

ALASKA LEGISLATURE COMMITTEE FILES

1993-1994

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HOUSE RESOURCES

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Briefing on  
Spruce Bark  
Beetles

2-10-93



Official Business

# Alaska State Legislature

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.<sup>1</sup>

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.<sup>2</sup> 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.<sup>3</sup>

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<sup>1</sup> John W. See, Cooper Landing Spruce Beetle Fire Behavior Analysis February 23, 1990

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

<sup>3</sup> Rodney A. Norum, personal correspondence, February 1993

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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.<sup>4</sup> 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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<sup>4</sup> 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 *W.W.*  
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  
AR  
Falls Cr  
Timber  
Sale

**TO:** Jim Peterson  
Area Forestar  
Division of Forestry  
Department of Natural Resources

**DATE:** January 22, 1993

**FILE NO.:**

**TELEPHONE NO.:** 267-2284

FL ✓  
EF ✓

**SUBJECT:** Review Comments  
Falls Creek  
Timber Sale  
ADL 222802  
SC-3010K

*SWA*  
**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, delimiters, 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 Niniilchik 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:

##### Page 2, Parag. No. 2

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.

##### Page 3, Parag. No. 3

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

January 22, 1993

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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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.<sup>1</sup>

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.<sup>2</sup> 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.<sup>3</sup>

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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).

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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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<sup>4</sup> Neil Marchbanks, National Weather Service, Fire Weather Forecaster, personal correspondence, February 2, 1993

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.

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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.

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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.

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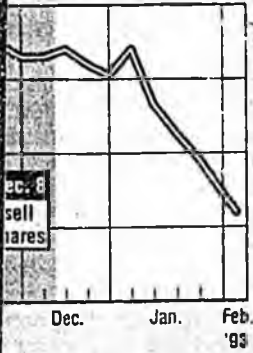
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**Interactive**  
Stock prices



Information Services/Tradelink

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sales by officers and on Oct. 23 through Dec. 8 million shares, at prices from \$18.25 to \$22.50 a share, 7. This total doesn't include analysts, who have also been holdings. There are about 10 million shares outstanding.

taken public in March of 1991 at \$5 a share in an offering by Morgan, Stanley & Co. and Stephens & Co. In May, Morgan analyst J.C. Mendelson recommended the purchase of the stock, as a one-year price target of \$27. Mr. Moore, who couldn't be reached for comment, said that the price target was based on Page C18, Column 6

# Lumber Futures Rise the Limit In Bull Market

## COMMODITIES

By JEFFREY TAYLOR

Staff Reporter of THE WALL STREET JOURNAL

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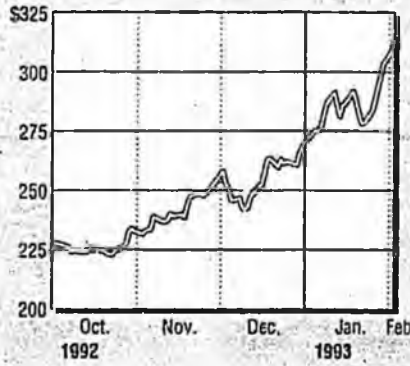
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In fact, since December, small fortunes have been made and lost in lumber futures and options contracts. "People who have been long [a wager that lumber prices will rise] have made a tremendous amount of money," says Steve Moore, president of the Moore 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

## Lumber Futures

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



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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

FEBRUARY 3, 1993

# CORRECTION

THIS DOCUMENT  
HAS BEEN REPHOTOGRAPHED  
TO ASSURE LEGIBILITY

# Land swap

Continued from page 1

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Date JAN 15 1993

Ketchikan Daily News

Client No. 211

# Land swap could raise electricity bills

211 518 130

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 Socttisham 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."

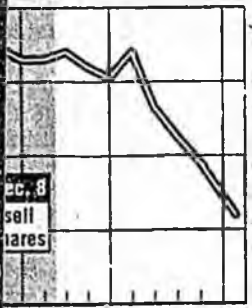
KPU's contract with Swan Lake is

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*

Interactive  
Stock prices



Union Services/Tradeline:

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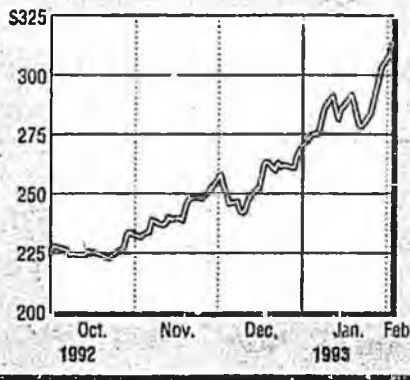
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Please Turn to Page C12, Column 3

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 (AS 11.15) and will be prepared in accordance with Division's Policy and Procedure Manual (PPM), Section 3146.53. The Annual Operating Plan will be subject to interagency review similar 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 coho 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 in 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 Conservation. 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 mariana* 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, dwarf 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 exists 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 Conifer 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, delimiters, 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.

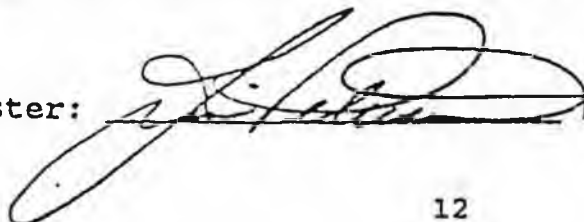
At the present time, the division has elected not to increase the acreage size of this offering. The Falls Creek area has been identified and set aside for timber production since the late '70's when it was identified as public interest lands for forest management. Since that time, numerous small sales 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
	E $\frac{1}{2}$	18	320
	all	19	640
	all	20	640
	all	29	640
	E $\frac{1}{2}$	30	320
T1N R12W	W $\frac{1}{2}$	13	160
	E $\frac{1}{2}$	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
	SW $\frac{1}{4}$ SE $\frac{1}{4}$	32	40
	all	33	640
	all	34	640
T1S R12W	all	5	640
	all, except allotment	6	600
	N $\frac{1}{2}$ , N $\frac{1}{2}$ SE $\frac{1}{2}$ , SW $\frac{1}{2}$	7	560
	N $\frac{1}{2}$	8	160
	all	17	640
	SE $\frac{1}{2}$	18	160
	E $\frac{1}{2}$	19	320
	all	20	640
T1S R13W	N $\frac{1}{2}$ NE $\frac{1}{4}$ , SW $\frac{1}{4}$ NE $\frac{1}{4}$ , S $\frac{1}{2}$ NW $\frac{1}{4}$ , NE $\frac{1}{4}$ NW $\frac{1}{4}$ , N $\frac{1}{2}$ SW $\frac{1}{4}$ , SW $\frac{1}{4}$ SW $\frac{1}{4}$	1	340
	E $\frac{1}{2}$ SE $\frac{1}{4}$ , W $\frac{1}{2}$	2	400
	S $\frac{1}{2}$ , NE $\frac{1}{4}$ , NW $\frac{1}{4}$ NW $\frac{1}{4}$ , S $\frac{1}{2}$ NW $\frac{1}{4}$	11	440
	NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ , E $\frac{1}{2}$	12	160
	all	13	640
	all	14	640
	S $\frac{1}{2}$ SE $\frac{1}{4}$ , SW $\frac{1}{4}$	15	240
	NW $\frac{1}{4}$ , W $\frac{1}{2}$ NE $\frac{1}{4}$	22	240
	NE $\frac{1}{4}$	23	160
	NW $\frac{1}{4}$	24	160

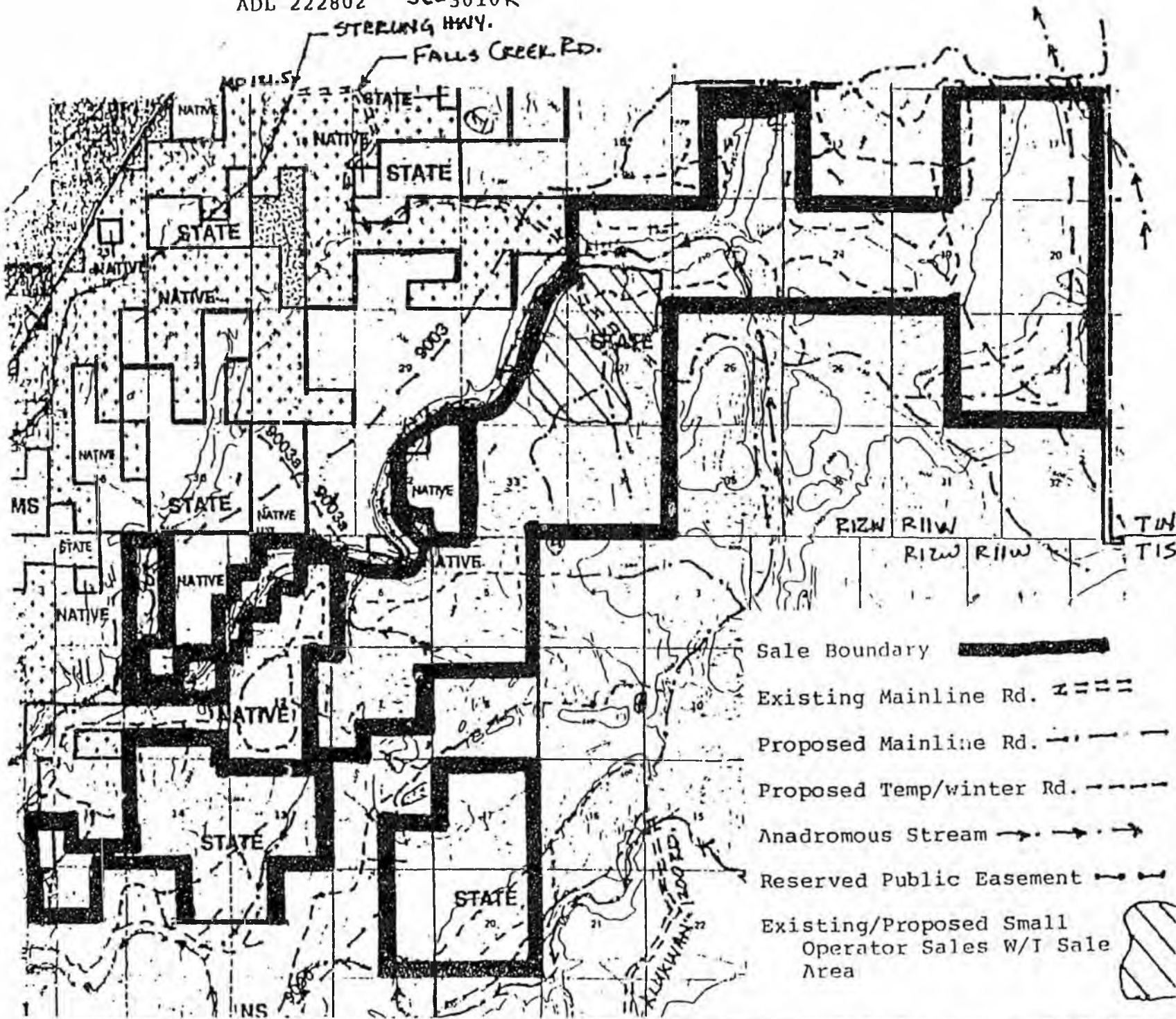
Total Acroage: 14,226

FALLS CREEK TIMBER SALE

ADL 222802 SC-3010K

STERLING HWY.

FALLS CREEK RD.

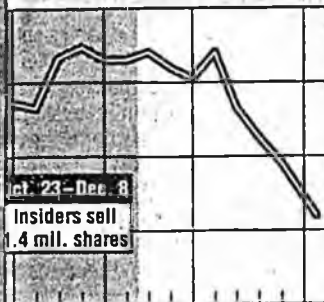


- Sale Boundary
- Existing Mainline Rd.
- Proposed Mainline Rd.
- Proposed Temp/winter Rd.
- Anadromous Stream
- Reserved Public Easement
- Existing/Proposed Small Operator Sales W/I Sale Area

P. 17

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**er Interactive**  
losing stock prices



Nov. Dec. Jan. Feb. '93  
DD Information Services/TradeLine; reports

between Nov. 11 and Dec. 7, the  
now:  
national over-the-counter trading  
Walker shares fell 75 cents to  
\$11.  
Brownlee declined to comment, but  
data said the insider selling was  
to diversify our holdings." Mr.  
has "a substantial position in the  
still in unvested options," Mr.  
ided.  
together, sales by officers and  
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-  
inley analyst J.C. Mendelson rec-  
ided 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

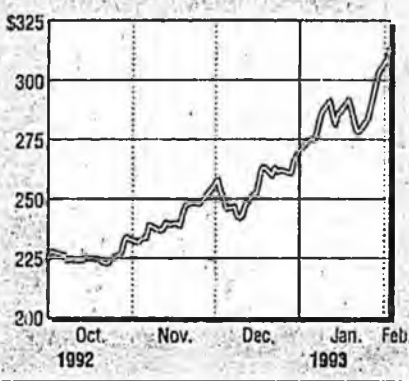
## COMMODITIES

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

### Lumber Futures

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



invaded Kuwait."  
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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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.

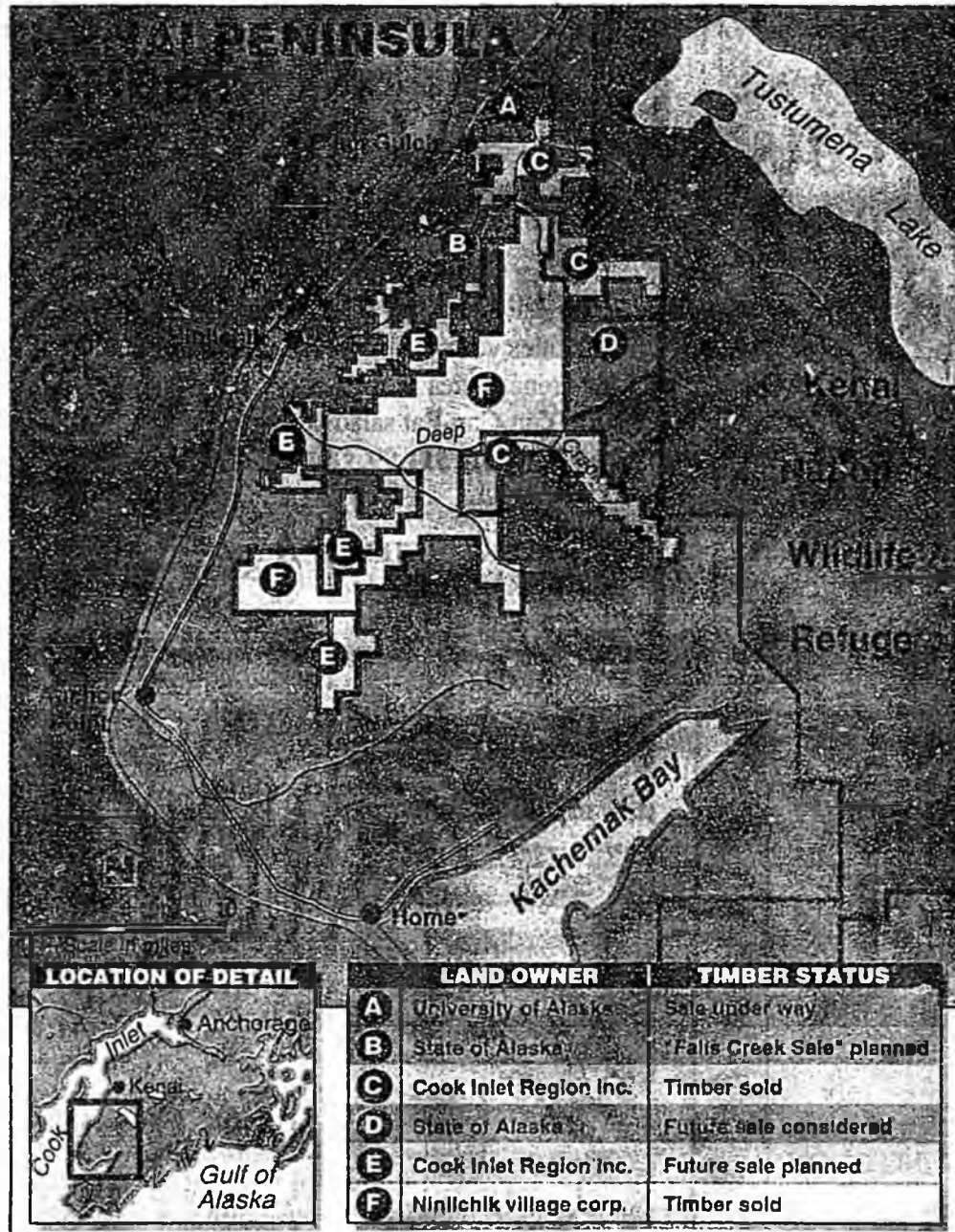
Dan Golden, who is leading the timber effort for the state Division of Forestry, said the constitution requires Department of Natural Resources Commissioner Glenn Olds to manage the forests as a renewable resource.

"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.



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 south-central 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.

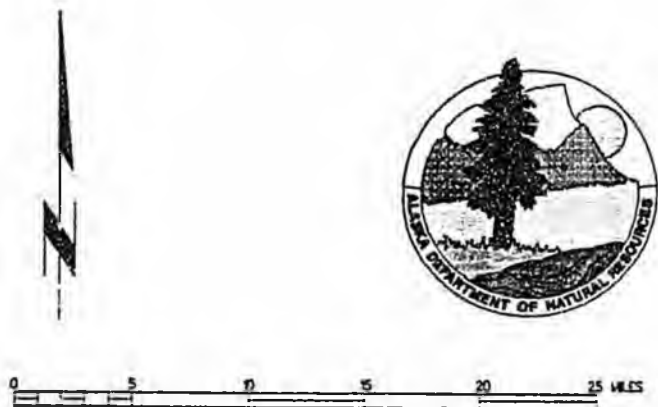
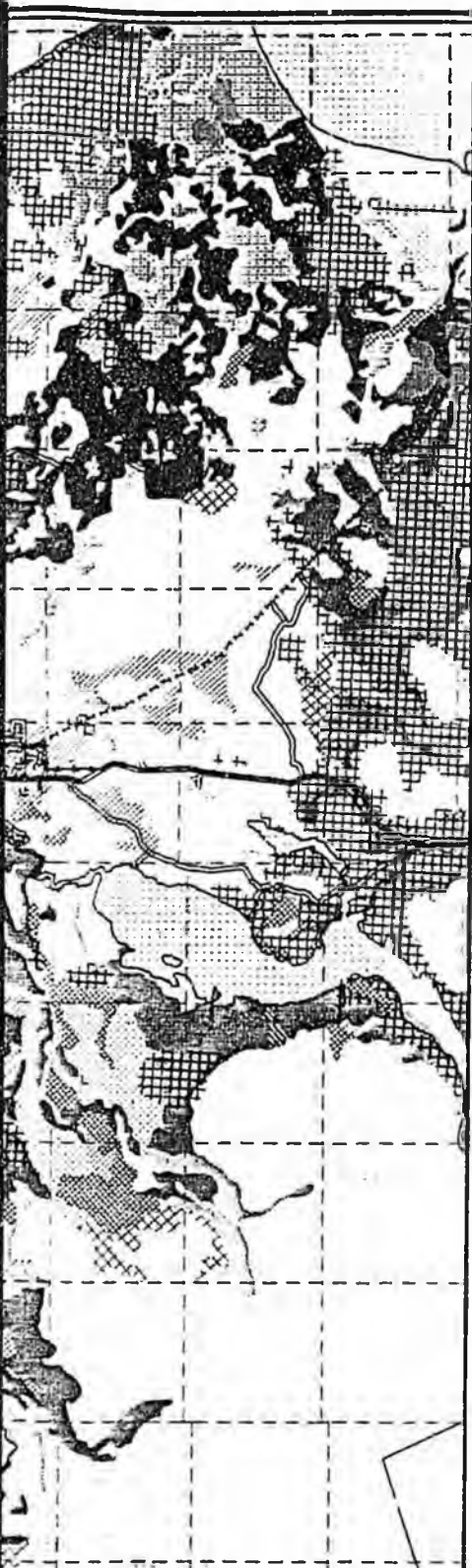
"I'm not prepared to be the timber guru of the Kenai Peninsula," borough Mayor Don Gilman said. "Two things ought to drive the borough's decision-making. We should be careful not to harvest trees at the expense of other resources like fish and game and recreation. And we shouldn't subsidize it."

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
		Woodland Coniferous Forest
		Closed Mixed Forest
		Open Mixed Forest
		Woodland Mixed Forest
		Closed Deciduous Forest
		Open Deciduous Forest
		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

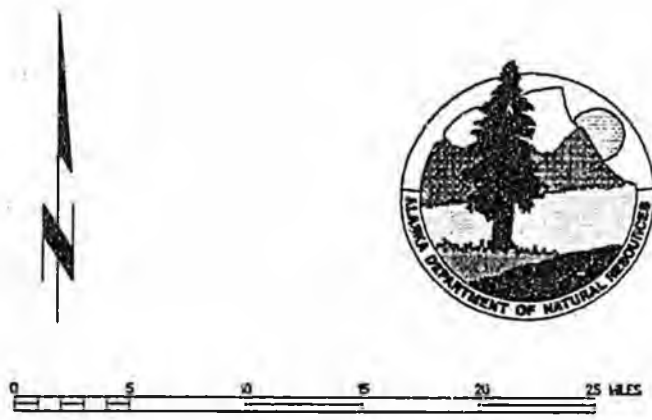
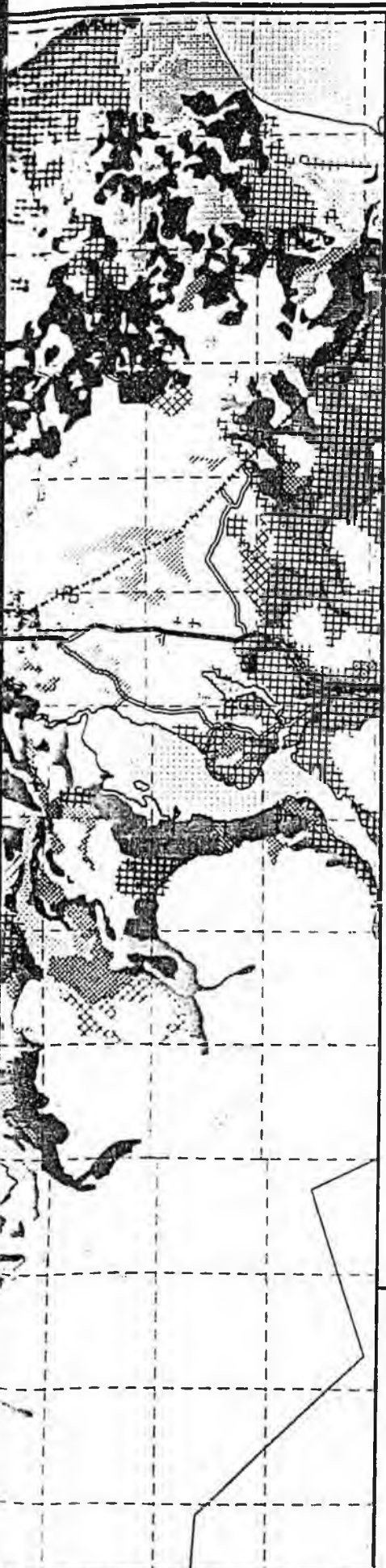
## SPRUCE BEETLE AREAS

	Mapped 1982-1991
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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 based upon "Revision of Preliminary Classification For Vegetation of Alaska" authored by A.R. Batten, C.T. Dryness, and L.A. Viereck, May 1982.

The vegetation database was developed under contract by E.S.R.I. for Alaska Department of Natural Resources. Source photos include Landsat and high altitude CIR. Mapping was per-

# FOREST HEALTH INITIATIVE SPRUCE BEETLE SURVEY 1982 thru 1991 VEGETATION COVER



### VEGETATION COVER

Primary	Secondary	
		Closed Coniferous Forest
		Open Coniferous Forest
		Woodland Coniferous Forest
		Closed Mixed Forest
		Open Mixed Forest
		Woodland Mixed Forest
		Closed Deciduous Forest
		Open Deciduous Forest
		Woodland Deciduous Forest

### ROADS and TRAILS

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

### SPRUCE BEETLE AREAS

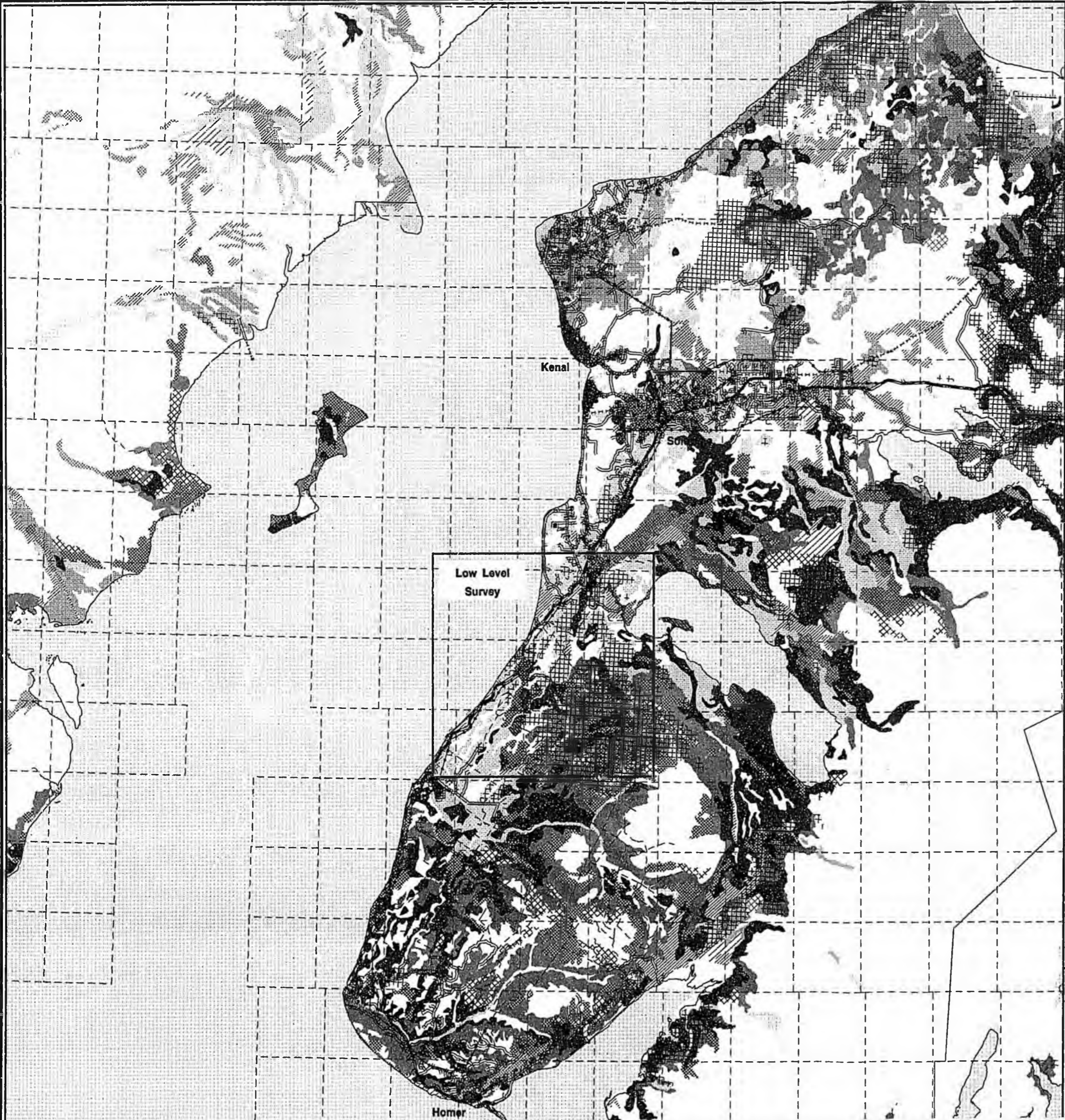
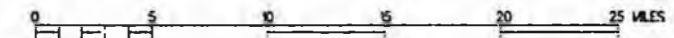
	Mapped 1982-1991
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Note: Primary and Secondary forest covers may overlap.

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 based upon "Revision of Preliminary Classification For Vegetation of Alaska" authored by A.R. Batten, C.T. Dryness, and L.A. Viereck, May 1982.

The vegetation database was developed under contract by E.S.R.I. for Alaska Department of Natural Resources. Source photos include Landsat and high altitude CIR. Mapping was performed at a scale of 1:250,000. 1982 thru 1991 insect surveys were mapped by USDA Forest Service, State and Private Forest Health Management at a scale of 1:250,000. 1990 thru 1991 insect surveys were more intensively mapped by the State of Alaska, Division of Forestry and USDA Forest Service, State and Private Forest Health Management at a scale of 1:63,360.

**FOREST HEALTH INITIATIVE  
SPRUCE BEETLE SURVEY  
1982 thru 1991  
VEGETATION COVER**



**VEGETATION COVER**

Primary	Secondary	
		Closed Coniferous Forest
		Open Coniferous Forest
		Woodland Coniferous Forest
		Closed Mixed Forest
		Open Mixed Forest
		Woodland Mixed Forest
		Closed Deciduous Forest
		Open Deciduous Forest
		Woodland Deciduous Forest

**ROADS and TRAILS**

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

**SPRUCE BEETLE AREAS**

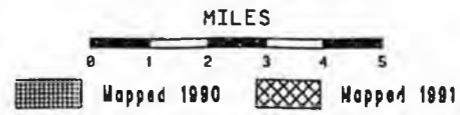
	Mapped 1982-1991
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Note: Primary and Secondary forest covers may overlap.

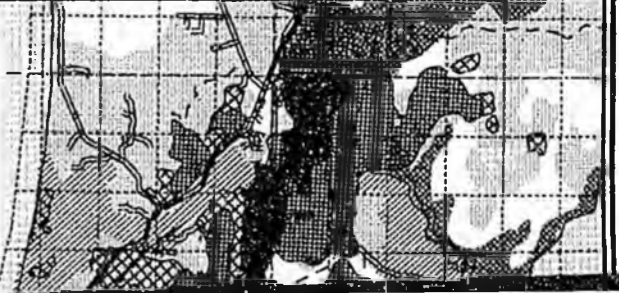
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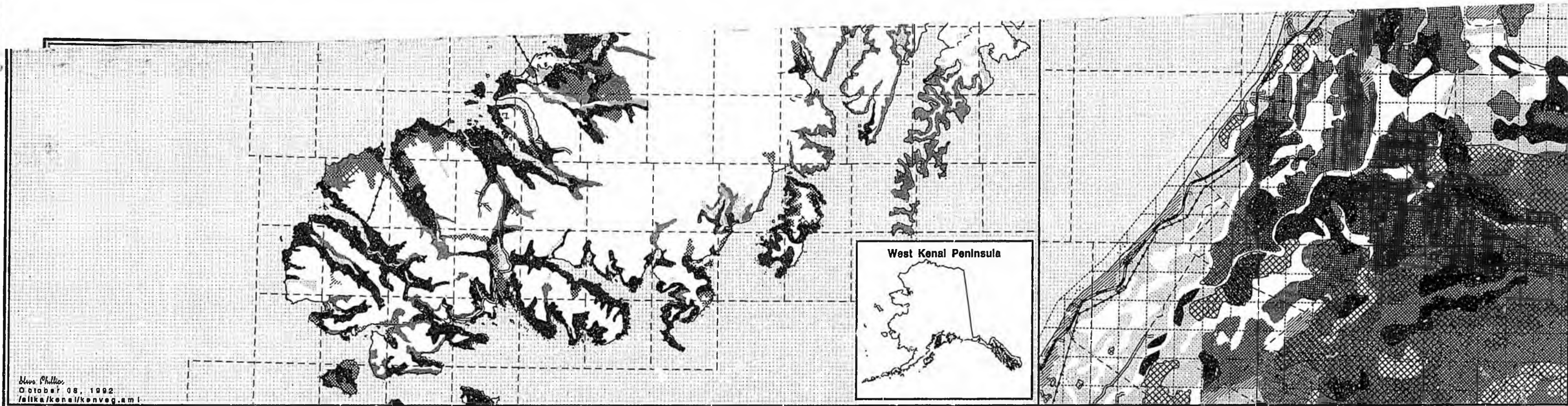
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**Low Level Forest Survey  
1990 and 1991  
VEGETATION COVER**



	Mapped 1990		Mapped 1991
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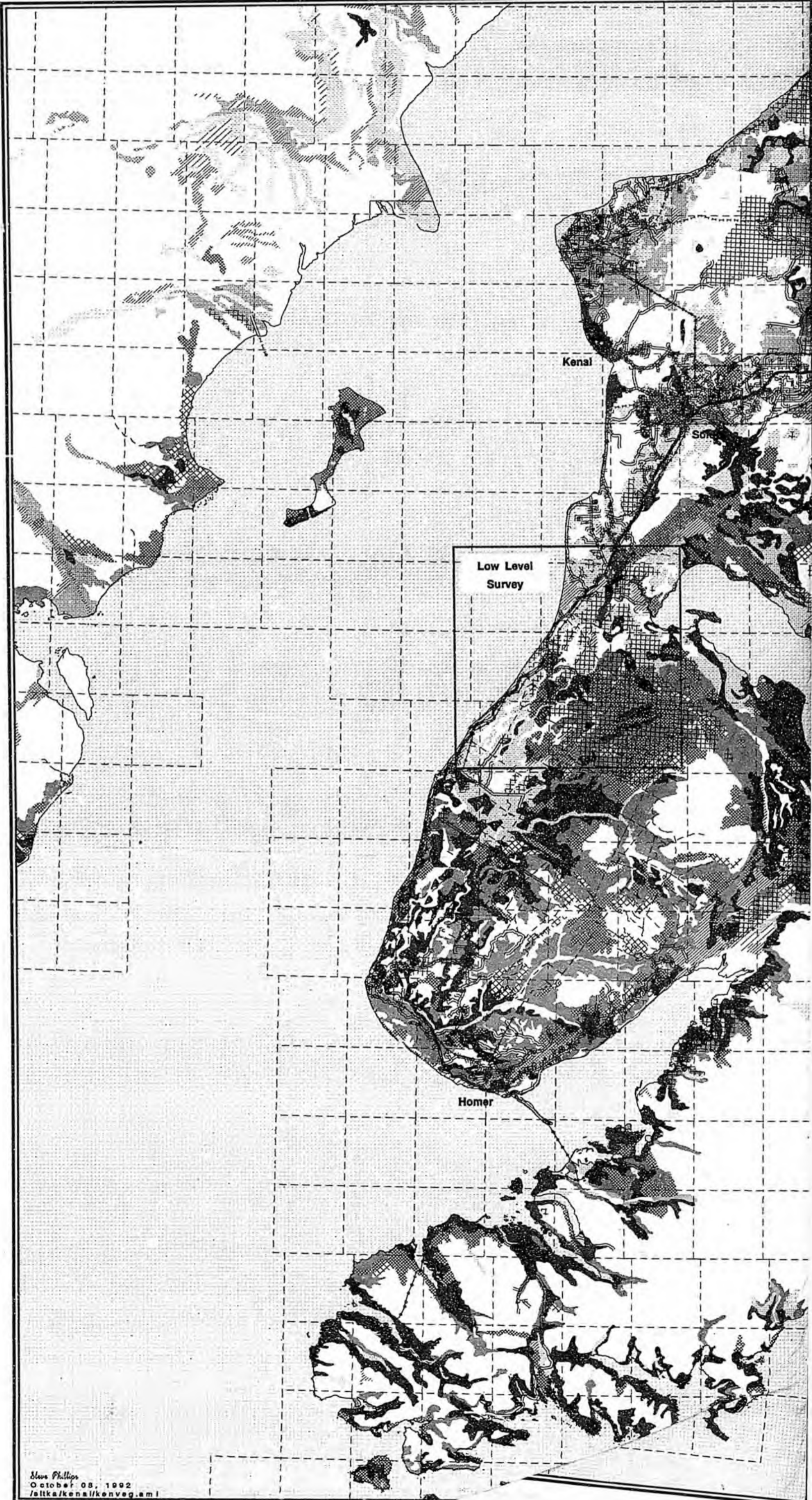




Steve Phillips  
October 08, 1992  
/alaska/kenai/kenveg.aml

West Kenai Peninsula





# FOREST HEALTH INITIATIVE SPRUCE BEETLE SURVEY 1982 thru 1991 VEGETATION COVER



### VEGETATION COVER

Primary	Secondary	
		Closed Coniferous Forest
		Open Coniferous Forest
		Woodland Coniferous Forest
		Closed Mixed Forest
		Open Mixed Forest
		Woodland Mixed Forest
		Closed Deciduous Forest
		Open Deciduous Forest
		Woodland Deciduous Forest

### ROADS and TRAILS

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

### SPRUCE BEETLE AREAS

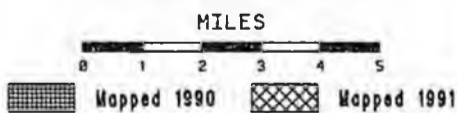
	Mapped 1982-1991
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Note: Primary and Secondary forest covers may overlap.

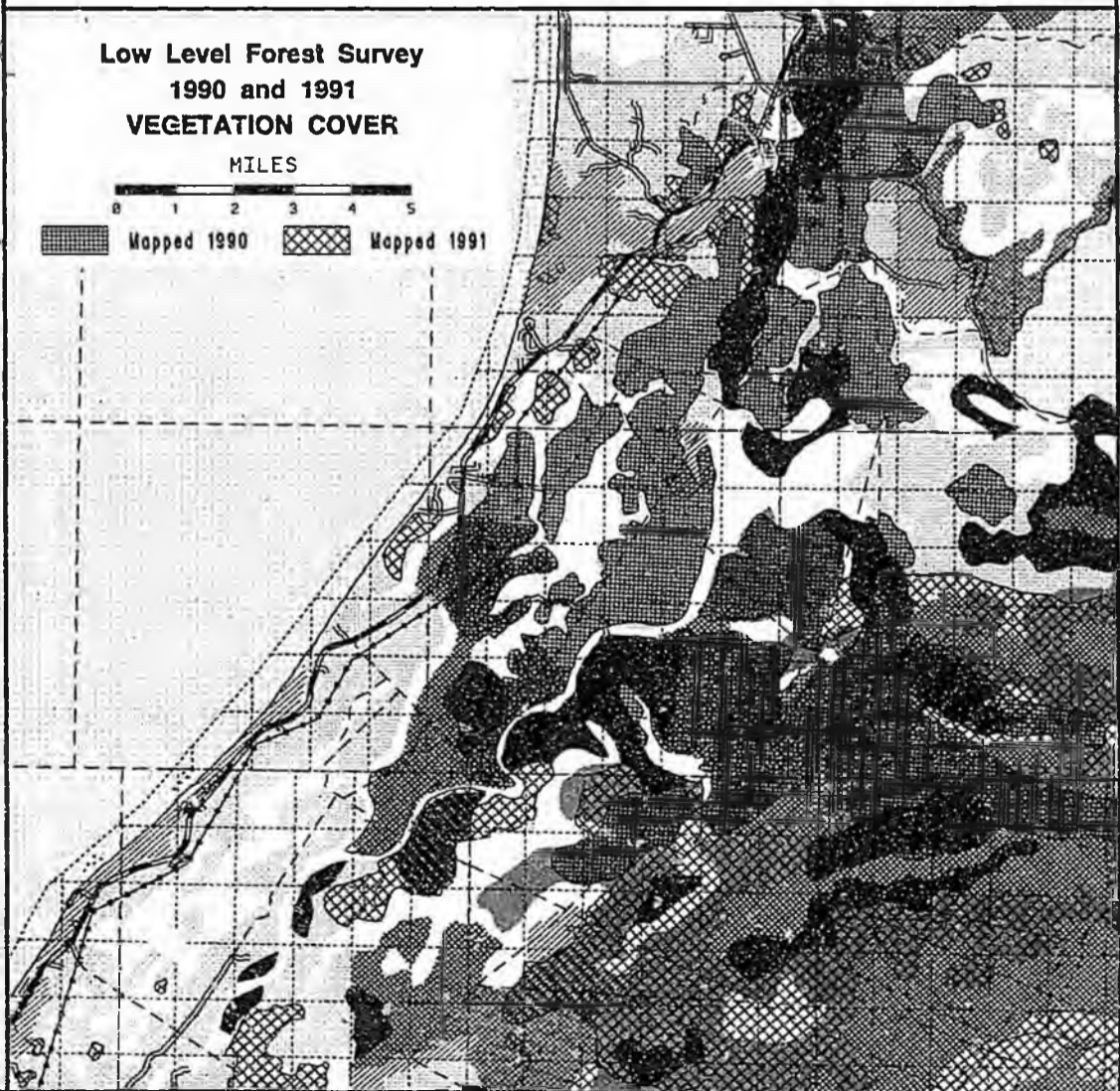
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### Low Level Forest Survey 1990 and 1991 VEGETATION COVER

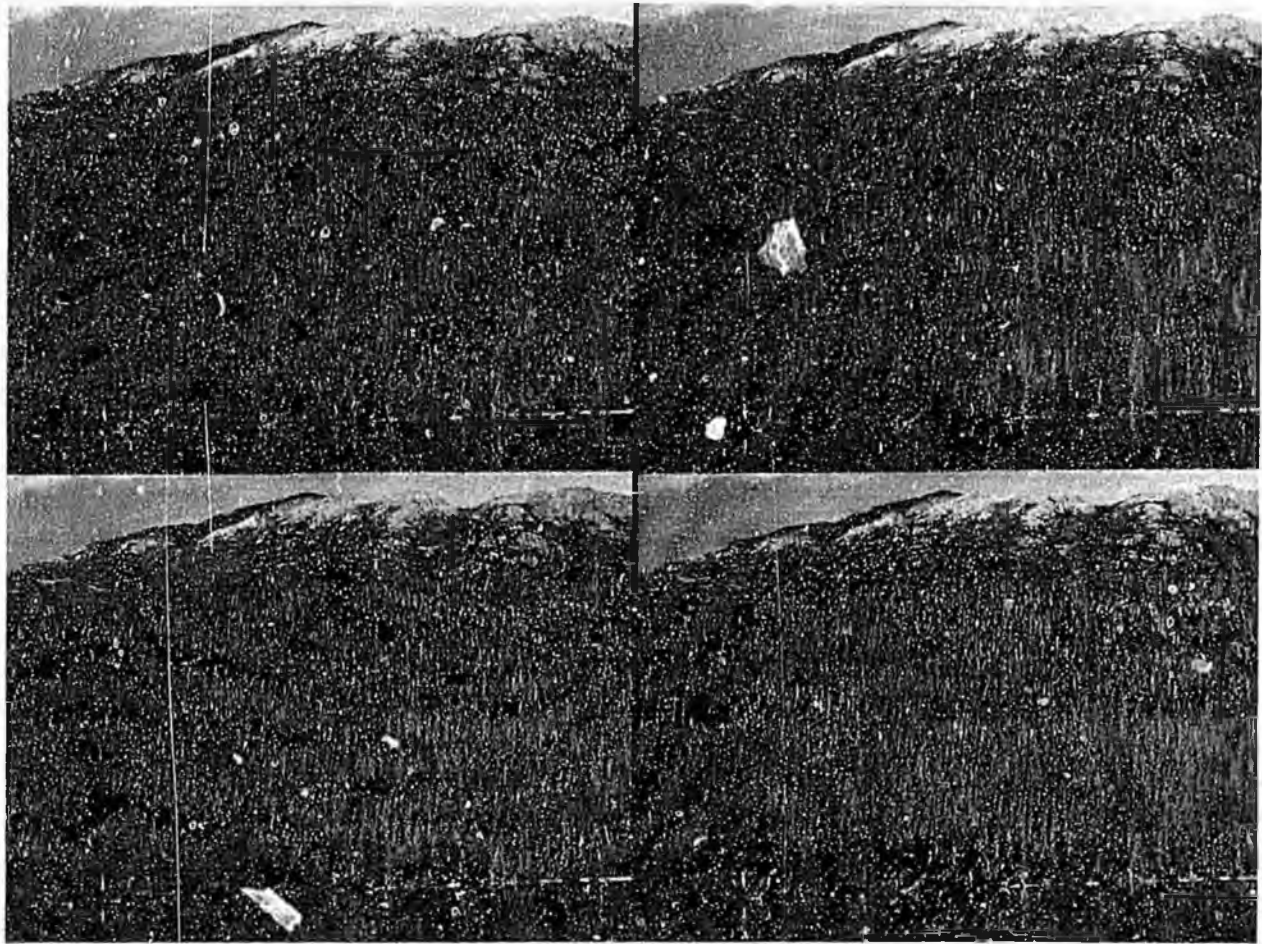


	Mapped 1990		Mapped 1991
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West Kenai Peninsula





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

Final Report December 1992

prepared for:  
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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.<sup>1</sup>

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<sup>2</sup> 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

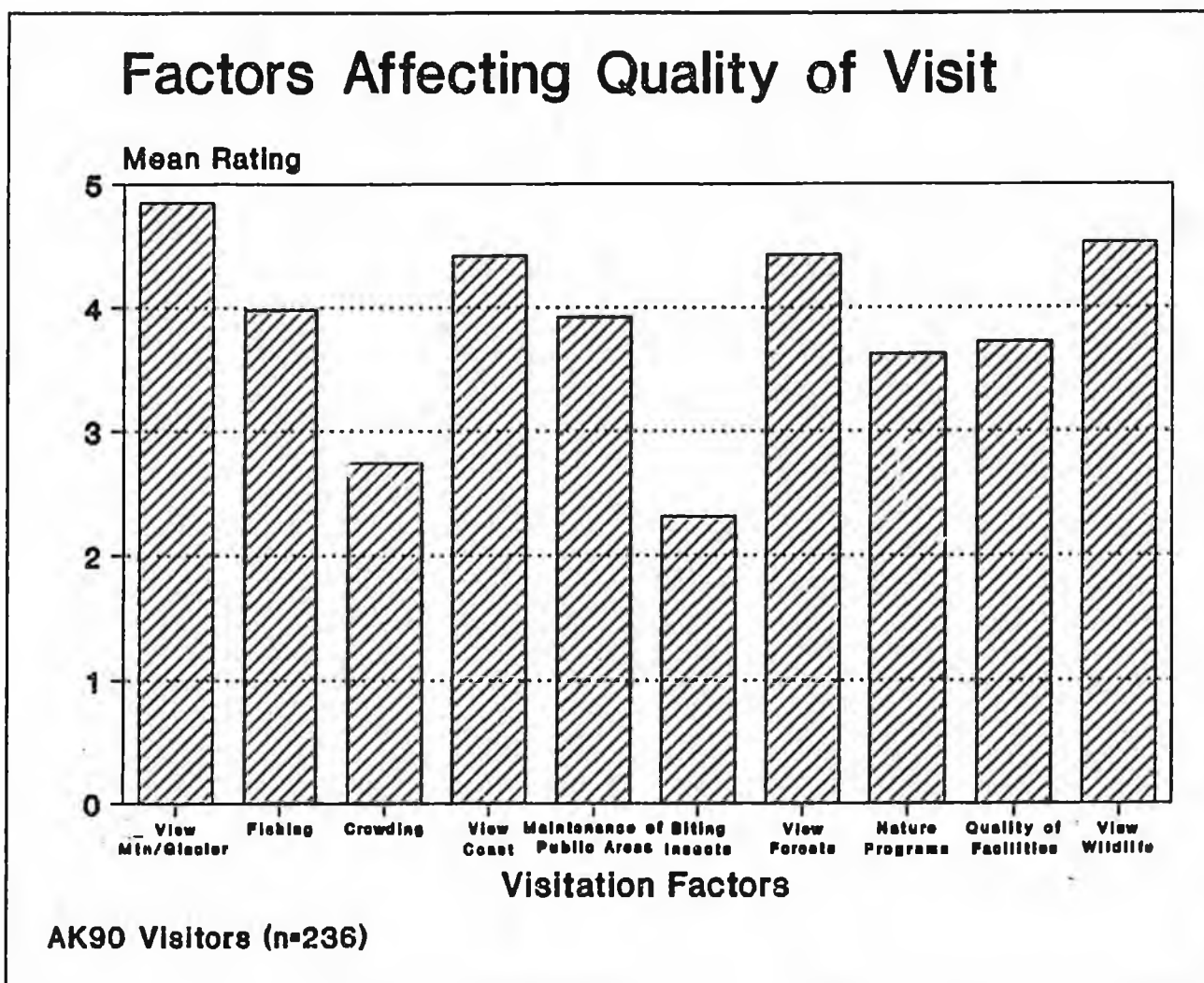
sample" were from the Anchorage area, with smaller numbers from Kenai Peninsula communities.

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

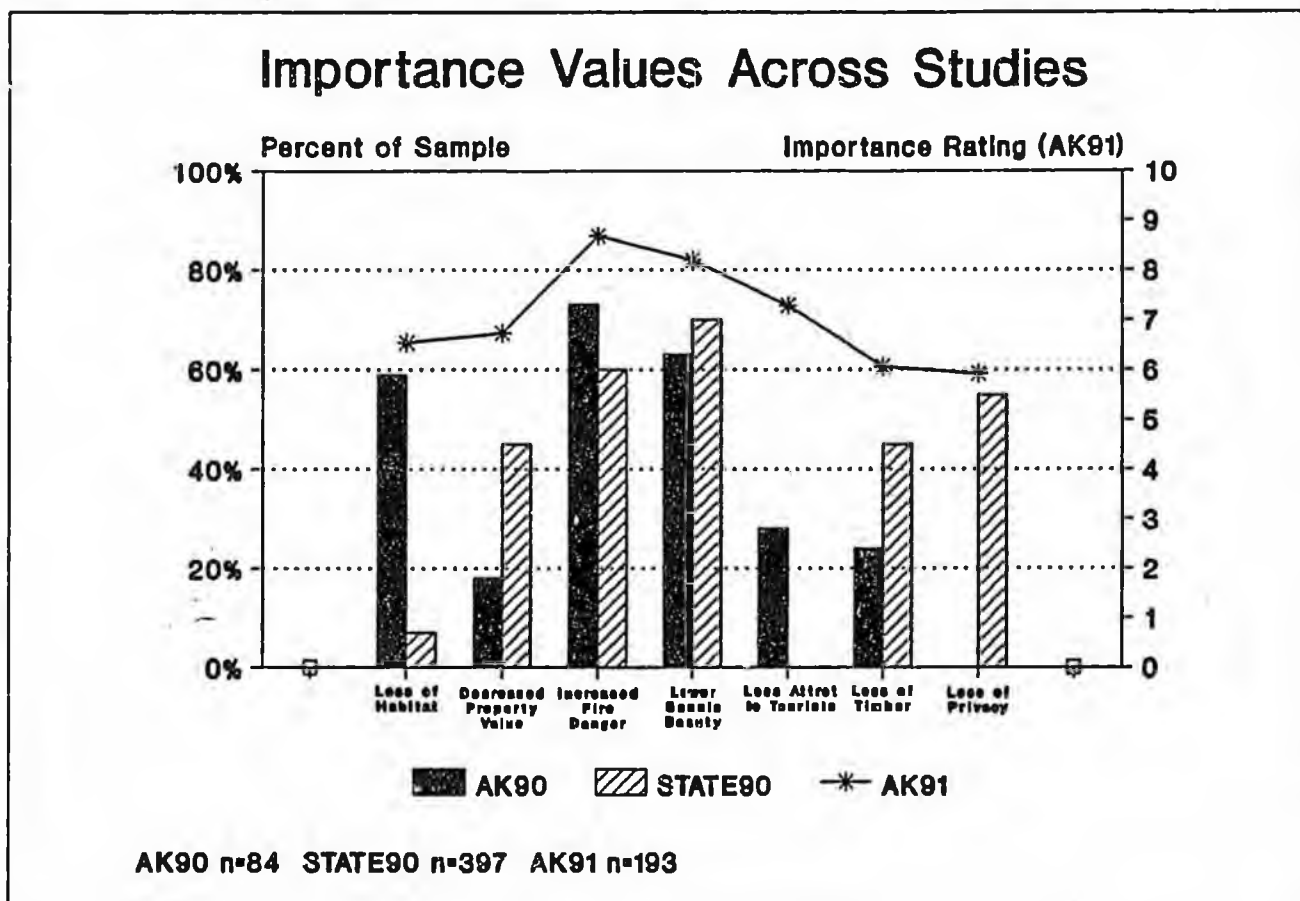
1990 and 1991 studies. Of the residents sampled in 1990, 73% reported *noticing dead*

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,<sup>3</sup> 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
Seldatna	11	Florida	15	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	5
Sterling	3	Indiana	10	Association	
Other	27	Other	122		
<b>Total</b>	<b>203</b>	<b>Total</b>	<b>306</b>	<b>Total</b>	<b>161</b>

### 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.<sup>4</sup> 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 "projective views" and by the expert judgments 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

<u>Retrospective Scenarios</u>	<u>3-6-9-12 years</u>	<u>Plate #</u>
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
<u>Restoration Scenarios</u>	<u>5-10-20-50 years</u>	
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

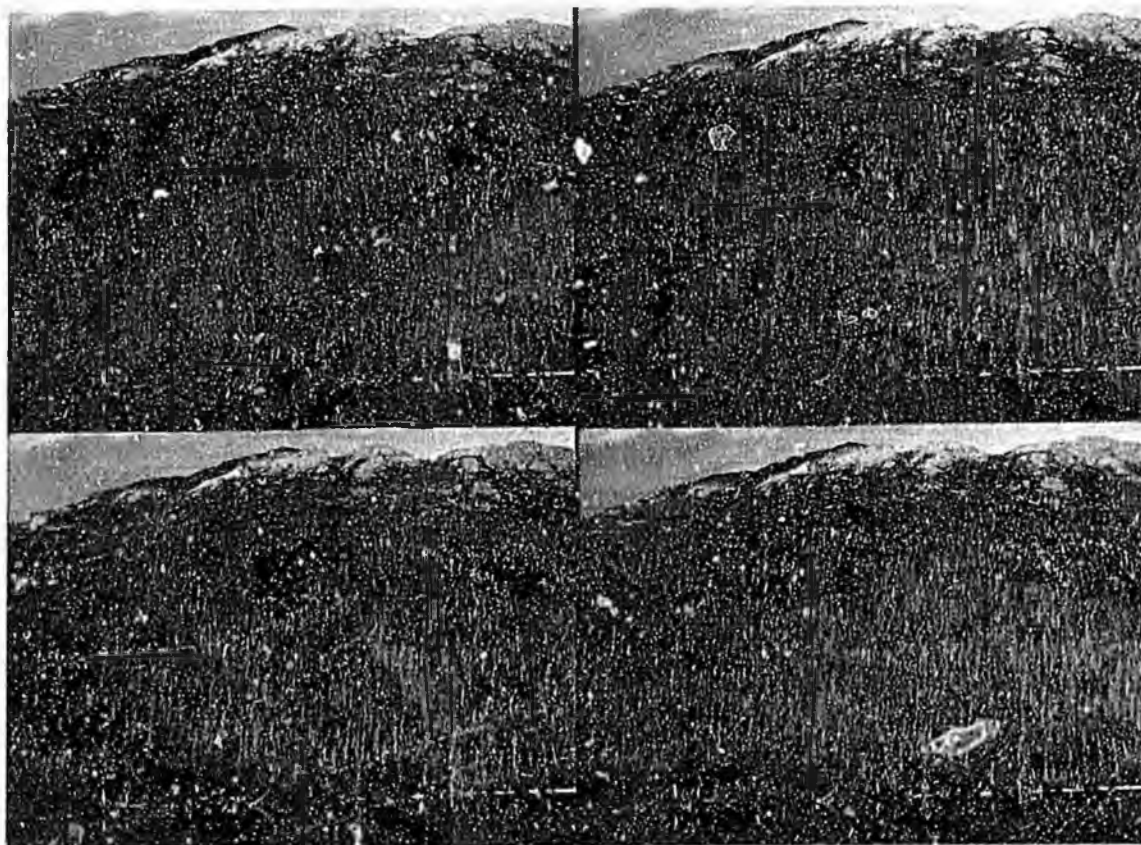
## Color Plates

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 - Scenc 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.



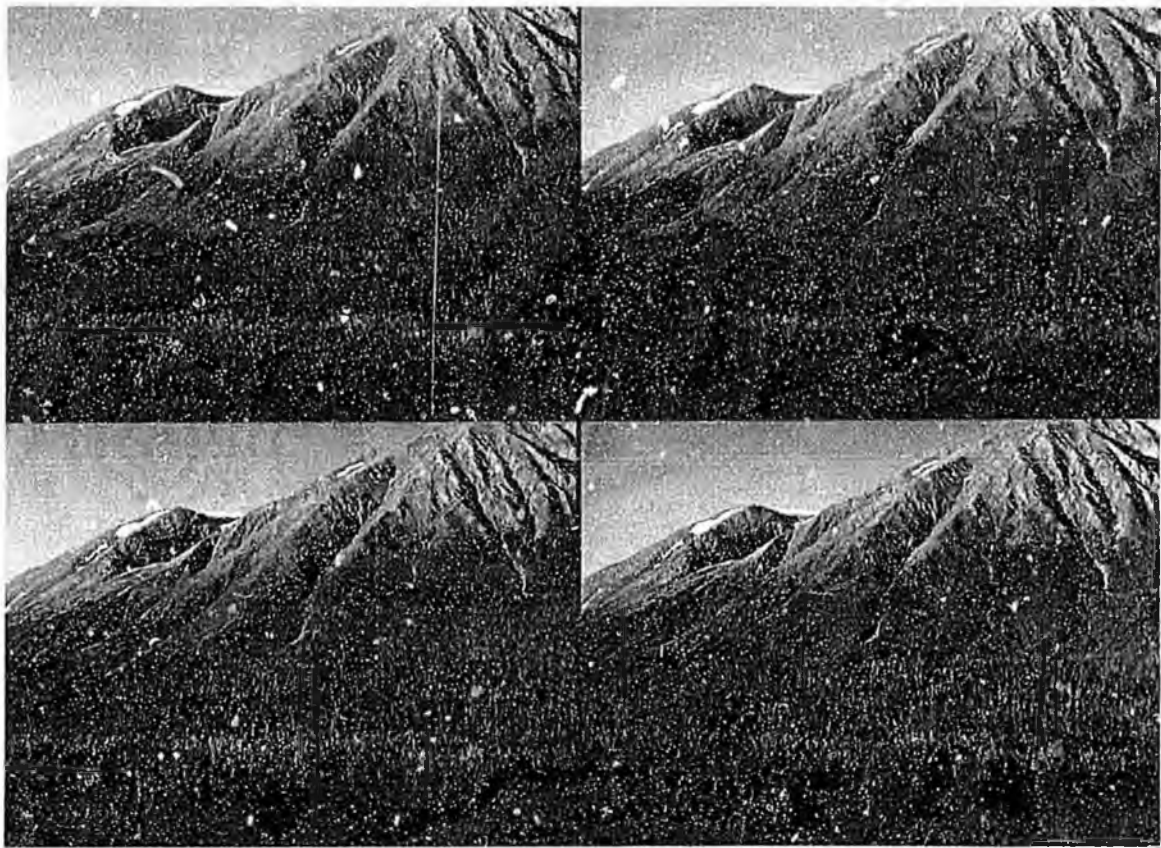


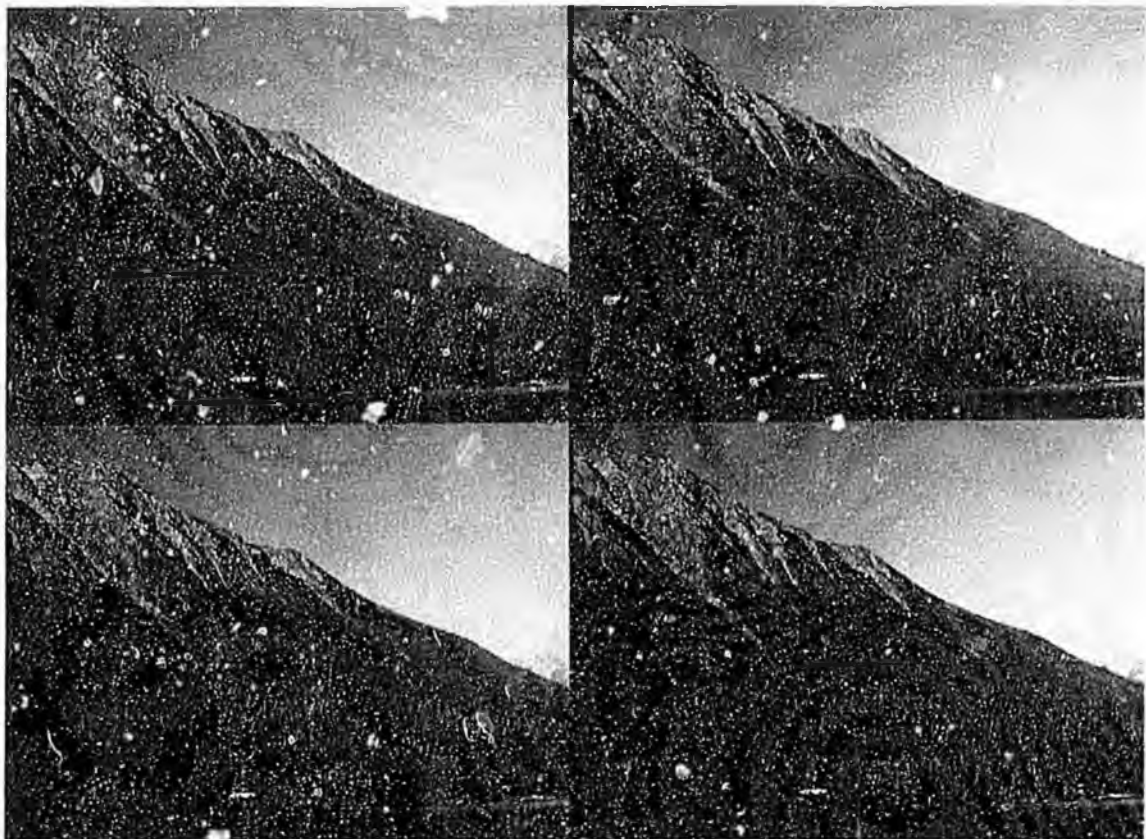
Plate 2a

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



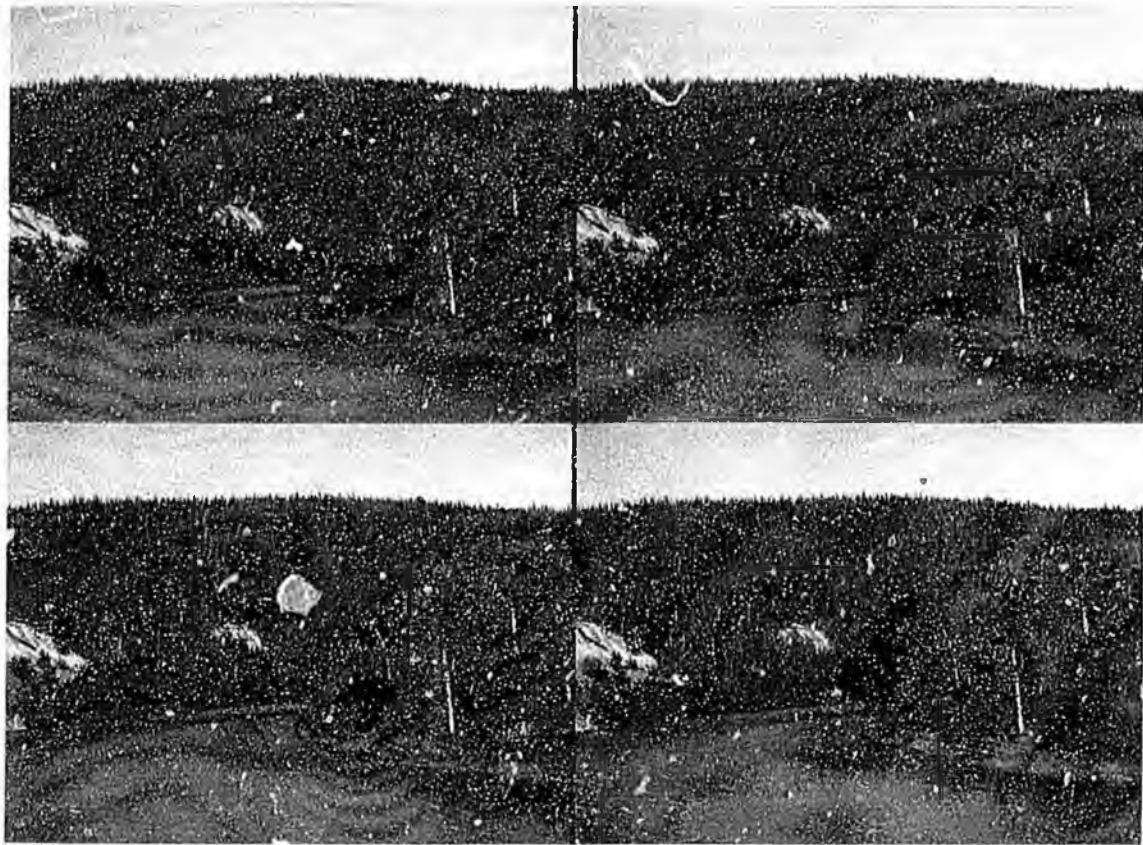
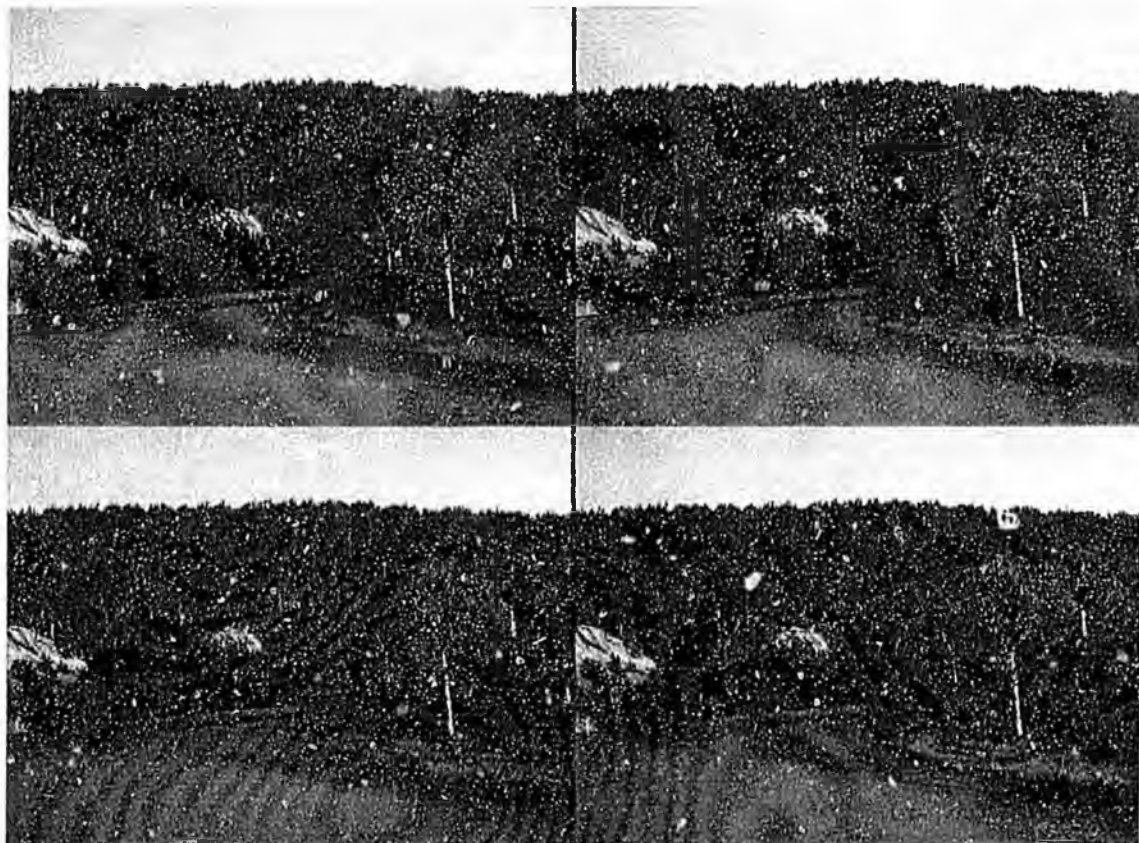


Plate 3a

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



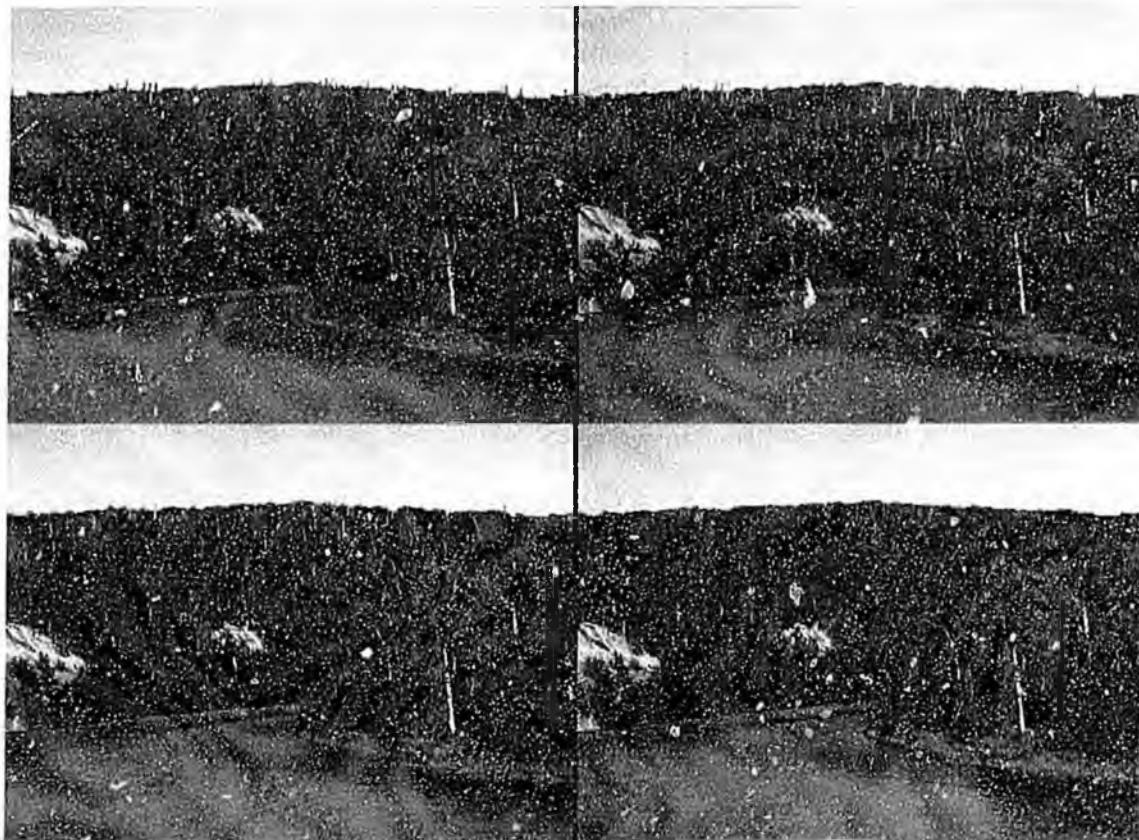
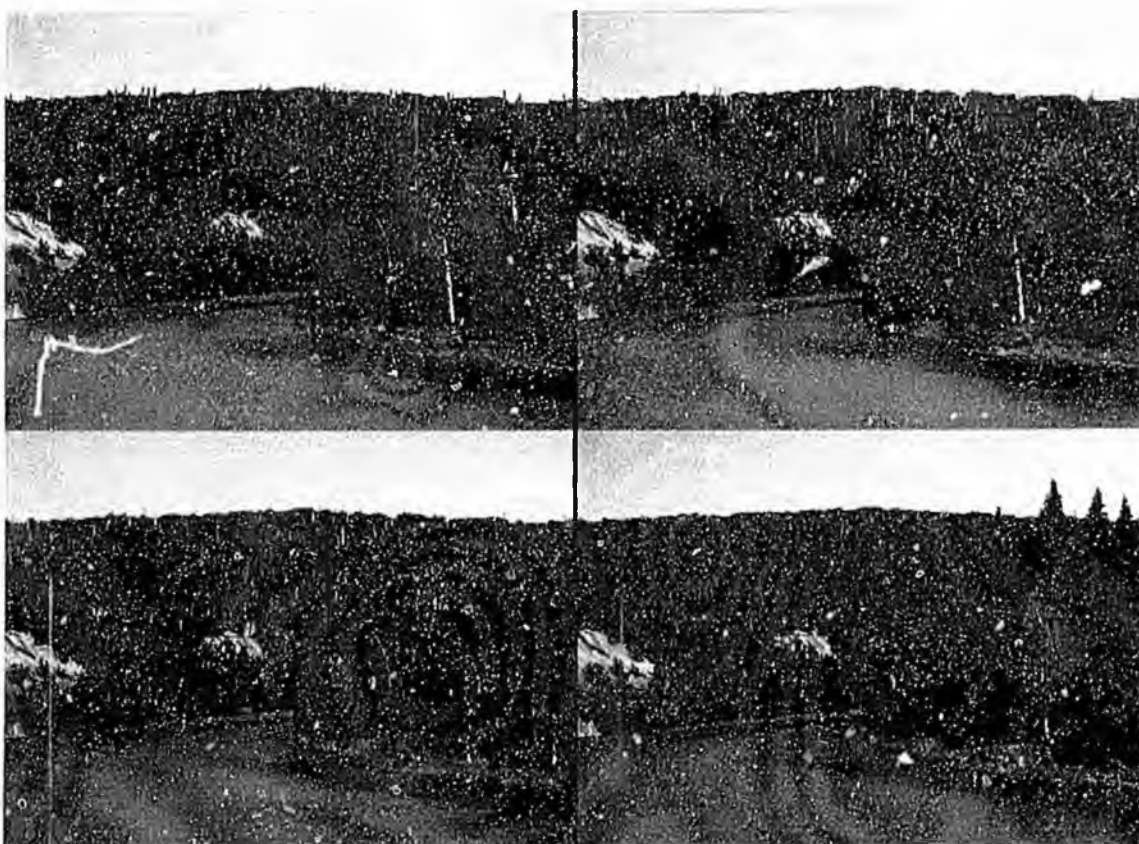


Plate 4a

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



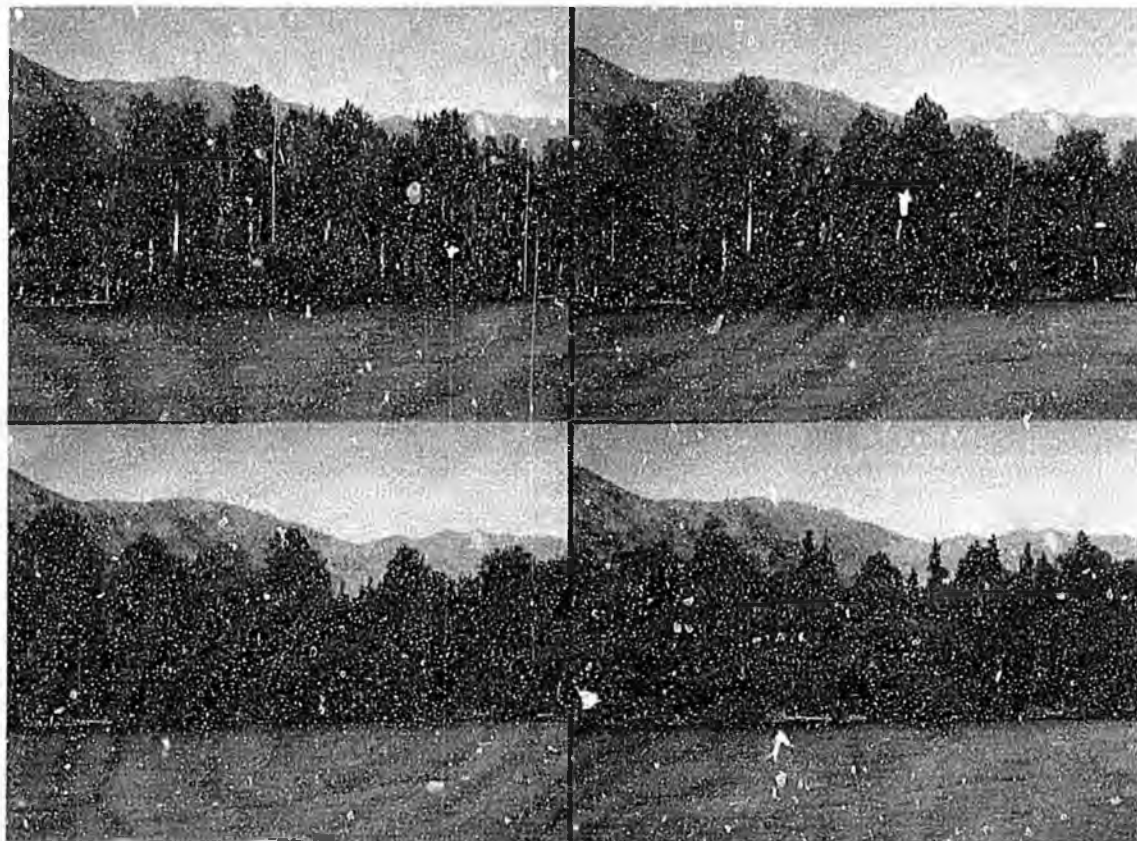


Plate 5a

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



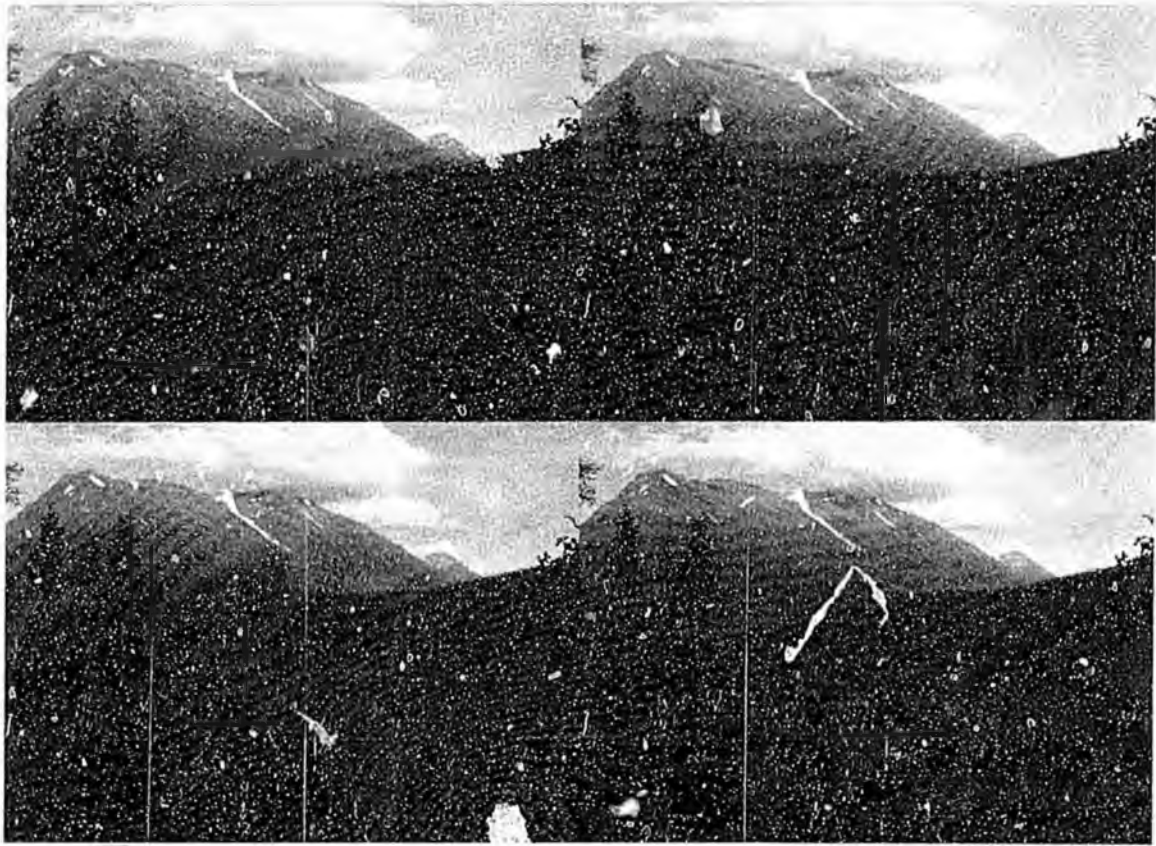


Plate 6a

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



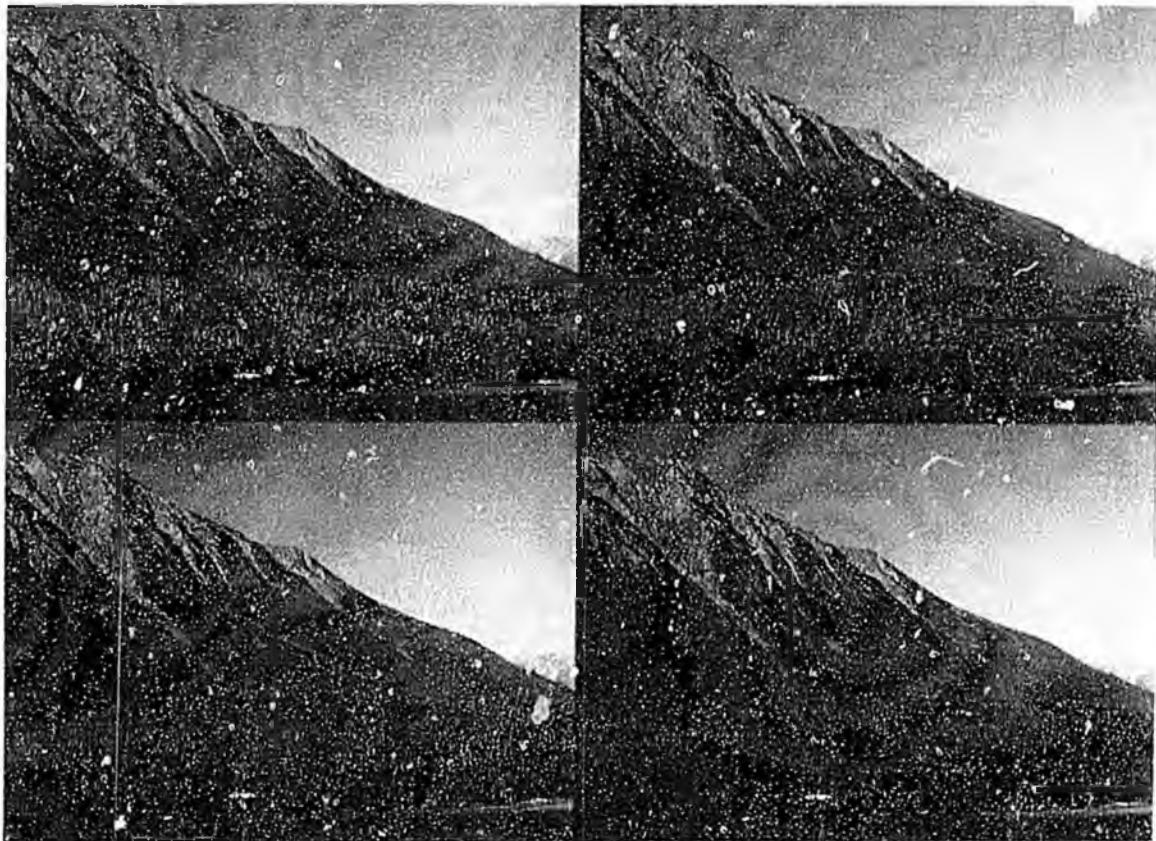
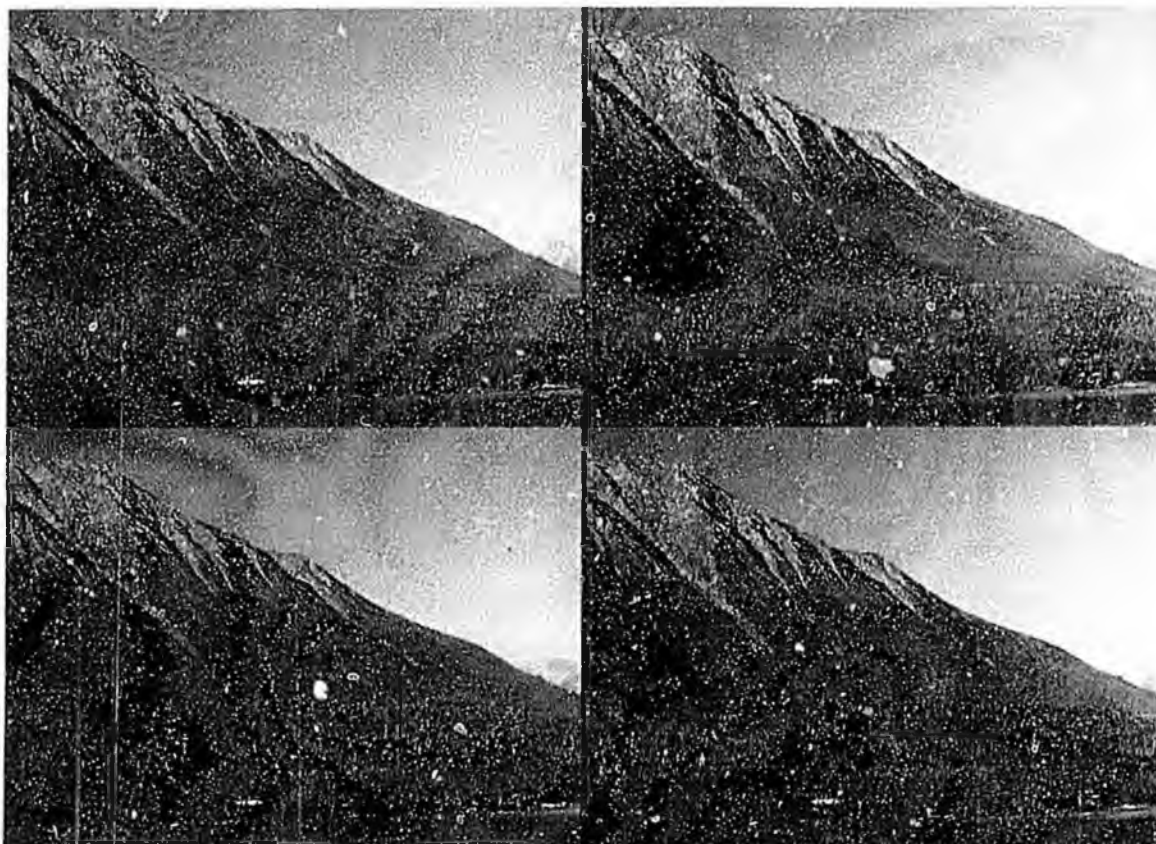


Plate 7a

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



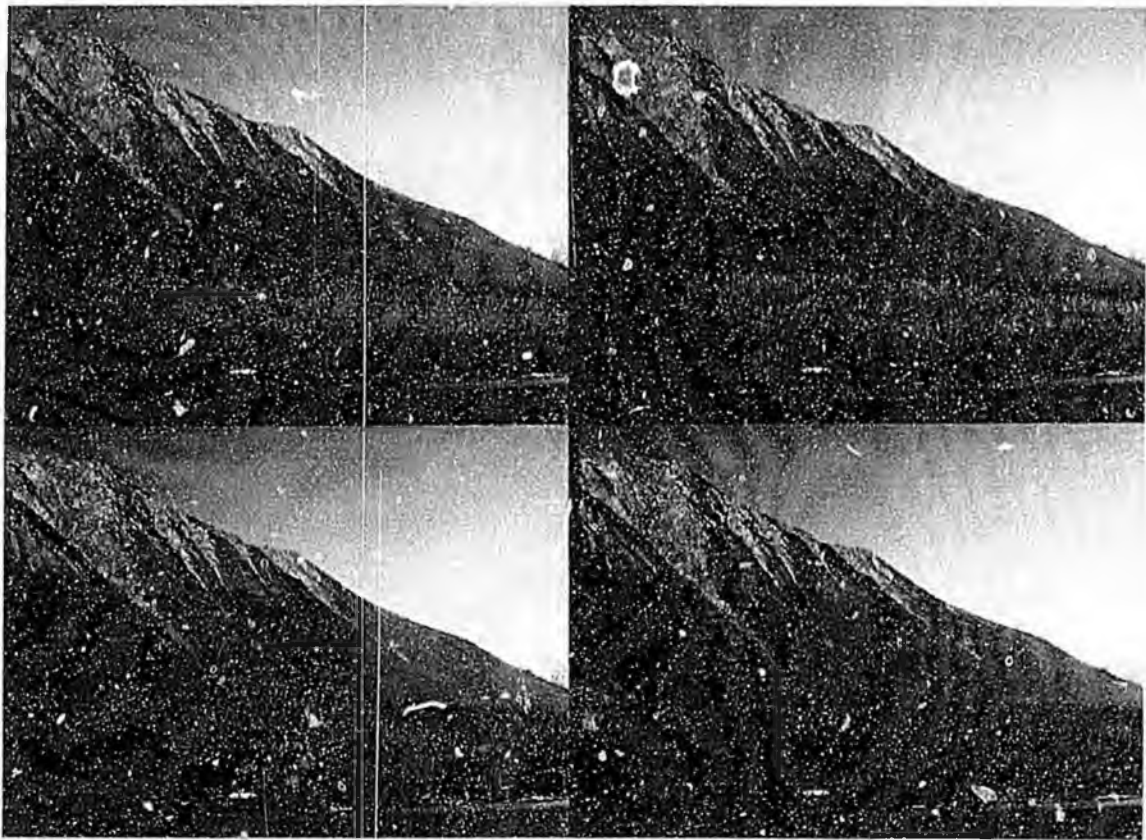
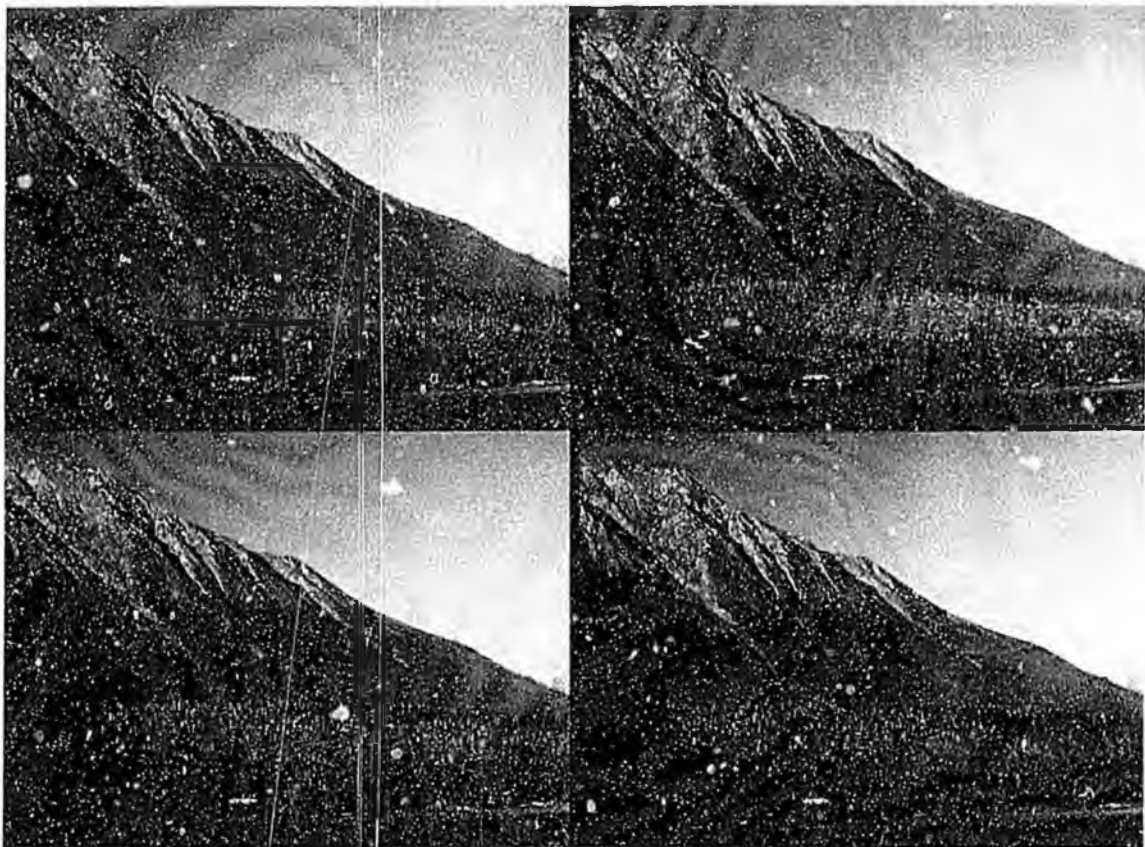


Plate 8a

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



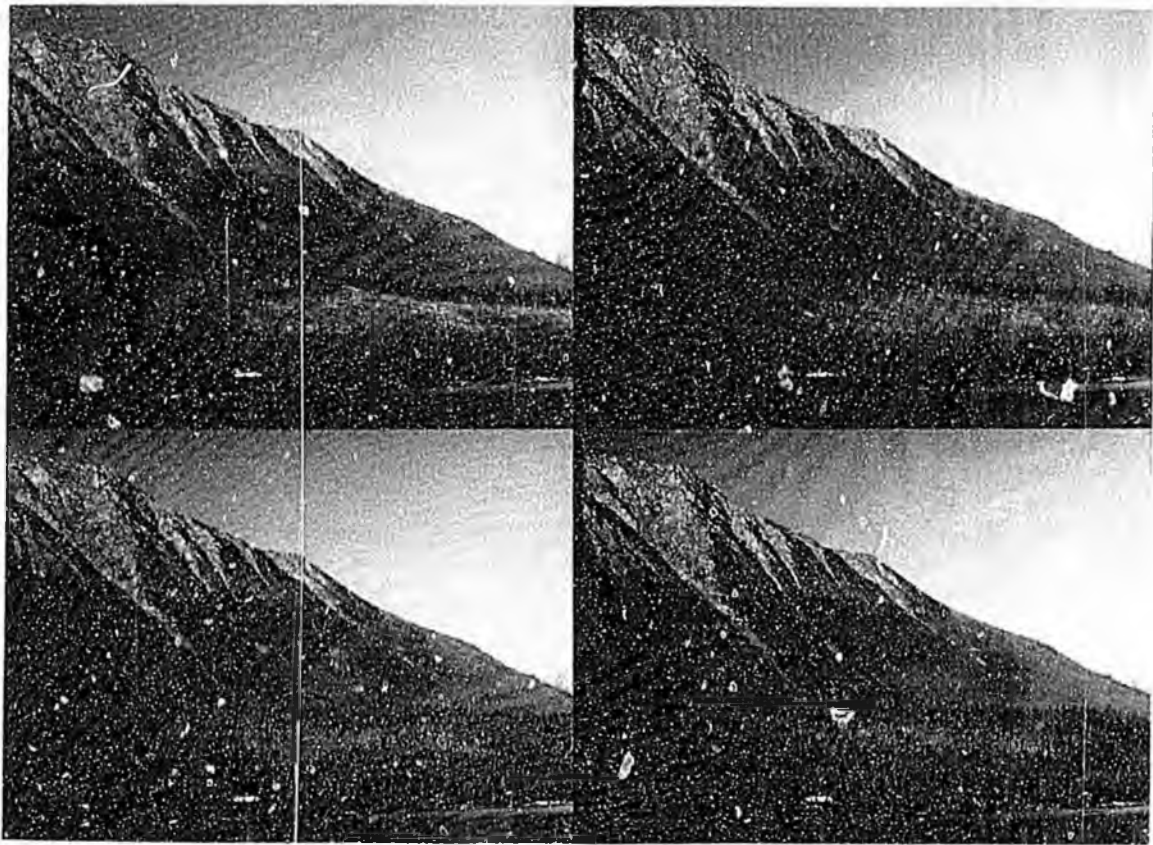
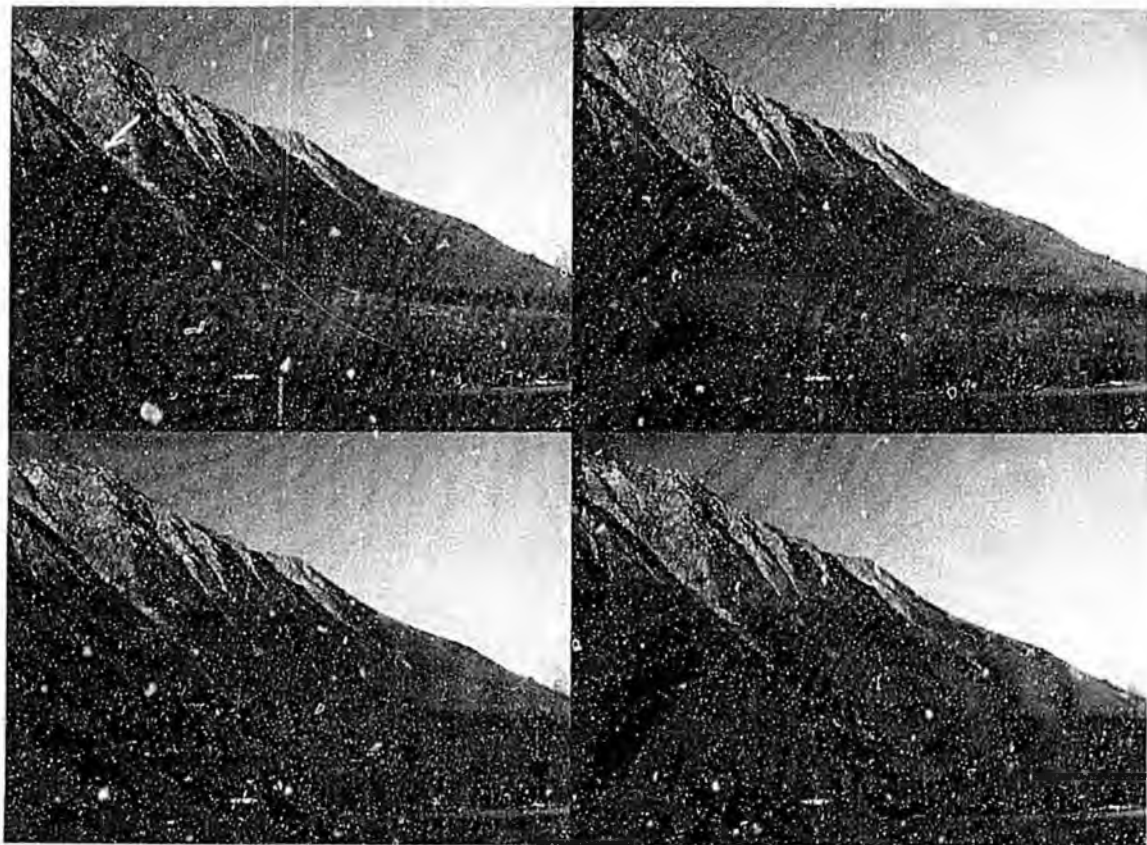


Plate 9a

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 preceding 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.<sup>5</sup>

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).

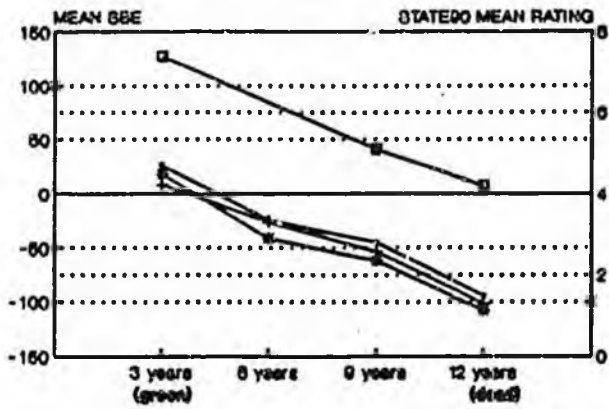
Comparison of scenic beauty judgements across the three presentation media (slides, prints and video) also indicated nearly perfect agreement. Correlation coefficients based on the ratings of the scenes that were common to all presentation sets and participant groups ( $n = 43$ ) ranged from .93 to .97.

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.

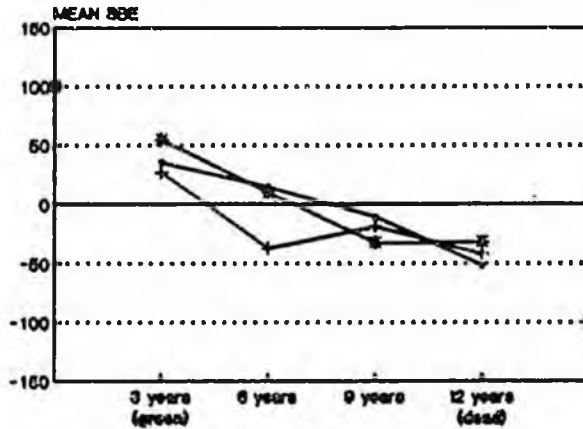
#### Comparison of Residents and Visitors

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

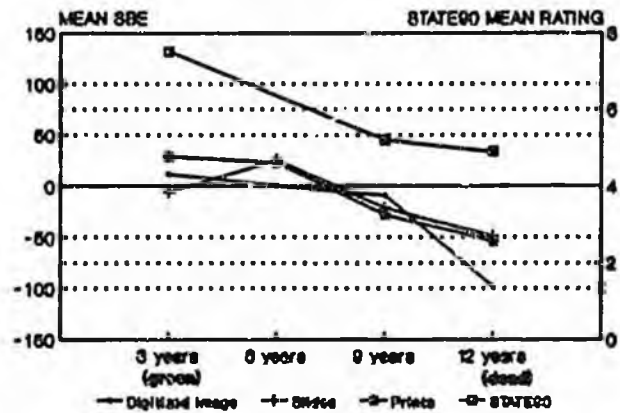
**Individual Scenes - Retrospective  
AI1319 - Jean Lake**



**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 residents, 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

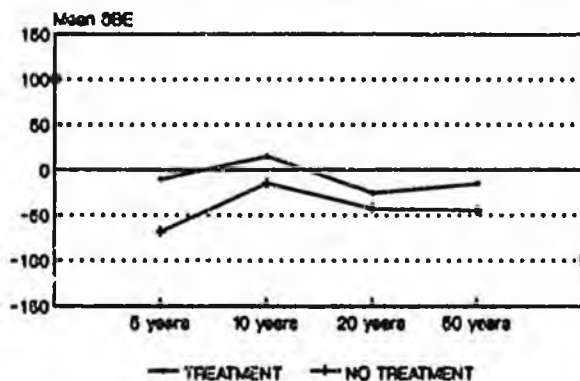
The results of the 1990 perceptual assessment, based on individual scene judgements, clearly and consistently showed that scenic beauty values declined significantly as the proportion of bark-beetle killed trees visible in the scene increased. When insect-caused mortality was

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.

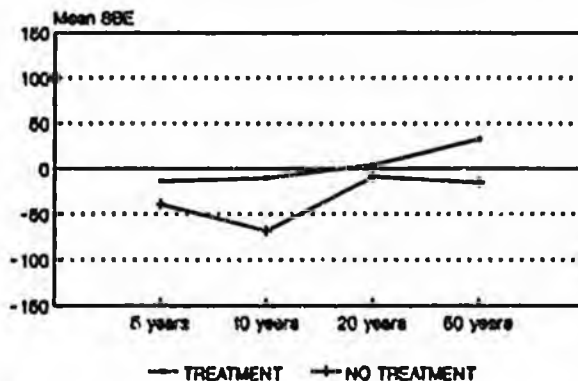
For the simulated scenarios representing the effects of various forest management actions, several major trends were revealed. First, for the retrospective infestation vs protective thinning scenario (Kenai River/Schooner Bend, Plate 3), the individual scenes depicting the expected effects of protection 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**



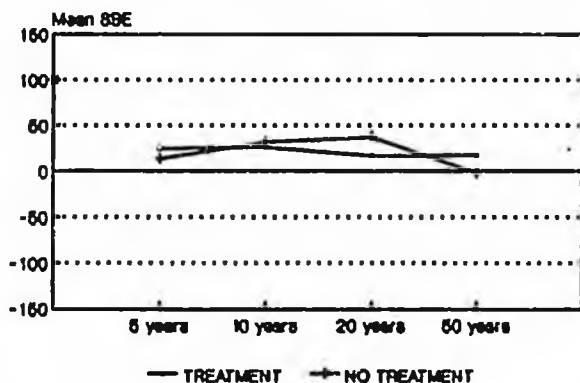
n=908

**Individual Scenes - Restoration  
AI0617 - Kenal River/Schooner Bend**



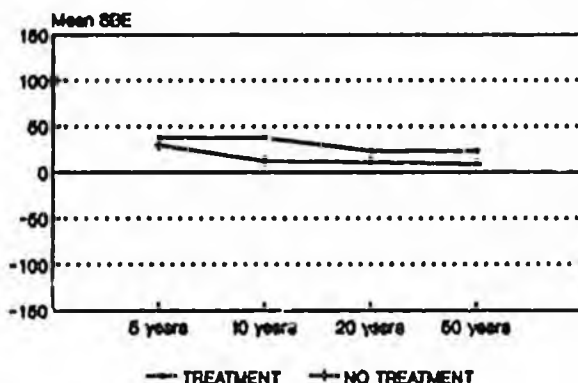
n=908

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



n=908

**Individual Scenes - Restoration  
AI1532 - Kenal Lake/Snug Harbor**



n=908

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.

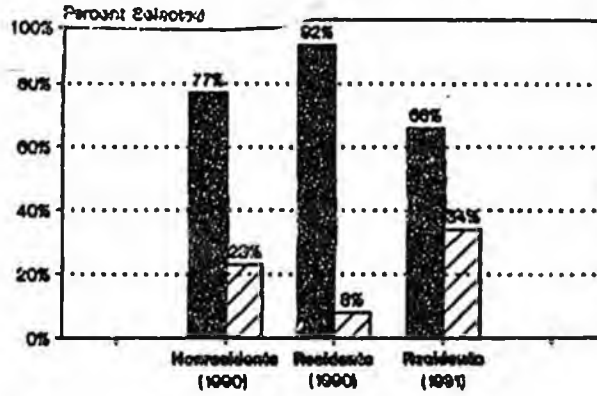
The final pair presented the two retrospective scenarios for the Kenai River/Schooner Bend scene (Plate 3). One four-scene set depicted the progressive stages of bark beetle infestation (from approximately 1978) based on historic data, with the final scene being the unmanipulated (digitized) picture 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.

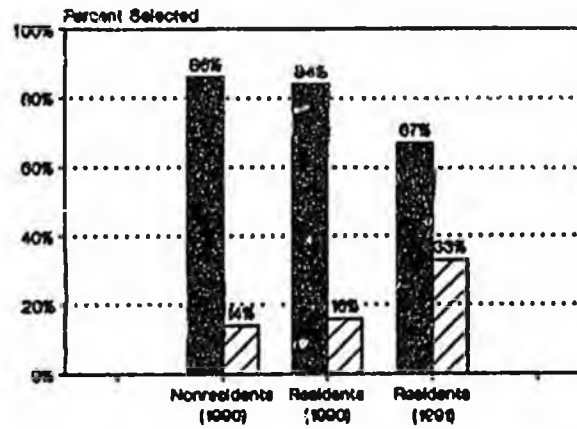
For the restoration alternatives, the *treatment* scenarios, which more quickly and completely restored a predominately spruce forest, were consistently preferred over the *no treatment* scenarios, where recovery was slower and resulted in more grass, brush and hardwoods.

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

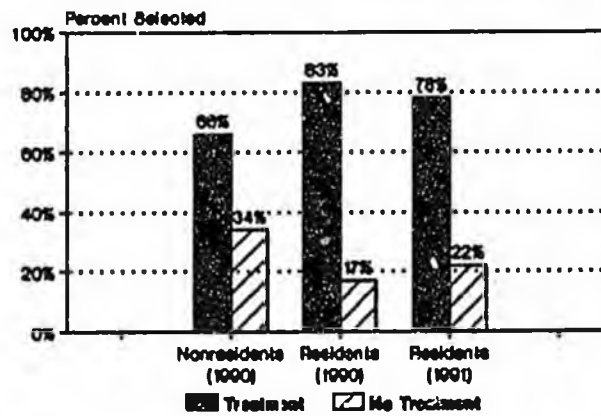
### Preferred Future Forest Conditions Cooper Creek Campground



### Kenai River/Schooner Bend



### Cooper Creek from Res. Pass Trail



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