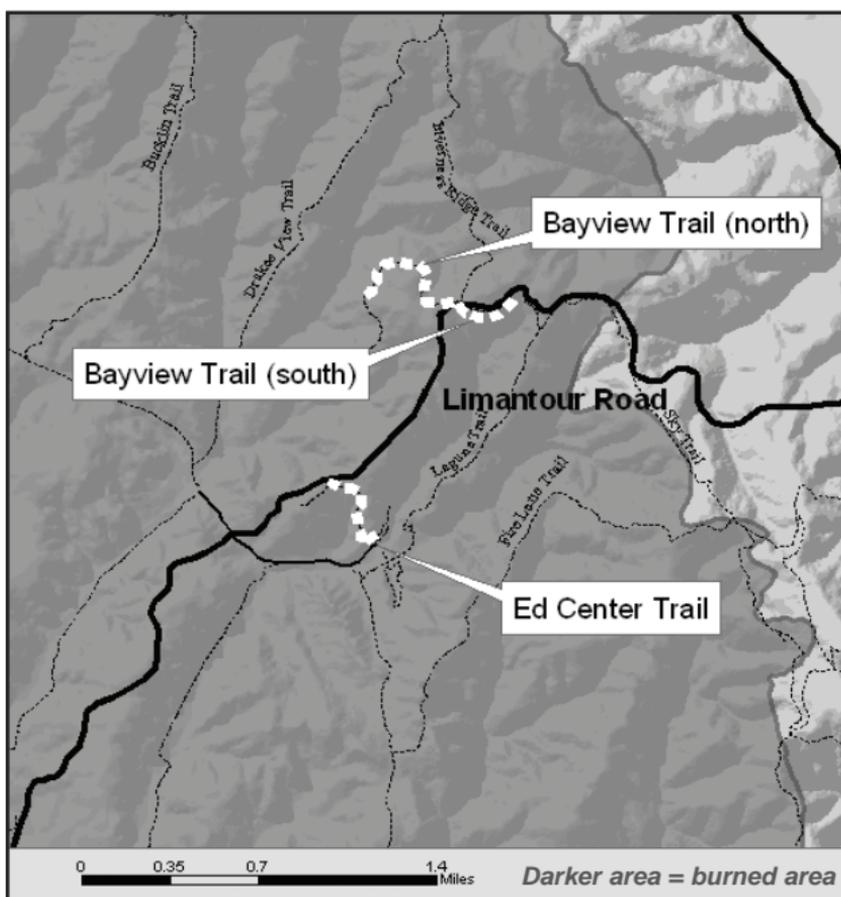




After The Vision Fire

an educational trail guide



The Vision Fire burned for over a week in October 1995, consuming nearly 12,000 acres of Point Reyes National Seashore, mostly in a designated wilderness area.

Fire is an integral part of California's ecosystems, but its role is only beginning to be understood. This guide offers an opportunity to explore the burn area, and learn how the landscape responded to the Vision Fire. The three short trail segments interpreted here are gateways to further exploration, and to the wilderness itself...

This guide covers two 1/4 mile segments of the Bayview Trail, and the 1/2 mile Ed Center Trail. Longer distance hiking options are also provided.

Begin at the Bayview trail parking lot. The first part of the trail is an easy, flat walk.

Bayview Trail (North) - ¼ mile

Many who witnessed the Vision Fire, recall the sound of popping as the cones on the bishop pines burst open in the heat, releasing vast numbers of seeds...

Trees Waiting for a Fire

At the beginning of the trail, notice the trees around you. These are bishop pines. This dense, young forest is a clue that a major fire recently burned here. Bishop pine uses fire to regenerate itself. Look for cones on the trees. Bishop pine seeds are protected in tightly-closed, or “serotinous,” cones, which open when exposed to heat. This can happen on a very hot day, but usually only fire can break the resinous seal.



Bishop pine
Pinus muricata

Bishop pine is highly flammable, and rarely survives a fire. When a fire burns a mature stand, the existing trees are killed, but the seeds released from their cones sprout quickly on the freshly exposed soil. The result is an even-aged forest, like this one, where a new generation has entirely replaced an older one.



Marin manzanita
Arctostaphylos virgata

Many shrubs, including most ceanothus and manzanita species are adapted to fire in a similar way with seed coats that require heat to open them. The rare Marin manzanita was almost unseen until the Vision Fire which triggered the germination of thousands of dormant

dormant, “sleeping” seeds. The best place to see manzanita is on the Inverness Ridge Trail, where the rare species intermingles with a more common one. If you look carefully around the trailhead, you will find one on the left, buried in the bishop pine.

The Great Competition

As you continue walking, notice how closely spaced the trees are. This is an early stage of forest regeneration after the Vision Fire. Eventually, most of these young trees will die as they compete for limited water and soil nutrients. Comparing the density of these young trees with older areas that didn't burn suggests that only three out of every hundred trees will reach full maturity. As the forest thins, it will become more diverse, as it begins to share space with an understory of huckleberry and salal, or gives way to openings where coastal scrub can intrude. The sequence of stages in an ecosystem's development is called succession.

Research done after the fire made an important discovery about succession in the bishop pine forest. The forest's mushrooms had changed! The thread-like fungus on the roots of the seedlings was a different species than on the mature trees. Their spore-containing fruits, the mushrooms seen above ground, were different too.

Species of root fungus (mycorrhizae) are important to many plants, and almost all trees. They are like an extra set of roots, which absorb water and nutrients in exchange for sugars made by the plant through photosynthesis, a process fungi can not do.

Countless spores had been dormant in the soil, waiting for a fire too. It was evident that root fungus played a major role in seedling survival and likely in their competition as well.



The mushrooms growing with young bishop pines are different than the mushrooms growing with older bishop pines.

An Opening in the Forest

Up ahead, on the right, the crowded pines you have been walking next to, change all of a sudden. What makes the forest stop, and become replaced by scrub? Maybe no bishop pine seeds fell in this spot, or those that did were disturbed before they could sprout.

Maybe there was too much nutrient-rich ash here, or maybe it all washed away. Were there seed predators? Did the fire just miss an area altogether? Maybe variation in soil chemistry favored scrub species over pines.



Coyote brush
Baccharis pilularis

Growing in this opening are many common shrubs from the coastal scrub environment. Coyote brush is the most common species. Also abundant is sticky monkey flower, which is covered with orange blossoms when in bloom. The edges of the opening are lined with blue blossom ceanothus. Like bishop pine, ceanothus emerges in dense, even-aged stands after a fire. On the surrounding hillsides you will see dark green patches of it, among the lighter patches of coyote brush. Many acres of the post-fire landscape are dominated by dense areas of ceanothus. These thickets, like the bishop pine, will eventually thin and intermingle with a more diverse array of species.

Defensible Space—A Human Adaptation

Huckleberry, coffeeberry, current, coyote brush, sticky monkey flower, California bay. Almost all of the shrubs and hardwood trees around you can resprout from the base if the top of the plant is destroyed, unlike houses which don't sprout back...

Farther down the trail, another opening provides an outstanding view. Notice the prominent house across the valley with space cleared around it. This house will have an excellent chance of surviving a future wildfire. The subdivision on the distant ridge borders national and state park lands. During the Vision Fire, 45 structures were lost, totaling approximately \$50 million in property damages.



Places where developed areas border natural areas is called the Wildland-Urban Interface (WUI). WUI areas are growing throughout the west as new development encroaches into fire-prone wildlands. Property owners must learn to adapt to fire much as native plants have. Since houses only “resprout” at considerable expense, they need to be designed to survive a fire. Fire resistant building materials is one important strategy. Another is to maintain a clearance of 30 to 100 feet—called defensible space—to reduce the amount of fuel near a structure.

Defensible space is required by California law in all fire-prone areas. Without defensible space, firefighters cannot safely defend a home. A home might also need to survive on its own, because during a wildfire, there may not be enough resources to protect every home that is threatened. Defensible space is a human adaptation to fire.

Fallen Snags

Snags are dead trees. There are lots of them in the burn area. On your left you, if you look carefully, you will find a fallen snag which was one of the mature bishop pines killed in the fire. Notice how it has created space in the forest by falling and killing some of the young trees. Falling snags are important to the thinning of the young bishop pine forest. The fallen trees will eventually decompose and contribute to soil development.



Notice other snags poking up through the young forest. These were the parents of the new trees surrounding you.

Snags play a vital role in forest ecology.

Woodboring insects lay their eggs in them. These insects provide food for woodpeckers and other animals. Other birds, such as osprey and other raptors, use snags for nesting and perching. Fallen snags also migrate down slope and add large woody debris to streams, providing habitat and nutrients to fish and other aquatic organisms.

Standing snags are also very unstable. Every winter, storms blow many of them over. After the Vision fire, a post-fire hazard assessment recommended 1,500 snags for removal. The park was reluctant to do this, however, because it did not want to interfere with natural processes in a wilderness area. In the end, only 60 were taken down.

Gateway to the Wilderness

When you have walked just about 1/4 mile, you will cross the wilderness boundary. Today, humans define these areas as places to witness natural processes, walk lightly, and consider that all landscapes once functioned without human influence.

Here, you enter the wilderness through an archway of ceanothus. Ceanothus flourished after the fire following waves of lotus and lupine. All three of these plants have a life sustaining role, central to the vibrant regeneration taking place in the burn area. They all have nitrogen-fixing bacteria living in their roots.



Blue blossom ceanothus
Ceanothus thysiflorus

Most of the nitrogen in an ecosystem vaporizes during a wildland fire. Without nitrogen there can be no protein, and no new cells. Life itself would stop. Most of the earth's nitrogen is in the air but can't be breathed in. Nitrogen-fixing bacteria convert atmospheric nitrogen into a form plants and animals can use. We depend on them too.

There is much more ceanothus in the burn area than there was before the fire. Their seeds, like the cones on the bishop pines, were awakened by the heat of the Vision Fire, which opened them, and gave rise to the generation you see now...

HIKING OPTION: Bayview-Bucklin Loop (8 miles)

For a longer hike, continue down the Bayview Trail toward Muddy Hollow Creek at the bottom of the canyon. Sediment that washed down from the burned hillsides after the Vision Fire significantly altered the middle to lower segments of this creek, in some places raising the valley floor by several feet.

The mixed hardwood riparian forest along the creek was more resistant to the fire, due to its higher water content. The riparian corridor provided crucial habitat for many songbirds immediately after the fire. Scientists discovered that nesting success was significantly greater here than in similar habitats outside the burn area. This is probably because of the increase in insects and seeds associated with regenerating vegetation. Tree mortality from the fire in these riparian areas was only 5%.

You can make an 8-mile loop back to the Bayview trailhead parking lot by continuing west along Muddy Hollow Road through open coastal scrub to the Bucklin Trail. Follow this trail northeast up the spine of the hill through dense chaparral back to the bishop pine forest on Inverness Ridge and turn south on the Inverness Ridge trail. Look for manzanita growing along the way. Rare Marin manzanita is difficult to distinguish from the more common Eastwood manzanita, but it is the first to bloom, usually in January.

Bayview Trail (South) - 1/4 mile

Walk across Limantour road to the south side of the Bayview Trail. On this segment, you will see examples of great resilience in Coast live oak and Douglas fir which can live through many fires in a lifetime...

A Coast Live Oak Survivor

Soon after you begin down this side of the trail, you will notice a large oak tree on your right. Up close, it seems to be in bad shape. Its bark is scorched and falling away. Much of the tree seems to be dead, but, in fact, it is quite healthy. Coast live oak is the most fire-resistant of our coastal trees. Its thick bark protects the living tissue underneath. You can tell that this tree is still very much alive by the abundant new shoots and green foliage growing high up in its canopy. Oaks are capable of both sprouting from the base and top-sprouting in response to fire.

Dormant buds in the upper crown are stimulated to grow in response to damage or stress. Even if the entire tree is consumed by a severe fire, an oak can still basal-sprout from the surviving stump, because its deep roots remain undamaged. By distributing the process of leaf growth across the entire year, oaks can concentrate more energy on resprouting in response to fire or other disturbance.

The Ocean: Making and Breaking Fire

On a clear day, there is a magnificent ocean view, not far past the first oak. The ocean is integral to the coastal climate, and caused the weather that shaped the Vision Fire. Fast moving northeast winds pushed the fire toward the ocean, where it was prevented from burning any further. Had the fire been able to continue, as much as 80,000 acres might have been consumed. This is why firefighters call the Pacific Ocean “The Great Pacific Firebreak”.

The critical wind event in the first 24 hours of the fire was a result of air under high pressure in the northern California interior flowing toward an area of lower pressure over the ocean. As this air flowed down, over the coastal mountains it was compressed, becoming hotter, and faster as the low pressure over the ocean pulled it like a vacuum. The same type of foehn (“fern”) winds occur in the Los Angeles basin, as the well known Santa Ana winds.

Although the Vision Fire originated from human activity (an illegal campfire), natural conditions determined its outcome. The fire occurred in early fall, when the landscape was tinder dry. Summer drought is typical in a Mediterranean climate, where most rainfall occurs in the winter. Wet winters produce lush vegetation which dries out in the summer and becomes available fuel. Ocean influenced weather produced the wind and the fuel that made the Vision Fire.

A Less Fortunate Oak

Sometimes very hot fire does kill an oak. This tree

was heavily damaged and probably will not survive. Because coast live oak depends on the thickness of its bark to insulate its living tissue, younger trees are less fire-resistant than older ones. This tree may not have been large enough to protect itself from the intense heat. But coast live oak has other ways to survive in a fire-prone environment. Squirrels and scrub jays both store acorns for food by burying them in the ground. This protects the acorns from damage in all but the hottest fires, and any acorns the animals forget to retrieve are already planted. Even if an unusually intense fire kills all the buried acorns, the species still has a good chance of becoming reestablished, because scrub jays actually prefer to bury acorns in fire-exposed soil. By doing this, they reintroduce oaks into burned areas from nearby trees that escaped burning.

Coast live oak is so well-adapted to fire that its population will increase in the more frequently fires occur. Fire suppression over the last century may have reduced the number of oaks in this area. Prior to European settlement, Native Americans regularly set fires in oak forests to clear surrounding vegetation and facilitate acorn gathering. In doing this, they were also increasing the oak population, one of their most important food sources.

Fire's Effect on Soils

Farther ahead, look for an outcrop of light-colored rock on the left side of the trail. It is crumbling a bit. This granite is part of the bedrock of the Point Reyes peninsula, which is exposed on the northern end. Granite soil is poor in nutrients, but some plants can thrive on it, including bishop pine. Douglas fir dominates on the richer shale-derived soils to the south where bishop pines lose their advantage.

Fire has many effects on soil. A fire will burn off the upper layers of decomposing organic material, or duff, which has accumulated over many years of falling leaves and twigs.

This exposes the mineral soil underneath and reduces moisture retention, which can lead to increased erosion. Ash left by burned material is rich in potassium, calcium, phosphorus and other nutrients. Nitrogen, however, is scarce after a fire. Many legumes, members of the pea family, are important early nitrogen fixers that move



Hairy lotus
Acmispon heermannii
var. *orbicularis*

in after a fire. Here you can see two of the four lotus species which rapidly colonized the burn area after the fire. These matlike, ground-covering plants with rounded leaves, were hosts of many insects including orange sulfur and blue acmon butterflies which thrived after the fire.

Charcoal is another important contributor to post-fire soil conditions. Compounds leached from charcoal from post-fire rains is known to trigger seed germination in some fire dependent species.

Death Despite its Protective Bark

Look on your left for a huge charred tree trunk with a splintered top. This large snag was a Douglas fir. Notice the size of its girth. It was very old when it died. Some Douglas firs on Inverness Ridge are as old as 400 years. As a Douglas fir ages, it becomes increasingly resistant to fire, as it forms a thick, spongy bark that insulate them from heat. It may take up to a century or more, however, for a tree to develop such a barrier.

The tree in front of you probably endured many fires before it was killed in 1995. Notice, however, that its scorched bark is well intact. This tree was not killed by flames penetrating its outer skin. Instead, the fire reached the top of the tree, more than 150 feet above the ground, and burned its foliage and unprotected upper branches.



Douglas fir
Pseudotsuga menziesii

Douglas firs are adapted to avoid this fate by shedding lower limbs, known as “self-pruning”. Lower limbs can act like the rungs of a ladder, allowing a fire to ascend into the crown, climbing from one branch to the next. Intermediate-sized vegetation nearby can also carry fire into tree tops, and are known to firefighters as “ladder fuels.” Crown fires represent one of the most intense and uncontrollable types of fire behavior. This dead Douglas fir is evidence that such an event happened here.

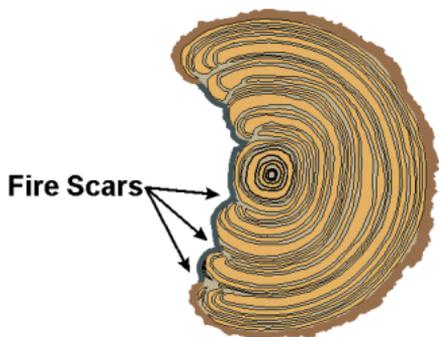
Fire History in Mixed-Age Stands

Look at the fire scars on the Douglas firs in this valley. They can tell you what direction the fire was moving and how big the flames were. Notice how many of these trees survived. If you see a live conifer in the burn area, it is almost certainly a Douglas fir rather than a bishop pine.

Douglas fir typically forms mixed-age stands, especially where fires periodically occur. This is because fire rarely kills mature trees, while it stimulates the growth of new ones by opening up the surrounding vegetation and admitting light to the forest floor. As a result, young and old trees will be found growing side-by-side. This diversity contrasts markedly with the even-aged stands of a bishop pine forest.

The hillside facing you to your left is dominated by even-aged bishop pines and ceanothus (just below

the bishop pine), while the valley floor and further slope have a more diverse forest of mixed-age Douglas fir and hardwoods like bay laurel and coast live oak.



A mature Douglas fir forest bears the record of the fires which have passed through it. The growth rings of older trees will have scars where weaker areas of bark allowed the flames to damage the living tissue underneath. Scars in tree rings can be used by researchers to determine when and how often fires have occurred. Scars found in old-growth redwood trees on the other side of Inverness Ridge have been used in this way to reconstruct the fire history of Point Reyes going back many centuries.

HIKING OPTION: Bayview-Woodward Valley Loop (10.5 miles)

For a difficult, but rewarding hike, continue on the Bayview Trail to the Sky Trailhead and follow Sky Trail southeast to Woodward Valley Trail. You will pass Sky campground which was used as a staging area for firefighters and equipment during the Vision Fire. This is also the site of an old dairy ranch which pre-dates the park. A few eucalyptus trees mark where the ranch house once stood. On the way down Woodward Valley Trail, notice the varying effects of the fire in the Douglas fir forest. At the top of the trail, large trees were scorched, but are otherwise undamaged. As you descend, you will find stands of dead trees where the fire was more intense. You will also see young trees rising from the forest floor near the trail. This new generation benefited from the increased sunlight available after the fire. Woodward Valley Trail meets Coast Trail in open coastal scrub. Go northeast to the Hostel or follow Laguna Trail from Coast Camp back to your starting point.

Environmental Ed Center Trail

- 1/2 mile

Consider how fire plays a role in shaping communities of plants, animals, and people...

What is your relationship to fire?

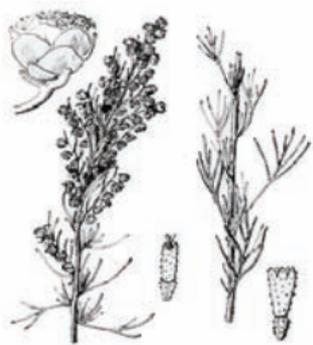
A Flammable Fragrance

Notice the low, grayish-green shrub growing here. California sagebrush is more common in southern California, where it is a dominant species in the southern coastal scrub community. Here it grows only where isolated microclimates, like this dry, south-facing hillside, mimic the conditions of its home range. How has it adapted to a more desert-like environment? Its leaves are very thin and covered with a fragrant oil. Both of these features help protect the plant from moisture loss in the hot sun. Oils also make plants more flammable.

California sagebrush is subjected to more frequent fire in southern California where there are more frequent Santa Ana wind events. Like here though, many of these fires are human-caused. In the fall of 2003, a hunter, lost in the coastal shrublands near San Diego, made a fire to call for help. Hot, dry, winds from the east, turned one man's fear, into a much larger emergency for thousands of people.

Coastal Scrub and the Mountain Beaver

Coyote brush is much more common than California sagebrush in Central California. As you walk down the trail, notice its size and shape. All of this scrub is post-fire regrowth. As coastal scrub matures, it changes considerably. Coyote brush can reach heights up to ten feet. As it grows, it sheds its lower limbs, so the understory opens up. This structural change significantly alters the way the vegetation is used by other creatures as habitat. This was dramatically illustrated at Point Reyes after the Vision Fire by the fate of the mountain beaver, a small, burrowing rodent endemic to the area.



California sagebrush
Artemisia californica

The mountain beaver is the only living species of a very ancient family of rodents. They require a lot of water because of their primitive kidneys. Mountain beavers at Point Reyes are specifically adapted to living in mature coastal scrub, where a leafy overstory provides shade and moisture during the summer, but also a relatively

open understory to allow freedom of movement.

Although the dense, post-fire regrowth provided excellent habitat for some species, like the small brush rabbit, it was disastrous for the mountain beaver, whose population plummeted from an estimated 5000 to only 19 in the burn area.



Mountain beaver
Aplodontia rufa

It takes about 20 years for Coastal scrub to mature to a point where it can support a healthy mountain beaver population. Whether the animal will rebound to its pre-fire population remains to be seen. Many species benefit from fire, even needing periodic fires to survive. Others, like the mountain beaver, can be devastated. Fire itself is neither good nor bad. It brings change which affects each resident of the ecosystem differently. Some populations go up and some go down. Habitat is both created and destroyed.

Dynamic Mosaic of Vegetation

Look out across the landscape for patches of light green, dark green, rounded shapes, and triangular shapes. Can you distinguish of coyote brush (light green), ceanothus (dark green), and Douglas fir (tall surviving conifers)? These different vegetation types form a complex, mosaic-like pattern. Why is there so much diversity? What do the patterns tell us if we try to read them? Soil types and microclimates contribute to the mosaic. Fire is also a factor.

The most obvious variation which fire introduces comes from differences in burn intensity. A fire may burn very hot in one place, killing all of the vegetation, while elsewhere it burns cool—or not at all—leaving most of the old vegetation intact.

In the Vision Fire, 70% of the vegetation burned at low intensity, 20% at moderate intensity and 10% at high intensity. Within the forest types, there were different degrees of mortality. Mortality in the Bishop pine was 42–82%; in the Douglas fir was 28–46%; and in the riparian woodlands was 5%. Think how this affects the pattern of revegetation. Unburned communities may mingle with areas where succession returns to earlier stages. Variation in intensity leads to variation in the structure of

plant communities which creates more different kinds of habitat.

Imagine the cumulative effect of several fires. With each event, the landscape becomes increasingly more varied and complex, promoting biodiversity.

Native Perennial Grassland

About halfway down to the bottom of the canyon, on the left of the trail, you will find well-defined bunches of grass. This is purple needlegrass, which is a perennial bunchgrass, like the majority of California native grass species. Unlike annual grasses, which die after dispersing their seed each year, perennials live for many years. California's perennials must survive the long summers of a Mediterranean climate and have adapted by establishing deep root systems which maintain the plant through this dry season. This adaptation also allows them to survive periodic fires, as their roots remain undamaged by the heat.

Perennial grassland once covered much of California. Suppression of fire since Euro-American settlement is one reason for its decline. Prior to the nineteenth-century, fire occurred much more frequently, many of them set by Native Americans as a tool for managing the landscape. Regular burning favored perennial grassland over scrub. Native Americans harvested seeds from these grasslands and hunted grazing animals like deer and elk. In the absence of fire, shrubs like coyote brush colonize grasslands, and convert them to scrub.



Purple needlegrass
Nassella pulchra

California bay laurel

As you near the bottom of the trail, you will see rounded clumps of green vegetation growing at the base of tall, snag clusters. These are bay laurel trees which resprouted from the base after the Vision Fire. Can you find the groves of bays across the valley on the opposite hillside? Look for the skeletons of burned trees emerging from bushy growth. They are a declaration of renewal.

The ability to resprout from the base, helps many plants survive a fire. This also allows them to survive browsing and grazing by animals or mechanical cutting by humans. When the fire burned through, it top-killed these trees (the standing, upper portion) but left the roots and part of the stump intact. The damage caused

damage caused by a fire actually stimulates tissues in the base of the tree to produce vigorous new shoots. The effect is similar to that caused by pruning. Basal sprouting is often associated with a thick tuber (underground root) or burl (massive stem base) which store food so plenty of energy is available when resprouting is triggered. As we have seen, many plants in the coastal scrub and oak woodland communities can basal sprout after a fire. This is testimony to the fact that fire is not always catastrophic, but is integral to many cycles within a landscape.



California bay laurel
Umbellularia californica

Fire and You

When you reach the bottom of the trail, turn left. A short walk ends at an outdoor amphitheater. At the center is a fire ring. Have you ever been around a campfire like this one? Many of us can remember the warmth of a fire at night, cooking food after a long day outside. Talking, singing, eating, resting, or listening to stories. Campfires can also lead to accidental wildfires. Always check to see if you need a fire permit whenever you are camping in parks or other natural areas. In many places only charcoal fires are allowed in established fire pits. It is always important to clear all flammable materials 10 feet around any kind of campfire, and to have water, and a shovel on hand. When the weather predicts hot, dry, windy weather, a Red Flag day may be declared, which could restrict all campfires, as well as other activities.

In 1995, a group of young boys camped in a place they were not allowed to be. They made a campfire and thought they had put it out. They poured water on it, stirred the ashes, made sure it was cool. They didn't realize the heat could cause the soil and roots to smolder beneath the surface.

Humans are part of the ecosystem. Like lightning, we start a lot of wildland fire, both by accident, and on purpose. Prescribed fire at Point Reyes National Seashore is for many of the ecological benefits that were demonstrated by the Vision Fire. Meanwhile, public fire use restrictions are also in place to prevent unwanted accidents.

As illustrated by bishop pines, which sacrifice trees to open new cones, fire can create and destroy in

the very same moment. This paradox was expressed by one of the homeowners on Inverness Ridge who said, “I sensed that something good would come of it. . . . Even as my house was burning down, I was struck by the sheer beauty and majesty of the event.”

HIKING OPTION: Fire Lane Loop (7.3 miles)

From here you can make a loop which will take you through a mosaic of plant communities, all affected differently by the fire. Turn right and continue along the paved road past the Environmental Education Center to the Laguna Trailhead parking lot (on your left). Follow Laguna trail south just under a mile and head northeast up the Fire Lane trail. You will pass through a mixture of coastal scrub and maritime chaparral. Notice the dense patches of blue blossom ceanothus growing on the hillslopes. As you climb toward Inverness Ridge, you begin to encounter Douglas firs. As in Woodward Valley, you can see how the fire burned with varying intensity along the edge of this forest, completely killing some trees while only scorching others. Turn northwest on Sky trail. Notice how different the forest and understory are here as you leave the burn area. This open, more diverse vegetation represents a more mature successional stage. Pick up the Laguna Trail once more from the far side of the parking lot at the Sky Trailhead and follow it back to where you began.

KEY TERMS

annual - a plant with a life span of one year

basal-sprouting - growth from the base of a plant when the top of the plant is disturbed or injured

biodiversity - condition in which there is a high number of species

crown fire - a fire moving above the ground, across the top of trees or other vegetation

defensible space - space between a structure and flammable material which enhances fire protection

dormant - asleep or in an inactive condition

even-aged stand - a forest community where trees are all the same age, e.g., bishop pine

foehn winds - hot, dry winds produced when air is forced over a mountain range (pronounced “fern”)

initial attack - the first phase of response to a fire wildland fire

mixed-aged stand - a forest community where trees are different ages, e.g., Douglas fir

mosaic - a varied pattern such as in vegetation after a fire burns different areas at different intensities

mycorrhizae - root fungus, provides an extension to the root system of a plant

nitrogen fixers - plants that host specialized bacteria in their roots, capable of converting nitrogen in the air into a form that plants and animals can use

perennial - a plant with a life span of more than two years

prescribed fire - the planned use of fire to accomplish land management objectives

Red Flag Day - weather and fuel conditions in which a fire will be very difficult to control

serotinous - cones that remain on a tree, unopened

snag - standing dead trees

spores - the microscopic reproductive units of non-flowering plants, such as fungi; spores develop in a mushroom like seeds develop in a fruit

succession - a series of stages in the development of an ecological community

wilderness - a land designation for areas that will be managed to minimize human influence **wildfire** - an unwanted fire that escapes initial attack

wildland-urban interface - places where natural areas are adjacent to developed areas

REMEMBERING THE VISION FIRE

An illegal campfire, rekindled by strong, east winds, had escaped initial attack. Before the first night was over, the fire had raced to the ocean, and forty-five structures were lost.

"I sensed that something good would come of it.... Even as my house was burning down, I was struck by the sheer beauty and majesty of the event." - Inverness Ridge Homeowner

Acknowledgements

Illustrations of Marin manzanita, Coyote brush Blue blossom ceanothus, and Hairy lotus are courtesy of University of California Press. These illustrations are taken from Roxana S. Ferris, *Flowers of Point Reyes National Seashore*, Berkeley: University of California Press, 1970.

Illustrations of California bay laurel, Douglas fir, California sagebrush, Purple needlegrass are courtesy of Stanford University Press. These illustrations are taken from Abrams, Leroy, and Roxana S. Ferris, *Illustrated Flora of the Pacific States: Washington, Oregon, and California*, 4 vols. Stanford, California; Stanford University Press, 1960.