KENAI-KODIAK AREA
FOREST MANAGEMENT PROGRAM OVERVIEW

Kenai-Kodiak Area Forest Management Goals

The Kenai-Kodiak Area (KKA) of the Division of Forestry (DOF) is committed to sound management of state forest resources. We will manage the forests in this area to ensure a sustained yield of renewable forest resources, and to provide opportunities for multiple forestland uses.

The State legislature has provided guidance on the importance of the forest resources to the state of Alaska when they prepared the declaration of intent found in AS 41.17.010 of the Alaska Forest Resources and Practices Act (FPA) in 1990. AS 41.17.010 states in part:

> The legislature declares that (1) the forest resources of Alaska are among the most valuable natural resources of the state, and furnish timber and wood products, fish and wildlife, tourism, outdoor recreation, water, soil, air, minerals, and general health and welfare; (2) economic enterprises and other activities and pursuits derived from forest resources warrant the continuing recognition and support of the state; (3) the state has a fundamental obligation to ensure that management of forest resources guarantees perpetual supplies for renewable resources, provides nonrenewable resources in a manner consistent with that obligation, and serves the needs of all Alaska for the many products, benefits, and services obtained from them;

The legislature provided further guidance in the FPA under AS 41.17.060(c) where it states in part that:

(1) forest land shall be administered for the multiple use of the renewable and nonrenewable resources and for the sustained yield of the renewable resources of the land in the manner that best provides for the present needs and preserves the future options of the people of the state;
(2) a system of allocating predominant uses or values to particular units within a contiguous area of land shall reflect in reasonable proportion the various resources and values present in that area;
(3) to the extent its capacity permits, forest land shall be administered so as to provide for the continuation of businesses, activities, and lifestyles that are dependent upon or derived from forest resources;
(4) timber harvesting is limited to areas where data and information demonstrate that natural or artificial reforestation techniques will result in the production of a sustained yield of merchantable timber from that area;
(5) there may not be significant impairment of the productivity of the land and water with respect to renewable resources;
(6) allowance shall be made for scenic quality in or adjacent to areas of substantial importance to the tourism and recreation industry; and
(7) allowance shall be made for important fish and wildlife habitat.

On the Kenai Peninsula, the number one disturbance agent affecting the forest resources is the bark beetle. Beginning in 1990, the bark beetle epidemic has exploded to unprecedented

proportions. According to a 1992 published report, (Van Hees, W. 1992) nearly one-half of all forestland on the Kenai Peninsula has been affected by beetle activity. The infestation increased substantially during the 1990's. However the rate of expansion overall has slowed, most likely due to lack of suitable host material as a result of losses incurred by the bark beetle since 1992. In some areas, beetles re-entering a stand that was previously heavily impacted can infest the residual trees. We expect areas near Cook Inlet from Kenai to Homer, the upper Kenai River drainage, Sadie Cove to Seldovia, English Bay, and North Kenai to see continued beetle activity.

The Iliamna Lake region, on the west side of Cook Inlet, has remained static for the last two years, with about 25,403 acres infested (Forest Health Protection Report, Forest Insect and Disease Conditions in Alaska – 2003, 2004). Overall, the epidemic beetle populations have affected 1,400,000 acres of Kenai Peninsula Borough lands through October, 2002. (Spruce Bark Beetle Program Report, 2002). Because of the extensive beetle-caused mortality, the goals and objectives of the KKA are primarily directed towards dealing with the long-term health and ecological restoration of the forest. The public is becoming more aware of the long-term aftermath of this beetle infestation and is concerned with the substantial and significant risk of uncontrollable wildland fire on the Peninsula and how the infestation is significantly influencing wildlife and its habitat.

Forest health is a condition of forest ecosystems that sustain their complexity while providing for human needs (Sampson, et al. 1994). Forests can be considered healthy when there is an appropriate balance between growth and mortality (Norris, et al. 1993). Having the resilience to react and overcome various stressors is a key indicator of health. In most areas of the peninsula, mortality in spruce stands caused by spruce beetle far exceeds growth. In order to achieve sustainability, management needs to focus on the condition of the forest, with goals of maintaining soil productivity, gene conservation, biodiversity, landscape patterns, and the array of ecological processes. The natural disturbance regimes provide the basic blueprint for sustaining pattern and process across the landscape. Management practices are sought that reflect these landscape patterns and ecosystem processes. We continue to refine our understanding of ecological processes, using adaptive management techniques on changing State forestland. ”Adaptive management” means using the best knowledge available to prescribe practices, monitor results, and adjust practices as needed to meet objectives.

The division's goal is to:

a. maintain the structural and functional integrity of the forest as an ecosystem;
b. meet the diverse needs of the human community; and
c. commit the technological, financial, and human resources needed for implementation.

Management actions will involve the use of adaptive management to meet the goals outlined above. Interagency and interdisciplinary cooperation is necessary along with public participation during the decision process in order to meet these goals.

Our objectives are:

- to provide wood for commercial and personal use, and provide jobs from timber harvest and processing,
- to maintain opportunities for diverse recreational activities,

- to protect and enhance fish and wildlife habitat,
- to protect water quality,
- to accelerate reforestation and ecological restoration of forests killed by spruce bark beetle by harvesting and replanting, and
- to minimize the potential of catastrophic wildland fire near developed areas by breaking fuel continuity as well as connecting natural fuel breaks and regenerating treated areas with native fire-resistant vegetation whenever possible.

Timber sale processes

The Five-Year Schedule of Timber Sales (FYSTS), published every two years, identifies areas where the Department of Natural Resources' (DNR) Division of Forestry (DOF) is planning timber sales. The Five-Year Schedule is meant to inform the public, timber industry, local governments, and other agencies of potential State timber sales. The Five-Year Schedule provides a basis for public comment and identification of issues. The schedule is not developed as a decision document for particular timber sales.

After adopting the Five-Year Schedule, DOF will do more detailed fieldwork to assess and design proposed sales. Before any commercial timber sale of ten acres or larger is offered, DOF will prepare a Forest Land Use Plan (FLUP) and make a finding that the sale is in the State's best interest. If applicable, a coastal consistency review and determination (CCD) occurs concurrently with the review and finding of a FLUP. The FLUP gives site-specific information for each sale, describing the location, estimated timber volume, harvest methods, reforestation plan, access, and other potential uses of the sale area. Other State agencies and the public have the opportunity to review and comment on every FLUP. Any concerns or mitigation needs that arise during the review period will be addressed by DOF before the sale proceeds. The FLUP and, if applicable, the CCD, not the FYSTS, are the final documents that decide whether or not the Division will offer a timber sale.

Coordination with other plans and processes

Proposed sales must be consistent with adopted Department of Natural Resources (DNR) land use plans. DNR has adopted the *Kenai Area Plan* for all state lands in the Kenai Peninsula Borough. The plan was adopted by the state in 2000. Proposed sales will be consistent with the plan.

When planning timber sales, the division also incorporates information on beetle activity and possible harvest areas from the *Forest Health Management Plan for the Western Kenai Peninsula and Kalgin Island* and *Forest Health Management Report, Forest Insect and Disease Conditions in Alaska--2002.* During the public review period of the FY 94-FY 98 Five-Year Schedule of Timber Sales, DNR sponsored an Advisory Panel of citizens and local and state officials to review the schedule. The DNR Commissioner at the time (1994) carefully reviewed the panel's recommendations. He adopted the recommendations fully where the panel was able to reach a consensus, and directed the division to address the issues where the panel was unable to reach a consensus. The adopted recommendations and other commitments are incorporated into Five-Year Schedule process. See Appendix B for the Advisory Panel recommendations, and

DNR's responses.

Spruce Beetles

One of the main factors affecting forest planning in the Kenai-Kodiak Area has been an epidemic of the spruce beetle. About 17,470 acres were infested with bark beetles on the Kenai Peninsula in 2003. Currently, timber sales are designed to salvage dead and dying timber, or to harvest timber with a high likelihood of infestation in the next few years. To minimize the spread of the spruce beetles, the standards in 11 AAC 95.195 for clearing of spruce trees will apply to timber sales in the Kenai-Kodiak Area (KKA). Sales will also be designed and administered to minimize damage to residual trees.

Initially, infested areas are determined through aerial surveys. Areas with "red" crowns are mapped on USGS quad maps. For a forest stand to be mapped, it must contain at least five percent mortality over the whole stand. Clumps of 5-20 infested trees are mapped as small pockets by placing a dot on the map. Areas of widely scattered individually infested trees (less than 1 tree per acre) are not mapped. If one of these infested areas is selected for further review, then a ground check is made. During this field review, sample plots determine the percentage of trees infested.

Alaska Forest Insect and Disease Survey – 2003 is available on the web at:
http://www.dnr.state.ak.us/forestry/insects.htm

Visuals

DOF is very concerned about the visual impacts that both the spruce beetle and timber harvest may have on the public, particularly on important view sheds along the Peninsula's scenic highways. A U.S. Forest Service-sponsored survey of residents and visitors to the Kenai Peninsula, Alaska in the summer of 1990 revealed several consistent patterns of perceptual and attitudinal responses to the on-going spruce beetle outbreak in the area. Residents and visitors consistently rated forest vistas damaged by spruce beetles lower in scenic beauty, and the more tree mortality present the lower the perceived scenic beauty (Daniel, et al. 1991).

Both residents and visitors cite loss of scenic values as an important effect of the beetle damage, and visitors consistently report sightseeing as a dominant activity, and indicate views (of mountains, forests, and coast lines) as a major factor affecting the quality of their visit to Alaska.

Respondents in this study consistently preferred preventative thinning treatments to a no-treatment scenario. For forested areas already severely impacted by spruce beetle, respondents preferred the visual conditions produced by rehabilitation strategies that resulted in more rapid regeneration of forest cover. From a list of proposed actions, including no action, respondents preferred actions included cutting and removing dead trees (even if selling them will recover only part of the costs), then burning the site to aid in the reestablishment of a spruce forest. Similar results were obtained in studies conducted on the Dixie and Deschutes National Forests where respondents preferred rehabilitation strategies that resulted in the faster recovery of forest conditions from current infestation levels (Orland, et al. 1993).

Watershed

The effect of a spruce beetle outbreak on water yield is probably similar to changes that occur after logging with minor differences caused by the standing dead trees (Schmid and Frye 1977). How similar a beetle-infested area is to a harvested watershed depends on the extent and intensity of the infestation and the design of the harvest area. Snow deposition among dead trees should be slightly less than in harvest opening because the dead trees will intercept some snow and prevent it from accumulating on the ground; interception will decrease as the branches weather and drop to the ground.

Evapotranspiration should be the same as that of the cut areas, while interception loss should be slightly greater. Standing dead trees should inhibit winds from scouring out the snow, so the size of infested areas should not be a factor. The snowmelt season should begin somewhat later than that of harvest areas because the dead trees will provide some shade. Water yields should be slightly less than in cut areas because of the slightly greater interception loss. The increase in water yield should last as long as it would in a selectively-cut stand (Reynolds, et al. 1994).

In the Rocky Mountains, streamflow increased up to 22% annually for a watershed in the White River spruce beetle outbreak (Love 1955, Mitchell and Love 1973, Bethlahmy 1975). The increase was attributed to reduced rainfall interception and transpiration due to changes in vegetation cover. When logged areas are compared to uncut areas, length of the snowmelt season remains the same, but snowmelt increases early in the season and decreases in the latter part (Leaf and Alexander 1975). Evapotranspiration and interception losses are reduced in proportion to amount of forest cover removed. On a watershed basis, the redistribution of snow into clearings increases runoff because less water is needed to satisfy soil moisture deficits due to reduced transpiration loss after tree removal. The increase in water yield will last for 30 years or longer depending on how soon the forest cover density reaches its maximum value.

Ips Beetle

Two species of Ips beetles are currently causing spruce mortality. *Ips pertubatus* are found primarily in interior and south-central Alaska and often cause mortality in white and Lutz spruce. *I. concinnus* are the most common species in southeast Alaska's Sitka spruce. *I. concinnus* has also been collected from south-central Alaska's white and Lutz spruce. A primary visual indication of Ips infestation in spruce is that all needles turn red the first season of attack, usually beginning at the top of the tree progressing down as compared to the spruce beetle where the needles turn red a year after attack, usually starting from the bottom.

Spruce stands bordering the Seward Highway near the entrance to Granite Creek campground came under heavy spruce beetle attack. In 1995, national forest personnel developed prescriptions to mitigate the losses attributed to the bark beetle by removing infested trees and thinning the stand in order to increase residual stand vigor. From a site visit in 1996, it became apparent that some of the residual spruce had been attacked by *Ips spp*. Tentative identifications showed that *I. pertubatus* was the main species involved in tree mortality; a few *I. concinnus* were also identified. Approximately 18% of the residual spruce was killed in 1996. Based on field observations elsewhere on the Kenai Peninsula, it was anticipated that Ips-caused tree mortality would continue. A ground check undertaken in the fall of 1997, however, indicated

that Ips caused-tree mortality increased; 32% of the live residual spruce was attacked and killed that year.

Ips-caused tree mortality is also occurring in untreated stands following spruce beetle infestations. Small diameter residual spruce that survived the spruce beetle infestation is now being threatened or killed by Ips on some sites.

Wildlife - Brown Bears

The Division of Forestry has demonstrated its concern for wildlife habitat, including brown bears, fisheries and water quality, through sale layout, contract requirements, solicitation of agency and public comments, and willingness to work with interested parties. We have taken an active role conducting field reviews with ADF&G personnel and modifying sale layout. The brown bear population was lowest during the turn of the century when poisonings, indiscriminate shootings and bounties were paid for bears. Since that time the population has increased through management efforts. Brown bears on the Kenai Peninsula are of importance to all land managers. Most studies indicate that timber harvest does not cause a decline in habitat utilization. Roads associated with timber removal, though, do have an effect on bear utilization of an area. Therefore, proper road management actions are necessary to minimize these impacts. Mace et al. (1996) found that road density did not strongly influence bear use of habitats within established home ranges where most of the roads were closed to vehicles. Their study also found that there was either a neutral use or positive selection towards habitats near closed roads or roads with less than 10 vehicles per day. This use pattern was also partially due to bears utilizing harvested areas (McLellan & Shackleton 1988) demonstrated avoidance of areas close to roads, yet survival rates were high and demographic consequences were minimal. To be of major concern to wildlife managers, behavioral responses to disturbance must have demonstrable demographic consequences (Shank 1979).

The disturbance caused by timber harvest would be for a relatively short period of time, however, the berry production (an important dietary component of bears) and browse production (for moose) should increase from the State's timber harvest operations. Access exposes bears to more human interactions; however, adaptability of bears has been documented in a number of case studies for more than 20 years. Typically bears that are reclusive in nature are able to adapt readily and bears that are not reclusive can become problematic and are often the bears that are taken in defense of life and property. To minimize bear conflicts, we intend, whenever possible, to use existing roads and winter or temporary roads to access sale areas.

Wildfire

The increased fuel loads resulting from spruce beetle outbreaks increase the fire hazard significantly. One of the most significant effects of spruce bark beetle activity is the invasion of grass into the understory after the dying crowns allow additional sunlight for photosynthesis. A recent study conducted by the U.S. Forest Service on the Kenai Peninsula concluded that surface cover of grasses (such as blue joint reed grass) increased from below 5% to over 50% in the five years following a spruce bark beetle attack (Schulz 1995). Total fuel loading (vegetation) increased from about 10 tons per acre to over 35 tons per acre. This fuel type burns 20 times

faster and 6 times more intensely than the fuel type associated with healthy white spruce stands, particularly in the spring and early fall. (See Appendix A for additional information on the wildland fire danger on the Kenai Peninsula)

Transportation

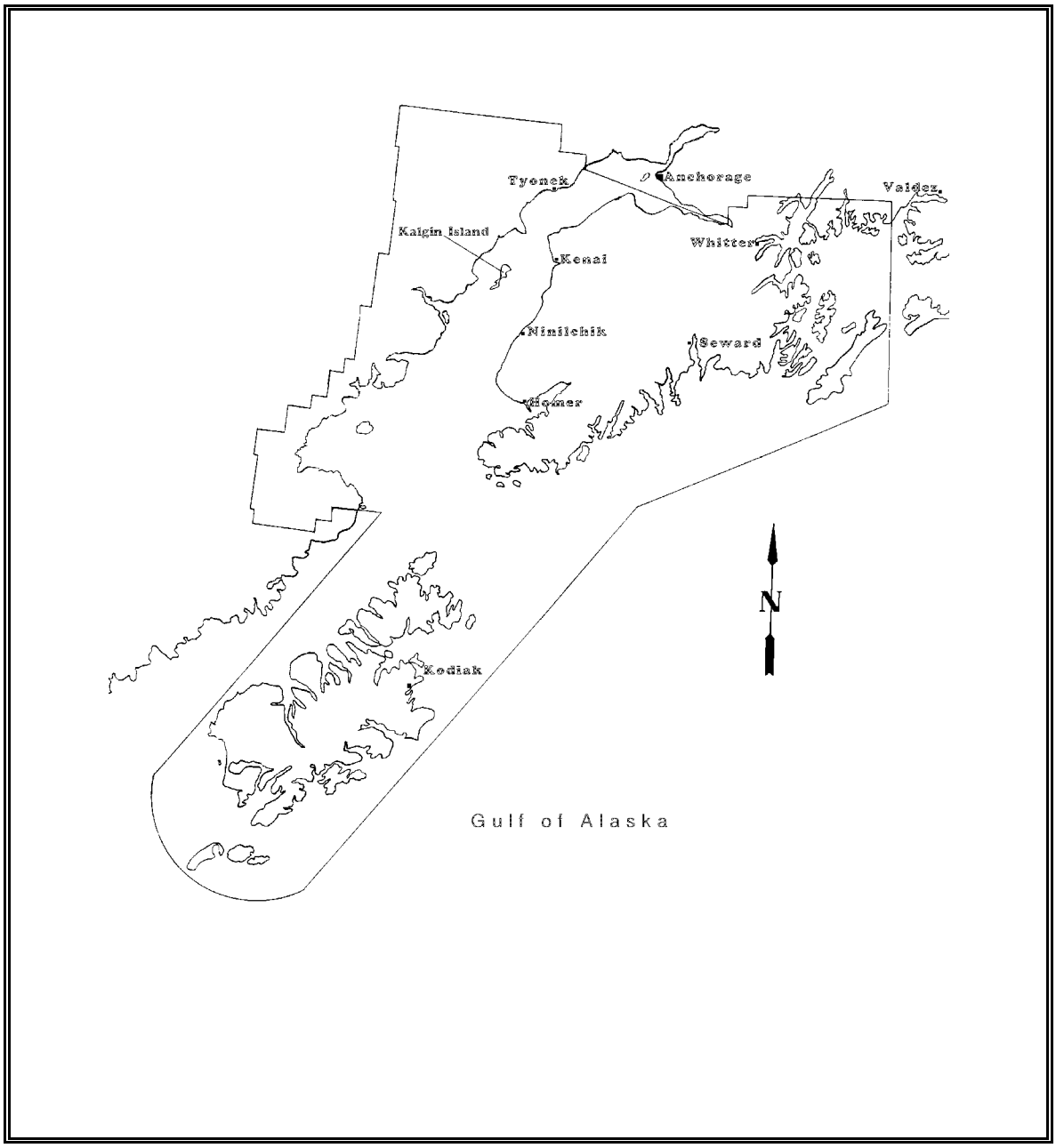
DOF plans to minimize road construction for state timber sales. As much as possible, access to state timber sales will use existing roads, seismograph trails, temporary roads, and winter ice roads. In some areas, roads built for timber harvesting on other land ownerships will provide access to state sales. Access to timber sales is also used for reforestation activities and regeneration surveys following harvest operations.

State timber sale purchasers are expected to pay for road construction and maintenance during the life of the sale. In personal use areas, the state pays for road construction.

Reforestation

All areas harvested on state land will be reforested. Natural regeneration will be used where possible. Where natural regeneration is unlikely, the land will be promptly replanted with native spruce seedlings. Only seedlings raised from seed collected from the appropriate seed zone will be used. We will not harvest unless we are confident that we can reforest the land. Regeneration surveys are conducted 3 years following harvest to assess seedling recruitment and survival. If necessary, additional site preparation and planting will be done on areas not meeting regeneration standards. Additionally, we conduct surveys again, five years following harvest, if questions on adequate regeneration persist.

KENAI-KODIAK AREA MAP



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Appendix A

WILDLAND FIRE HAZARDS IN SOUTHCENTRAL ALASKA

John See, Alaska Division of Forestry

The spruce bark beetle, *Dendroctonus rufipennis* (Kby.), has affected 1.5 million acres of forestland in Southcentral Alaska. Land and home owners, land managers, local fire departments and wildland fire managers have all expressed concern over the potential hazards created by the increased beetle activity in once healthy stands of white spruce *(Picea glauca)*, Sitka spruce *(Picea sitchensis)*, and the white spruce hybrid, Lutz spruce. In an attempt to find viable solutions that will decrease fire hazard, there has been a tendency to simplify patterns of fire behavior, which are in reality quite site-specific and complex. Fire behavior variables include detailed weather observations, topography and fuels parameters. Many different combinations of variables influence fire behavior in the spruce beetle-infested forest. For example, areas with a low percentage of grass and a large percentage of moss and lichen surface coverage should generate much less concern than a beetle-attacked stand of spruce that has over 50% surface coverage in blue joint reed grass, *(Calamagrostis canadensis)*. The following information will help to explain the dynamics of the fire hazard in Southcentral Alaska as a result of spruce beetle activity.

The increased fuel loads resulting from spruce beetle outbreaks increase the fire hazard significantly. However, fire plays an important role in preparing a site for forest vegetation establishment. Because of the importance of the role of fire in the boreal forest ecosystem, state, federal, and local land managers in Alaska have developed interagency fire management plans to preserve this vital management option. The inclusion of "natural" fires in the ecosystem is not acceptable in many areas because of intermingled private and government land ownership patterns.

Land ownership and development patterns in Southcentral Alaska have emerged as a checkerboard, consisting of privately-owned land and homes adjacent to undeveloped public lands. The term for this phenomenon is "urban/wildland interface." Very different management objectives of these owners complicate the forest and fire management regimes. Prescribed burning, an acceptable alternative to natural fires, has been severely limited because of the shortage of funding, the limited number of appropriately trained staff to meet the prescribed fire, the fire suppression workload demands that occur simultaneously, and scarce windows of opportunity. As a result, Alaskans will be living with an increasing threat of wildland fires as the spruce beetle activity continues.

Fire danger varies with the different phases of the spruce bark beetle's attack on a forest. The "red needle" phase occurs a year after the successful attack of once healthy stands of spruce. The first sign of beetle attack may be yellowing needles, which later turn reddish in color. The needles may remain on the branches for an entire season after the tree dies. Field observations from firefighters indicate that trees are slightly more flammable during the "red needle" phase than a green, healthy tree. It is during this "red needle" phase that fire managers fear the "worst case" fire behavior scenario. Even the crowns of healthy white spruce trees will burn during Alaska's fire season because of the naturally low foliar (needle) moisture content and the

presence of volatile resins and chemical compounds. However, field observations show that a hotter surface fire is required to ignite tops of green trees.

Extreme fire behavior characteristics are likely when the following conditions occur: long-term drying trends (reduced snowfall or drought) which result in exceptionally low fuel moistures in heavy (large) fuel particles; the presence of trees in the "red needle" phase; and "red flag" weather conditions (referring to a combination of higher than normal temperatures, low humidity (less than 20%) and high winds (generally over 25 mph). Combining these conditions would cause rates of spread to exceed 1 ½ miles per hour and intensities in excess of 10,000 kilowatts per meter (2,891 BTU/sec/ft). Long range spotting (wind-driven embers starting small fires downwind of the main fire) of 2-3 miles would occur with high wind speeds. During 1996, the Crooked Creek Fire ran eight miles in one burning period (8 hours), and conditions during that event were not extraordinary. Initial attack efforts, although timely, failed.

One of the most significant effects of spruce bark beetle activity is the invasion of grass into the understory after the dying crowns allow additional sunlight for photosynthesis. A recent study, conducted by the U.S. Forest Service on the Kenai Peninsula, concluded that surface coverage of grasses such as blue joint reed grass increased from under 5% to over 50% five years after a spruce bark beetle attack.[1] Total fuel loadings (vegetation) increased from about 10 tons per acre to over 35 tons per acre. This fuel type burns 20 times faster and 6 times more intensely than the fuel type associated with healthy white spruce stands, particularly in the spring and early fall.[2] This emerging grass/timber fuel type can be very dangerous. Most fatalities and loss of structures in wildland fires occur in light fuels, such as grass and brush.[3] Rapid rates of spread can outrun a person, especially when the fire is being pushed upslope by the wind. These new fuel types currently exist or are developing rapidly in Southcentral Alaska's spruce forests and present a much higher threat to life and property prior to green-up, after frost, and during drought conditions than healthy stands of white spruce. An important product generated from a case study of fire in beetle-impacted forests conducted by Beaver in 1997 was the finding of a comparison of fire "critical surface intensity" (CSI). CSI is the term used to describe the amount of surface fire heat production that is necessary to generate full crown fire involvement of tree canopies. In the case of spruce forests that are alive and unaffected by bark beetles, Beaver determined that 1,704 kilowatts/meter (KW/M) of surface heat intensity is required to ignite green trees whose crown begins an average of four feet above the ground. In beetle-killed spruce with the same crown height ratio, only 192 KW/M is required to generate crown fires.

After bark beetle-caused mortality, dead spruce trees begin a physiological change that occurs over time, starting with changes in moisture content. Foliage supported by moisture from root systems in live trees usually contains from 200 percent water content during the early summer to 120 percent during drought conditions. The moisture content of live tree boles usually ranges

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[1] Beth Schulz. 1995. Changes Over Time in Fuel Loading Associated with Spruce Beetle Impacted Stands of the Kenai Peninsula, *USDA Forest Service Technical Report* R10-TP-53.

[2] Hal E. Anderson. Aids to Determining Fuel Models for Estimating Fire Behavior, *General Technical Report* INT-122

[3] Carl C. Wilson. 1978. Some Common Denominators of Fire Behavior on Tragedy and Near-Miss Forest Fires, *USDA Forest Service.*

from 70% to 40%. This water content significantly decreases after tree mortality. Based on previous sampling of large dead tree material it has been determined that dead spruce will reach equilibrium with environmental conditions within approximately 60 days following mortality. This material will typically have moisture content of approximately 10%.

The moisture content in live trees is supported by root systems. By comparison, the moisture content of dead trees are subject to daily changes due to changing weather conditions and long term drying in drought periods. In an average year, it is estimated that environmental conditions necessary to allow for full crown fire involvement of live spruce forests only occurs about 2 to 3 days each year. The number of days where environmental conditions are reached that will allow for crown fire in dead trees occurs with much greater frequency. It is estimated that dead spruce forests can reach crown fire involvement about 30 days/year on the average.

Another factor affecting the fire risk of forests is the "probability of ignition," or how easily a fire will ignite. Dead spruce with low moisture content will ignite far more readily than green spruce. Lightning has historically been an infrequent cause of fire ignition on the Kenai Peninsula[4], but wildland fire research scientists think that lightning fire starts will increase as a result of the "sea of snags" that has been created[5]

The probability of crown fire events is greatly enhanced as a result of the spruce beetle infestation. Once fires reach crown fire stage, they are difficult to suppress and are often uncontrollable. This fire risk condition will be sustained for about ten years, after which the dead timber stands begin to break apart. The reduction of vertical fuel load continuity will not diminish the fire risk problem. To the contrary, increased fuel loading on the ground will extend the fire problem in fuel types that are known to be of short season duration. Specifically, grass that evolves with increased exposure to sunlight usually only creates fire control problems during the early summer season before "green-up." The addition of large woody material from downed beetle-killed trees will create fuel conditions that will support fire occurrence throughout the summer season. These fuel types have been observed to burn at high intensity levels (personal comm. Kromery). Fires in this fuel type burn 20 times faster and 6 times more intensely than the fuel type associated with healthy white spruce stands, particularly in the spring and early fall[6]. Fires in downed spruce trees in grass fuels are very difficult for firefighters to control. Downed timber impedes access into and from a fire area and severely limits the use of tactical ground forces such as engines, dozers and hand crews[7]. Even when suppressing fires during moderate environmental conditions, placing crews in this type of fuel poses a significant personal safety risk if winds begin to rapidly increase, change direction, or if sudden slope changes are encountered. This downed material, along with resultant smoke, will likely disorient or impede travel by wildlife such as bear, moose, and small mammals, and fires may kill many animals.

As stands of dead spruce trees age, surface fires can readily climb up the increasing volume of "ladder fuels" beneath the stand and cause torching, spotting and a general increase in the fire behavior. Running crown fires may begin in stands of old snags if crowns are closely spaced

4 See, 1998
5 Alexander and Stocks. 1997.
6 See 1997
7 See, 1998

and/or slopes are adequately steep in conjunction with high wind speeds. These dead snags This is also an accepted term also catch embers from fires upwind and ignite readily, unlike healthy green trees. The amount of dead and dry fine material, such as Old Man's Beard lichen, that is contained in standing dead trees aids spot fire occurrence. Dead material downwind of a fire creates a condition where hot embers initiate new fire starts with much greater frequency when compared to green live forests (personal observation W. Wahrenbrock). This type of fire behavior is referred to as "extreme" and may surpass the prediction methods currently available.

After the snags fall, usually caused by stem breakage, the fire behavior will change again. The rates of spread will slow down because the heavy fuels break up the continuity of the surface fuel bed, acting as a heat sink to the passing flames. If the heavy (large) fuels support combustion, the resulting fire intensity may preclude control efforts. A hot, intense fire in heavy fuels may also 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 forest and related vegetation type may be lost for decades if this occurs.[8]

If the danger of a devastating wildland fire as a result of the spruce bark beetle activity is similar to an odds game. Long-term drying (drought) conditions occur, on the average, once every four years on the Kenai Peninsula. "Red flag" weather conditions occur on the average of once every five years.[9] 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.

Federal, state and local fire protection organizations responsible for fire suppression must be prepared to effectively attack fires while they are small. Initial attack response times during red flag weather conditions cannot be delayed, especially prior to green-up. During drought conditions, additional suppression forces must be in place, including aircraft resources such as airtankers and helicopters.

Large forests of dead trees has also created a condition where fires will burn at high intensity but may not produce seedbeds that are receptive to forest regeneration. Several early-season fires such as Pot Hole Lake, Hidden Creek, and Crooked Creek fires demonstrate this problem. Even though the dead spruce canopy of these fires burned with high intensity, surface vegetation consumption was low, due to high moisture content. Surveys of one of these burned areas revealed that the fire consumed only 2 to 3 centimeters (cm) of duff material and less than 2% of the surface area had exposed mineral soils (Berg 1996). To compound the problem of regenerating this area, virtually all birch and the sapling size spruce, which had not succumbed to the earlier bark beetle epidemic, were killed as a result of fire intensity. The lack of a seed source within and adjacent to this burned area will compound the problem of reforesting this 17,000-acre area.

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[8] Rodney A. Norum, personal correspondence with John W. See, February 1993

[9] Neil Marchbanks, National Weather Service, Fire Weather Forecaster, personal correspondence with John W. See, February 2, 1993

Had these large fires occurred closer to towns or improvements, structures may have been seriously threatened or lost. The risk factors for a catastrophic wildland fire are starting to stack up on the Kenai Peninsula. With the right weather conditions, the scenario for a catastrophic urban/wildland interface fire with property loss and loss of life is possible. Defensible space on a landscape scale is one of the most important actions that can be undertaken to reduce the potential of a large fire. This can be accomplished through harvesting the dead and dying timber in order to break up the continuity of fuels. Studies in Alaska and Canada show that a large percentage of beetle-killed trees will fall to the ground in five to ten years. This downed fuel loading will add to the problem fire potential[10]. Of the three main factors affecting fire behavior (fuel, weather, and topography) fuel is the only component that can be managed. Extensive fuel management is the only option for mitigating potential losses[11].

Homeowners can assist in the defense of their houses by creating defensible space around their houses. This practice can assist and/or improve a homeowner or landowner's chances of withstanding a wildland fire. The principles are simple: clear flammable vegetation within 30 feet of your home; thin and prune trees beyond the 30 foot perimeter out to at least 100 feet; remove beetle killed spruce trees within 100 feet of structures; use metal or other fire resistant roofing materials; and move woodpiles and other combustibles away from structures. Well-constructed defensible space, combined with a good evacuation plan, may save lives, too! Defensible space must be created prior to a major wildland fire. There is usually very little time to complete these important tasks as the fire approaches. It is also unlikely that firefighters will be able to successfully prepare a structure to withstand an urban interface fire. Their success will depend on how well members of the community followed the defensible space guidelines. Homeowners may still be at risk if their neighbors have not participated in the effort. Insurance companies are beginning to recognize the value of defensible space and may offer premium reductions for implementing the principles. Assistance and information in the form of brochures, pamphlets and on-site visits are available from local fire departments, Division of Forestry offices, the Cooperative Extension Service and the U.S. Forest Service.

The impact of the spruce beetle on the wildland fire hazard is certainly one of the most challenging issues of the decade for those who live in the wildland urban interface. It will take the combined efforts of private citizens and government agencies to meet the challenge!

10 See, 1998
11 Beaver 1997

Appendix B

Status of Commissioner's Advisory Panel Recommendations for the Kenai-Kodiak Five-Year Schedule of Timber Sales

* Indicates unanimous recommendations. The DNR Commissioner agreed to implement unanimous recommendations of the Commissioner's Advisory Panel. Other recommendations reflect a majority opinion of the panel, but not a consensus. The panel completed its work in 1994.

Recommendation	Response
*Consent to concept of proceeding with timber sales	Ongoing. DOF is proceeding with timber sales
*Reforest all timber sales to the strictest standards under the law	Ongoing. DOF is reforesting all timber sales to the FPA standards for non - salvage sales
*Use the strictest standards in the law to minimize the spread of insects and reduce wildfire risk	Ongoing. DOF applies the FPA standards to all Kenai - Kodiak Area sales
*Require sales to cover all costs unless another source of funding is provided.	Ongoing. All sales cover all harvesting and roading costs. Sales pay varying levels of the costs of reforestation and administration. Sales have also been supported with CIP funding provided by the legislature, with federal assistance for forest health, and with program receipts from statewide timber sales that have helped pay for reforestation.
*Do not use herbicides on any state sales.	Ongoing. DOF is not using herbicides.
*Minimize harm to trees not purchased for harvest.	Ongoing. DOF is designing sales to retain trees not infected by the beetle wherever possible. Contract stipulations include requirements to protect retained trees and advanced regeneration.

Recommendation	Response
*Do not sell timber without full reforestation funding.	Ongoing. DOF is committed to reforesting all sales. A combination of natural regeneration, site preparation, and planting will be used. On some sales, purchasers will pay planting costs. Program receipts from statewide timber sales help pay reforestation costs. We are also using operating and CIP money to pay for reforestation and are applying for federal grants to assist with our reforestation program.
*Use harvest practices that promote site-specific species diversity for regeneration and habitat.	Ongoing. We are designing sales on a site-by-site basis to retain live spruce, seedlings and saplings, other tree species, snags, and important wildlife cover. DOF has collected local seed to preserve the natural genetic diversity of Kenai spruce populations. We will reforest with native species, and our intent is to bring back mixed forests promptly.
*Design some timber sales for small operators.	Ongoing. The schedule lists sales for both small and large operators.
*Hold public meetings in affected communities prior to adopting Forest Land Use Plans.	Ongoing with changes. DOF has held meetings on the Five - Year Schedule and FLUPs in communities before the FLUPs are final. The past few public meetings have had little to no public participation. DOF will hold future public meetings if the public expresses interest to do so.
*Require performance bonds adequate to correct improper clearing, storage, and transportation operations.	Ongoing consistent with state regulations. DOF requires bonds on all sales proportional to the risk of defaulted actions and costs of correcting improper actions.
*Ensure that the budget for administering the Forest Practices Act is adequate.	Ongoing. DOF will continue to search for funding sources to assist with administration of the Forest Practices Act.
*Focus on the perimeters around structures in the Borough and the protection of life and property.	Ongoing. Life and property are the highest priorities for wildfire protection. DOF has held workshops on “defensible space” in places such as Moose Pass, Anchor Point, Homer, Soldotna, Nikiski, Kenai, Ninilchik, Cooper Landing, and Kasilof to teach homeowners how to reduce the risk of fire on their land. DOF also hands out information on defensible space to applicants for burn permits. The Kenai - Kodiak office has prepared a display on defensible space for use at the state fair, malls, and other sites. DOF has also developed a FireWise Community Action Kit to assist communities to become more fire resistant.

Recommendation	Response
*Destroy and reforest nonpermanent roads unless within an adopted transportation master plan.	Ongoing. DOF is constructing mostly temporary roads for state timber sales. Temporary roads are put to bed after use, consistent with FPA standards, and site disturbance techniques are used, when necessary, to encourage natural regeneration.
*Convene the Board of Forestry	Done and ongoing.
*Keep the same members on the Advisory Panel if it is reconvened.	Not applicable yet. DNR has not reconvened the panel.
*Use only native species for reforestation.	Ongoing. DOF collects local seed to preserve the natural genetic diversity, and replant with seedlings grown from these native seeds. Our goal is to re-grow mixed forests of native species.
*Proceed with the Griner Road sale.	Done. Griner Road was resold and harvest completed.
*Make the Moose Pass working group an "integral part of the development of the Moose Pass Plan"; allow the group "to be site specific bearing in mind the concerns of this Panel for fisheries protection, erosion, and water quality control."	Done. The working group developed 7 preliminary alternatives for the Moose Pass Cooperative Project. After USFS fieldwork, the alternatives were revised and combined, and 5 were reviewed with the public and agencies. The USFS prepared a draft Environmental Assessment (EA) and reviewed it with the working group. The USFS published the final EA with its preferred alternative in May 1995. The state worked with the USFS throughout the project, and will continue to cooperate with the USFS as salvage sales are designed in Moose Pass. The state did not select a preferred alternative as part of the EA because we must complete Forest Land Use Plans for each sale before decisions are final.
*Postpone the Point Possession sale until FY96 to coordinate with the Borough.	This sale has been dropped from the schedule.
Postpone the East Ninilchik sale to FY 97.	Done. The panel recommended postponing the East Ninilchik sale (block) to FY97. The East Ninilchik sale has been postponed beyond FY97.
Postpone the South Ninilchik sale to FY 97.	Done. The panel recommended postponing the South Ninilchik block to FY97. The South Ninilchik was offered in 2004, but was unsold. It will be reoffered in the future.

Recommendation	Response
Minimize the length of permanent road in the South Road timber sale.	Done. The South Road sale included only 1.4 miles of permanent road. Other sales since South Road and the sales proposed on schedule use only temporary or winter ice roads on state land except for the Dome View Sale which will have approximately 1.5 miles of permanent road.
Delete the Fox River Sale.	Partial Change. We delayed the Fox River block from FY97 to a later date. We reduced the acreage of timber sales within the block from 27,500 acres on the FY94 to 98 schedule to 1,000 acres on the more recent schedules. We will provide information on preliminary sale design before moving sales in this block to the preliminary decision stage.
Postpone the Kalgin Island sale to FY95 unless ADF&G approves the specific sale document earlier.	Done. The Kalgin Island sale was offered in FY95, but not purchased. It was re-offered in FY96 and sold. The sale was not harvested and returned to the state and was not reoffered. Kalgin Island is no longer in the Five Year Schedule.
Include a 100' setback from the break of the hill in all sales along the Ninilchik River and its tributaries.	Ongoing. Sale boundaries are set back at least 100' from the slope break on these streams. In some cases we have established larger set backs to meet site-specific habitat concerns. For example, steam setbacks on anadromous streams for the Dome View sale exceed 375'.
Delete the Falls Creek sale.	Partial change. The Falls Creek sale was reduced from 14, 230 acres to 3,420 acres and sold in FY95. As desired by the Panel, detailed information on sale design was reviewed with the public and agencies through the FLUP prior to sale. A public meeting was held to review the sale and a field trip held for Advisory Panel members. The sale has subsequently been returned to the state and resold as the Sault Timber Sale.
Delete the Tyonek II sale.	Partial change. This sale is located on Alaska Mental Health Trust land and a decision to conduct the sale will be made by the Trust Land Office in consultation with the Trust Authority.
Delete the Caribou Hills sale.	Partial change. The Caribou Hills sale was sold in FY98. We reduced the sale acreage from 14,720 on the FY94-98 schedule to 2,600 acres when sold. The sale was partially completed and returned to the state. Recreational users and cabin owners have encouraged us to accelerate salvage in the Caribou Hills area. Therefore, a Caribou Hills Block II has been identified and included in this schedule. We will provide information on preliminary sale design before moving sales in this block to the preliminary decision stage.

Recommendation	Response
Provide specific information for all sales in the 1995 Five-Year Schedule.	Ongoing. DOF has added more information to the Five - Year Schedules and Forest Land Use Plans, and improved sale maps.