# FOREST STEWARDSHIP PLAN FOR ROBERTA HIGHLAND

**Developed by Devony Lehner**

**August 23, 2010 (Review draft)**

**Kenai Peninsula Borough Assessor's Parcel Numbers for parcels covered in this plan:**

| | |
|---|---|
| **APN 17529029** | **14.2 acres (more or less), includes homesite and barn** |
| **APN 17529068** | **16.8 acres (more or less)** |
| **APN 17529067** | **4.4 acres (more or less)** |
| **Total acreage** | **35.4 acres (more or less)** |

### What is a Forest Stewardship Plan?

Individuals with 7 or more acres of land that are forested or "capable of growing trees" are eligible to receive a "Forest Stewardship Plan" (FSP). Forest Stewardship Plans are provided at no cost to landowners, because communities benefit if local forestlands are managed in ways that maintain or increase long-term productivity along with environmental quality.

Forest Stewardship Plans are developed with landowner involvement and are based on landowner goals. They have a 10-year outlook. After landowner goals have been identified, trained personnel conduct site visits to measure tree size and density, assess forest conditions, and identify insect or disease threats. Observations are also made about wildlife use, as well as what landowners can do to reduce wildfire risks.

Landowner goals and collected information are summarized in a written plan. Plans are designed to help landowners understand the current condition of their forestlands and what actions they might take to achieve identified goals. Recommendations are provided for tree planting and tree care, as well as suggestions for improving wildlife habitat and/or recreation.

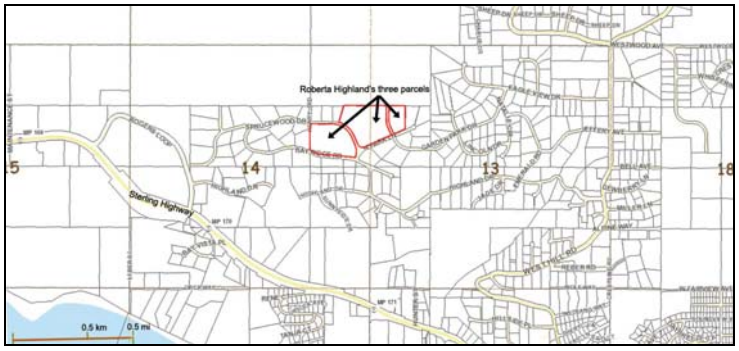
FSP plans do not obligate landowners to any particular actions, but landowners are asked to sign the plan to show their intention to manage their forestlands in ways that are consistent with the plan. Certain actions may be eligible for cost-share reimbursement. Examples include: preparing soils for tree seeding; purchasing and planting trees for forestry or wildlife; and removing dead trees (or thinning and pruning live trees) to reduce wildfire hazards to homes.

## INTRODUCTION AND LOCATION

Forest Stewardship Plans are based on the premise that forestland owners want to learn about and care for their forests, that they will make sound decisions about their forestlands if they have information about local forest resources and how various actions might affect those resources, their neighbors, and themselves. An FSP is intended to help landowners gain the knowledge they need to make well-informed management decisions. It is also intended to help spark landowner interest in their forests.

This Forest Stewardship Plan has been developed for Roberta Highland. Her home is located on Sprucewood Drive in Mountain Park Subdivision. Maps 1a and 1b show the general location of the area covered in this plan. This area lies within Homer city limits, on the west side of town, at about __ ft in elevation.


**Maps 1a (above) and 1b (below). Location of planning area.**



## LANDOWNER OPERATION AND OBJECTIVES:

Roberta Highland is very interested in environmental information and issues. She is currently on the City of Homer Advisory Planning Commission and serves as president of the Kachemak Bay Conservation Society. She is also on the board of the Kachemak Bay Equestrian Association. Roberta's husband, Robert Archibald, co-owns a portable sawmill with neighbor Dave Brann, which is kept on Robert's and Roberta's land. Roberta and Robert own two horses and ride daily throughout the summer and fall, weather permitting. They have about __ acres in pasture, the dominant pasture grass is Kentucky bluegrass. In the winter, Robert and Roberta ski regularly on their own trails and the Baycrest ski trails, which originate in the Homer Demonstration Forest, abutting their property on the north.

Roberta has identified the following objectives concerning her and Robert's forestlands:

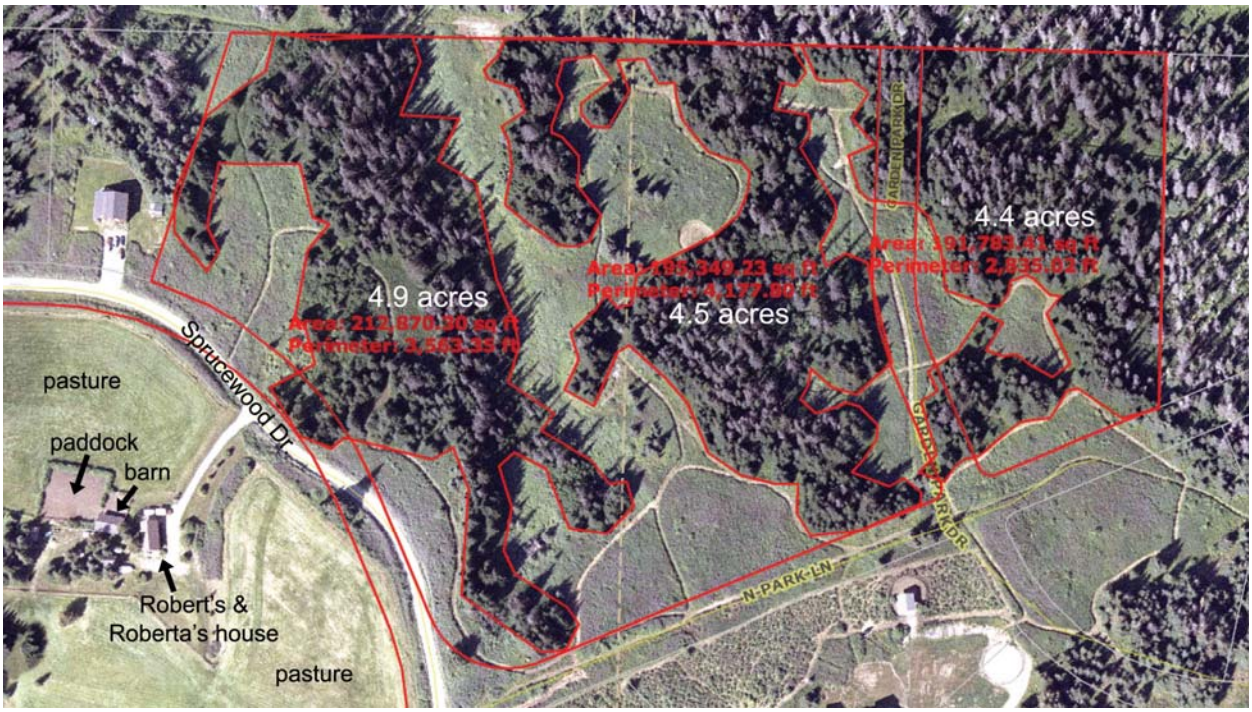
- Learn more about her forestlands,
- Promote forest health,
- Enhance wildlife habitat,
- Reduce wildfire hazards,
- Improve overall aesthetics and,
- Provide non-motorized recreation on her parcels connected to existing trails in the neighborhood and to the Homer Demonstration Forest.

## CURRENT CONDITIONS:

The following section provides information about conditions in the planning area. Information was obtained from published sources such as soil surveys and wetlands inventories and from site visits conducted in July and August 2010. When compiling information for landowners about resources on their parcels (or the parcels they're managing), the goal is to provide what will be useful but not overwhelming. Because many landowners are quite interested in learning about environmental conditions on their land, the tendency here is to provide more rather than less information.

### The spruce forest

Map 2 shows forested areas on Roberta's two eastern parcels, the main focus of this plan. Together, these parcels encompass about 21.2 acres. All of this acreage could theoretically produce trees, but currently, only about 13.8 acres are forested. Much of this forested acreage is covered by large dead spruce, both standing and windthrown (Map 3 and Photos 1 and 2). These trees were killed by the spruce bark beetle (*Dendroctonus rufipennis*) over the last 10-15 years. The photo base for Maps 2 and 3 is from the Kenai Peninsula Borough (KPB) online geographic information system (GIS); photography dates to about 2003.

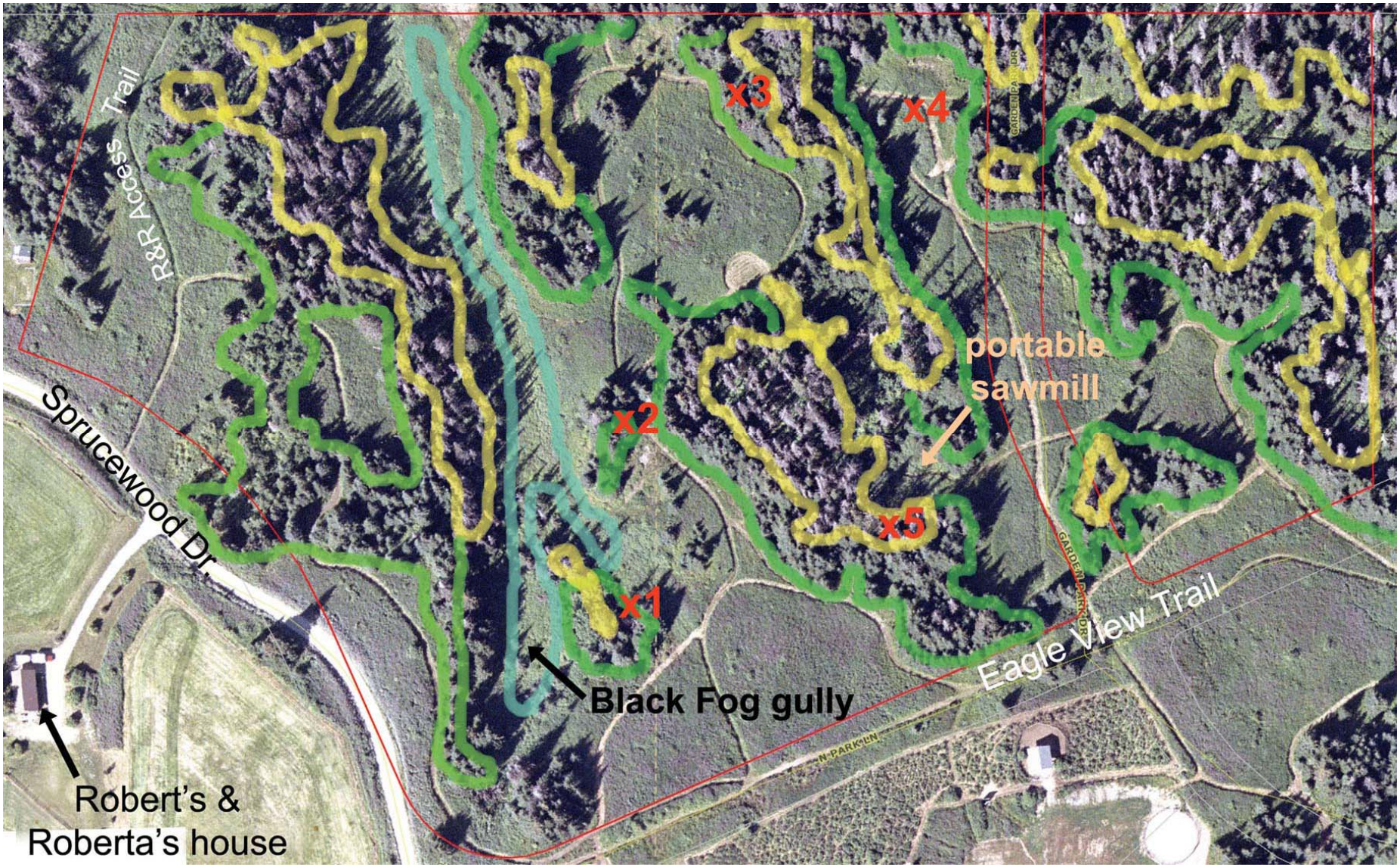



**Map 2. Approximate acreage of forested areas on Roberta's two eastern parcels.**

An interesting pattern is seen on Map 3. Stands of live trees form "rings" around predominantly dead centers (forest stands with mostly live trees are outlined in green, those with mostly dead in yellow). This can be explained by four interacting factors: (1) many of the younger trees associated with a stand are found on the stand's edge, where it is expanding into adjacent unforested areas such as meadows; (2) a high percentage of these live young trees were too small in diameter to be attacked by the spruce bark beetle when adjacent areas were infested 10 to 15 years ago; (3) trees on the edges of clearings can grow relatively rapidly because, on the side next to the clearing, they are not competing with other trees for sunlight, water, or soil nutrients; (4) once larger trees were killed, they ceased providing competition for younger adjacent trees. Photos 3 and 4 illustrate how rows of live trees, 2-to-4-trees deep, grow in front of a backdrop of dead trees. Photo 5 illustrates trees spreading into a meadow, with youngest trees on the outermost edge.

Roberta and her husband, Robert, have cleared numerous trails on their parcels. Because most of these hiking/riding trails are routed through meadows, the pattern of live spruce lining the edges of these meadows means trail users see mostly live trees. The trail that parallels the northern border of their two eastern parcels is called Calypso Trail. This trail passes through alternating areas of dead and live spruce. The trail that passes by the portable sawmill also crosses an area of many dead spruce.

**Photo 1 (above) and 2 (below).**
**Beetle-killed trees in the planning area.**




**Map 3. East forestland parcels; large trees in forest stands outlined in yellow are generally dead, those outlined in green are live. Red x's show measured trees.**

**Photo 3 (above) and 4 (below). Live spruce growing in front of a backdrop of dead spruce; note meadow in the foreground of Photo 4, into which trees are spreading.**

**Spruce Bark Beetle on the Kenai Peninsula**

Modified from "Forest Health Update – A Decade of Beetle Activity in Alaska" by R. Burnside (not dated) and "White Spruce Regeneration Following a Major Spruce Beetle Outbreak in Forests on the Kenai Peninsula by K. Boggs, M. Sturdy, D. Rinella, and M. Rinella (2008)

By 1993, the Alaska spruce bark beetle epidemic was the largest ever recorded for North America. Aerial surveys by the U.S. Forest Service and Alaska Division of Forestry recorded over 1.4 million acres of spruce beetle activity since 1989 on the Kenai Peninsula. The Alaska epidemic peaked in 1996 in terms of the single highest year's mapping of new beetle activity. In many infested stands on the Kenai Peninsula, over 90 percent of the total spruce component was beetle killed by 1998.

While southcentral Alaska's forests have experienced periodic outbreaks over the past 250–300 years, this extensive outbreak corresponded to above average summer temperatures that resulted in increased over-winter beetle survival and an acceleration of the beetle maturation rate from 2 years to 1 year. The beetle attacks all spruce species that occur in Alaska, but large diameter white spruce and Lutz spruce are most susceptible to attack. The presence of relatively high densities of mature, large diameter host trees and regional drought-induced stress of these trees may have amplified the outbreak.

National Fire Plan funding has been used by state, federal and local government grantees to establish fire emergency management coalitions, provide "FireWise" (www.fire-wise.org) strategies to landowners for protection of structures in forested urbanized areas, and to increase mapping and software capabilities for assembling data needed for fire risk and hazard strategic planning. In addition, a number of state and federal researchers have been gathering information and looking at ways to project the effects of the epidemic on regeneration potential, stand rehabilitation, and fire fuels modeling.

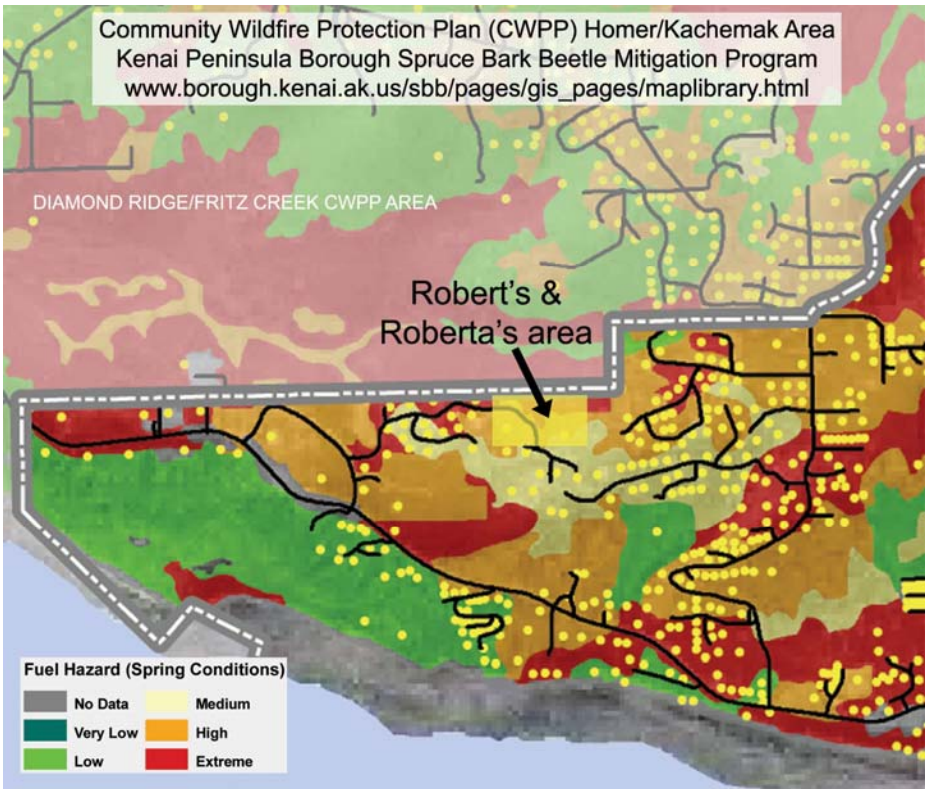
**Photo 5. Spruce spreading into an adjacent meadow.**

## Fire

As the sidebar below indicates, because of the abundance of dead trees, wildfire concerns have driven research, planning, and management in beetle-killed forests on the Kenai Peninsula. Map 4 shows that spring fire hazard ratings (before green-up) in and around Roberta's parcels are "extreme" or "high," including in much of the adjacent Homer Demonstration Forest. Map 5 shows a nearby fuel reduction project being planned as part of the Kenai Peninsula Borough (KPB) Spruce Bark Beetle (SBB) Mitigation Program. The "Bay Crest [sic] Fuel Reduction project" is intended to treat roughly 60 acres of KPB land around Homer Solid Waste facilities. SBB personnel have met with the Kachemak Bay Nordic Ski Club to coordinate hazard tree removal along Baycrest ski trails as part of the project. (Baycrest ski trails are shown on Map 5.) Funding from the KPB SBB may be available to help private landowners with fuel reduction efforts?

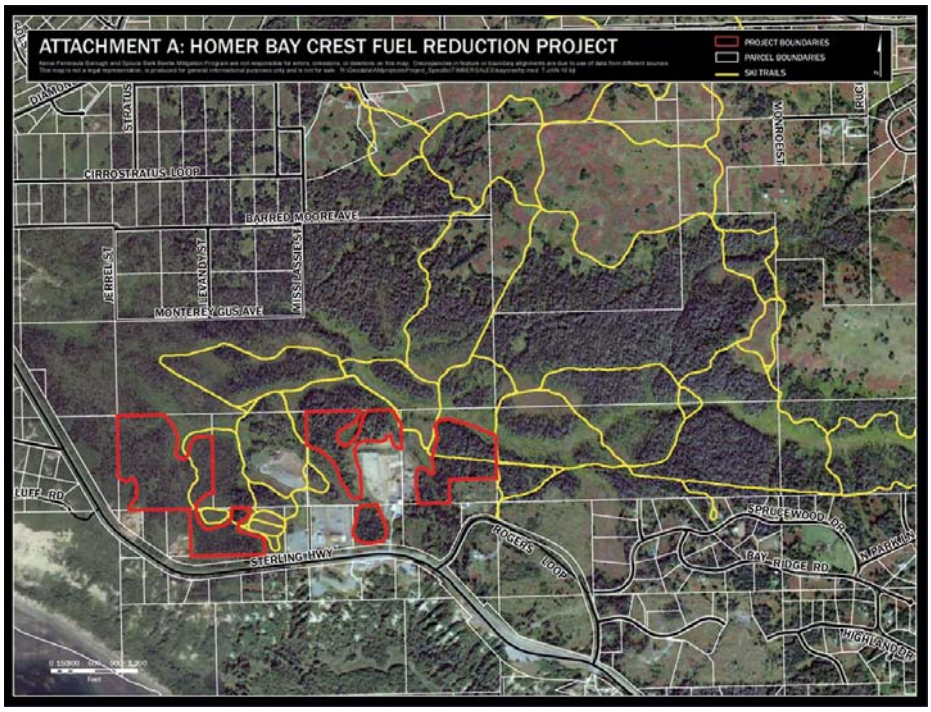
Areas with many large windthrown trees are virtually impassable for humans or large animals like moose. Windthrown trees have

generally snapped off at some height up the trunk, rather than ripping out of the ground (i.e., root tip-up). This occurs as a result of wood rot fungi and other microorganisms that weaken the trunks of dead trees. Photos 6 and 7 show stumps from which the upper trunk has snapped off.




**Map 4 (above). Spring fire hazard ratings in and around the planning area.**

**Map 5 (below). Fuel reduction project (outlined in red) planned by KPB SBB Mitigation program.**



As Map 3 shows. live trees encircle centers dominated by dead trees, many of them windthrown. These dead-spruce dominated areas provide numerous management opportunities, including reducing potential fire fuels, encouraging spruce regeneration, establishing other trees or other kinds of plants (berries for wildlife, for example), or other uses (creating clearings for various purposes). Several alternatives are discussed under recommendations, below. Whichever alternatives are pursued, the first task will be to buck up windthrown trees (cut them into manageable lengths) and stack cut wood. Photo 8 shows the nature of the clearing challenge.

**Trees in Roberta's forests**

The only tree species in Roberta's forests is white spruce. White spruce in the Homer area are Lutz spruce (*Picea glauca x lutzii*), which is a hybrid of white spruce (*Picea glauca*) and Sitka spruce (*Picea sitchensis*). Lutz spruce are common south of Ninilchik, north of Kachemak Bay. North of Ninilchik, drier, colder conditions favor white spruce; south of Kachemak Bay, wetter, maritime conditions favor Sitka spruce. Because Lutz spruce are hybrids, a variety of tree phenotypes (types of observable physical appearance) are seen in Roberta's forests.

**Photo 6 (above) and 7 (below). Snapped off trunks.**

**Photo 8. "Jackstraw" stands of dead spruce present a clearing challenge.**

**Photo 9. Three Lutz spruce phenotypes.**

Four live spruce trees were measured to determine tree height, age, and "diameter at breast height" (dbh, which is measured about 4.5 ft up from the ground on the upslope side of a tree). Locations of measured trees are shown with red x's on Map 3. The tallest tree measured was about 47 ft tall and the oldest was 37 years old. (The other three were all about 34 years old and ranged in height from 26 to 41 ft tall.) These trees and their data are shown in Photo 10.

In addition, annual growth rings in three large cut stumps were counted to determine the age at which these trees had died. One stump is located just south of the portable sawmill (red x5 on Map 3). This stump is about 17 inches in diameter and has about 120 rings. A second stump is on Calypso Trail just west of "Four Corners." This stump is about 14.5 inches in diameter and has about 110 rings but is from a section of trunk that was 15-20 ft tall before the trunk snapped off. The third trunk is on Calypso Trail in the northeast corner of the easternmost parcel. It has a diameter of


**Photo 10. Live trees measured in Roberta's forest.**

about 17 inches and just over 140 rings. The dead tree with the largest girth noticed during reconnaissance of Roberta's forests had a diameter of just over 26 inches. This was a stump with a snapped off top and couldn't be aged because of wood rot.

For comparison, the oldest beetle-killed spruce measured by Boggs et al. in their study of the Anchor River watershed was 220 years old, and the oldest live spruce they measured was 140 years old. The largest girth Boggs et al. measured was 28 inches dbh, and the tallest tree was 118 ft tall (Boggs et al. 2008).

Forest stands in the Bridge Creek Reservoir area provide another basis for comparison. After reconnaissance visits in June 2010 by personnel from the KPB Spruce Bark Beetle Mitigation Program, stands around Bridge Creek Reservoir were described as follows:

> The forest stand prior to bark beetle influence had an uneven forest age structure. The largest component of tree age class structure was found to be trees in the intermediate- (80-120 yrs) to-mature (>120 yrs) age classes. Younger spruce composed roughly 20% of the forest stand tree stem density. There were few seedling-size trees around the area on a per acre basis prior to bark beetle influence.

Field observations suggest that pre-outbreak conditions in Roberta's forests were similar.

**Shrubs and groundcover plants**

Five kinds of shrubs were observed in Roberta's forests. Alders (*Alnus* spp, probably mountain alder (*Alnus incana* ssp. *tenuifolia*) create small-to-large, widely scattered shrubby patches. They are common in several of the "dead centers" where falling spruce have opened up the canopy—increasing sunlight reaching the ground—and where disturbances have exposed patches of mineral soil (Photo 11). Alders are particularly abundant in the Black Fog Gully drainageway (see wetlands discussion, below). Red elderberry (*Sambucus racemosa*) are scattered throughout bluejoint and fireweed meadows. Devil's club (*Oplopanax horridus*) is common in the understory of both live and dead forest stands. A few willow shrubs are found on the edge of forest clearings (*Salix* spp., probably *barclayi*), and spirea can be found on the eastern edge of Black Fog Gully. Photo 12 shows three of these shrub species in Roberta's forest.

**Photo 11. Alder shrubs (on right) growing among bluejoint, fireweed, and spruce saplings in a "dead center."**

**Photo 12. Three shrub species found in the planning area.**


The dominant groundcover plants in Roberta's forest meadows include bluejoint reed grass (*Calamagrostis canadensis*), horsetail (*Equisetum* spp.), and fireweed (*Epilobium angustifolium*). Meadows are dominated by bluejoint grass or fireweed (Photo 13). Bluejoint generally dominates the "dead forest centers," often with devil's club. The effects of bluejoint on spruce regeneration are discussed below.

**Photo 13. A forest meadow dominated by fireweed and bluejoint grass.**

In areas where bluejoint and/or fireweed coverage is less dense—for example, along edges between forest and meadow—a variety of other herbaceous plants occur, including nagoonberry (*Rubus arcticus*), starflower (*Trientalis borealis*), northern goldenrod (*Solidago multiradiata*), common yarrow (*Achillea millefolium*), yellow Indian paintbrush (*Castilleja caudata*), Nootka lupine (*Lupinus nootkatensis*), western oakfern (*Gymnocarpium dryopteris*), northern monkshood (*Aconitum delphinifolium*), and pushki or cow parsnip (*Heracleum lanatum*).

**Photo 14. Groundcover plants; flowering or fruiting plants, clockwise from top left: yarrow, nagoonberry, star flower, yellow paintbrush and lupine.**

## Spruce regeneration

Soils in the planning area are relatively productive for adapted trees (see soils discussion below). Some spruce regeneration is clearly visible in many of the photos included in this stewardship plan. Spruce establish readily on exposed mineral soils. In forests, soils are exposed when trees are blown over and their root wads tear from the ground (root wad tip-up). Fires also expose mineral soil. Spruce seedlings also commonly become established on decomposing downed logs and stumps (often called “nursery trees).

The main impediment to spruce regeneration in areas of heavy beetle kill on the Kenai Peninsula is bluejoint reedgrass (*Calamagrostis canadensis*). Bluejoint is a sod- and hummock-forming, native, perennial, cool-season grass that produces shallow fibrous roots and extensive creeping underground rhizomes. An extensive network of rhizomes can develop in a single growing season, and small sections of rhizomes can produce shoots and establish new clones. As it grows, bluejoint grass creates a thick "mulch" of litter that prevents spruce seeds from coming into contact with mineral soil. This layer of litter also insulates the underlying soil surface, decreasing soil temperatures[1]. Once death and breakage of spruce trees increase sunlight reaching the forest floor, bluejoint can grow rapidly. (Photo 15). Bluejoint leaves generally reach heights of at least 4 ft, and in some parts of Alaska, the grass has been known to reach heights of over 6 ft within 6 weeks. Tall stands of bluejoint virtually block out the sun at ground level, overtopping and outcompeting plants trying to grow between the grass hummocks. In Roberta's stands, devil's club is often associated with bluejoint in the forest's "dead centers." Devil's club, which is moderately shade tolerant, is primarily found in understories of late seral, climax, and old-growth forests. When the canopy opens up, devil's club continues growing well unless soils become too dry.

**Photo 15 (below). "Dead center" dominated by bluejoint reed grass and devil's club.**

[1] The rhizomatous nature of bluejoint helps stabilize streambanks by binding bank soils. Its dense, fibrous hummocks dramatically slow overbank flows. Its effectiveness in slowing floodwaters is readily observed along Diamond Creek when flood flows overtop Diamond Creek streambanks.

An established dense stand of bluejoint can persist almost indefinitely, severely limiting the invasion of woody species. Once bluejoint reaches about 60 percent coverage of an area, tree seedlings have trouble becoming established. In a study of spruce regeneration in beetle killed forests in the nearby Anchor River watershed, the average number of spruce seedlings in sample plots with less than 60% bluejoint litter coverage was 27.2 (n = 98), while the mean number in sample plots with more than 60% bluejoint litter coverage was only 2.4 seedlings (n = 10) (Boggs et al. 2008).

Bluejoint is sensitive to overgrazing and regular cutting, so regular mowing or grazing can allow tree seedlings to become established. Its yields decreased by 15 to 20 percent when bluejoint was cut two to four times during the growing the season, by 35 to 45 percent when the grass was cut five to six times, and by about 70 percent when cut seven times, when compared to plots cut once at the end of the growing season. (This and information above is from www.fs.fed.us/database/feis/plants/graminoid/calcan/all.html.)

Another potential problem affecting spruce regeneration is that in some suitable sites, seedlings establish so successfully and in such dense clumps that all severe overstocking occurs (Photo ). In this situation, trees that survive to maturity may be very stressed. (A prime example of this situation is found near Roberta's land, just east of the intersection of Highland Road and South Park Road.)

Another problem that can affect trees in the planning area is "overstocking." This occurs when a disturbance such as fire or land clearing "scarifies" an area, removing the layer of decomposing vegetation usually present and exposing mineral soil. (On planning area soils—which are almost all Kachemak silt loams—the organic mat is typically up to 3 inches thick.) On exposed mineral soils, spruce seedlings can colonize so thickly that they are continually stressed by competing with one another for moisture, sun, and nutrients. A dense and sickly stand develops, often called "doghair" spruce by locals. An example in the planning area is shown in Photo 16.

With appropriate management, healthy and productive forests can be grown in the planning area. The <u>potential</u> productivity of "merchantable" or common trees on a particular kind of soil is expressed as a "site index." The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years, usually 100 years in Alaska. The site index applies to fully stocked, even-aged, unmanaged stands. The site index for Kachemak silt loams (573-576) is 67, meaning that in an unmanaged, fully stocked, even-aged stand of white spruce (in this case, Lutz spruce), a tree would be expected to be 67 ft tall when 100 years old. For soils mapped as Kachemak silt loam-forested (583), the site index is 71. Recommendations for improving forest health over the 10-year timeframe of this plan are included in the Recommendations section, below.

**Photo 16. An overstocked stand in Roberta's forest where competition has stressed saplings.**

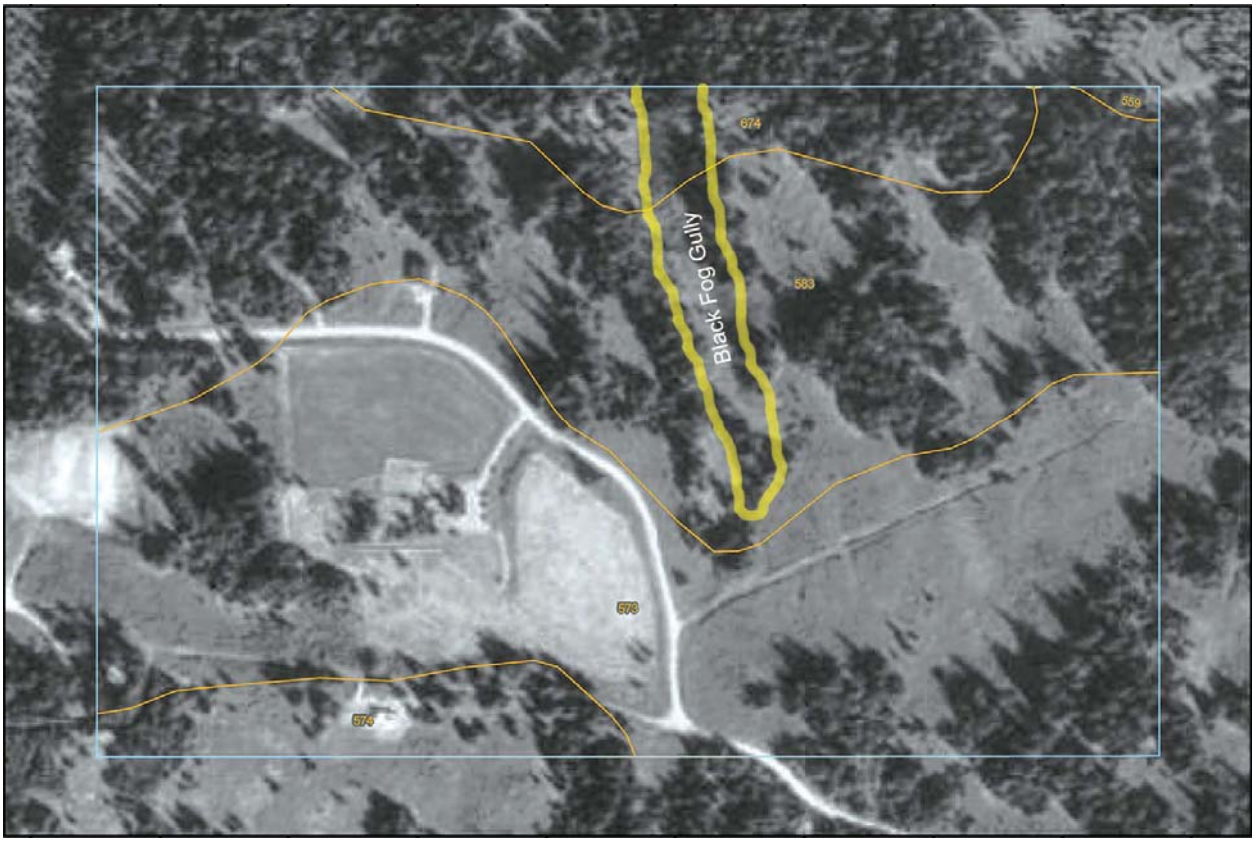
## Soils

Understanding any site begins with understanding something about its soils. In 2005, the Natural Resources Conservation Service (NRCS) completed an updated soil survey of the Western Kenai Peninsula. Map 6 shows "soil map units" delineated (outlined and identified) in the planning area. The photo base for this soils map is 1996 photography, and forest stands visible in the photo appear to be dominated by live trees.

As Map 6 shows that the dominant soils on Roberta's property are Kachemak silt loams (573, 574, 583) except for an area of 559. Not mapped on the soil map, but shown on the wetlands map, is the area that Roberta calls "Black Fog Gully." Map 7 shows soils in the larger area around Robert's and Roberta's. As this map shows, soils in Black Fog Gully are likely to be

The Kachemak soil series consists of moderately deep soils on dissected uplands. Kachemak soils formed in volcanic ash mixed with silt overlying moderately consolidated shale and sandstone. Slopes in this soil series can range from 0 to 45 percent. The mean annual temperature where these soils are found is about 36 degrees F., the average annual precipitation is about 38 inches, and the frost-free period ranges from 85 to 130 days. Soils of the Kachemak series are well drained and have slow to medium runoff and moderate permeability. These are relatively productive and versatile soils; in the Homer area, they are

used for vegetable and hay production, rangeland, wildlife habitat, recreation, and residential development. Native vegetation on these soils is dominantly bluejoint reed grass, fireweed, and associated grasses and forbs.




**Map 6. Soil map units in the planning area. (Note, this map is printed at a larger scale—more detailed—than was used during soil mapping. Mapped boundaries reflect limitations inherent in mapping at the less-detailed scale.)**

Key properties and features of soils in the area are described in informative detail in *Soil Survey of Western Kenai Peninsula Area, Alaska*, which was published online in 2005. The manuscript of this soil survey, as well as accompanying map sheets, can be downloaded at http://soildatamart.nrcs.usda.gov/Manuscripts/AK652/0/. (This FSP planning area is located on Map Sheet 1). Additional information can be found online at Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm).

## Descriptions of soils in the planning area

Below are excerpted soils descriptions for the planning area. This information was derived from the Western Kenai Peninsula soil survey as summarized on the "Web Soil Survey" Website; the opening paragraph that describes a soil map unit is quoted from that site. For more information about local soils, refer to the *Soil Survey of Western Kenai Peninsula Area, Alaska* (see above). The soil survey manuscript provides much useful information and an excellent glossary of technical terms, which are often

encountered in soil discussions. Alternatively, go to the online Web Soil Survey Website or feel free to contact the NRCS Homer field office.

> **What is a soil map unit?** A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous [non-soil] areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils. The Map Unit Descriptions [below] displays a description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. [Each] description is generated from the underlying soil attribute data. Additional information about the map units… is available in other Soil Data Mart reports [found on the Web Soil Survey], which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.

**Kachemak silt loams, Map Units 573, 574, 575, 576, and 583.**

All of the Kachemak silt loam soil map units share the same basic properties except for (1) slopes, (2) "capability classification[2]" which is related to slope, and (3) minor components. These features of each

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[2] Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes. *Capability classes* are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use.

Soils in

- Class 1 have slight limitations that restrict their use. There are no Class 1 soils in Alaska due to climate.
- Class 2 have moderate limitations restricting choice of plants or requiring moderate conservation practices.
- Class 3 have severe limitations restricting choice of plants or requiring special conservation practices, or both.
- Class 4 have very severe limitations restricting choice of plants or requiring very careful management, or both.
- Class 5 are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 6 have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 7 have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.
- Class 8 and miscellaneous [non-soil] areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

*Capability subclasses* are soil groups within one class. They are designated by the small letters, *e, w, s,* or *c*. The letter ***e*** shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; ***w*** shows that water in or on the soil interferes with plant growth or cultivation; ***s*** shows that the soil is limited mainly because it is shallow, droughty, or stony; and ***c***, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations restricting their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

soil map unit are listed below. In addition, Soil Map Unit 583, Kachemak silt loam-forested, supports a forested rather than rangeland (herbaceous and/or shrub dominated) natural plant community. The basic description for all Kachemak soil map units is as follows:

> The Kachemak component makes up 80 percent of the map unit. This component is on moraines on till plains. The parent material consists of ash-influenced loess [wind-blown sediments] over glacial drift. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 90 percent. This soil does not meet hydric criteria [i.e., this soil does not meet the criteria of a wetland soil].
>
> **The typical Kachemak silt loam soil profile, from the ground surface to 60 inches deep, is as follows:**
>
> Oi—0 to 3 inches; slightly decomposed plant material, high permeability
> A—3 to 8 inches; silt loam, high permeability
> B—8 to 30 inches; silt loam, high permeability
> 2C—30 to 60 inches; silt loam, moderately high permeability
>
> **Map Unit: 573—Kachemak silt loam, 4 to 8 percent slopes**
> This component is in the Loamy Slopes, Mountain Slopes rangeland ecological site[3]. Nonirrigated land capability classification is 3e. Minor components: Redoubt (10%), Tuxedni (10%).
>
> **Map Unit: 574—Kachemak silt loam, 8 to 15 percent slopes**
> This component is in the Loamy Slopes, Mountain Slopes rangeland ecological site[4]. Nonirrigated land capability classification is 4e. Minor components: Redoubt (5 to 15%), Tuxedni (5 to 20 %), Starichkof (0 to 5%).
>
> **Map Unit: 575—Kachemak silt loam, 15 to 25 percent slopes**
> This component is in Loamy Slopes, Mountain Slopes rangeland ecological site[4]. Nonirrigated land capability classification is 6e. Minor components: Redoubt (0 to 25%), Tuxedni (5 to 15 %).
>
> **Map Unit: 576—Kachemak silt loam, 25 to 35 percent slopes**
> This component is in the Loamy Slopes, Mountain Slopes ecological site[4]. Nonirrigated land capability classification is 6e. Minor components: Redoubt (0 to 25%), Tuxedni (5 to 25%).
>
> **Map Unit: 583—Kachemak silt loam, forested, 4 to 8 percent slopes**
> This component is in the *Picea lutzii/Salix Barclayi-Empetrum nigrum/Equisetum arvense* forested

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[3] An ecological site, or ecosite, is an area where ecological conditions are sufficiently uniform to produce a distinct natural plant community (sometimes called the "hypothetical climax plant community" or HCPC). An ecological site is the product of all environmental factors responsible for its development, including climate, landform, hydrology, soils, vegetation, and other ecological properties and processes (such as nutrient cycling, vegetative succession, and productivity). An ecosite is typified by an association of plant species that differs in kind and/or proportion, or in total production, from associations on other ecological sites. Ecosites are identified as either forestland or rangeland depending on whether the potential natural plant community (PNC) is dominated by trees or by grasslike plants. Rangeland is land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. Rangeland ecosites include natural grasslands, savannas, many wetlands, tundras, and areas that support certain forb and shrub commu-nities. Forestland ecosites are dominated by tree species.

ecological site[4]. Nonirrigated land capability classification is 3e. Minor Component: Redoubt (5 to 20%), Tuxedni (5 to 15%), Starichkof (0 to 5%), Kalifornsky (0 to 5%).

**Other soils**
**Map Unit: 559—[add generated description]**
**Map Unit: 674—[add generated description]**

**Map Unit: 703—Typic Cryorthents, 100 to 150 percent slopes**
The Typic Cryorthents component makes up 80 percent of the map unit. Slopes are 100 to 150 percent. This component is on sea cliffs. The parent material consists of debris slide deposits derived from interbedded sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 90 percent. This component is in the R169XY101AK Alpine Ridges ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. Minor component: Badland, sea cliffs (0 to 20%), Beluga (0 to 10%), Kachemak (0 to 10%).

[Add Table 1. Physical characteristics of planning area soils.]

## Wetlands

Wetlands are areas that are flooded or saturated so frequently and/or long-term that the soils and plant communities there develop characteristics reflecting wetness. Soils having these wetland characteristics are called “hydric” soils, plants typically found in wetlands are called “hydrophytic” plants. Wetland areas support a variety of beneficial functions, from providing fish and wildlife habitat to storing floodwaters and recharging wells. Because these functions cross property lines and benefit many of us, wetlands are regulated as a public good. Dredge and fill activities, which can alter wetland functions and conditions, are regulated under Section 404 of the 1972 Clean Water Act. The US Army Corps of Engineers, along with the Environmental Protection Agency, enforces Section 404 by requiring “404 permits” for activities involving dredge and/or fill in “regulatory wetlands.” The definition of wetlands under Corps jurisdiction is contained in a manual produced by the Army Corps of Engineers; the Alaskan supplement to this manual can be downloaded at www.usace.army.mil/CECW/Documents/cecwo/reg/erdc-el_tr-07-24.pdf. Techniques for “delineating” and mapping regulatory wetlands focus on soils, hydrology, and vegetation data so that, in any particular area, a line between wetlands and uplands can be drawn for jurisdictional purposes. With some exceptions, on the Kenai Peninsula anywhere that floods frequently, has over 16 inches (40 cm) of organic material on top, and/or a water table within about a foot (30 cm) of the surface for at least 2 weeks during the growing season qualifies as a regulatory wetland.

Map 6 shows wetlands on Roberta’s parcels as identified on the Kenai Peninsula Borough’s GIS Website. These wetland maps were developed at a scale of 1:24,000 by the Kenai Watershed Forum in the early 2000s and published online in 2005 as *Wetland Classification and Mapping of the Kenai Lowland, Alaska* (www.kenaiwetlands.net). The Kenai lowland classification system identified ten wetland ecosystems on the basis of landforms and generalized hydrology, as well as 71 plant communities on the basis of vascular plant presence and abundance. Informative descriptions of wetland types can be found at the “kenaiwetlands” website.

Map 6 also shows how wetlands on Roberta’s parcels connect to wetlands associated with Diamond Creek and the Diamond Creek watershed. The finger of wetland that extends onto Roberta’s parcel in the area she calls Black Fog Gully appears to be a relatively narrow “relict glacial drainageway” wetland with some characteristics of a “riparian” wetland. Photo 17 shows two view of Black Fog Gully.

**Map 7. Wetlands mapped on Roberta's parcels and in the Diamond Creek watershed (including the Homer Demonstration Forest).**

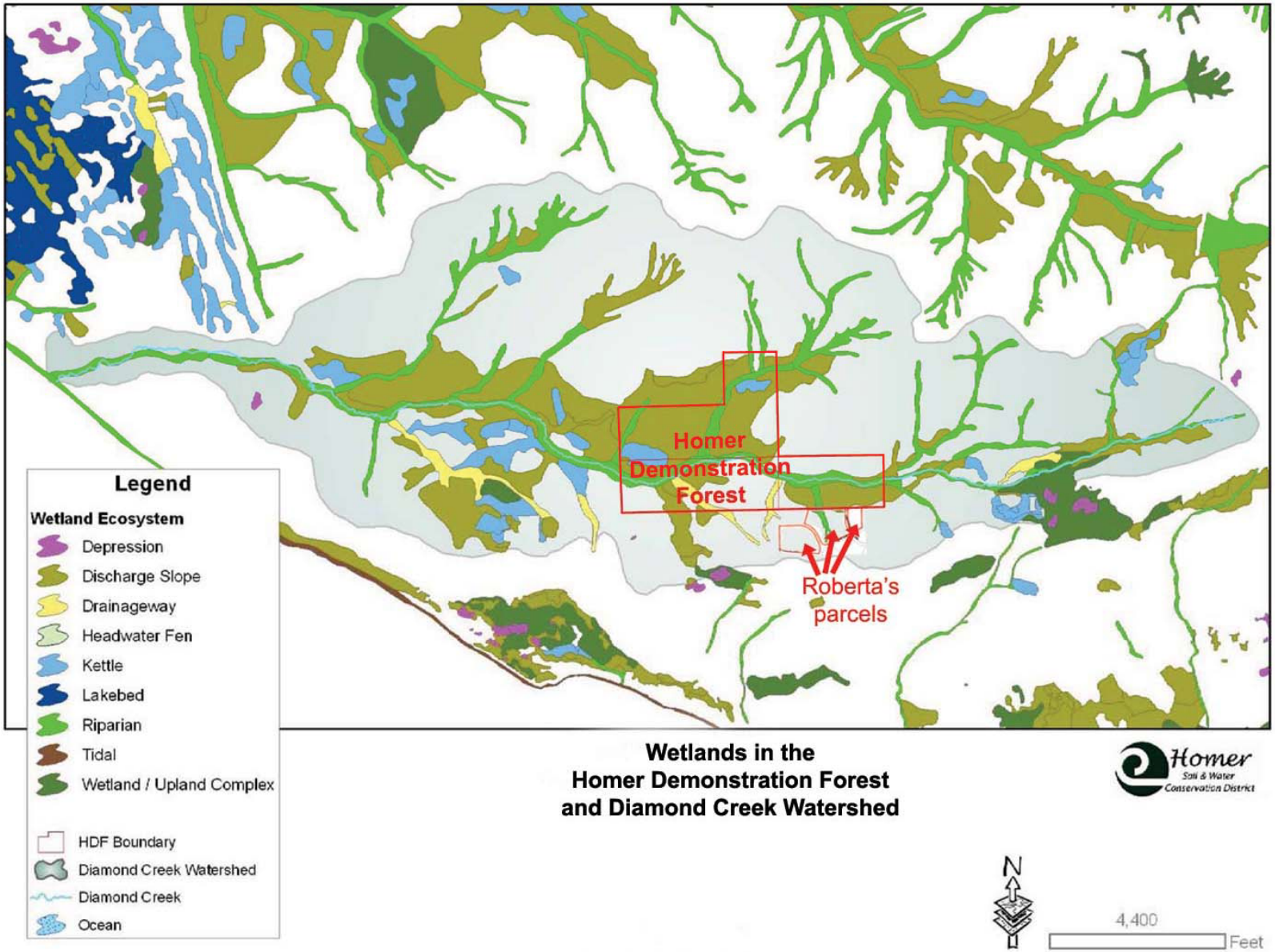


**Photo 17. Two views across Black Fog Gully, a narrow "relict glacial drainageway" wetland with some characteristics of a "riparian" wetland. The top view is looking towards the west southwest. The bottom view is looking towards the north, which is the direction of water flow in the small rivulet at the bottom of the gully.**

## Recreation

Roberta and Robert have a strong appreciation of and commitment to local recreation. They have created and now maintain an extensive system of non-motorized trails on their property (Photo 18). Many of these trails are visible on Map 3, above. These trails are mowed in the summer and groomed for skiing in the winter, largely by Robert with help from neighbors (and the Kachemak Nordic Ski Club). Trails across Robert's and Roberta's parcels allow residents from surrounding subdivisions to access the 360-acre Homer Demonstration Forest, as well as the adjoining 270-acre open space that was purchased by Kachemak Heritage Land Trust and then transferred to the City of Homer. (This is labeled "Diamond Creek open space" on Map 8.) Subdivisions that are connected to public lands by trails across Robert's and Roberta's parcels include Eagle View Subdivision, Emerald Highlands, Mountain Park, and Raven Ridge. Map 8 shows recreation and open space lands (including existing horse properties) that are near or adjacent to the planning area.

**Map 8. Open space and recreation lands near Robert's and Roberta's parcels.**

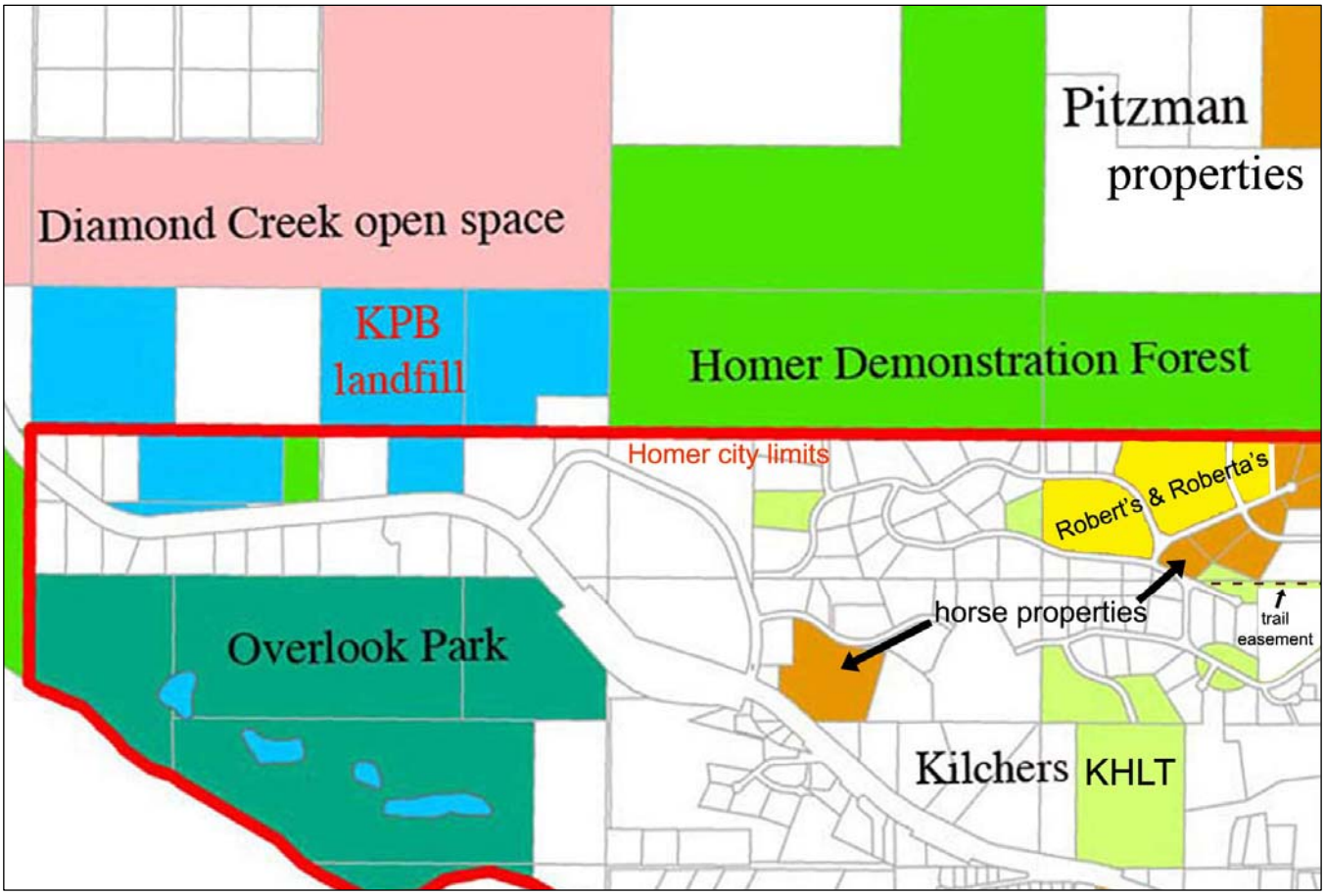


**Photo 18. A typical trail in the planning area; this trail is called "Lower Calypso."**

Recommendations, below, include some ideas for expanding and enhancing Robert's and Roberta's trail system.

**Photo 19 (above). Moose sign on spruce near the planning area.**
**Photo 20 (below). Spruce seedlings with branches consumed by snowshoe hare.**

## Wildlife

A variety of wildlife species use the planning area. Abundant sign of moose (Photo 19) and snowshoe hare were observed during site visits. Spruce seedlings in Photo 20 have had their lower branches nibbled off by snowshoe hares. Black bears have been observed in the planning area, as have coyotes. Black bears (as well as brown) consume devil's club seeds, leaves, and stems; in some years, trampled bear trails can be seen leading to virtually all fruiting devil's club in Roberta's forest. Other wildlife species likely to use the area include porcupine, fox (although anecdotal evidence suggests that fox numbers have dropped to very low—or nonexistent—levels in the area), lynx (whose populations track those of snowshoe hares, which are currently abundant), and smaller mammals such as voles and shrews. Red squirrels use healthy stands of spruce and are known to occur nearby but are now rarely seen in the planning area.

A variety of birds use the area, including owls (e.g., saw-whet, boreal, great horned), accipiter hawks (e.g., sharp-shinned), bald eagles, spruce grouse, woodpeckers (e.g., northern 3-toed), brown creeper and nuthatch, and numerous perching birds like chickadees, thrushes, warblers, and sparrows. A peregrine was observed flying low over Rogers Loop, near Roberta's, on August 9, 2010.

Practices that promote diversity in forest plant communities also produce more variety in wildlife habitats. Managing forests to provide a variety of successional stages, such as grass-forb, shrub-seedling, pole-sapling, young forest, and mature forest, are likely to attract larger varieties of wildlife. Recommendations that improve forest health and that promote recreational trails and clearings will tend to increase wildlife diversity (see below).

## RECOMMENDATIONS FOR A 10-YEAR ACTION PLAN

No resource concerns that require immediate attention—such as soil erosion or disease infestation—exist in the planning area, but many actions are possible to improve forest stands in terms of objectives identified by Roberta.

**The following recommendations could improve forest health and aesthetics and reduce fire risk:**

- Remove dead trees; begin with windthrown trees and trees over 8 in dbh. Select trees to fell in terms of removing dead trees presenting windthrow hazards to live trees, and creating openings for trails. Care should be taken both during felling and removal not to damage remaining live trees. Stumps should be cut to 1 ft or less in height. Residual material over 5 inches in diameter could be removed, chipped, buried, burned, or piled onsite. (Note, burning can impact neighbors negatively; contact neighbors before burning, and burn when air movement carries smoke away from other residences.)

- Thinning can be done incrementally to assess post-cutting responses in terms of damage to live trees, effects on views or trails, etc. Also remember that one or two large snags (standing dead trees) per acre benefit wildlife.

- To increase the growth rate and health of live trees, selectively thin stands of live trees so that live trees are spaced 10-to-15-ft apart. Many opportunities exist to selectively remove live trees to "release" from competition the adjacent trees. Fell stressed trees first. Stressed trees can be identified by noticing which trees have (a) live canopies (that is, live limbs) making up less than 25% of the tree's height, (b) damage to bark, (c) split trunks, or (d) other defects affecting tree health and vigor. Downed live trees can provide ideal conditions for spruce bark beetle reproduction, so be sure that felled live trees are bucked up and removed for disposal or sawmilling before the second spring after felling. Selective thinning could provide an ongoing supply of lumber to mill with the portable sawmill that Robert co-owns (Photo 21).

**Photo 21. Portable sawmill co-owned by Robert.**

- Consider scarifying areas in order to expose mineral soil and promote natural seeding from nearby live trees. Bluejoint grass may need to be kept from outcompeting seedlings volunteering in scarified areas. This can be done by regularly cutting grass around seedlings with a string mower or other suitable tool, or by laying dark tarp around or between seedlings.

- Consider transplanting local spruce seedlings to desired areas. Areas of good regeneration exist in and near the planning area. In many of these, thinning would be beneficial to the vigor of tree seedlings.

- Birch seedlings and non-native conifers could be considered for reforestation, making sure to protect non-native species from wildlife damage. The arboretum in the Homer Demonstration Forest has a variety of trees growing within a fenced enclosure. These can provide ideas about what may do well in the area. Alaskan larch, or tamarack (*Larix laricina*), is a deciduous conifer that does well in the area and provides beautiful color when needles turn yellow in the fall.

- Thinning and removing slash will reduce fire fuels and contribute to defensible space. "Firewise" information is provided as an attachment.

- Dead felled trees that are limbed so as to bring the trunk into contact with the ground will rot faster than trees held off the ground by large limbs. Trees with good ground contact will also provide better "nursery trees" for spruce seedlings.

**The following recommendations could improve recreational suitability:**

- Conduct thinning so as to connect openings that can serve as trails. Trails to be used for skiing should have an opening above them in the canopy at least 10 to 12 ft wide to allow for good snow accumulation on the trail below.

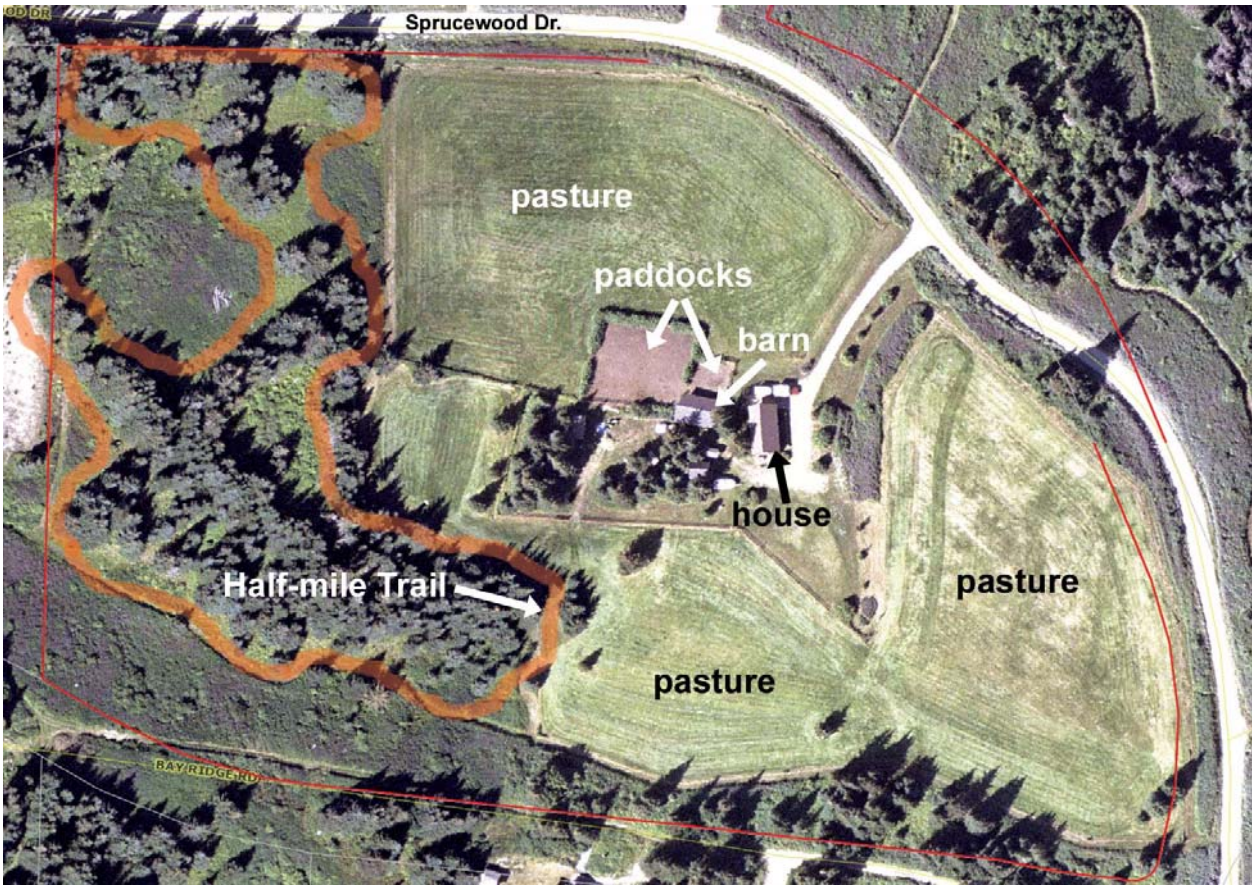
- Remove lower limbs of spruce to allow for movement between live trees (this also benefits moose, which readily use cleared trails).

- Map 9 provides one possible trail that could be used throughout the year, especially for riding. This loop is about ½ mile long and very convenient to the homesite.

- "Dead centers" surrounded by live trees provide a number of interesting possibilities for use, limited only by landowner imagination. Some examples of how these areas could be used once cleared of "jackstrawed" dead trees include: growing Christmas trees for income; creating mini-wildlife-observation areas planted with berry-producing plants and other wildlife attractants; creating

dramatic, enclosed gathering places—e.g., with benches and firepit—surrounded by a "wall" of live trees; and creating sheltered areas where equestrian visitors could pasture a horse and camp overnight.

**Map 9. A possible half-mile trail that could provide year-round use near the homesite.**




**The following recommendations could benefit wildlife:**

- If dead trees are removed, small diameter branches can be used to build brush piles for small mammal habitat. Brush piles should be at least 8 ft by 8 ft and built with log cribbing at the base to create a cavity for wildlife access. Additional information about enhancing the area for wildlife is provided as an attachment.

**NRCS Conservation Practices**

Table 2 identifies a number of forestry-related NRCS conservation practices that could provide additional benefits in the planning area. These include, for example, "Forest Site Preparation," "Firebreak," "Prescribed Forestry," and "Trails and Walkways." For more information on how to install particular practices, contact the NRCS Homer field office. Table 3 shows how these practices can be combined into

“Resource Management Systems” (RMSs) that address both landowner objectives and environmental quality criteria.

**Table 2. Selected forestry-related NRCS Conservation Practices.**

| Conservation practice name and how measured (listed alphabetically) | Code | Practice definition (For Kenai Peninsula specifications and other planning assistance, contact the NRCS Homer Field Office.) |
|---|---|---|
| Animal Trails and Walkways (ft) | 575 | Established lanes or travel ways that facilitate animal movement; purposes:<br>• provide or improve access to forage, water, working/handling facilities, and/or shelter<br>• improve grazing efficiency and distribution<br>• protect ecologically sensitive, erosive, and/or potentially erosive sites |
| Early Successional Habitat Development/ Management (ac) | 647 | Manage early plant succession to benefit desired wildlife or natural communities; purpose: increase plant community diversity to provide habitat for early successional species |
| Firebreak (ft) | 394 | A permanent or temporary strip of bare or vegetated land planned to retard fire; purposes:<br>• reduce the spread of wildfire<br>• contain prescribed burns<br>specifications for Alaska revised July 2005 |
| Forest Site Preparation (ac), also called Tree/Shrub Site Preparation | 490 | Treatment of areas to improve site conditions for establishing trees and/or shrubs; purposes:<br>• encourage natural regeneration of desirable woody plants<br>• permit artificial establishment of woody plants<br>specifications for Alaska revised December 2007 |
| Forest Slash Treatment (ac) | 384 | Treating woody plant residues created during forestry, agroforesty, and horticultural activities to achieve management objectives; purposes:<br>• reduce hazardous fuels<br>• reduce the risk of harmful insects and disease<br>• protect/maintain air quality by reducing the risk of wildfire<br>• improve access to forage for grazing and browsing animals<br>• enhance aesthetics<br>• reduce the risk of harm to humans and livestock<br>• improve the soil organic matter<br>• improve the site for natural or artificial regeneration<br>specifications for Alaska revised December 2007 |
| Forest Stand Improvement (ac) | 666 | The manipulation of species composition, stand structure, and stocking by cutting or killing selected trees and understory vegetation; purposes:<br>• increase the quantity and quality of forest products by manipulating stand density and structure<br>• harvest forest products<br>• initiate forest stand regeneration<br>• reduce wildfire hazard<br>• improve forest health by reducing the potential of damage from pests and/or moisture stress<br>• restore natural plant communities<br>• achieve or maintain a desired native understory plant community for special forest products, grazing, and/or browsing<br>• improve aesthetic and recreation values<br>• improve wildlife habitat<br>• alter water yield<br>• increase carbon storage in selected trees |
| Prescribed Forestry (ac) | 409 | Manage forested areas for forest health, wood and/or fiber, water, recreation, aesthetics, wildlife habitat, and plant biodiversity; purposes:<br>• maintain or improve forest health<br>• protect soil quality and condition<br>• maintain or enhance water quality and quantity<br>• maintain or improve forest productivity<br>• maintain or improve plant diversity<br>• improve aesthetic and recreational values<br>• improve wildlife habitat<br>• achieve or maintain a desired understory plant community for forest products, grazing, and/or browsing<br>• store carbon in biomass<br>specifications for Alaska revised December 2007 |
| Recreation Area Improvement (ac) | 562 | Establishing grasses, legumes, vines, shrubs, trees, or other plants or selectively reducing stand density and trimming woody plants to improve an area for recreation; purposes:<br>• to increase the attractiveness and usefulness of recreation areas |

| | | |
|---|---|---|
| | | • to protect the soil and plant resources |
| Silvopasture Establishment (ac) | 381 | An application for establishing a combination of trees and/or shrubs and compatible forages on the same acreage; purposes:<br>• provide forage for livestock and the production of wood products<br>• increase carbon sequestration<br>• improve water quality<br>• reduce erosion<br>• enhance wildlife habitat<br>• reduce fire hazard<br>• provide shade for livestock<br>• improve aesthetics |
| Trails and Walkways (ft) | 568 | A pathway for pedestrian, equestrian, bicycle, other off-road modes of recreation travel, farmworkers, construction/maintenance access, and small walk-behind equipment; this practice may be applied as part of an RMS to support one or more of the following purposes:<br>• provide travel ways for recreational activities such as walking, horseback riding, bicycling, cross country skiing, and hiking<br>• provide access to recreation areas<br>• provide safe, environmentally friendly pedestrian access for planting, cultivation, and harvest operations<br>• provide worker access for construction and maintenance operations<br>specifications for Alaska revised June 2010 |
| Tree/Shrub Establishment (ac) | 612 | Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration; purposes, establish woody plants for:<br>• forest products, such as timber, pulpwood, and energy biomass<br>• wildlife habitat<br>• long-term erosion control and improvement of water quality<br>• treating waste<br>• storing carbon in biomass<br>• energy conservation<br>• improving or restoring natural diversity<br>• enhancing aesthetics<br>specifications for Alaska revised March 2006 |
| Tree/Shrub Pruning (ac) | 660 | The removal of all or part of selected branches, leaders, or roots from trees and shrubs; purposes:<br>• improve the appearance of trees or shrubs, e.g., ornamental plants and Christmas trees<br>• improve the quality of wood products<br>• improve the production of plant products, e.g., nuts, fruits, boughs, and tips<br>• improve safety |
| Tree/Shrub Site Preparation (ac) | 490 | See Forest Site Preparation |
| Upland Wildlife Habitat Management (ac) | 645 | Provide and manage upland habitats and connectivity within the landscape for wildlife; purpose: treating upland wildlife habitat concerns identified during the conservation planning process that enable [animal] movement or provide shelter, cover or food in proper amounts, locations, and times to sustain wild animals that inhabit uplands during a portion of their life cycle<br>specifications for Alaska revised March 2002 |

**Table 3. Resource Management Systems (RMS's) for addressing forestry-related resource concerns on the Kenai Peninsula**
From the NRCS electronic Field Office Technical Guide (eFOTG), Section III, RMS, Conservation System Guide (CSG) for the Kenai Peninsula
https://csg.sc.egov.usda.gov/CSGReporteFOTG.aspx?csg_statecounty_code=02122

Note: T&E stands for Federally Threatened or Endangered; SOC stands for Species of Concern.

| Guide Code | Baseline Description | System Code | System Name | System Description | Conservation Practices used in the System | Resource Concerns addressed by System |
|---|---|---|---|---|---|---|
| AK 224.4-FO-FRU_SOC | Rural residential forestland threatened by wildland fires due to spruce bark beetle mortality. Slight to moderate slopes, with elevations that begin at sea level and reach in excess of 4,400 feet. Vegetation is spruce, mixed and hardwood forest, alder and willow scrub; and grasslands and other herbaceous communities. A major spruce bark beetle outbreak has killed most of the spruce forest, resulting in an increased wildfire risk, as well as a flush of herbaceous vegetation (Bluejoint reedgrass), which also adds to the risk of wildland fire. This land use does not meet the wildlife quality criteria as determined by the wildlife habitat evaluation guide. | R-THIN | Thinning for fire protection and forest productivity | Thinning and dead tree removal will both improve forest productivity and reduce fire hazard. Final forest stocking will be sufficient to reduce ground fuels as well as maximize forest production. Tree species retention will favor species the landowner selects if the emphasis is production or it will favor birch; pruning will reduce fire hazard by preventing the crowning of fires and will improve timber quality. Firebreaks will be utilized in conjunction with roads, driveways and other natural and cultural features to break the continuity of the forest fuels. To address resource concerns for species of concern, state sensitive, or T&E species, both Restoration and Management of Declining Habitats (643) and Upland Wildlife Habitat Management (645) must be applied. The SOC must be identified in the plan as a current or proposed federal, State Sensitive, or T&E species. | 383 Fuel Break<br>394 Firebreak<br>643 Rest and Mgmt of Rare/Declining Habitats<br>645 Upland Wildlife Habitat Management<br>660 Tree/Shrub Pruning<br>666 Forest Stand Improvement | Fish and Wildlife - T&E Species: Declining Species, Species of Concern<br>Plant Condition - Productivity, Health and Vigor<br>Plant Condition - Wildfire Hazard |
| AK 224.4-FO-FRU_TWFI | Rural residential forestland threatened by wildland fires due to spruce bark beetle mortality. Slight to moderate slopes, with elevations that begin at sea level and reach in excess of 4,400 feet. Vegetation is spruce, mixed and hardwood forest, alder and willow scrub; and grasslands and other herbaceous communities. A major spruce bark beetle outbreak has killed most of the spruce forest, resulting in an increased wildfire risk, as well as a flush of herbaceous vegetation (Bluejoint reedgrass), which also adds to the risk to wildland fire. | R-THIN | Thinning for fire protection and forest productivity | Thinning and dead tree removal will both improve forest productivity and reduce fire hazard. Final forest stocking will be sufficient to reduce ground fuels as well as maximize forest production. Tree species retention will favor species the landowner selects if the emphasis is production or it will favor birch; pruning will reduce fire hazard by preventing the crowning of fires and will improve timber quality. Firebreaks will be utilized in conjunction with roads, driveways, and other natural and cultural features to break the continuity of the forest fuels. | 383 Fuel Break<br>394 Firebreak<br>660 Tree/Shrub Pruning<br>666 Forest Stand Improvement | Plant Condition - Productivity, Health and Vigor<br>Plant Condition - Wildfire Hazard |
| AK 224.5-FO-FWFHWFI | Timber - moderate bark beetle impacted areas. Located on elevations of less than 500 ft with slopes of 0 to 15%. The forests are a mixture of white spruce and birch, with black spruce and shrubs found on wetter sites. Spruce bark beetle have impacted some areas of these forests that were old and stressed due to other environmental conditions. Fire has a greater influence on these | HRVS TRGN | Forest harvest with natural regeneration | Unharvested forest with no existing access roads. System will remove mature timber and at-risk trees. Disturbance of the forest floor will create greater than 20% mineral surface evenly distributed over the harvest area. Roads, trails, and landings will not exceed 10% of the forested area. Size of harvest units will allow natural seeding from edges, if harvest unit area becomes too large seed-bearing trees will be left at a stocking rate of | 490 Tree/Shrub Site Preparation<br>560 Access Road<br>612 Tree/Shrub Establishment<br>655 Forest Trails and Landings<br>666 Forest Stand | Plant Condition - Productivity, Health and Vigor<br>Plant Condition - Wildfire Hazard |

| | | | | | | |
|---|---|---|---|---|---|---|
| | forests, resulting in a mosaic of forest covers and ages. Community and government concerns over wildland fire hazards are major due to the increased number of homes located in this area. Reforestation by natural regeneration is desired. Erosion is a minor concern due to the slight to moderate slopes. | | | 2 per acre. | Improvement | |
| AK 224.7-FO-FRU_SOC | Rural residential forestland threatened by wildland fires due to spruce bark beetle mortality. Slight to moderate slopes, with elevations that begin at sea level and reach in excess of 4,400 feet. Vegetation is spruce, mixed and hardwood forest, alder and willow scrub; and grasslands and other herbaceous communities. A major spruce bark beetle outbreak has killed most of the spruce forest, resulting in an increased wildfire risk, as well as a flush of herbaceous vegetation (Bluejoint reedgrass), which also adds to the risk to wildland fire. This land use does not meet the wildlife quality criteria as determined by the wildlife habitat evaluation guide. | R-THIN | Thinning for fire protection and forest productivity | Thinning and dead tree removal will both improve forest productivity and reduce fire hazard. Final forest stocking will be sufficient to reduce ground fuels as well as maximize forest production. Tree species retention will favor species the landowner selects if the emphasis is production, or it will favor birch; pruning will reduce fire hazard by preventing the crowning of fires and will improve timber quality. Firebreaks will be utilized in conjunction with roads, driveways, and other natural and cultural features to break the continuity of the forest fuels. To address the resource concerns for species of concern, state sensitive, or T&E species, both Restoration and Management of Declining Habitats (643) and Upland Wildlife Habitat Management (645) must be applied. The SOC must be identified in the plan as a current or proposed federal, State Sensitive, or T&E species. | 394 Firebreak<br>643 Rest and Mgmt of Rare/Declining Habitats<br>645 Upland Wildlife Habitat Management<br>660 Tree/Shrub Pruning<br>666 Forest Stand Improvement | Fish and Wildlife - T&E Species: Declining Species, Species of Concern<br>Plant Condition - Productivity, Health and Vigor<br>Plant Condition - Wildfire Hazard |