SEA RANCH ASSOCIATION
FUELS MANAGMENT PROGRAM

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I. EXECUTIVE SUMMARY

Since 1990 The Sea Ranch Association (TSRA) has been implementing a Fire Management Plan to reduce fire hazard on its property. Since that Plan was adopted, the situation on The Sea Ranch (TSR) has changed due to an increase in understory fuels, invasion of meadows by shrubs, decline in health of pine tree plantings, increased number of homes at risk, and other factors. TSRA, wishing to more actively pursue means of reducing fire hazard on its property, proposes to amend the adopted plan to address these changes in vegetation and the location and the number of residences as well as to incorporate the most current approaches and techniques to reduce fire hazard. The proposed Fuels Management Program that will replace the existing Plan has been developed to reduce the fire hazards on TSR which have not been addressed by past implementation of the existing Fire Management Plan. The following specific goals were developed by TSRA, its staff, and its consultants to address the general aim of reducing the fire hazard:

- Provide safe evacuation and emergency vehicle access routes.
- Reduce fire intensity near structures.
- Protect valuable natural resources.
- Keep fires starting west of Highway One from crossing the highway.
- Minimize the spread of fires that start east of Highway One.
- Limit fire size.
- Minimize the number of fire ignitions.

It is not possible to completely eliminate the fire hazard on a large property like TSR that contains hundreds of homes, steep slopes, and a wide variety of vegetation types. The proposed Fuels Management Program identifies actions that can be taken to substantially reduce the hazards and that are financially feasible to complete. The recommended actions would reduce the risk of fire ignitions in the most critical areas that include along Highway One and grasslands west of Highway One. Other actions would reduce fuels along Highway One to reinforce its utility as a firebreak which can prevent fires from moving east into wooded areas and residences on the ridge to the east of the highway. East of this main firebreak, actions are recommended to reduce fuels to slow fires near the highway and below homes, reduce fuels in topographic "chimneys" that lead up the ridge, and expand riparian zones which can act as barriers. Finally, roadside actions are recommended to improve safe access along critical roads in the case that fires are not suppressed before they enter wooded areas on the ridge. Together, these actions would reduce the risks of ignition, slow fires if they do ignite, provide protection below homes most at risk, and provide safe evacuation and access routes. A Fuel Management Map is included as part of the program, and indicates where the various actions are to occur. The recommended actions are summarized in more detail below.

- Create roadside fuelbreaks along important access roads to provide safe evacuation and emergency access.

- Construct downslope calming zones in portions of the eastern ridge to reduce fire intensity below homes most at risk.

- Enlarge the Highway One fuelbreak by grading, disking and mowing in critical areas east of the highway.

- Construct a reduced fuel zone east of Highway One to further slow fires that are burning up the ridge. These zones are connected to the Highway One fuelbreak to the west and, generally, to the "downslope calming zone" to the east.

- Construct a reduced fuel zone west of Highway One to reduce the chance of a fire that ignites west of the highway from entering tree crowns where embers can be produced that would blow east and potentially start fires east of the highway.

- Conduct livestock grazing in grassy areas to reduce fuels thereby reducing the chance of fire ignitions and slowing fires that do start, making it more difficult for fires to enter trees where ember production and fire spotting might occur.

- Enhance existing natural riparian vegetation along drainages to act as barriers to the spread of fires.

- Remove hazardous conifers in designated drainages to prevent these drainages acting as chimneys that would rapidly carry a fire up the ridge.

- Monitor and maintain areas cleared of trees as part of the County's implementation of the Bane Bill to ensure that new hazardous fuel conditions do not result once the trees are removed.

The Program includes a discussion of the various techniques that may be used to conduct these recommended actions. The techniques include:

- Use hand labor equipped with power equipment to prune and thin understory vegetation and remove shrubs in grasslands.

- Use a mechanized mower for shrub removal in grasslands and shrub/small tree understory thinning.

- Use livestock grazing to remove grasses and shrub resprouts.

- Use a mechanical mower, a tractor-pulled mower, or hand crews with weed whippers to annually mow grass that is not grazed by livestock.

- While the Program does not include the immediate use of prescribed burning, such burning could be used in the future if the California Department of Forestry and Fire Protection (CDFFP) and other agency resources become available.

The explicit techniques to be used for each treatment area will be selected based on site conditions, the type and extent of vegetation to be removed, availability of equipment and staffing, and financial feasibility.

Finally, the Program describes a series of guidelines that TSRA staff should consider when implementing recommended actions in areas where there are sensitive natural resources. These guidelines describe how and when certain actions should be avoided or monitored to avoid significant impacts to rare, threatened, or endangered wildlife and vegetation, riparian vegetation, wetlands, and archaeological resources.

II. GOALS

The following goals to reduce fire hazard were developed by TSRA, its staff, and its consultants:

1. **Provide Safe Evacuation and Emergency Vehicle Access Routes.** The highest priority is to provide safe evacuation routes for homeowners and visitors in the case that a fire is burning on TSR. In addition, emergency vehicles (including firefighting equipment) need to have safe routes in order to access the scene of the fire.

2. **Reduce Fire Intensity Next to Structures.** When the fire intensity is high next to structures, damage is more likely. Reducing fire intensity near structures is the most important action TSR can take to reduce the chance of structure damage. Fire intensity is most often reduced by vegetation management, such as mowing grasses, pruning lower limbs of trees, and removing understory shrubs.

3. **Protect Valuable Natural Resources.** Higher fire intensity increases the damage to natural resources. While most natural resources on TSR have adapted to fires, catastrophic wildfires burning through fuels that have not been burned in many decades can result in loss of sensitive plant and wildlife species, changes in soil composition, and severe soil erosion.

4. **Keep Fires West of Highway One.** Because the slopes east of Highway One face west, the prevailing west wind will easily blow uphill, which helps fire spread toward structures uphill. The goal is to prevent fires spreading to the east of Highway One and uphill to residences, other structures, and common lands.

5. **Minimize the Spread of Fires that Start East of Highway One.** Prevent fires igniting immediately to the east of Highway One from spreading uphill.

6. **Limit Fire Size.** Because of limited firefighting resources available at TSR, any fire on TSR property would be a high concern. The concern is that under severe weather conditions a fire can ignite and spread too quickly to be suppressed by local firefighting staff and equipment. Such a fire can quickly spread through untreated lots or burn structures causing unacceptable damage before additional firefighting resources can arrive to contain the larger fire. Many homes and mature trees could be lost. The goal is to compartmentalize fires and limit spread of any fire within TSR.

7. **Minimize the Number of Fire Ignitions.** Reduce the chance of fire ignitions thereby reducing the chance that a wildfire would escape the initial control efforts by local firefighting staff.

III. FUEL TREATMENT RECOMMENDATIONS

To achieve these goals, the following fuel treatments are recommended. The accompanying Fuel Management Program Map shows the location where each of these fuel treatments are recommended. This map is a critical part of this Program. It was developed after thorough review of the fire hazard on TSR. See Section V of this Program for the types of techniques that would be used to construct recommended fuelbreaks and other fuel management actions.

A. Roadside Fuelbreaks

1. Treatment Description

A reduced fuel zone would be constructed adjacent to major roads. The fuelbreak would be constructed 100 feet wide from the road edge on the downhill side of the road and 30 feet wide on the uphill edge. Where the road travels up the slope, (for example, along much of Moonraker) the roadside fuelbreak in forested areas would be constructed 100 feet wide on both sides of the road. The fuelbreak in forested areas would be constructed by cutting understory shrubs, thinning smaller trees, and pruning larger trees to remove lower branches. The objective is to maintain a closed canopy forest while removing smaller shrubs, trees, and branches beneath the canopy. These areas would need to be re-treated about every four years to remove any shrubs or other understory that has grown since the initial treatment. The forested area would be treated by hand crews using manual and power equipment. Grassy areas would be mowed for a distance of 30 feet on both sides of the road. These roadside fuelbreaks in open areas will be mowed annually with mechanical mowers or hand crews using weed whippers.

2. Rationale for the Treatment

Without reducing the fuel loads along the roads identified for such treatment, a wildfire could ignite and burn vegetation directly adjacent to these roads. The fire could burn with such intensity that residents would be unable to safely evacuate from homes uphill from the burning vegetation. Fire departments may not dispatch crews to areas uphill of the burning area due to their concern for crew safety. Reducing fuels along the roads shown on the Fuel Management Map would facilitate efficient emergency vehicle access and increase safety during evacuation in case a major wildfire did occur. This treatment is particularly important in units with limited access, areas with high residential building density, and areas adjacent to major collector roads. The reduced fuel zone would decrease the ferocity of a fire by reducing the heat output of burning vegetation near the travel routes. Because the fire would not burn with such intensity near the roads, vehicles would be able to pass safely. These fuelbreaks would also enhance the Fire Department's ability to stop the fire at roads and improve their ability to protect structures near the fuelbreak. Finally, a roadside fuelbreak would help limit ignitions, most of which occur within 10 feet of a road.

The fuelbreaks in forested areas are wider on the downhill side of the road because winds and topography make a fire burn faster and more erratically as it travels uphill. On the uphill side of the road, the fire front is burning or traveling away from the road, so the fuelbreak need not be as wide on this side of the road. When the road travels uphill, the fuelbreak will need to be as wide on both sides of the road because wind may come from either direction and blow the flames across the road.

B. Downslope Calming Zone

1. Treatment Description

The areas designated for such treatment on the Fuel Management Map would be treated in the same fashion described above for Roadside Fuelbreaks. These treatments would occur in conjunction with treatments that are required around structures which are the responsibility of homeowners.

2. Rationale

The intensity of a fire is the most important factor determining whether a residence would survive a wildfire. Because fire generally spreads uphill, treating the area below structures in larger open spaces is the most effective means of reducing structure loss. While homeowners are responsible for treating fuels around their homes, the currently required treatment zone may prove inadequate in certain areas with steep slopes and heavy fuels downhill of the home. Treating the recommended areas would reduce fuels for a much greater distance below homes at risk. This wider fuelbreak would reduce the heat output and rate of fire spread.

C. Improved Highway One Firebreak

1. Treatment Description

Along identified sections of the east side of Highway One, annually construct a 12 to 24-foot wide firebreak. The firebreak would be constructed by rototilling and mowing a fuel-free area. A wider fuelbreak is recommended east of and adjacent to certain sections where the firebreak would be constructed. This "wider mow zone" would be an additional 50 feet wide, where possible. It would be annually mowed with a mechanized mower or tractor-pulled mower. Some shrubs and small trees may need to be removed within this fuelbreak.

2. Rationale

The firebreak immediately adjacent to the highway would minimize the opportunities for a fire ignition to occur east of the highway, thereby reducing its chance of spreading uphill to residences to the east. It would also act to enhance the use of the highway itself as a firebreak for fires starting west of the highway.

The wider mow zone would further reduce the chance of an ignition spreading to the east. The fire would move much more slowly through this mowed grass plus not provide flame lengths sufficient to ignite crown fires in trees. Mowing grasses in these treatment zones would further slow fire spread and provide additional opportunity for fire departments to suppress fires near the highway edge.

D. Reduced Fuel Zone East of Highway

1. Treatment Description

In forested areas, maintain a closed canopy while thinning small trees and pruning branches similar to the technique described for Roadside Fuelbreaks. In more open areas, remove dead and dying trees, though occasional trees may be left for wildlife habitat. Remove decadent (i.e., old) shrubs and thin stands of shrubs and non-native trees. Thinning trees and shrubs can be

done with large machinery or with crews using chain saws and a chipper. Hand crews would be needed to limb trees and provide an aesthetically acceptable landscape.

2. Rationale

As shown on the Fuel Management Map, these Reduced Fuel Zones are generally located east of the Highway One Firebreaks. These Reduced Fuel Zones would reduce fuels within the likely path of fires starting along or crossing Highway One. The slope and prevailing wind pattern align to encourage fire spread to the structures east of the highway. By removing dead and dying trees and shrubs, providing a vertical space between the forest floor and canopy, and reducing shrub density in the open areas, fire behavior would be more conducive to control and containment by fire protection agencies before structures are damaged. Reducing the understory in forested areas would likewise slow fires thereby allowing an increased chance of fire suppression.

E. Reduced Fuel Zone West of Highway

1. Treatment Description

Treatments would be similar to those described for Roadside Fuelbreaks, though livestock grazing used for management of grasslands west of Highway One may also be used to remove fuels in grassland areas adjacent to the highway. Annual mowing would be used in areas not suitable for grazing. Treatments would be 50-100 feet wide as indicated on the Fuel Management Map.

2. Rationale

Vegetation near Highway One should be managed to prevent fires starting to the west from crossing the highway. The recommended treatments would reduce the flame length produced by burning vegetation and limit the ability of a fire to climb into the tree crowns. If a fire becomes a crown fire, it can "torch" and produce embers that might be blown across the highway and ignite flammable vegetation to the east. The treatment zone for both "Forested" and "Open" sub-zones is generally within the first 50-100 feet immediately west of Highway One.

F. Grazing Areas

1. Treatment Description

Areas recommended for livestock grazing would be grazed under contract. Initially, grazing would likely use approximately 600 sheep. The sheep would be rotated to the different treatment areas once fuels are adequately grazed in the target areas. Sheep would be confined to target grazing areas using electric fences. Prior to grazing, invading shrubs and small non-native trees in grasslands would be cut using either mechanical equipment or hand crews. Grazing would be conducted under a grazing prescription developed by the grazing contractor and TSRA staff. Grazing would be monitored to ensure that overgrazing does not occur and that there is no significant effect on desirable native species or other natural resource values.

2. *Rationale*

Reducing grasses in large grassland areas adjacent to and/or below homes would substantially reduce the fire hazard. It would be more difficult for fires to ignite in grazed areas, and, if a fire does ignite, it would burn much slower across grazed land. The removal of shrubs in the grassland would reduce the chance for torching. Reduction in grass height would reduce the chance of a fire burning into the crowns of adjacent wooded areas. Livestock grazing would decrease the chance of shrub invasion of grassland areas, as livestock would browse or trample new shrub shoots or resprouts.

A proper grazing program can also benefit certain native grasses and forbs by reducing the buildup of thatch produced by non-native grass species. Many species of grassland plants are adapted to and may rely on periodic grazing.

While some areas proposed for grazing could be mowed with a mechanical mower, many steeper areas would require hand crews using weed whippers. Livestock grazing is a less expensive way of reducing these grassland fuels, which need to be reduced every year.

G. Riparian Zone Planting

1. *Treatment Description*

Riparian species of trees and shrubs should be planted along selected drainages to slow the spread of fire. The width of the zones would vary with the size of the drainage, the amount of water in the riparian zone, and the amount of riparian vegetation already present. Widths would average about 100 feet and vary from 50-200 feet. Willow cuttings or other types of container stock would be planted by hand crews at the appropriate time of the year, as determined by TSRA staff.

2. *Rationale*

Planting water-loving and inherently moist species would increase the density and width of such plants in drainages. These plants serve as a barrier to all but the most intense fires by filtering embers and slowing fire spread close to the ground. These riparian plantings would also improve wildlife habitat on The Sea Ranch. The width of plantings would be sufficient to absorb the fire's heat before penetrating through the barrier. The riparian plantings are designed to be continuous to prevent "holes" in the fire barrier.

H. Drainageway Conifer Removal

1. *Treatment Description*

Using chain saws, hand crews would remove conifers within the treatment zones. Prune the lower branches of hardwood trees.

2. *Rationale*

Draws, or drainages, are topographic features that act like "chimneys." They concentrate the heat from a fire and direct it upwards in the "chimney". These locations are often dominated by hardwoods but have a significant coniferous component. The pines and Douglas fir trees increase the flammability of the entire drainage feature due to their resinous foliage, higher amounts of dead material, and structure conducive to fire spread through the crowns. By removing the conifers, the flammability and expected fire behavior in drainages are moderated.

I. Bane Bill Easement

The County is implementing the provisions of the Bane Bill to preserve views towards the ocean in certain areas west of Highway One. Several stands of non-native Monterey pines and cypresses have been slated for removal or pruning using hand crews and large machinery. While not a recommendation of this fuel management plan, the removal of these stands does affect the immediate and eventual fire safety of The Sea Ranch. The immediate effect is to create bare spots, which is the most effective firebreak near Highway One. These locations would naturally re-vegetate very quickly, and the type and spacing of the resulting vegetation should be maintained in a condition consistent with other areas immediately west of Highway One so as to minimize the chance of ignition, and spread to adjacent structures or to the east side of Highway One.

IV. PROTECTION OF SENSITIVE NATURAL RESOURCES

Most native vegetation and wildlife on TSR has evolved and is adapted to periodic fires, While such periodic fires may kill a few plant specimens and slow-moving wildlife, these species would recover over time. Periodic fires open up the plant community favoring those species which prefer early succession habitat. As such, a wildfire would not be expected to significantly affect these biotic populations, at least over the long term. However, in some cases the fuel buildups on TSR have reached "unnatural" concentrations (i.e., "unnatural" from the perspective of relatively frequent fires in the local environment either caused by natural forces such as lightning strikes or purposely set by Native Americans). When a fire burns through areas with these unnatural fuel buildups, there can be more damage than would have occurred from the same ignition in pre-European times.

Shrub and grass-dominated habitats are not likely to be adversely affected since fuel buildups are not that significant. However, forested habitats with a significant understory plant community and/or significant amounts of dead fuel beneath the trees can suffer significant damage. What once might have been an understory burn that cleared out small trees and shrubs and dead materials, could become a crown fire that kills large, mature trees. Most of the trees and shrubs would resprout even after a catastrophic fire, but some, like Douglas fir, would be killed and others would take decades to reestablish their stands.

Such catastrophic wildfires can have other adverse impacts, including:

- An intense fire can result in large areas of bared earth which are susceptible to erosion. The eroded soils can adversely affect streams and thus adversely affect steelhead, salmon, and other aquatic species.

- An intense fire can alter the chemical composition of soils, reducing permeability and decreasing the ability of seeds to become established.

- A fast moving crown fire can kill more wildlife than a wildfire burning under historic conditions.

The actions recommended to achieve the other goals of this Program would also reduce the chance of a catastrophic wildfire that would burn those natural areas that would be most affected by such a fire, namely wooded areas east of Highway One. No separate actions to realize this goal are required beyond those described for other goals. Wildfires can also damage or destroy important cultural resources, such as the chapel and historic structures on TSR. The actions recommended for other goals would likewise act to improve the chances of such structures surviving a fire on TSR.

V. TECHNIQUES

The recommended techniques for implementing the various recommended actions were previously described. The following provides a more detailed description of each technique, including some techniques that TSRA staff may decide to use in the future to replace or augment recommended techniques.

A. Hand Labor

Pruning

Pruning lower branches of trees is usually done with a hand-held pole saw that may or may not have a motorized chain saw attached. Lower branches on shorter trees can be pruned with loppers. To promote stronger trunks on small trees, a six-inch stub from the branch should be left. In areas of high foot traffic, this rule should not be followed because of increased risk to visitors. Material pruned would need to be burned, chipped or hauled off the site.

Thinning

Removing smaller trees and shrubs, such as coyote bush, is usually done with a hand-held chain saw. Trees smaller than 3 inches in diameter may be removed with loppers. The trees themselves can usually be handled by hand labor because of their small size. Material produced from the thinning operation would need to be burned, chipped or hauled off the site.

Weed-whipping

This treatment is generally limited to small material such as grass or short herbs. Weed whipping may be accomplished any time of the year, and regardless of whether the material has cured. Most woody plant stems are not actually severed by the treatment, however seedlings can be damaged by the string action that strips the bark off, thereby girdling the plant. Weed whipping using a string cutter provides a great deal of control over which areas are cut, however the height to which plants are cut may be difficult to control if the operator is not experienced. Mowing with a string cutter is an effective way to reduce fire hazard in grassy areas, but has mixed effectiveness in controlling weeds, depending on species, timing of treatment, operators, and height of mowing. Weed whipping is usually employed in areas too steep for mechanical equipment. Because of its high cost (relative to other treatments), weed whipping is normally done for small areas (usually under 2 acres in size).

Using a Brush Saw Blade

Using the same equipment as in weed whipping, but replacing the string head with a brush saw blade, allows workers to cut woody material up to two inches in diameter. The same or greater selectivity is possible as with weed whipping; workers can avoid desirable plants. When the bush blade is used to cut the severed material into smaller pieces, this technique called "multi-cutting" provides a coarse mulch that avoids the necessity of other disposal methods. Like weed whipping, a brush saw blade can be used on steep terrain; it is a relatively costly technique.

Pulling

Pulling tree and shrub seedlings by hand or with a weed wrench offers the most control of any management technique and is the most time-consuming. The production rate for hand pulling, on a scale that is effective for enhanced fire safety, is low. Because of its selectivity, hand-pulling tree and shrub seedlings results in the least environmental impact, provided the pullers

are knowledgeable regarding which plants are targeted species. This technique is suitable for volunteers as no equipment is required. Pulling by hand is not theoretically limited by slope steepness, however, heavy foot traffic would cause surface soil erosion in steeper areas.

B. Herbicide

Use of herbicides is not currently part of the fuels management program, however, if grazing does not keep shrub re-growth to an acceptable level, herbicide application to shrub stumps may be considered as an alternative method to control shrub re-growth.

Application methods are generally by hand, and include using a sponge, spray bottle, or a pressurized container and wand. The types of herbicides used generally have low to moderate toxicity. The effectiveness of control varies with application method and applicator experience. It is imperative to wear proper safety gear and to follow label directions. Selectivity is high with manual application, particularly with stump treatments, however limited drift can occur on windy days when not using a sponge.

The timing of herbicide application varies with the chemical used. Usually herbicide application to target plants such as coyote bush or alien pest plants is done during the time of active growth, which coincides with active growth of native species as well. Stump control of woody plants, such as tanoak or coyote bush, may need to be applied within minutes or within one week after the tree or bush is cut, depending on the chemical used. Generally better control is achieved when spraying for sprout control is done during the spring.

C. Grazing

Grazing with sheep has been a historical method of fuel reduction in the Sea Ranch area. Historically, sheep were grazed throughout the year so that grass heights were low by the time the grass dried. Grazing of recommended target areas would be done under contract to a livestock grazer who would be responsible for constructing electric fences to confine the sheep to the target areas. A grazing management program should be developed that includes provisions for the following:

- Proper stock rotation to avoid overgrazing. The Natural Resources Conservation Service (NRCS) should be contacted to determine what levels of residual dry matter should remain after grazing is completed.

- Where feasible, stock should be kept off areas with heavy clay soils when the soil is saturated to prevent soil compaction. Confer with NRCS to determine the stocking schedule.

- Sensitive resources such as wetlands, riparian zones, and special status species of plants should be protected.

In the East Bay Hills, goats are sometimes used to reduce fire hazard and to remove weeds. Goats are best used in areas that do not have a large number of plants which need to be retained since all plants other than large trees would be damaged or killed unless they are protected. Grazing under contract using a large herd of goats is moderately expensive, however, they can graze approximately one acre per day. Goats can be placed on any steepness of slope, and can graze generally any shape or size of parcel. Care should be used in steep slopes because they can denude the site and cause significant erosion. Goat grazing often is used to reduce shrubby cover; hand labor is often involved to set up temporary fences and cut down the unsightly stalks of girdled shrubs after the goats have left.

Grazing with horses is another effective way to reduce fire hazards because they eat the grass and other plant material that constitute flashy, ignitable fuels in the summer. Erosion is a problem in small acreages where bare dirt is exposed from high "hoof traffic, " and on steep slopes. Horses do not usually eat shrubby material, so cannot be used to clear sites. They would, however, easily maintain a grassland as a grassland if coyote bush sprouts are controlled by another means. Use of either horses or goats would require a grazing management program similar to that recommended for sheep to avoid overgrazing, soil compaction, and damage to sensitive resources.

Grazing with cattle is appropriate in large grassy areas that are not steeper than 35 percent slope. Management of a strict grazing lease which controls the season of grazing and number of cattle on the site is critical for environmental sensitivity. Grazing with cattle is not selective in nature, as the animals would affect almost any herbaceous plant by consuming or trampling the material. Like mowing, grazing with cattle effectively reduces fire hazard in grassy areas, however the effects on weeds is mixed, depending on the timing of grazing, species of plants involved, and amount of material left after the cattle are gone.

D. Heavy Machinery

Heavy machinery is usually used in flat areas where terrain and the presence of numerous trees do not prohibit travel. This type of machinery should not be used on slopes over 30 percent because of concerns for worker safety as well as erosion control and slope stability issues. Roadside mowing is a prime example of the use of heavy machinery. A variety of attachments to tractors serve numerous purposes. For example, a brush hog attachment cuts and breaks brush plants off and produces a mulch of the brush debris. Mowers that cut or flail grass and small woody plants are also attached to tractors. Attachments with articulated arms which reach as far as 20 feet away from the tractor reduce the area over which the tracks must travel and offer more maneuverability. These articulated arms also cut and/or break off material. Use of heavy machinery is a moderately fast and relatively inexpensive treatment. There is some control over which plants are cut, and machines can travel around isolated areas of concern.

Heavy machinery should not be used when the ground is soft in order to prevent ruts and bared soil. This technique can be used at almost any other time of year, but is faster when done in the summer or fall when brush is brittle and grass has cured. It must not be used during times of high fire danger because the machines can start fires. The under-carriage of the machine and attachments should be washed off after use in areas of weed infestations.

Comparison of the Use of Mechanical Mowers and Grazing

Several similarities and differences exist between the two potential fuel management techniques. The following table summarizes some of these attributes

	Grazing	*Mowers*
May start ignitions	no	yes
Sensitive to timing of use	yes	yes
May cause increased erosion	if kept on site too long	less likely
May cause soil compaction	if grazed on heavy soils when wet	if used on heavy, wet soils
Rate of vegetation removal	if stocking rate is high	yes
Noise	not noticeable	yes
Slope sensitive	less so	more so
Compatible with pets (dogs)	of concern	no concern

E. Prescribed Burning

Prescribed burning is generally done by the local fire protection district under precise weather conditions and generally after extensive precautions (such as installing firebreaks) are taken. A prescribed burn must be approved by a number of regulatory agencies. This technique can be used almost any time weather conditions are appropriate. Prescribed burning is the fastest and most effective fuel removal treatment. Additionally, prescribed burning can be the least expensive option. However, prescribed burning generates many public safety concerns over the chance of escape as well as distribution of smoke. Coordination and notification of interested parties are major tasks. Future prescribed burns may bear the additional burden of a fee imposed by the Air Quality Management District for each ton estimated as consumed.

If prescribed burning is used in the future, a burn plan shall be developed and approved by the appropriate agencies. The plan would detail what area would be burned, the appropriate weather conditions under which the burn would occur, staffing, fuelbreak and other considerations for fire control, protection of all sensitive species and natural resources, monitoring, and other factors required by the California Department of Forestry and Fire Protection.

F. Debris Disposal

Disposal of material generated from fuel management presents a major effort. The fuel management technique used may help or hinder disposal of the material. For example, disposal of fuel when using grazing animals is not a concern. However, debris from prunings or cut understory shrubs need to be either hauled away, chipped, or otherwise made fire safe.

Debris disposal may take many forms; use of any technique must consider access and type of material to be removed. Grazing animals may be the disposal mechanism for foliage and can be used in locations far from roads. In contrast, large chippers may be needed for large woody material, but must have vehicular access. Large cutting machinery can travel off-road on relatively gentle terrain, and usually produces mulch that need not be removed. Mowing usually does not involve raking or otherwise removing the cut grass because it either decomposes quickly or is blown away. A commonly used method of debris removal is to rake the fuels into piles to be burned under safe conditions. Burning piles is an effective way to remove fuels far from roads. When the fuel is not very thick, the material can be cut into small pieces, and left as mulch. The more compact arrangement of the small pieces of fuel creates relatively fire safe condition. Occasional "wildlife piles" can be constructed of cut materials in open areas. Both these methods can be used far from access, and on steep slopes.

Other considerations in debris disposal are costs, noise, and with burn piles, smoke. Chippers or other tractor-pulled machinery can be noisy, but are fast, and efficient. "Multi-cutting" small material is more costly because hand labor is required, is not as fast as a chipper, and generates as much noise as a weed-whipper. Concerns with burn piles as a debris disposal method involve ease of scheduling, air pollution and the minor chance of escape. Burning under appropriate weather conditions can help concerns regarding escape and smoke, but makes burns difficult to schedule.

Fuel Management Element	*Debris Disposal Method*				
	Multi-Cut	Burn Piles	Chipper	Weed Whippers	Heavy Machinery*
Roadside Fuelbreaks			X	X	X
Downslope Calming Zone	X	X		X	
Improved Highway 1 Firebreak					X
Reduced Fuel Zone East of Hwy	X	X	X		X
Reduced Fuel Zone West of Hwy	X	X	X	X	X
Grazing Areas					
Riparian Zone Planting					
Drainageway Conifer Removal	X	X	X		

**Heavy machinery includes large mowers, and brush hogs*

X = possible use

VI. AVOIDING IMPACTS TO SENSITIVE RESOURCES WHEN MANAGING FUELS

The following section describes guidelines and recommendations to avoid adversely impacting sensitive and valuable vegetation, wetlands, wildlife, and archaeological resources when conducting fuel reduction actions. In general, the recommended actions would reduce the chance of a catastrophic wildfire starting on or crossing TSR, and this is considered a beneficial environmental impact. The guidelines recommended below would further ensure that the fuel reduction actions themselves do not cause significant environmental impacts.

Vegetation

1. TSRA staff should consult its inventory of the locations of populations of Special Status Species of plants prior to conducting any fire reduction action that involves vegetation removal. If populations of Special Status Species are known or expected to exist in the treatment area, then the specimens of these populations should be protected from removal or damage. At least the following species are worthy of protection:

    - Bolander's reed grass (*Calamagrostis bolanderi*) is a perennial grass common in moist places.
    - Swamp harebell (Campanula californica) is a perennial herb found in wet coastal scrub and forest openings.
    - Point Reyes ceanothus (Ceanothus gloriosus var. gloriosus) is a shrub found in coastal scrub along bluff tops.
    - Supple daisy (Erigeron supplex) is a perennial herb found in grassland with poor soils and short grass.
    - Coast lily (Lilium maritimum) is a perennial herb found in wet coastal meadows and scrub and in open, dry mixed forest.
    - Gairdner's yampah (Perideridia gairdneri ssp. gairdneri) is a perennial herb that is found in meadows.
    - Point Reyes checkerbloom (Sidalcea calycosa ssp. rhizomata) is a perennial herb that is found rarely in coastal scrub.
    - Maple-leaved checkerbloom (Sidalcea malachroides) is a perennial herb that is rarely found in coastal scrub.
    - Fringed corn lily (Veratrum fimbriatum) is a perennial herb common in wetlands.

2. The existing meadow monitoring program should be expanded to assess impacts of livestock grazing on these Special Status Species. If adverse effects to these species occur, the grazing regime should be amended to avoid such impacts.

3. To the maximum extent feasible, the grazing plan should be developed and monitored to avoid:

    - Removal of Special Status Species of vegetation
    - Expansion of undesirable non-native species such as thistles
    - Soil erosion caused by overgrazing
    - Soil compaction caused by grazing heavy, saturated soils
    - Soil erosion caused by grazing within 50 feet of any streamcourse, and

- Impacts to vernal pools/wetlands caused by grazing when there are saturated soils and prior to when wetland-dependent plant species have seeded.

4. Removal of native vegetation in riparian zones should be minimized. At least a 50-foot band of undisturbed native vegetation should be retained along streamcourses; non-native trees and shrubs may be removed even within this 50-foot zone.

5. If prescribed burning is conducted in the future, populations of sensitive plant species shall not be burned until pilot burns show that there is not an adverse effect on the species.

Wetlands

1. Areas with known wetlands including riparian zones, seeps, vernal pools, and jurisdictional wetlands (per the U.S. Army Corps of Engineer's definition) should be protected from heavy equipment and grazing. If grazing is to occur in wetland areas, it should be done at a time and in a manner that does not adversely affect the wetlands or biotic species dependent on those wetlands.

2. If prescribed burning is used, then at least a 100-foot wide buffer would be left unburned on either side of a stream or around a wetland site.

Wildlife

1. Avoid removal of trees used by nesting Special Status Species of birds and other wildlife; Special Status Species are species listed by the State or Federal governments as endangered, threatened, fully protected, or a candidate for the above classifications. Avoid use of heavy equipment in areas around trees or areas used for nesting by Special Status Species during the nesting season. Species that could be adversely affected by the use of heavy equipment or by tree removal and that might possibly inhabit TSR include:

    - Golden eagle
    - Cooper's hawk
    - Sharp-shinned hawk
    - White-tailed kite
    - Northern harrier
    - Osprey
    - Northern spotted owl, and
    - Marbled murrelet.

2. Where TSRA wildlife inventories indicate possible nesting of such species, the area should be surveyed for nests if work is to occur in the area between March 1 and September 15. If nests are identified and work would occur during the nesting season, TSRA should consult with the Department of Fish and Game and the U.S. Fish and Wildlife Service to determine the area of avoidance around the nests.

3. To the extent possible, baccharis and other shrubs slated for removal in grassland areas should be removed after the nesting season.

4. When removing understory fuels, leave large downed logs as wildlife habitat.

5. If prescribed burning is used, the burn prescription should be developed to avoid impacts to nesting birds and any other special status species of wildlife. Large logs should be left unburned to provide wildlife habitat.

Archaeological/Historical Resources

1. No disturbance below ground level should be allowed in areas of known or expected archaeological or historic resources unless the area is first assessed by a qualified archaeologist.

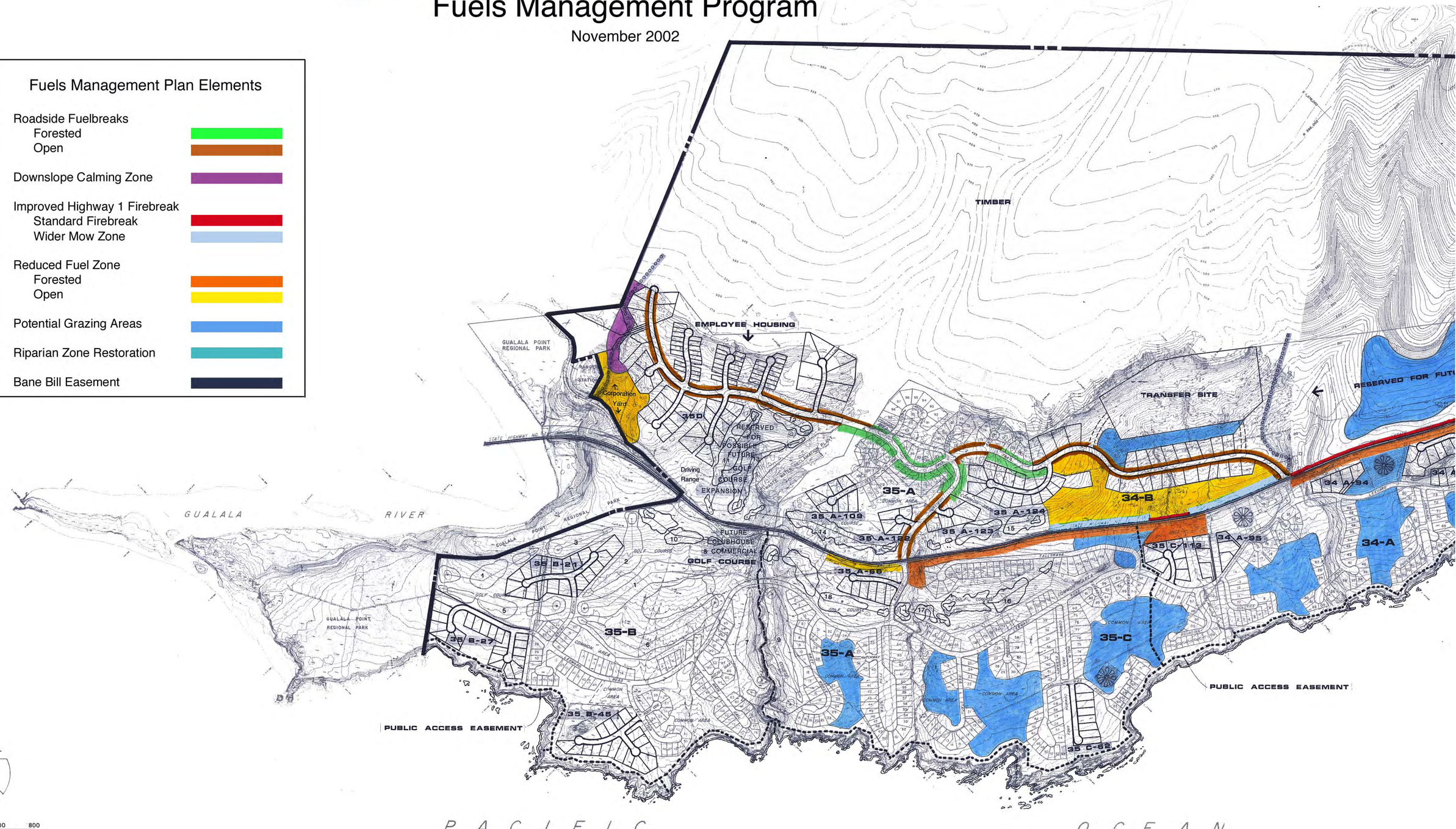
The Sea Ranch Association

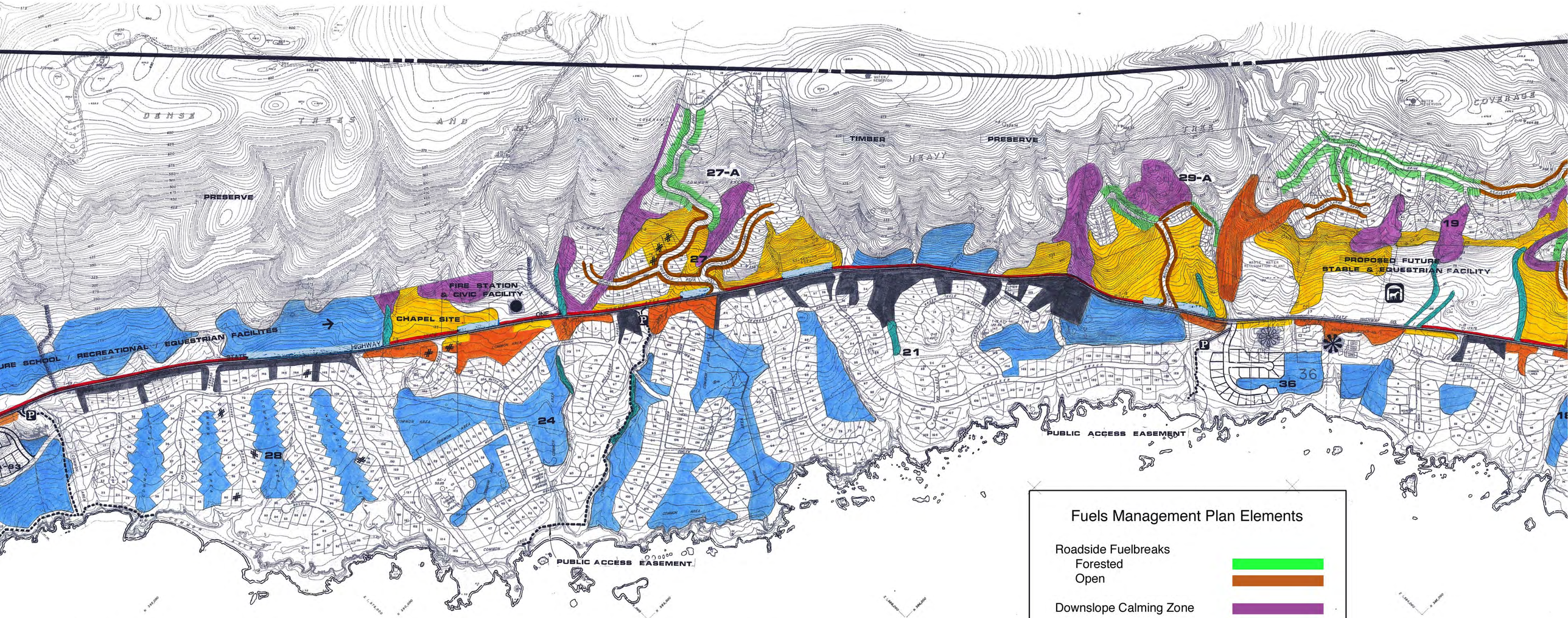
Fuels Management Program

November 2002

Fuels Management Plan Elements

- Roadside Fuelbreaks
  - Forested
  - Open
- Downslope Calming Zone
- Improved Highway 1 Firebreak
  - Standard Firebreak
  - Wider Mow Zone
- Reduced Fuel Zone
  - Forested
  - Open
- Potential Grazing Areas
- Riparian Zone Restoration
- Bane Bill Easement





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Fuels Management Program

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400 0 400 800
scale feet

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