cook Inlet	Tyonek	1,846
	Tuxedni- Crescent R. Polly Cr.	6,129
Total Area Infested KPB-1992 survey		**365,273**

Source: USDA Forest Service, State and Private Forestry, Robert Wolfe.

A review of the past spruce beetle infestations by locations in the Kenai Peninsula Borough is given in the following table[1].

Spruce Beetle Infestations in the Kenai Peninsula Borough—Historical Years 1954 through 1974

YEAR	LOCATION-IMPACT	ACRES
1950	Kenai burn of 1947. Scattered mortality, beetles bred in fire scorched trees then moved to green trees.	No Acreage (NA)
1954	Activity in Skilak & Tustemena Lakes, Soldotna-Homer area. Powerline & road clearing light but steady rate. Seward Bear Lake logging area standing trees.	NA
1957	Small outbreaks in Chugach N.F. @ Six-Mile-Resurrection Creek. Moose Range Chickaloon Bay & Swanson River. Losses around Kenai burn.	NA
1958	CNF-Resurrection Creek Palmer Granite & Quartz Creeks. Summit Lake. Moose Range: large scattered infestation @ Moose Pt. to Point Possession east to Chickaloon	16,000 60-100,000
1962	Kenai Peninsula, increase with hot spots @ Anchor Point & 40 miles N. of Seward (Kenai Lake - Summit Lake) 2-3 fold increase.	NA
1966	CNF-Tree mortality west shore of Kenai Lake, Russian River-Kenai River junction & Jerome Lake. Increase around 1959 Kenai Lake burn Increase throughout Kenai, mouth of Chickaloon River.	NA NA 100
Late Sixties 1967	CNF-Granite Creek high incidence since 1957 East Fork River & Granite Creek. Juneau Falls	NA 1,300 8
1969	Point Possession to Homer-Anchor Point.	40,000
1969	Spruce beetle activity subsiding. Drought hits.	
1970	Estimate on Kenai National Moose Range State & pvt. land one billion board feet of spruce mortality. Unbroken infestation from Pt. Possession to Clam Gulch. Two small outbreaks in Deep Cr. near Ninilchik. Major outbreak of 260,000 expanded from minor outbreak, less than 100 Ac in 1960	200,000 60,000
1970	Spruce beetle buildup in 1969 blowdown in Six Mile, Resurrection Creeks & Summit Lakes areas. 1969 Russian River burn, increase around edges.	NA
1972	North Kenai. Decrease of outbreak after 6 years of activity due to reduction in size of residual spruce stand. Central Kenai-Clam Gulch to Anchor Point.	60,000
1972	Mt. Iliamna-Crescent River.	6,000
1972	West Side of Cook Inlet-Trading Bay & Tyonek (in progress for 3-4 years due to drought of 69-70) Tyonek salvage sale by DNR 223,000 acres & 425 mmbf. 113 mmbf of spruce and 20 mmbf of hardwood actually cut.	70,000
1974	Kenai Peninsula decline. Beluga Lake.	53,000 140,000

[1]The source for the following information is the USDA-Forest Service, Alaska Region report titled, Forest Pest Management Report, R-10-90-18: Spruce Beetle Activity in Alaska 1920-1989, February, 1990. The maps and data produced by the DOF for the 1980-1989 were also used.

Summary Table-Cook Inlet to 1974

Date	Kenai Pen.	W. Cook Inlet	Total
Late 60's-73	257,700	120,600	378,300
1974	300	143,400	143,700
TOTAL	258,000	264,000	522,000

Years 1975 through 1989

YEAR	LOCATION-IMPACT	ACRES
1975	West Side Cook Inlet	167,000
1976 & 77	CNF Resurrection Creek	12,300
1977	Summit Lake Upper Russian Lake	3,000 1000
1978	KNMR West Side Cook Inlet	47,000 64,000
1980	CNF-Summit Lake Resurrection Creek KNMR-Barbara Lake West of Tustemena West Side Cook Inlet N. of Beluga Lake (not KPB)	13,924 15,240 12,162 19,698 374,452
1981	South shore of Kachemak Bay (scattered)	NA
1981	Total-Southcentral	240,000
1982	Total Southcentral	490,220
1982	Chugach N.F. Kenai Pen. 1981 (27,303 to 41,369) SPBB Activity in Kachemak Bay	37,929 41,369 NA
1984	CNF increase to Cooper Landing to Russian River KNWR Increase on North Peninsula & on to South Peninsula (Fox R. 15,690)	56,342 53,713 22,177
1985	Decrease in CNF & West Side of Cook Inlet Increased activity @ Cooper Landing Infestation North of Beluga Lake	64,234
1986	CNF Increase @ Cooper Landing Ninilchik River & Crooked Creek	40,423 10,000
1987	KNWR Increase by 9,000 ac-Mystery Hills Skilak Lake to CNF-Summit Lake & Cooper Landing	63,099
1988	CNF Heavy infestation @ Cooper Lake & Near Upper Trail Lake KNWR SW of Tustemena Lake (had been apparent for 2-3 years)	41,000
1989	Decline in 89 KNWR & CNF	7-10,000
 1986 1988-89	Maritime Coastal forest Kachemak Bay (1,168 Mallard Bay & 1,300 Bear Cove) Seldovia Kachemak Bay increased to 10,000	 3,600 500 10,000

Summary of Acres Impacted by Spruce Beetle Outbreaks, Kenai Peninsula Borough

Year	Acres.	Impact
1950	No Ac Given	Kenai Burn
1954	NA	Skilak, Tustemena, Soldotna, Homer
1957	NA	CNF-Six Mile & Resurrection
1958	16,000 100,000	CNF KNWR
1966	40,100	Pt. Possession to Homer
1967	1,308	East Fork & Granite Creeks
1970	260,000	One billion bf of timber lost from Point Possession to Clam Gulch
1972	60,000 6,000 70,000	Central Kenai Crescent River/Mt. Iliamna Tyonek-113 mmbf to 425 mmbf cut/lost
1974	53,000 140,000	Kenai Peninsula Beluga Lake
1975	167,000	Tyonek-Beluga Lake
1976-77	16,300	CNF-Cooper Landing
1978	47,000	KNMR
Sub-Tot 1950-78	1,040,708	Entire Borough
1980	29,164 31,860	CNF KNWR
1982	37,929 41,369	CNF Kenai Peninsula
1984	56,342 75,890	CNF KNWR
1986	40,423 3,600 10,000	CNF Kachemak Bay Ninilchik
1987	63,099	KNWR
1988	41,000 10,000	KNWR Kachemak Bay
1989	10,000	KNWR &CNF
1990	39,000	KNWR
1991	187,000	Western Peninsula
1992	**365,000**	**All of KPB (DOF Figures)**

The Forest Service analysis of the survey maps shows that 1,077,000 acres were impacted from the 1950's to 1989. An analysis of the DNR-DOF and USFS maps shows a net increase of 125,000 acres infested from 1990-92. This totals 1.2 million acres infested by the spruce beetle since surveys were started. Due to lack of detailed forest inventories, the estimated volume loss of spruce timber varies from 1.6 to 3.0 billion board feet since 1950.

5.2 Certification of Infestation

Professional opinion: Based on the above surveys and data, the spruce beetle infestations have impacted 1.2 million acres since 1950. Based on the age of the spruce forest, past and present infestations, rate of spread and other factors it is projected the infestations will continue south on the Kenai Peninsula to the Homer area, continue in the Kachemak Bay area and possibly spreading further south into the Seldovia, Port Graham and English Bay drainages. In the Chugach National Forest, the Hope and Six-Mile infestations are spreading rapidly. The Trail Lakes-Moose Pass infestation is a major one and is spreading south toward Seward. On the west side of Cook Inlet, the infestations in the Crescent River-Polly Creek and Tyonek areas need close surveillance. These could become major outbreaks next year.

Susceptibility of Sitka spruce in a maritime forest to bark beetle infestations: A review of the record concerning spruce beetle infestations in the coastal or maritime forest reveals that in the mid-thirties the Forest Service recorded a 100,000 acre infestation on Afognak Island (80 miles south of English Bay) in the pure Sitka spruce forest. The estimated loss of volume was 150 million board feet spruce sawtimber. This is important to consider as it is a widely held misconception that Sitka spruce in the maritime forest are somehow immune to devastating beetle infestations.

5.3 Verification Procedure

The process used to verify the infestation is discussed below. Robert Wolfe, the Forest Service insect and disease professional, provided all of the 1992 KPB 1:250,000 aerial forest health maps and data and the 1992 acreage information. This data was compared with the map data at 1:63,360 secured from Rick Plate, Division of Forestry-Soldotna. Both data sets were reviewed and compared with the infestation as mapped since 1970. Since this information was gathered through use of aerial surveys and under certain light and weather conditions, evidence of infestation can be difficult to identify. However, it is the best and most current data available and should provide a relatively reliable and accurate picture of the extent of the spruce beetle epidemic. Maps using this information have been prepared in two formats. A 1:250,000 work map shows the infestation borough-wide, 1:63,360 work maps provide a much greater level of detail and provide a fairly good indication of the forest cover. In addition, acreage figures for the infestation were compared using data from both the DOF and U.S. Forest Service and then verified via an independent estimation of the impacted acreage.

6.0 Timber Harvest

The spruce bark beetle infestation is widespread—reaching all regions of the Kenai Peninsula Borough (except for the outside gulf coast from Seward to English Bay)—while ignoring all boundaries, natural or artificial. Most of the borough's various forest resource lands are not too remote or isolated to escape the ongoing devastation. However, in formulating a timber harvest and an associated transportation plan, availability for harvest was considered along with desirability. If a landowner or manager is unwilling or unable to provide timber for harvest despite the ravages of the beetle, then it makes little sense to formulate plans. These unharvestable lands should be included in a broad reforestation plan which includes under-planting of seedlings and prescribed fire treatment.

For planning purposes the borough has been divided into blocks, then units within these blocks. The options for the master timber harvest plan are discussed under each block and unit.

6.1 Alternatives

Alternative I: Advocate and facilitate harvest on accessible commercial forest lands, primarily on the western Kenai Peninsula south of Kasilof to Kachemak Bay. Encourage quick harvest of beetle killed spruce on KPB, private and available State and Federal land in the Chugach National Forest around Moose Pass-Trail Lakes. Limited new road building. Low investment in infrastructure.

Advantages: Limited amount of fire risk mitigation achieved only in most populous areas of borough.

Disadvantages: Beetle damaged forest partially harvested and reforested. Loss of large volume of forest resources. Limited secondary processing and associated jobs. Large areas of western peninsula, including populated and recreation areas would still have a high risk of catastrophic fire.

Alternative II: In addition to conditions of Alternative I, encourage harvest in south peninsula, north peninsula, west side of Cook Inlet, Beluga and Fox River, with some activity in Chugach National Forest. Provide financing assistance for infrastructure investments in roads and transfer facilities. Limited harvesting of green timber incidental with beetle killed timber on public lands. Moderate increase in management obligation for KPB and State.

Advantages: Increases potential harvest over a ten year period. Includes majority of operable (economic, technical and political) acres harvested and reforested.

Disadvantages: Beetle problem not fully mitigated. Outbreaks continue unabated primarily in more remote areas. Significant economic loss due to unharvested but still dead timber. Large areas of populated western peninsula would still have a moderate to high risk of catastrophic fire. Limited value-added activity with associated jobs, economic growth and taxes.

Alternative III: Comprehensive timber harvest and management for entire borough, including harvest of beetle killed timber in all units and blocks. Harvest of green timber on private, KPB, State and Federal lands. Substantial public and private investment in timber industry related infrastructure, roads, transfer facilities, ports and secondary processing.

Advantages: Increased economic activity within the borough, including increased tax base. Employment increases over long period of time. Jobs created are relatively high paying and nearly year-round—could offset jobs lost in other sectors of borough economy. Majority of beetle infested acres mitigated except for KNWR. Large areas of borough would have reduced fire risk with reforested-green acres prevalent. Enhanced wildlife habitat on harvested acres. Substantial increase in access for land management and recreation.

Disadvantages: Creates greater obligation/requirement for reforestation. Effort will require increased staffing by State and KPB to manage timber sales, roads and permitting. Substantial commitment of public/private funds for investment. Opportunities may be lost in other areas for economic investment.

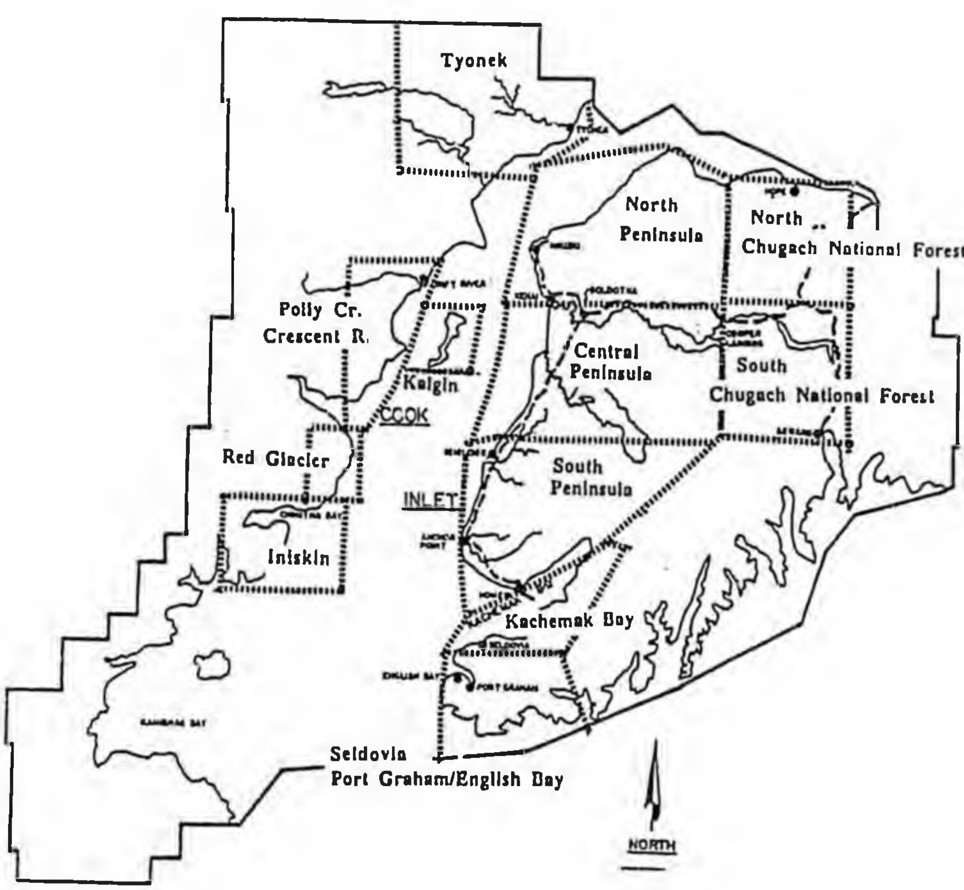
For forward funding of roads and other issues see Section 4.5, Proposed KPB Ordinances.

6.2 Blocks and Units

The blocks and units are as follows for inventory and management of lands within the Kenai Peninsula Borough:

BLOCK	UNIT
Kenai Peninsula	North
	Central
	South
	Kachemak Bay
	Seldovia
	Port Graham/English Bay
Chugach National Forest	North
	South
West Side Cook Inlet	Tyonek
	Kalgin Island
	Polly Cr./Crescent R.
	Red Glacier
	Iniskin

The blocks and units for inventory and management of lands within the Kenai Peninsula Borough are shown by dashed lines on the map below.



6.3 Timber Harvest Plan

The spruce bark beetle has infested and had a major devastating impact on the spruce forest of the KPB and adjoining forest lands. Since 1970, over 1.2 million total acres have been hit heavily with an estimated loss of between 1.6 to 3 billion board feet of spruce. The 1992 surveys show 365,000 acres which are currently infested. The infestations have moved from Federal and State lands to the small private, ANCSA Corporate, KPB and State lands. The projected and present economic and environmental costs are substantial and in the millions of dollars.

This proposed timber harvest program has many options based on the land owners objectives, the forest products market and the quality of the trees killed and infested. Coordination in proposed timber harvest programs is needed among private land owners and the KPB, University, State Agencies, U. S. Forest Service and the U. S. Fish and Wildlife Service. Immediate coordination is needed among the University; State agencies: DNR, ADF&G, DOT, DCED; Kenai Peninsula Borough and ANCSA Corporations: Cook Inlet Region Inc. and the Ninilchik, Kenai, Salamatof, Tyonek, Knik and Chickaloon village corporations.

Due to the deterioration of the timber in a 2-5 year period after a tree turns red and because of the pattern of continued spread of the infestation, the suggested option is to harvest all recently-killed spruce and threatened spruce stands on all lands and ownerships. These proposed harvests must be drawn with proper planning and protection of the fisheries, wildlife and recreation values. Artificial reforestation, if needed, must take place immediately after harvest.

6.31 Forest Inventory Data

The data used to estimate the acreage and volume of spruce in the borough is derived from the Forest Service's extensive surveys (Kenai Peninsula, Tuxedni Unit and the Beluga area) and the recent Kenai Peninsula Borough Economic Development District report titled Commercial Timber Resources of the Kenai Peninsula Borough. Several intensive inventories were also used for reference. There are no adequate composite timber type maps available of the commercial forest land of the borough. The borough is divided into blocks and subdivided into units based upon the above data and knowledge of the forest resources. For each of these units, the commercial forest land and volumes as for each of the major owners is estimated. These estimates are imprecise. On all units, detailed timber type maps are direly needed as a planning and management tool.

The following tables summarize the ownership, volumes and location of the 646,000 acres of commercial forest land in the borough. The inventory table shows there is an estimated 3 billion board feet of available timber (minus the trees recently beetle killed). Of this, approximately 0.8 billion board feet is currently under contract. Also, the volume table shows there may be 0.6 billion board feet of timber on the Chugach National Forest, some of which could be harvested. Commercial forest land must occur in 5 acre tracts to be inventoried. The inventory data includes some hardwoods (5 to 15 percent in general and up to 50 percent of the total in the Tyonek unit). In the Chugach National Forest there are some mountain hemlock and hardwoods types of commercial quantities.

6.32 Ownership and Inventory Table

Ownership of Estimated Commercial Forest Land in the Kenai Peninsula Borough by Location and Major Owners[1]

COMMERCIAL FOREST LAND
(CFL)---ACRES

Location	Total	Unavailable	Possible	Available & Under	Existing	Contract		Total
Kenai Pen.		KNWR	CNF	KPB	State	Corp	Other	Available
North Pen.	66,000	44,000		7,000	2,000	12,000	1,000	22,000
Central Pen.	135,000	62,000		9,000	28,000	32,000	4,000	73,000
South Pen.	148,000	89,000		5,000	33,000	18,000	4,000	60,000
CNF-N	31,000		29,000	1,000			1,000	2,000
CNF-S	56,000		50,000	4,000	1,000		1,000	6,000
Kach. Bay	11,000	1,000			4,000	4,000	1,000	9,000
S-PG-EB	35,000					28,000	7,000	35,000
Total KP	482,000	196,000	79,000	26,000	68,000	94,000	19,000	207,000
West Side								
Kalgin Is.	6,000				6,000			6,000
Tyonek	85,000			4,000	25,000	56,000	1,000	86,000
Lake Clark NP	28,000	28,000						
Tuxedni	*Sub-unit*							
Polly Cr	16,000					16,000		16,000
Red Gl.	13,000					13,000		13,000
Iniskin	16,000					16,000		16,000
Sub -Total	45,000					45,000		45,000
Total W. Side	164,000	28,000	0	4,000	31,000	101,000	1,000	137,000
TOTAL KPB*	**646,000**	**224,000**	**79,000**	**30,000**	**99,000**	**195,000**	**20,000**	**344,000**

*This is an estimate based upon the best available data.

Totals may be off due to rounding.

[1] The source for the tables 6.32 & 6.33 are Timber Resource Statistics for the Tuxedni Bay Inventory Unit, Alaska, 1971. USDA PNW-88, Timber Resource Statistics for the Beluga Block, Susitna River Basin Multiresource Inventory Unit, Alaska, 1980. USDA PNW-121, Timberland Resources of the Kenai Peninsula, Alaska, 1987. USDA PNW-RB-180.

6.33 Volume and Inventory Table

Volume of Estimated Commercial Forest Land in the Kenai Peninsula Borough by Location and Major Owners

Million Board Feet (MMBF)

LOCATION	TOTAL	Unavail	Possible	Available and Under Existing Contract					
Kenai Pen.		KNWR	CNF	KPB	State	Corp	Other	TOT Avail	
North Pen.				40	20	40	9	109	
Central Pen.				89	311	330	40	770	
South Pen.				70	354	230	50	704	
CNF-N			241	6	2		5	13	(+241) CNF
CNF-S			400	26	8	40	10	84	(+400) CNF
Kach. Bay								0	
S-PG-EB						354	90	444	
Total KP	0	0	641	231	695	994	204	2124	(+641) CNF
West Side									
Kalgin Is.					25			25	
Tyonek				24	75	224	3	326	
Lake Clark NP								0	
Tuxedni sub-unit									
Polly Cr						195		195	
Red Gl.						180		180	
Iniskin						159		159	
Sub -Total	0	0	0	0	0	534	0	534	
Total W. Side	0	0	0	24	100	758	3	885	
TOTAL KPB*	0	0	641	255	795	1752	207	3009	(+641) CNF 3650

* Totals may be off due to rounding. Includes 5 to 15 percent hardwoods in general and up to 40-50 percent in the Tyonek unit. Also, mountain hemlock and hardwoods are present in CNF.

6.4 Coordination Needed

The coordination and cooperation among private owners and agencies is discussed below by priorities.

6.41 Priority One

Kenai Peninsula: North, central and south. Ninilchik Native Assoc. Inc. (NNAI) and Cook Inlet Region, Inc. (CIRI) are already cooperating on the harvest and access to their adjoining lands. The Kenai Peninsula Borough and State should consider several joint salvage sale plans that could be used for the local forest products industry. The other CIRI village corporations with land in the north peninsula should coordinate their forest management and harvest plans with the adjoining State, Borough and private lands.

State general grant lands and Mental Health lands, along with University lands, could be packaged with the KPB lands. The University lands office and Alaska Department of Fish & Game (ADF & G) Habitat should be actively involved because of the present and future impact on these lands.

Kachemak Bay: The Division of Parks, Seldovia Native Association, Alaska Dept. of Fish & Game-Habitat, Koncor Forest Products Co., the City of Homer and the Division of Forestry need to study and work up a plan of action or no action on the infested area. "No Harvest" recommended in this area because of a proposed buy-back of private land and timber rights within Kachemak Bay State Park. If the buy-back does not go through, the 50 mmbf owned by Koncor could be harvested.

Trail Lakes-Moose Pass: The State-DNR, the Kenai Peninsula Borough and the Chugach National Forest need an action plan on the currently intense, destructive infestation in this important multi-resource area.

Tuxedni Unit-Polly Creek Tract: The CIRI village corporations of Seldovia, Ninilchik, Knik, Tyonek and Chickaloon, which own most of the private land, need to prepare a coordinated timber harvest and resource plan for this tract. The infestation has started and could spread if other infestations are any indication. These corporations could sustain an economic loss from $3.5 to 4 million in stumpage value if they lose 100 million board feet to the beetle epidemic. This is based on 1992 estimated logging costs and values.

Port Graham & English Bay: Coordination on construction of a dock at Port Graham to facilitate harvest of potentially infested areas in English Bay and Port Graham allotment sales and existing and planned corporation sales. Connect communities by road. Connect into Windy Bay and English Bay road systems. Coordinate with both Bureau of Indian Affairs and Port Graham and English Bay corporations.

6.42 Priority Two

Tyonek: Coordination is needed between Kenai Peninsula Borough, State, Tyonek, CIRI, and with the Matanuska-Susitna Borough on their lands with infestations to the north.

Chugach National Forest: Coordination with the Kenai Peninsual Borough, State, Chugach National Forest and Chugach Alaska Corp. on the lands in the Hope, Six-Mile and Seward areas.

North Peninsula: Estimated 22,000 acres of available commercial forest land (CFL) containing 109 mmbf. Ownership in KPB, State, CIRI, Salamatof, Tyonek, Kenai, Chickaloon and Point Possession ANCSA Corporations.

Approximately 50 miles of main and spur road are needed to access KPB tracts. No estimate made for corporation tracts.

Infestations heavy in Kenai area and north to Point Possession. Unit needs coordinated KPB/State/Corporation plan.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK Kenai Peninsula UNIT North Peninsula

OWNERSHIP KPB, State, State Parks, Mental Health & small private-residential-Nikiski & Kenai

Available Commercial Forest Land

	Available-CFL
Acres	22,000
Est-Vol-MMBF	109
Est-Vol-MMCF	31

Infested Forest Land

	Recent Dead
Acres	86,561

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB	7,000	40	11.4	
State	2,000	20	5.7	
ANCSA Corp	12,000	40	11.4	20-40*
Small Private	1,000	9	2.5	
Other-Residential				
TOTAL	22,000	109	31.2	20-40*

Comments: A coordinated infestation reduction and harvest is needed on the residential, other private, agency and other corporate lands in the area from Kenai to Nikiski.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	40	$45,000	$1,800,000
Spur Rd	10	$18,000	$180,000
Winter			

* A rough estimate for the ANCSA Corporation land is that 40 to 60 miles main road and spur road might be needed. Cost share and joint managment agreements will be needed between the corporations, State and KPB.

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Central Peninsula: Estimated 73,000 acres of available commercial forest land in unit with 770 mmbf. State and KPB have 400 mmbf, when combined could make for feasible coordinated planning and harvest program. Unit is one of the hardest hit by spruce beetle in 1992.

The CIRI sale to Circle DE Pacific and the Ninilchik sale to Klukwan are or will be active in this unit. Planned road net for the major owners shown on work map.

Estimated Available Commercial Forest Land, Infested Acres,
Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK Kenai Peninsula UNIT Central Peninsula

OWNERSHIP KPB, State, U of A, CIRI, NNAI & small private. Plus residential-Sc[illegible]na, Kasilof & Sterling.

Available Commercial Forest Land

	Available-CFL
Acres	73,000
Est-Vol-MMBF	770
Est-Vol-MMCF	220

Infested Forest Land

	Recent Dead
Acres	184,799

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB	9,000	89	25	
State	28,000	311	89	
ANCSA Corp	32,000	330	94	220
Small Private	4,000	40	12	
Other				
TOTAL	73,000	770	220	220

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	101	$45,000	$4,545,000
Spur Rd			
Winter			

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

South Peninsula: South peninsula has 60,000 acres of commercial forest land with estimated volume of 704 mmbf. State has 354 mmbf in general grant and critical habitat lands. KPB has 70 mmbf. Infestation is light but spreading in Anchor River and Homer area. Coordinated plan and harvest plan with KPB and State agencies would be desirable. Fisheries, wildlife, land and recreation values are very high in unit. Two major sales on ANCSA lands: Ninilchik-Klukwan and CIRI-Circle DE Pacific.

Suggested road system with a minimum of stream crossings is shown on work map. Access south of Caribou Lake would depend on timber values, infestation and CIRI's approval to connect with Oil Well Road system.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK Kenai Peninsula UNIT South Peninsula

OWNERSHIP KPB, State, State Critical Habitat, U of A, Ninilchik Corp. & CIRI , Communities of Ninilchik, Happy Valley, Anchor Point & Homer + Russian Villages

Available Commercial Forest Land

	Available-CFL
Acres	60,000
Est-Vol-MMBF	704
Est-Vol-MMCF	201

Infested Forest Land

	Recent Dead
Acres	37,209

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPE	5,000	70	20	
State	33,000	354	101	
ANCSA Corp	18,000	230	66	230
Small Private	4,000	50	14	
Other				
TOTAL	60,000	704	201	230

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	100	$45,000	$4,500,000
Spur Rd			
Winter Rd			

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Chugach National Forest-North: Infestation hot in the Six-Mile/Hope area—should be closely monitored. State/KPB selections should be studied for increased infestation in 1993. Coordinated plan and harvest program needed in this portion of CNF. Estimated 29,000 acres of commercial forest land with net volume of 241 mmbf on National Forest. Chugach Alaska Corp.'s forest products complex at Seward could utilize beetle killed spruce in future.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK Kenai Peninsula UNIT Chugach NF-North

OWNERSHIP CNF, KPB, state & some small private; Hope & Sunrise communities.

Available Commercial Forest Land

	Available-CFL
Acres	29,000
Est-Vol-MMBF	241
Est-Vol-MMCF	69

Infested Forest Land

	Recent Dead
Acres	5,500

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB	1,000	6	1.7	
State	500	2	0.6	
ANCSA Corp				
Small Private	500	5	1.4	
Other/CNF	(29,000)	(241)	(69)	
TOTAL	2,000	13	3.7	

Comments: State/KPB selections need detailed study on acres of commercial forest land infested. Coordinated, detailed inventory and management plan needed for these areas and entire unit.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd			
Spur Rd	20	30,000	$600,000
Winter			

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Chugach National Forest-South: Estimated 56,000 acres commercial forest land in unit; 50,000 acres in CNF and 6,000 in KPB, state and small private. Proposed KPB lands at Trail Lakes-Moose Pass heavily infested. Coordinated management and harvest plan between KPB, CNF and the State needed immediately. KPB lands could have from 20 to 35 mmbf. Estimated 26 mmbf for this report. The private, ANCSA Corp. lands in Kenai Fjords National Park are shown in this table.

From 15 to 25 miles of main and spur road needed to harvest area. Other resource values are very high and must be considered in harvest plan.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK Kenai Peninsula UNIT Chugach N.F.- South

OWNERSHIP CNF, State, KPB, some private & Port Graham & English Bay Corporations within Kenai Fjords NP

Available Commercial Forest Land

	Available-CFL
Acres	56,000
Est-Vol-MMBF	400-425
Est-Vol-MMCF	90-110

Infested Forest Land

	Recent Dead
Acres	19,071

Available Commercial Forest Land and Volume

Owner	Ac[illegible]	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB	4,000	26	7.4	
State	1,000	8	2.3	
ANCSA Corp*		(40)		
Small Private	1,000	10	2.9	
Other/CNF	(50,000)	(400)	(111.4)	
TOTAL	6,000	44	12.6	

* ANCSA Corp. land located within Kenai Fjords NP. Owned by Port Graham and English Bay Corporations.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	63	$60,000	$3,780,000
Spur Rd			
Winter			

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Kachemak Bay: Estimated 9,000 acres of available commercial forest land in unit. 13,000 acres of forest land infested with spruce beetle per 1992 inventory. Ownership in State Park and Seldovia Corp. No estimate made of volume. Proposed buy-back of Seldovia land complicates any planning to promote healthy forest in area.

No road estimates made either for same reasons.

If buy-back does not get approved, Koncor would log 50 mmbf from Seldovia Corp. land.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK Kenai Peninsula UNIT Kachemak Bay

OWNERSHIP State, State Parks & Critical Habitat, Seldovia Corp (Koncor)-Buy Back

Available Commercial Forest Land

	Available-CFL
Acres	9,000
Est-Vol-MMBF	
Est-Vol-MMCF	

Infested Forest Land

	Recent Dead
Acres	13,000

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB				
State	4,000			
ANCSA Corp	4,000			50 to Koncor
Small Private	1,000			
Other				
TOTAL	9,000			50

Comments: No estimates made of volumes due to proposed buy-back of Seldovia lands and proposed land management direction.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd			
Spur Rd			
Winter			

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Seldovia-Pt.Graham & English Bay: Active and ongoing timber harvest on corporate lands—Rocky/Windy Bays & Dogfish Bay. Encouragement of value-added processing and investment in timber transfer facilities needed at Port Graham. Connecting road needed between English Bay/Port Graham and Rocky/Windy Bay. Dock for barges and ships needed.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK Kenai Peninsula UNIT Seldovia-Pt.Graham & English Bay

OWNERSHIP Seldovia Native Assn, Port Graham Corp & English Bay Corp. and allottments.

Available Commercial Forest Land

	Available-CFL
Acres	35,000
Est-Vol-MMBF	444
Est-Vol-MMCF	127

Infested Forest Land

	Recent Dead
Acres	NE

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB				
State				
ANCSA Corp	28,000	354	101	100
Small Private	7,000	90	26	
Other				
TOTAL	35,000	444	127	100

Comments: Spruce beetle infestations are as far south as English Bay & are increasing in Jackolof & Seldovia Bay areas.

A dock is needed at Port Graham to handle logs from the English Bay, Port Graham and Windy and Rocky Bay drainages.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	40	$50,000	$2,000,000
Spur Rd	20	$20,000	$400,000
Winter			

Log Transfer Facility:# 1-Dock* $1.5 Million

*A detailed cost estimate is needed.

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Kalgin Island: Infestation on island is widesread. DOF estimates 25 mmbf. Estimate of roads— 15 miles of main and spur roads. Best site for transfer facility appears to be on NW end of island.

Sale should be planned and sold this winter to salvage recently and new dead spruce. Coordinated plan would be needed with DOF, DOL, ADF&G and Cook Inlet Aquaculture Assn.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK West Side Cook Inlet UNIT Kalgin Island

OWNERSHIP State, small private, set net sites & Cook Inlet Aquaculture

Available Commercial Forest Land

	Available-CFL
Acres	6,000
Est-Vol-MMBF	25
Est-Vol-MMCF	7.1

Infested Forest Land

	Recent Dead
Acres	
	USFS Est*.

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB				
State	6,000	25	7	
ANCSA Corp				
Small Private				
Other				
TOTAL	6,000	25	7	

Comments: Timber cruise of Kalgin Island needed to determine percent of recent and older dead.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	13	25,000	325,000
Spur Rd	2	17,000	34,000
Winter	5	8,000	40,000

Log Transfer Facility:# 1- LTF $300-400.000

* USFS estimate-entire spruce forest infested.

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Tyonek: Estimated 85,000 acres of commercial forest land in Tyonek unit with 326 mmbf. Infestations in past have been heavy and destructive. Present infestations are light and scattered. New type map for all owners is needed to determine useable volume and inventory other values. Estimates given in following table are imprecise.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK West Side Cook Inlet UNIT Tyonek

OWNERSHIP State, KPB, Tyonek, CIRI & small private-(allotments)

Available Commercial Forest Land

	Available-CFL
Acres	85,000
Est-Vol-MMBF	326
Est-Vol-MMCF	93

Infested Forest Land

	Recent Dead
Acres	1,168

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB	4,000	24	7	
State	25,000	75	21	
ANCSA Corp	56,000	224	64	
Small Private	1,000	3	1	
Other				
TOTAL	85,000	326*	93	

Comments: An intensive up to date inventory is needed for Tyonek Unit to record old dead, present infestations and present volumes. These estimates are imprecise and need to be updated by the State and corporations. Mat-Su Borough has six sections with CFL. Reforestation from old Tyonek State sale should be considered in planning. Reforestation planning and implementation critical.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd			
Spur Rd			
Winter			

Log Transfer Facility:# ** 1-Dock/LTF $500-800,000

* Hardwood volume ranges from 30 to 50 percent in this unit.

** Coordinated inventory, management, harvest and transportation plan with LTF, chip transfer and dock facilities needed. Major land and timber owners are Tyonek Corp, Koncor, DOF, KPB and Mat-Su Borough.

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Polly Creek: Coordinated land management and timber harvest program needed for this important tract. Spruce beetle infestation has started in Squarehead Cove and should be closely monitored. First class log transfer facility and dock needed to access 16,000 acres of timberland. Other resource values of fisheries, wildlife, recreation and lands are very important.

CIRI village corporations which own alternate sections are: Seldovia, Ninilchik, Knik, Salamatof, Tyonek and Chickaloon.

52 miles of main line and spur road might be needed to access 195 mmbf of high quality timber.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK West Side Cook Inlet UNIT Tuxedni
TRACT Polly Creek
OWNERSHIP CIRI Village Corps

Available Commercial Forest Land

	Available-CFL
Acres	16,000
Est-Vol-MMBF	195
Est-Vol-MMCF	56

Infested Forest Land

	Recent Dead
Acres	3,269

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB				
State				
ANCSA Corp	16,000	195	56	
Small Private				
Other				
TOTAL	16,000	195	56	

Comments: Some KPB lands to the north; but volumes are low. Ownership is in 6 CIRI Villages. Infestation of 3,269 acre should be studied closely for possible expansion. Also, a number of allotments and some small private holdings in tract.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	52	$45,000	$2,025,000
Spur Rd			
Winter			

Log Transfer Facility:# 1 LTF $400,000

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Red Glacier: Estimated 180 mmbf in this tract on 13,000 acres of commercial forest land. Preliminary transportation plan shows about 25 miles of main and spur road are needed. Quality long-term log transfer facility/dock would be needed.

Coordinated planning with the major owners of Seldovia, Tyonek, Ninilchik, Salamatof, Chickaloon and Knik. Fisheries and wildlife, land and resources values high here. No known infestation at present.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK West Side Cook Inlet UNIT Tuxedni
TRACT Red Glacier
OWNERSHIP CIRI Villages

Available Commercial Forest Land

	Available-CFL
Acres	13,000
Est-Vol-MMBF	180
Est-Vol-MMCF	36

Infested Forest Land

	Recent Dead
Acres	

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB				
State				
ANCSA Corp	13,000	180	37	
Small Private				
Other				
TOTAL	13,000	180	37	

Comments: Some allotments in tract.

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	25	$45,000	$1,125,000
Spur Rd			
Winter			

Log Transfer Facility:# 1-2 LTF $300-400.000

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

Iniskin: Tract has 16,000 acres of commercial forest land with estimated volume of 159 mmbf. Three corporations have majority of timberland: Tyonek, Seldovia and Knik. State has some land in tract.

Up-to-date inventory management plan is needed. No recorded infestation.

Only ten miles of road and 2-3 LTFs are proposed with the minimum of data available.

Estimated Available Commercial Forest Land, Infested Acres, Area and Volume of Available CFL in Unit and Transportation Estimate

BLOCK West Side Cook Inlet UNIT Tuxedni
TRACT Iniskin
OWNERSHIP CIRI Villages, mainly Seldovia & Ninilchik

Available Commercial Forest Land

	Available-CFL
Acres	16,000
Est-Vol-MMBF	159
Est-Vol-MMCF	32

Infested Forest Land

	Recent Dead
Acres	NE

Available Commercial Forest Land and Volume

Owner	Acres	MMBF Volume	MMCF Volume	Under Contract MMBF
KPB				
State				
ANCSA Corp	16,000	159	32	
Small Private				
Other				
TOTAL	16,000	159	32	

Transportation Estimate

	Miles	Cost/mile	Total
Main Line Rd	10*	$45,000	$450,000
Spur Rd			
Winter			

Log Transfer Facility:# 2-3 LTF $150-200,000 each*

*These need further study.

Note: In these tables some items left intentionally blank. Not all units will have data in all categories.

7.0 Transportation Plan

7.1 Background

While there has been ongoing timber harvesting and processing for over thirty years in the borough, there has never been a strong and continual timber industry presence here. Recently, two ANCSA (CIRI and Ninilchik) Corporations sold timber resources in the central peninsula. These sales entailed approximately 500 million board feet of Lutz spruce. These sales are fairly representative of the forest resources of the borough in terms of location, basal area, distance to transfer or processing facilities, altitude and topography. From data gained from these two sales, it is possible to provide a range of values which reflect actual transportation costs and road building conditions within the borough.

7.2 Road Costs

In general terms, one mile of road will provide access to 700 thousand board feet (mbf) of medium to high volume (5.3 to 9.6 mbf/acre) commercial forest land (white, Lutz or Sitka spruce). Road costs per mile and estimated breakdown of main line, spur and winter roads are shown in the following table.

7.31 Table: Estimated Road Cost per Mile to Harvest 1 Billion Board Feet

Type	Cost per mile	Miles	%/Miles	Total	%/Total
Main Line	$45,000	178.5	25%	$8,032,500	32%
Spur	$18,000	357	50%	$16,065,000	63%
Winter	$7,000	178.5	25%	$1,249,500	5%
TOTAL		714	100%	$25,347,000	100%

This estimate includes culverts, bridges and maintenance during period of harvest.

7.32.
Estimated Miles, Number and Cost of Roads, Log Transfer Facilities and Docks Needed by Location and Ownership

LOCATION	CFL-AC	Vol mmbf	Roads Miles	$K	LTF & Docks #	LTF & Docks $K	TOT-RDS Docks/$K	Assist-Needed Yes/No/ $MM
KENAI								
North Pen.								
KPB-State	9,000	60	50	1,980			1,980	Yes/$1.2
ANCSA-Corp	12,000	40	NE					
Private	1,000	9	NE					
Central Pen.								
KPB-State	37,000	400	101	4,545			4,545	Yes/$2.0
CIRI-NNAI	32,000	330	NE					
Private	4,000	40	NE					
South Pen.								
KPB-State	38,000	424	100	4,500			4,500	Yes/$3.0
CIRI-NNAI	18,000	230	NE					
Private	4,000	50	NE					
CNF-N								
KPB-State	1,000	8	10	600			600	Yes/$0.
Private	1,000	5	NE					
CNF-S								
KPB-State	5,000	34	63	3,780			3,780	Yes/$2.8
Private	1,000	10	NE					
KFNP		40	NE					
S-PG-EB								
ANCSA	28,000	354	60	2,400	1	1,500	3,900	Yes/$1.
Private	7,000	90	NE					
Total KP								
KPB-State	94,000	926	384	17,805			15,405	Yes/$9.
ANCSA-Corp	94,000	994	60	2,400	1	1,500	3,900	Yes/$1.0
Private	19,000	204	NE					
SUB-TOTAL:	207,000	2,124	444	20,205	1	1,500	19,305	Yes/$10.

7.32.
Estimated Miles, Number and Cost of Roads, Log Transfer Facilities and Docks Needed by Location and Ownership

LOCATION	CFL-AC	Vol mmbf	Roads Miles	LTF & Docks $K	LTF & Docks #	LTF & Docks $K	TOT-RDS Docks/$K	Assist-Needed Yes/No/ $MM
KENAI								
North Pen.								
KPB-State	9,000	60	50	1,980			1,980	Yes/$1.2
ANCSA-Corp	12,000	40	NE					
Private	1,000	9	NE					
Central Pen.								
KPB-State	37,000	400	101	4,545			4,545	Yes/$2.0
CIRI-NNAI	32,000	330	NE					
Private	4,000	40	NE					
South Pen.								
KPB-State	38,000	424	100	4,500			4,500	Yes/$3.0
CIRI-NNAI	18,000	230	NE					
Private	4,000	50	NE					
CNF-N								
KPB-State	1,000	8	10	600			600	Yes/$0.3
Private	1,000	5	NE					
CNF-S								
KPB-State	5,000	34	63	3,780			3,780	Yes/$2.8
Private	1,000	10	NE					
KFNP		40	NE					
S-PG-EB								
ANCSA	28,000	354	60	2,400	1	1,500	3,900	Yes/$1.0
Private	7,000	90	NE					
Total KP								
KPB-State	94,000	926	384	17,805			15,405	Yes/$9.3
ANCSA-Corp	94,000	994	60	2,400	1	1,500	3,900	Yes/$1.0
Private	19,000	204	NE					
SUB-TOTAL:	207,000	2,124	444	20,205	1	1,500	19,305	Yes/$10.3

(Continued)

LOCATION	CFL-AC	Vol	Roads	LTF & Docks			TOT-RDS	Assist-Needed
WEST SIDE		mmbf	Miles	$K	#	$K	Docks$K	Yes/No/ $MM
Kalgin Is.								
State	6,000	25	20	399	1	400	799	Yes/$0.4
Tyonek								
KPB-State	29,000	99	NE		1	800	800	Yes/$0.4
Koncor-CIRI	56,000	224	NE					No
Private	1,000	3	NE					
Tuxedni								
Polly Cr								
Vill-Corp	16,000	195	52	2,025	1	400	2,425	No
Red Glacier								
Vill-Corp	13,000	180	25	1,125	1	400	1,525	No
Iniskin								
Vill-Corp	16,000	159	10	450	2	600	1,050	No
Sub -Tot								
KPB-State	35,000	124	20	399	2	1,200	1,599	Yes/$0.8
ANCSA	101,000	758	87	3,600	6	1,400	5,000	
Private	1,000	3	NE					
TOT W. Side	**137,000**	**885**	**107**	**3,999**	**8**	**2,600**	**6,599**	**Yes/$0.8**
Sub-Borough								
KPB-State	**129,000**	**1,050**	**404**	**18,204**	**2**	**1,200**	**17,004**	**Yes/$10.1**
ANCSA	**195,000**	**1,752**	**147**	**6,000**	**7**	**2,900**	**8,900**	**Yes/1.0**
Private	**20,000**	**207**						
TOTAL	**344,000**	**3,009**	**551**	**24,204**	**9**	**4,100**	**25,904**	**Yes/$11.1**

NE: No Estimate needed.

7.4 Transportation

To access the forest land infested and potentially infested, a primary transportation system of main-line forest roads is needed. The above tables show an estimate of the roads and log transfer facilities needed by the major landowners in each unit, except Kachemak Bay. The road access for timber harvest on the Kenai Peninsula should be accomplished in a three to five year period. This primary access system would allow for a well-planned harvest of the spruce forest over a twenty year period, depending upon the intensity of future spruce beetle infestations.

The ANCSA Corporations could need assistance with their various plans for access. However, their greatest need might be in log transfer facilities and docks which would allow for value-added forest products facilities (low to high tech sawmills, chip storage & house logs).

The State and KPB lands have been combined for purposes of the transportation estimates. On the heavily infested forest lands of the Kenai Peninsula it is estimated that 384 miles of main-line roads would be needed to access most of the 94,000 acres of combined State/KPB timber. The estimated cost is 18 million dollars and could increase up to 25 million dollars for the main-line roads. This road system should be funded up front and built within 5 years and then paid for with receipts from the timber sales.

7.5 Road Access and Cost Share Agreements

Road access and cost share agreements have been obtained and are included in the Appendix. One is for an agreement between the Kenai Peninsula Borough and a private entity. The other is for an agreement between two private entities.

-GLOSSARY-

Abbreviation	Explanation
ADF & G	Alaska Department of Fish & Game
ANCSA	Alaska Native Claims Settlement Act: Created Village and Regional Corporations which own 44 million acres in Alaska.
ANILCA	Alaska National Interest Lands Conservation Act, 1980. Set-aside over 100 million acres in Parks, Wildlife Refuges and Wilderness.
borough	Used as an all inclusive term for everything within the KPB's legal boundaries.
CIRI	Cook Inlet Region, Inc.: Regional ANCSA Corp for Cook Inlet and majority of the KPB.
CNF	Chugach National Forest: Managed by U.S. Forest Service
DNR	Division of Natural Resources, State of Alaska
DOF	Division of Forestry, State of Alaska
FPA	Alaska Forest Resources and Practices Act
KNWR	Kenai National Wildlife Refuge
KPB	Kenai Peninsula Borough
MMBF	Million Board Feet, Scribner Scale: Common method of measuring volume of timber.
MMCF	Million Cubic Feet: The conversion factor for the majority of the timber in the KPB is 3.5 board feet per one cubic foot.
NNAI	Ninilchik Native Association, Inc.: Village Corporation in CIRI Region. Sold over 200 mmbf to Klukwan on central peninsula.
USFWS	U.S. Fish and Wildlife Service: Manages KNWR

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ATTACHMENT A

Kenai National Wildlife Refuge Lands

The Kenai National Wildlife Refuge—managed by the U.S. Fish and Wildlife Service—encompasses over 1.8 million acres. Of this, 1.35 million acres are designated Wilderness. The refuge was established in 1941 as the Kenai National Moose Range. The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) increased the size by 250,000 acres, changed the name to Kenai National Wildlife Refuge (KNWR) and designated 1.35 million acres as Wilderness (with a capital W, this federal designation is highly restrictive with authorization by the Wilderness Act of 1964). The Federally designated Wilderness areas south of the Sterling Highway are: the entire south half of the refuge, the central portion south of Skilak Lake and westward to within 4 to 12 miles of the western boundary and south of the Sterling-Soldotna corridor. The Federally designated Wilderness areas north of the the Sterling Highway has two units: one on the eastern edge of the Mystery Creek and Chickaloon River and the other in the center running south from Point Possession to the Moose River, with non-wilderness on the east and west side of this unit.

Approximately 800,000 acres or 40 percent of the refuge is classified as forest land. Out of this it is estimated there are 195,000 acres of commercial forest land (the softwood types total 101,000 acres), with white spruce at 79,000 acres, Sitka spruce at 11,000 and mountain hemlock and black spruce at 5,000 acres each. The hardwoods total 94,000 acres, with paper birch at 88,000 acres and quaking aspen at 5,000 acres. The majority of the commercial forest lands are in the northern portions of the refuge. No estimates are available on the volume of the commercial forest lands.

Area Impacted: The recent surveys show 253,000 acres of KNWR forest lands were infested in the 10 years up to 1991[1]. This occurred mainly in remote areas and designated Wilderness. The 1992 surveys indicate a spread to the refuge lands adjoining ANCSA Corporation and other private, State and KPB lands.

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[1] Forest Health Management Plan for the Western Kenai Peninsula and Kalgin Island Draft ,8/6/92, State DOF/DNR

Suggested process for authorization and action for salvage timber sales to protect the forest resources of adjoining land owners: The refuge management must adhere to four major federal laws: National Wildlife Refuge System Administration Act of 1966, ANILCA, The Wilderness Act of 1964 and the National Environmental Policy Act of 1969 (NEPA). Also, several international treaties with Canada and Mexico concerning migratory birds affect the management of the refuge. ANILCA requires a comprehensive plan with a specified input from local and state governments and ANCSA corporations.

Based on the recent infestations and the threat of future infestations and catastrophic fires similar to the past northern peninsula fires, it is recommended:

That the Mayor of the Kenai Peninsula Borough, the Governor and ANCSA Corporate officials contact the Director of the U. S. Fish and Wildlife Service (USFWS), the Secretary of Interior and the Alaska Congressional Delegation and request funding and action of the following:

A. A joint inventory (this winter, 1992-93) of the location, size and severity of present and past infestations and predictions on the spread. 1992 satellite imagery would be used with past USFS/DOF survey maps.

B. Request Alaska Congressional Delegation to seek funding for the planning process required by USFWS Analysis of Risk and Responsibility to determine action needed to conduct timber salvage sales (Environmental Impact Statements or Environmental Assessments). Request money for involvement of State, KPB, ANCSA personnel and the public in this process.

C. Request Congressional Delegation to initiate procedures to authorize legislation and funding for coordinated planning, management, harvest and rehabilitation of infested forest lands.

D. Coordinate the above effort with the refuge manager and the managers and owners of the adjoining KPB, State, ANCSA Corporations, other private land owners and impacted communities.

E. Follow-up for action and progress on the above authorized activities must be accomplished in 1993 with salvage sales (if authorized) in 1994.

Impacted and interested groups: The following is a list of landowners, managers, agency officials and groups who would have strong interest in the management of the spruce beetle epidemic in KNWR.

Government

-Local-

Kenai Peninsula Borough (KPB)
Communities of Nikiski, Kenai, Soldotna, Sterling, Cooper Landing, Moose Pass, Seward, Hope, Kasilof, Ninilchik, Happy Valley, Anchor Point, Homer, Kachemak City and the Russian villages.

-State-

DNR-DOF, DOL, DCED, ADF&G-Habitat, Game and Fisheries

-Federal-

USDA-Forest Service-Chugach NF, USDA Soil Conservation Service

Private

-Local-

Fish, game & waterfowl clubs
Commercial fishermen organizations: Cook Inlet Aquaculture Assn.
Snowmachine & ATV clubs & dealers
Trappers, hunters, fishers
Dealers of all hunting and fishing & outdoor equipment
Local loggers, sawmill owners and the local forest products industry
All users & friends of KNWR
All educators, K-12 & Kenai Peninsula College

-State & National Groups-

Audubon Society
National Wildlife Federation
The Wilderness Society
The Sierra Club
The Nature Conservancy
The Wildlife Management Institute
Alaska Center for the Environment
Alaska Forest Association
Resource Development Council

The personnel at the refuge emphasized that the national conservation organizations, with their local, state and national memberships were very important. This process and the resulting management could assist the USFWS and other agencies in professional management which could enhance the resource of the refuge at a savings to the taxpayer and government entities. In this regard, it is purported the legendary conservationist, wildlife biologist and forester, Aldo Leopold, stated the two main tools of the wildlife biologist has are ":..fire and the axe..."

ATTACHMENT B

Salvage and Harvest of Beetle Killed Spruce on the Chugach National Forest

"Opportunities and Challenges"

The areas of the Chugach National Forest impacted by the recent spruce bark beetle infestation are around Trail Lakes, the Six-Mile drainage and Hope.

The State has selected approximately 8,500 acres in the Trail Lakes area. At the request of the Kenai Peninsula Borough under its municipal entitlement, the State intends to transfer this land to the Borough as soon as possible. It is estimated that there are from 3-4,000 acres of commercial forest land in this tract. Also, the adjoining National Forest land contains commercial forest land in small tracts. A coordinated timber harvest inventory and timber salvage operation is needed in the next three months.

The infested timber in the Six Mile and Hope areas could be utilized by the Chugach Alaska sawmill at Seward. The Forest Service can now conduct salvage sales at an accelerated rate.

With the potential volume and the increasing infestation, additional scoping and inventory work is needed on the National Forest commercial forest lands and timber salvage policies. The National Forest timber is in the Seward zone for harvest and utilization in close proximity to the existing Chugach Alaska sawmill and chip facility and other local operators.

-APPENDIX-

I	Reforestation Center Costs
II	Alden Recommendations
III	Infestation Table-Map Surveys
IV	Blocks & Units Map
V	Salvage Harvest Priority Areas Map
VI	Cost Share and Access Agreements

I (3.1) Reforestation Center Costs

Tables K5-11

These tables were extracted from the Tree Improvement, Nursery and Research for Interior and Southcentral Alaska. Most costs are accurate and applicable for the reforestation center recommended in this report.

Table K4

Funded Facility, Container Seedling Production

Item	Description	Cost Estimate (thousands $)
Headhouse	100 x 100 feet Storage/work area plus mechanical areas and lunchroom/restrooms	275.0
Excavation	3,000 cubic yards Foundations and drainage	3.6
Embankment	8,400 cubic yards Raise elevation of buildings	26.0
Water	Well and service lines	16.5
Septic	System and drainfield	22.0
Utilities	Electric and gas service to facility	33.0
Mechanical	Purchase and installation of utilities in headhouse and standby generator facility	38.5
Moving	Move the two existing greenhouses and generator	90.0
New Houses	Purchase and install four new houses	355.0
Corridor	Corridor from headhouse connecting all greenhouses	88.2
Cooler	Small (600 sq. ft.) seedling cooler	44.0
Administration	Engineering, drafting, printing, admin. etc.	65.0
Contingency	Ten percent contingency for bid/cost overruns	125.2
	Total Funded Container Seedling Production Facility	1,182.0

Table K5

Funded Equipment
Container Seedling Production

Item	Description	Cost Estimate (thousands $)
	Sowing Operations and Growing Equipment	
Benches	Growing bench system inside all houses	45.4
Mix/Filler	Potting soil mixer and container filler	12.0
Seeder	Seeder for sowing containers	15.0
Sprayer	Three-point hitch for treating outside seedlings	3.0
Irrigation	Irrigation equipment	5.0
Moving	Moving seedlings and small equipment	10.0
	Transportation and Material Handling	
Forklift	Propane or electric forklift	20.0
Tractor	Small 4-wheel-drive tractor with bucket and forks	20.0
Conveyors	Conveyor system for moving containers	20.0
Van	Passenger van for personnel pickup and return	20.0
Flatbed Truck	One-ton, 4x4 truck with snowplow for plowing road and hauling in shipping orders from outside seedling storage areas (locate surplus unit)	5.0
	Yard Structures	
Coldframes	Coldframe structures for overwintering plants	18.0
Shadehouse	Shadehouse for hardening and holding plants	1.6
	Total Funded Container Operation Equipment	**195.0**

Table K6

Unfunded Facility
Container Seedling Production

Item	Description	Cost Estimate (thousands $)
Office	Office/laboratory (1,200 sq. ft.) for administration and testing; estimated cost at $71,500/1,000 sq. ft.	85.8
Garage	Garage facility for vehicles, tractors, and equipment. Four 12 x 32-foot deep bays for van, one-ton pickup, tractor, transplantor seedling lifter, bedformer, etc. (1,600 sq. ft at $25,000/1,000 sq. ft.)	40.0
Utility	Container wash facility and sanitizing; Building-to-house container washer, minimal container storage, and other sanitizing equipment. (500 sq. ft. at $30,000/1,000 sq. ft.)	15.0
Cold Storage	Additional cold storage facility (4,000 sq. ft. at $80,000/1,000 sq. ft.) to hold seedlings dormant until planting season at colder locations. Freezer (29 degree) storage, 40 x 100 feet with 20 feet usable ceiling height (See Coeur d'Alene Nursery, Coeur d'Alene, ID design.)	320.0
Pond	A pond designed to allow residue from greenhouse to purify by use of natural aquatic life. (Information available from Univ. of Idaho, Dr. David Wenney.)	100.0
	Total Unfunded Container Seedling Production Facility	560.8

Table K7

Unfunded Equipment, Container Seedling Production

Item	Description	Cost Estimate (thousands $)
	Sowing Operations and Growing Equipment	
Irrigation	Irrigation equipment and supplies	10.0
Washer	Upgrade of existing container washer	10.0
Containers	Additional containers for four additional houses (200 m. x 4 @ $0.075 each with trays)	60.0
Mixer	New potting mix mixer	10.0
Monitoring/ Alarm System	Sensors, control/recording unit, with telephone dialer to monitor greenhouses, storage units, electrical security, fire alarms, and other processes and report to appropriate personnel or authorities	20.0
	Transportation and Material Handling	
Fuel	Aboveground fueling station (500-gal.)	10.0
Flatbed	Upgrade of above "surplus" vehicle to new unit	15.0
Utility Vehicle	Small utility vehicle to carry two people and tools or a few trays of seedlings, e.g., a Kawasaki Mule.	5.0
	Yard Structures	
Shadehouse	Additional shadehouse structures for growing and holding plant materials.	6.8
Lighting	Security lighting of buildings (other than greenhouses)	2.0
Fencing	Six-foot fence around area to prevent damage from stray animals and to provide security from vandals. Note: This is especially needed to secure a proposed effluent pond from entry by children from nearby trailer park. (estimated 4,800 ft. @ $13/ft.)	62.4
	Office Equipment	
Copier	New office copy machine	3.0
	Total Unfunded Equipment for Container Seedling Production	**214.2**

Table K8

Unfunded Facility
Seed Extraction and Cleaning

Item	Description	Cost Estimate (thousands $)
Extractory	Cone drying, seed extractory, and cleaning building (2,000 sq. ft. at $50,000/1,000 sq. ft.)	100.0
Cone Storage	Cone storage building. (Pole shed for rack storage of cones as they come in from collection areas. Note: Some cones may need specific after-ripening conditions.) (2,000 sq. ft. at $20,000/1,000 sq. ft.)	40.0
	Total Unfunded Seed Extraction and Cleaning Facility	**140.0**

Table K9

Unfunded Equipment, Seed Extraction and Cleaning

Item	Description	Cost Estimate (thousands $)
Large Kiln	Stackable tray design	60.0
Small Kiln	For small lots (5-10 bushels) Modify an existing unit	3.0
Cone Tumbler	Tumbler (with hopper for dumping into top) for extracting seeds from cones	20.0
Large Dewinger	Large continuous feed wet/dry unit	10.0
Small Dewinger	Additional MTDC unit	10.0
Scalper	Single- or double-screen unit to remove debris and dirt/chaff from seed	15.0
Air Separator	Pneumatic separator for fine separation of seed	7.0
Gravity Separator	Tilting oscillating table with air (e.g., Oliver)	15.0
Fans	Heavy-duty utility fans for overcoming dead air sections in cone storage	0.2
Cone Conveyer	Conveyer to take cones from tumbler to receiving hopper or grinder	5.0
Cone Grinder	Farm-type hammermill or similar unit to grind down unsold cones into usable mulch	4.0
Air System	Air evacuation/filter system to remove resinous dust from operating machine and collect it for safe disposal	10.0
Seed Storage	Second unit similar to existing one to provide additional space needed and redundancy in case of failure of initial unit	20.0
Cone Racks	Materials to build racks for cone storage	5.0
Miscellaneous	Miscellaneous small equipment and supplies	10.0
Scales	Small laboratory and large production scales	11.0
	Total Unfunded Equipment for Seed Extraction and Cleaning	**205.2**

Table K10

Unfunded Equipment
Transplant Operation

Item	Description	Cost Estimate (thousands $)
Tractor	Sixty-horsepower plus tractor, properly configured for seedling bed preparation, culturing equipment, and harvest. Note: its use with a transplanter. It must be properly geared for this operation. This tractor must also have a front-end loader for the dibble transplant assembly listed below.	35.0
Bedformer	To form raised beds (standard for bareroot operation)	3.0
Transplanter	Six-row unit fitted with mechanical (TM) or other units suited for pine and supercell plugs	20.0
Dibble Assembly	A dibble assembly to fit on front-end loader for creating multiple dibble holes required to transplant larger containers which cannot be planted with transplanter	3.5
Portable Pipe	Piping and sprinkler heads to irrigate seedbeds. Estimated 2,000 linear feet of 2-inch portable aluminum pipe, fittings, and impact-type sprinklers to irrigate up to three 200 ft. long seedling beds. (600 ft. of mainline and two waterlines with sprinklers every 20 to 24 ft.)	5.0
Spreader	Granular fertilizer spreader for fertilizing beds	3.0
Vertical blades	Three-point hitch, belly- or front-mount vertical root pruner blades for vertical pruning between rows of seedlings for root manipulation	9.0
Lifter	Seedlings bed lifter to loosen seedlings for lifting with pruner/wrencher blade attachment.	10.0
	Total Unfunded Equipment for Transplant Operation	88.5

Table K11

Summary of Total Funded and Unfunded Nursery Operations
(in thousands of dollars)

Funded		
Container seedling production facility	1,182.0	
Container seedling production equipment	195.0	
Total funded container seedling production operation		1,377.0
Unfunded		
Container seedling production facility	560.8	
Equipment for container seedling production	214.2	
Total unfunded container seedling production operation		775.0
Seed extraction and cleaning facility	140.0	
Equipment for seed extraction and cleaning	205.2	
Total unfunded for seed extraction and cleaning operation		345.2
Equipment for transplant operation	88.5	
Total unfunded for transplant operation		88.5
Total funding requirements for all operations		1,108.7

II (3.21) Alden Recommendations

Seed transfer guidelines are necessary to maintain the genetic integrity and diversity of forest tree species and reduce the risk of maladaptation in artificial reforestation programs. The following procedures are recommended for harvest and use of tree seeds in Alaska.

Record the geographic source (provenance) of each cone and seed collection. The exact geographic origin (provenance) of the first-generation seed parents is needed to transfer seeds among similar habitats within seed zones and to meet source identified certification standards for domestic and world trade. Minimum seed certification standards are established by the Association of Official Seed Certifying Agencies of the United States and Canada for domestic use in all States and Provinces and by the Organization for Economic Cooperation and Development in world trade (Rudolf 1974). Minimum standards for source-identified seeds of each provenance in Alaska include the name of the collection area or nearest landmark, latitude and longitude to the nearest minute of arc (township, range, and section), and altitude to the nearest 10 meters (about 30 ft) above m.s.l.

Assign a six-digit seed zone identification code to each collection:

Physiographic and climatic region	=	xx
Physiographic subregion	=	yy
Seed zone number	=	zz
Complete seed zone code	=	xxyyzz

1. Collect seeds from at least 30 well-distributed trees (unrelated trees) for reforestation of each local population. Record the number of seed trees in each collection to document the genetic base.

2. Transfer seeds only from natural populations in environments that are similar to the environment of the planting sites.

3. Avoid transfer of seeds from upland populations to flood-plain sites and from flood-plain sites to upland sites.

4. Restrict transfer of seeds to 100 meters (330 ft) in altitude of its indigenous source in upland and montane zones.

5. Transfer seeds among similar habitats within seed zones as first priority; among similar habitats and seed zones within subregions as second priority; and among similar sites and subregions within seed regions as last priority. Always observe rules 1 through 5, above, when transferring seeds to new habitats. Transfer of seeds between zones along seed region and subregion boundaries with contiguous populations is preferable to long-distance transfer of seeds within seed regions and subregions. Transfer of seeds across major genetic barriers, for example mountains above treelines, should be avoided.

These guidelines apply to the transfer of all forest reproductive materials, such as ortets of cuttings or other vegetative propoagules from native populations, used in forestation and commercial trade in Alaska.

III (5.1) Infestation Table-Map Surveys

1:250 MAP SERIES -1992 USFS Survey Results

AREA	MAP	LOCATION	ACRES
West Side	Tyonek	Beluga	623
Cook Inlet		Beluga	15
		Tyonek	10
		Tyonek	15
		Tyonek	15
		McArthur River	1,168
		TOTAL	1,846

AREA	MAP	LOCATION	ACRES
West Side	Kenai	Drift River	389
Cook Inlet		Cannery Creek	836
		Cannery Creek	1,635
		Squarehead Cove	3,269
		TOTAL	6,129

AREA	MAP	LOCATION	ACRES
N. Peninsula	Kenai	Point. Possesion	311
		Big Indian Creek	1,168
		Pt. Pos-Skilak	85,082
		TOTAL	86,561

AREA	MAP	LOCATION	ACRES
C. Peninsula	Kenai	Skilak S.-Ninilchik	184,799
		TOTAL	184,799

AREA	MAP	LOCATION	ACRES
S. Peninsula	Seldovia	Fox River Caribou	22,263
		Ninilchik South	4,904
		Homer/East end	10,042
		TOTAL	37,209

AREA	MAP	LOCATION	ACRES
Seldovia	Seldovia	Bradley Lake	12,688
		China Poot	234
		TOTAL	12,922

AREA	MAP	LOCATION	ACRES
CNF N	Seward	Big Indian	7,784
		Hope	701
		Hope Y	389
		Summit Lake	2,024
		Quartz Creek	2,413
		Kenai Lake	3,425
		TOTAL	16,736

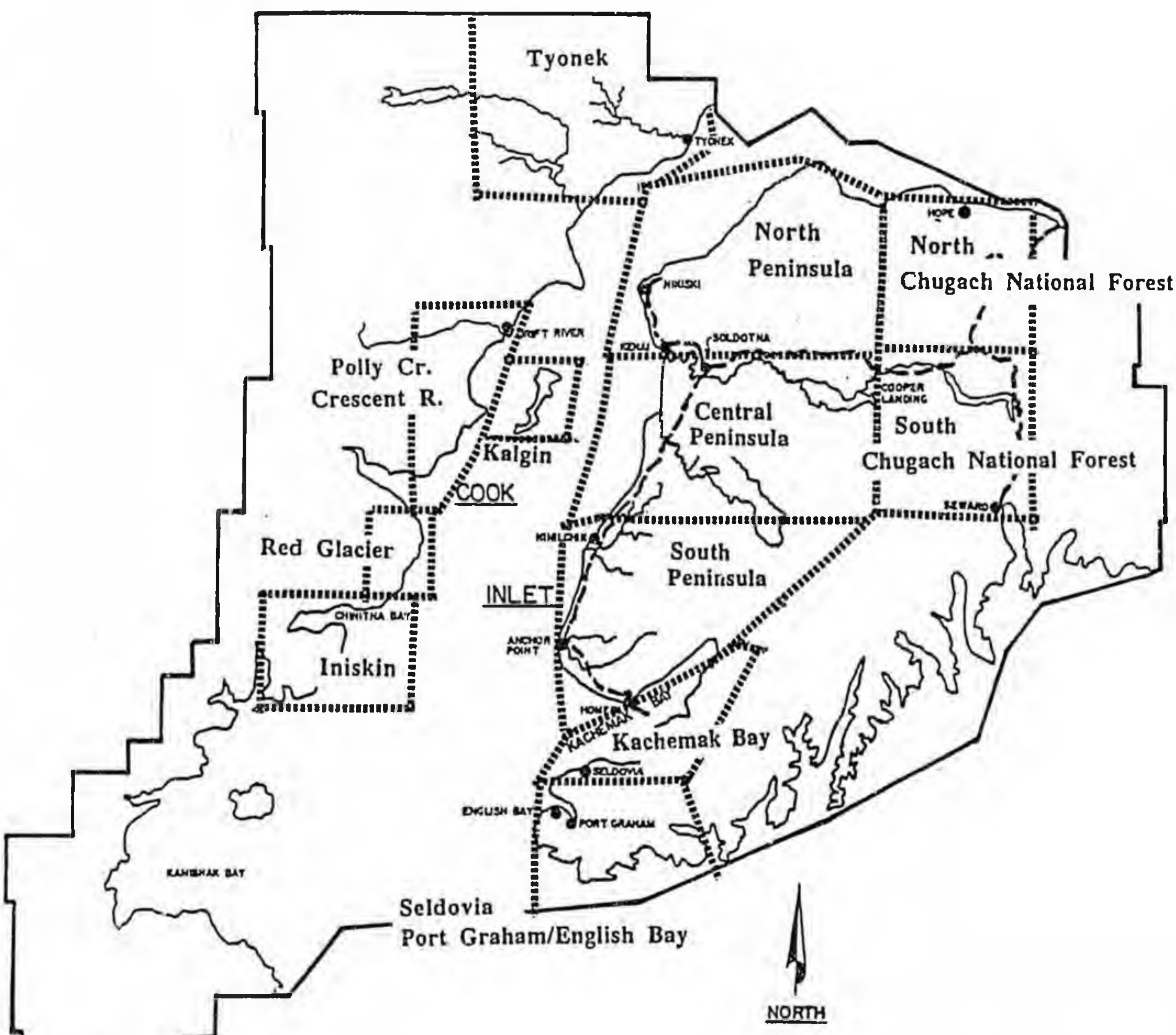
AREA	MAP	LOCATION	ACRES
CNF S	Seward	Moose Pass	5,527
		Kenai Lake South to Seward	311
		Cooper Lake	7,395
		Russian Lakes	5,838
		TOTAL	19,071

GRAND TOTAL 365,273

IV (6.21) Blocks & Units Map

BLOCKS & UNITS

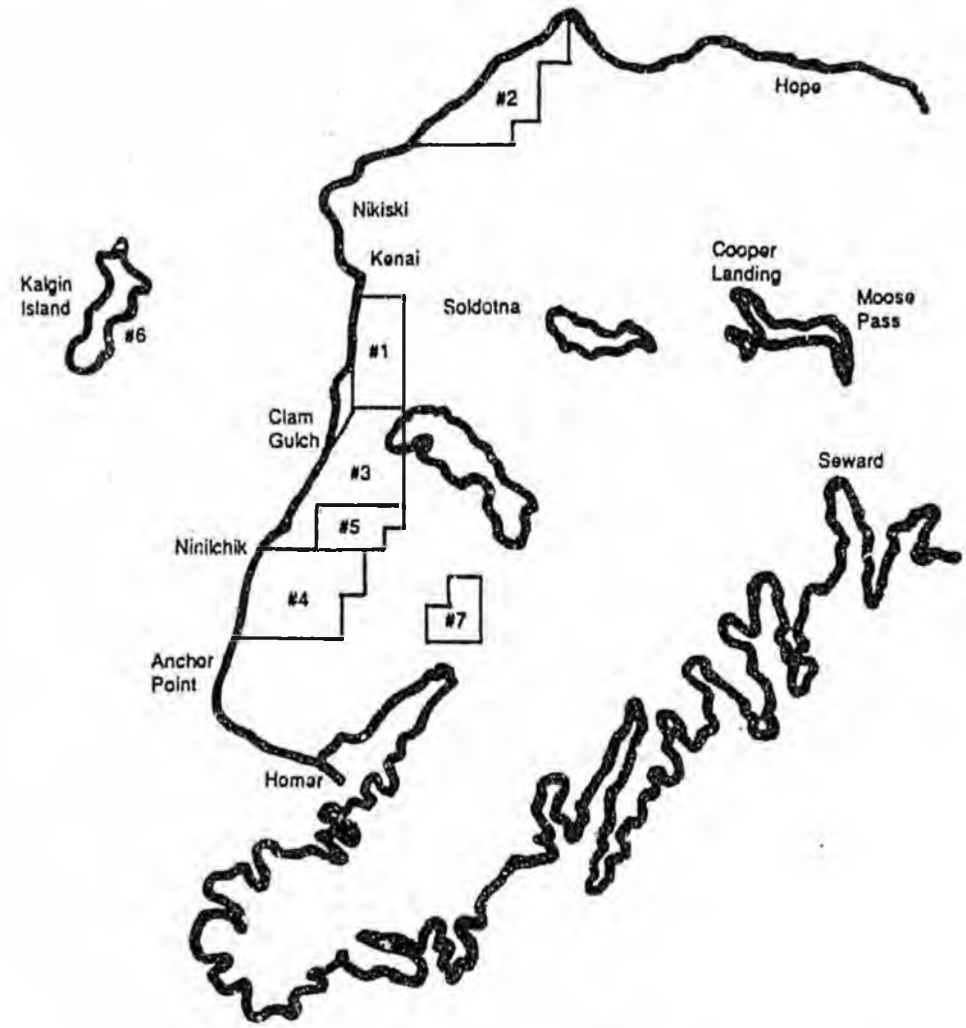
The blocks and units for inventory and management of lands within the Kenai Peninsula Borough are shown by dashed lines on the map below.



V (6.22) Salvage Harvest Priority Areas Map

Division of Forestry Map showing state salvage priority areas

Scale: 1:250,000



State of Alaska-DNR Salvage Harvest Priority Areas-1992

#	UNIT	ACRES	CCF	MBF
1.	Soldotna	220	1,171	410
2.	Point Possession	480	1,429	500
3.	Falls Creek	4,668	51,256	17,930
4.	Ninilchik	4,085	32,943	11,530
5.	Corea Creek	10,748	72,000	25,200
6.	Kalgin Island	12,000	71,429	25,000
7.	Fox River	4,050	23,143	8,100
	TOTAL	**36,251**	**253,371**	**88,670**

VI (7.5) Road Access and Cost Share Agreements

Draft Government Cost Share

COST SHARE ROAD AUTHORIZATION

Section 1. (a) The Kenai Peninsula Borough (KPB) Professional Resource Manager (PRM), under direction of the KPB Assembly and Mayor, with respect to KPB lands, is authorized to provide for the acquisition, construction, and maintenance of roads within and near the public lands in locations and according to specifications which will permit maximum economy in harvesting timber from such lands tributary to such roads and at the same time meet the requirements of protection, development, and management of such lands for utilization of the other resources thereof. Financing of such roads may be accomplished (1) by the KPB utilizing appropriated funds, (2) by requirements on purchasers of timber and other products from KPB lands, including provisions for amortization of road costs in contracts, (3) by cooperative financing with other public agencies and with other private agencies or persons, or (4) by a combination of these methods *Provided,* That, where roads of a higher standard than that are needed in the harvesting and removal of the timber and other products covered by the particular sale are to be constructed, the purchaser of timber and other products from public lands shall not, except when the provisions of this subsection apply, be required to bear that part of the costs necessary to meet such a higher standard, and the PRM is authorized to make such arrangements to this end as may be appropriate: *Provided further,* That when timber is offered with the condition that the purchaser thereof will build a road or roads in accordance with standards specified in the offer, the purchaser of the timber will be responsible for paying the full costs of construction of such roads.

(b) Copies of all instruments affecting permanent interests in land executed pursuant to this section shall be recorded in the KPB.

(c) The PRM may require the user or users of a road, trail, land, or other facility administered through the KPB including purchasers of KPB and KPB managed timber and other products, to maintain such facilities in a satisfactory condition commensurate with the particular use requirements of each. Such maintenance to be borne by each user shall be proportionate to total use. The PRM may also require the user or users of such a facility to reconstruct the same when such reconstruction cannot be so provided or if the PRM determines that maintenance or reconstruction by a user would not be practical, then the PRM may require that sufficient funds be deposited by the user would not be practical, then the PRM may require that sufficient funds be deposited by the user to provide his portion of such total maintenance or reconstruction. Deposits made to cover the maintenance or reconstruction of roads are hereby made available until expended to cover the cost to the KPB of accomplishing the purposes for which deposited: *Provided,* That deposits received for work on adjacent and overlapping areas may be combined when it is most practicable and efficient manner of performing the work, and cost thereof may be determined by estimates: *And provided further,* That unexpended balances upon accomplishment of the purpose for which deposited shall be transferred to miscellaneous receipts or refunded.

Draft Cost Share-Private

ACCESS AND RIGHT-OF-WAY AGREEMENT

This access and Right-of-Way Agreement ("Agreement") is made and entered into this __day of ____________, by and between PARTY ONE and PARTY TWO.

WHEREAS, PARTY ONE and PARTY TWO have entered into an agreement dated ____________ for the purpose of harvesting timber on __________land; and

WHEREAS, the parties wish to provide PARTY ONE and its agents with access and right-of-way through PARTY TWO land for the purposes of (1) reasonably necessary access road construction on PARTY ONE land; (2) timber harvesting on PARTY ONE land; (3) transporting harvested timber across PARTY TWO land; and (4) other related activities necessary for the fulfillment of the sale agreement ("timber harvest activities"); and

WHEREAS, PARTY TWO and PARTY ONE wish to cooperatively manage, inspect or monitor certain aspects of the PARTY ONE/TWO timber harvest activities;

NOW, THEREFORE, in accordance with these premises and in consideration of the mutual benefits to be derived, the parties agree as follows:

SECTION I - ACCESS, RIGHT-OF-WAY USE

A. For the consideration provided in Section III of this Agreement, and subject to the terms and conditions imposed by this Agreement, PARTY TWO grants to PARTY ONE and its "Operators" (as that is defined below) the right to enter upon and cross existing, later-established and/or approved access routes on PARTY TWO lands and construct roads and access routes for the purpose of conducting timber harvest activities in connection with the Sale agreement.

B. This right shall apply to lands owned by PARTY TWO which are adjacent to PARTY ONE lands covered by the Sale agreement, and which provide reasonably necessary access to these PARTY ONE lands. This right shall attach and run with PARTY TWO lands.

C. The right shall cover uses arising solely out of PARTY ONE's Sale Agreement and the implementation and management thereof.

D. This right extends only to PARTY ONE and those persons under contract to PARTY ONE for purposes of timber harvest under the Sale Agreement, including

OPERATOR and its subcontractors, together referred to as "Operators." All operators are strictly bound by the terms and conditions of this Agreement.

E. This right shall apply to presently established roads, to roads hereafter constructed by PARTY TWO, and to roads hereafter constructed by PARTY ONE and its Operators (jointly referred to as PARTY ONE in this subsection). PARTY ONE shall construct no roads on PARTY TWO land without PARTY TWO's approval, which shall not be unreasonably withheld. Any roads or access routes constructed by PARTY ONE shall be constructed and maintained entirely at PARTY ONE's expense; shall be constructed in accordance with the road building standards contained in the Sale Agreement; and shall be maintained at these standards for the term of this agreement (or during the period of PARTY ONE's actual use, if this is less than the term of the Agreement). At the termination of this Agreement, PARTY ONE will not be required to restore roads or access routes to their natural or pre-construction condition. The location and routing of all PARTY ONE built roads shall be done in consultation with PARTY TWO as provided in subsections G and H.

F. This right shall expire at the end of the Term of this Agreement as provided in Section V. The term of this Agreement shall be automatically extended for any period of delay in the timber harvest activities resulting resulting from an event of force majeure, such as weather, natural disaster, acts of GOD, or other such events beyond PARTY ONE's control.

G. PARTY TWO retains the right to recommend, implement or enforce reasonable route and access planning, access road construction, use criteria, maintenance scheduling and standards, alternate routing options, and types and quantities of use of existing or future PARTY TWO constructed roads where applicable, but shall not unreasonably limit, restrict or make unavailable any necessary or ordinary access as presently exists or may be developed by PARTY TWO.

H. PARTY ONE recognizes that PARTY TWO is also engaged in timber harvest operations on PARTY TWO lands, and that PARTY TWO will be using the existing road and acces routes discussed in this agreement, and any future road or access routes PARTY TWO constructs, for its timber harvest operations. PARTY ONE and its Operators shall work diligently to minimize impact or conflicting scheduling of road or right-of-way usage, including access road construction, for the purposes granted under this Agreement. If PARTY ONE's and/or its Operator's use of existing PARTY TWO roads or access routes (or roads or access routes hereafter constructed by PARTY TWO or PARTY TWO's operators) causes damage or deterioration beyond that which would occur without PARTY ONE's use, PARTY ONE and/or its Operators shall pay the additional repair or maintenance costs. Alternatively, PARTY ONE or its Operators may perform the repairs. The parties anticipate that PARTY ONE and/or its Operators will enter into a road maintenance agreement with PARTY TWO and/or its operators regarding these road maintenance costs. Any road construction or maintenance on PARTY TWO land will use only gravel and sand purchased from PARTY TWO.

I. PARTY ONE understands that this Agreement provides only for specific access rights for a term certain, and gives no rights not specifically provided herein. PARTY TWO assumes no liability for, and makes no warranties, guarantees, or statements of fitness, availability or future availability of, roads, proposed roads or the condition thereof.

J. PARTY ONE and/or its Operators will at all times carry adequate insurance coverage for all their personnel, equipment and facilities so as to fully protect PARTY TWO from any claims of liability, personal injury, death or damage resulting from the acts or omissions of PARTY ONE or its Operators. PARTY ONE and the Operators shall defend, indemnify and hold harmless PARTY TWO from any claims, suits, causes of action, injuries or damages arising out of or related to the activities of PARTY ONE or its Operators.

02/10/93 LEGISLATIVE TELECONFERENCE NETWORK SYSTEM LTN1150
08:56:01 PARTICIPANT LIST (ALL PARTICIPANTS) BY:ANC
TCN:30210 SCHEDULED FOR:02/10/93 08:00 TO 10:00 FOR:ANC
PUBLIC HEARING HOUSE RESOURCES

LOCATION:ANCHORAGE

OVERVIEW OF SP	JEFF	GRAHAM	DNR-DOF	OBSERVE
OVERVIEW OF SP	BELINDA	CONNOLLY	ADVOCACY SVCS	OBSERVE
OVERVIEW OF SP	LANCE	TRASKY	ADF&G	OBSERVE
OVERVIEW OF SP	PETER	MAASSEN	MARATHON/UNOCAL	OBSERVE
OVERVIEW OF SP	DAVE	WALLINGROOD		OBSERVE
OVERVIEW OF SP	ROGER	BURNSIDE		OBSERVE
OVERVIEW OF SP	CLIFF	EAMES	AK CNTR FOR ENVI	OBSERVE
OVERVIEW OF SP	R.B.	STILES	D&R VENTURES	OBSERVE
OVERVIEW OF SP	JEFF	JESSEE MENTAL HEALTH ?	ADVOCACY SVCS	TESTIFY
OVERVIEW OF SP	RICK	TESSANDORE	ADVOCACY SVCS	OBSERVE
OVERVIEW OF SP	GEORGE	ROTHSCHILD	MARATHON	OBSERVE
OVERVIEW OF SP	LOISANN	REEDER	SUSITNA VALLEY	OBSERVE
OVERVIEW OF SP	STEVE	ALBERT		TESTIFY

Steve Gibson
1622 Highland Drive
Homer 99603
235-6487

HOUSE RESOURCES COMMITTEE

DATE: 2/10/93

PLACE: Capitol, Room 124

SUBJECT OF MEETING: Spruce Bark Beetle Briefing (SBB)
Committee Discussion of Mental Health Lands Settlement

	NAME	REPRESENTING	BUSINESS/PERSONAL MAILING ADDRESS	ZIP	(H) PHONE	(W) PHONE	DO YOU WANT TO TESTIFY?		WHAT SUBJECT/ WHICH BILL?
1	Dan Golden	State of AK	3601 C Street, Suite 1008	99503	243-4733	762-2123	Y	N	SBB
4	John Torgerson	Kenai Borough	35322 Spur Hwy Soldotna	99669	262-6192	262-4802	Y	N	Bugs
5	Ron Somerville	ADF&G	Juneau			465-4100	Y	N	Available for Questions
							Y	N	
2	Steve Albert test. from Anch. LIO						Y	N	
3	Steve ~~Gibson~~ Gilbert test. from Homer-LIO		1122 Highland Drive		Homer 235-6487	99603	Y	N	
							Y	N	
							Y	N	
							Y	N	
							Y	N	
							Y	N	