Landscape Linkages and Biodiversity

DEFENDERS OF WILDLIFE

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7 The Klamath Corridors: Preserving Biodiversity in the Klamath National Forest

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THIS CHAPTER INVESTIGATES the biological impacts of forest fragmentation resulting from logging and road building in the Klamath Mountain Province of southern Oregon and northern California. To maintain biodiversity in this region, I present a proposal to designate certain drainages and ridge systems in the Klamath National Forest as biological corridors linking designated wilderness areas. The proposal is designed as a strategy to ensure that the impact of human activity will not change current species, habitat, and genetic diversity within the Klamath National Forest over the long term. While the concept applies approaches developed by Larry Harris and Reed Noss, the proposal itself is the creation of the Klamath Forest Alliance, a coalition of grass-roots environmental and community organizations located in and around the Klamath Forest. At this time the proposal has not been implemented nor has it been endorsed by any individual or agency other than the Klamath Forest Alliance.

THE KLAMATH MOUNTAIN PROVINCE

The Klamath National Forest is located at the heart of what is often referred to as the Klamath Mountain Province. Spanning the California/Oregon border, this area of steeply folded, granite-cored mountains is strategically situated at the junction of the Northwest (or

Cascadian), Californian, and Great Basin bioregions. Within the province the maximum elevation is slightly over 9,000 feet, upland valleys occur in the 1,500–3,000-foot range, and major river canyons wind through the mountains to the Pacific shore.

Biologically speaking, plant diversity is the area's hallmark. A long list of plant species are endemic to the Klamath Mountains. Noteworthy in this regard are the herbaceous plants that grow only on serpentine soils of the Kalmiopsis and Siskiyou mountains. It is with respect to tree diversity, however, that the area's greatest biological significance can be found. Within 1 square mile of the Sugar Creek drainage in the Klamath National Forest, for example, seventeen species of coniferous trees are found (Sawyer et al. 1970). Nowhere on earth is there a greater diversity of conifers. The Klamath Forest Alliance believes that the unique plant (and especially conifer) diversity of the Klamath Mountains qualifies the area for international recognition and protection as a World Heritage Biosphere Preserve.

Biologists and naturalists have identified the factors contributing to the outstanding plant diversity of the Klamath Mountains. The province was dry land when most of California was still under the sea. Species dominant during older geological periods—species that now occur at no other sites in California—can be found in the Klamath Mountains. Currently the region's climate is transitional between the wetter clime characteristic of the Northwest and the Mediterranean clime characteristic of California. Consequently, many northwestern plants find the southernmost extent of their range in the Klamath Mountains. Likewise, the northern range limit for several Californian plants occurs here.

Tree ring and other data suggest a historic alternation of climatic cycles. During warm and dry cycles, southern and eastern plants have extended their ranges to the north and west. Colder and wetter times have allowed northern plants, especially forest trees, to extend their range southward. Several large river systems cut through the Klamath Mountains from east to west providing avenues for the dispersal of species. Of the four major river systems—the Trinity, Klamath, Rogue, and Umpqua—the Klamath is probably the most significant as an avenue of plant dispersal. Like the Columbia to the north, the Klamath cuts through the Cascade Range providing a low-elevation route for Great Basin plants to migrate westward during periods of dry weather.

Because the high relief and multidirectional ridge systems have produced a variety of microclimates, remnant plant populations have tended to persist in the Klamath Mountains when they were extirpated from surrounding regions. Indeed, the unusual confluence of factors favoring plant diversity in the Klamath Mountain Province has resulted in a large number of unique plant associations. Only in recent years have ecologists begun to identify and classify these associations, and the process is far from complete (Atzet and Wheeler 1984).

Although the Klamath Mountains are not as well known for animal diversity, they do provide suitable habitat for many species of concern, including the Pacific fisher, wolverine, pine marten, and northern spotted owl. From a wildlife perspective, the region is important more for its location as a link between provinces than for endemism. Patterns of development along the West Coast have tended to isolate forested regions. For example, agricultural, urban, and highway development in the interior valleys of Oregon has created barriers to migration of animals associated with forest environments between the Coast Range and the Cascades. A similar barrier has developed between the southern Oregon Cascades and the northern Sierra Nevada in California. Located at the geographical crossroads of West Coast forest regions, the Klamath Mountain Province must play a key role in any strategy to maintain and restore biological connectivity between natural forest reserves in the western coastal portion of the United States.

Most watersheds in the Klamath Province support commercially important runs of anadromous salmonids. These fisheries have been in decline ever since statistics were first recorded in the 1940s. Of special concern are remnant populations of spring chinook salmon and summer steelhead. Both are now found in only a handful of streams and at population levels that may not be viable over the long term. Anadromous salmonid populations are increasingly dominated by hatchery-bred fish. Some biologists have suggested that the genetic diversity contained in wild stocks of anadromous salmonids will be increasingly important as reliance on hatchery fish continues to grow (National Council on Gene Resources 1982).

FOREST FRAGMENTATION

Although logging began in the Klamath Province with the coming of white settlers, impacts on the forest ecosystem were minor prior to World War II. The development of industrial forestry after that war, fueled by the demand for new housing, has resulted in major alterations to the landscape. Initially selection was the dominant logging practice, but by the mid-1960s the USDA Forest Service and Bureau of Land Management, which administer the majority of the province's forests, had adopted clearcutting as the preferred timber extraction technique and tree plantations as the method for reforestation. For technical and economic reasons, high-density road systems have been constructed to reach timber in steep, mountainous terrain. An active program to suppress fires, whatever the cause, has also been in continuous operation since the early part of the century.

During those early decades when selection and other partial tree-removal systems were the dominant logging methods, federal agencies charged with forest management relied on natural seeding from residual trees on the site to reforest logged lands. Some structural diversity was retained, although the large trees were removed from logged sites. With the dominance of clearcutting, planting of nursery-raised seedlings has become the typical reforestation practice. The result is a forest of even-aged trees with little structural diversity. Artificial reforestation has been problematic throughout the Klamath Province, particularly when sites with shallow soils and southwestern exposures are clearcut. Some logged sites have been replanted three or four times without establishment of a forest stand (Perry et al. 1989). On some sites forest has been replaced by brush or grass as the dominant vegetation type.

In the Klamath Province fire plays a major role in the life history of native forest ecosystems. Natural forest fires typically burn in a mosaic pattern. For the most part they are underburns—understory vegetation is reduced and the stand is thinned as weaker and diseased trees are killed. Forest openings are created where the fires flare up (because of fuel, wind, and other factors) to kill patches and "stringers" of forest. In this way fire helps create a diversity of successional stages. Some foresters have theorized that clearcut forest management can act in the same way, creating a mosaic of stands of different ages. But

comparison of natural and managed portions of the forest reveals basic differences in the size of openings and pattern of forest stages. More important, before human intervention the native forests of the Klamath Province were dominated by the older age classes whereas human management has resulted in the dominance of earlier successional stages.

Logging and fire suppression create unnaturally high levels of dead woody fuels in the forest. When a fire escapes immediate suppression in such an area, it often "blows up" into a firestorm that can kill all vegetation over a large area. Catastrophic fires have become more common and larger as the forest area under clearcut and plantation management has increased. A single fire complex in the Klamath Province can now cover more than 60,000 acres. Salvage logging and replanting after such fires have created vast plantations of young trees all approximately the same age and height. These plantations are highly susceptible to catastrophic fire.

The combination of extensive clearcut/plantation management, type conversions, and large catastrophic fires has created a forest landscape in the Klamath Mountain Province distinctly different from native conditions. In 1989 the Klamath Forest Alliance in cooperation with the Marble Mountain and National Audubon societies mapped the coniferous forests and tree plantations of the entire Klamath National Forest. The project utilized timber strata data compiled by the Forest Service from aerial photographs and representing ground conditions in December 1988. These maps demonstrate the extent to which forest fragmentation has progressed in the Klamath Forest. For the most part, wilderness areas appear as islands of natural habitat in a sea of clearcuts, young tree plantations, and isolated stands of older trees. Research referenced elsewhere in this book has amply demonstrated the limitations of small, isolated forest fragments as habitat for interior-forest species. The maps also reveal a few areas where the natural habitat connectivity of the forest has not been compromised. These watersheds and ridge systems have not yet been reached by the network of logging roads that covers most of the forest to facilitate the extraction of logs. They are the last remaining source of connectivity between reserved lands.

The spotted owl is perhaps the best-known species native to the Klamath Province whose fate is tied to forest fragmentation. But there are many other animal species still present in the province that find

optimal conditions in forests dominated by old-growth trees. The Pacific fisher and other furbearers are of particular concern because of their solitary habits and extensive home ranges. Although such animals are considered "sensitive" by state and federal wildlife agencies and have been identified as "management indicator species" by the Forest Service, data on their status in the province is limited. Nevertheless, there are indications that conversion from native to managed forests in the Klamath Province and elsewhere is having a significant impact on population and other factors that bear directly on the long-term survival of these animals (Calif. Dept. of Fish & Game 1987).

PRESERVING BIODIVERSITY

In the absence of substantive requirements on private lands, responsibility for conserving biodiversity has fallen to agencies that manage public lands. In the Klamath Mountain Province over half the land is in public ownership, the majority administered by the USDA Forest Service as part of the National Forest System. Within these national forest lands are designated wilderness reserves ranging in size from the 500,000-acre Trinity Wilderness to the 4,000-acre Red Buttes Wilderness. Until recently it has been assumed that these wilderness areas would provide sufficient habitat to ensure maintenance of viable wildlife populations. Smaller tracts have also been reserved for federally listed threatened and endangered species under provisions of the Endangered Species Act and as research natural areas.

Reliance on wilderness areas, national parks, and other reserved habitat islands to preserve biodiversity has many problems. Newmark (1987) has noted the disappearance of mammalian species from some of our largest reserves. He concludes that most parks are too small to support the assemblage of mammals present when they were created. Most national parks and wilderness areas have been created with scenic and recreational concerns paramount. Wilderness areas recommended by the Forest Service have typically been designed to exclude commercially valuable forested areas. In the West these reserves occur for the most part at higher elevations, the "rock and ice" wildernesses. In the Klamath Mountain Province the subalpine and true fir forest types are fairly well represented in wilderness areas because these types predominate at elevations above 5,000 feet. The mixed conifer, Douglas fir,

ponderosa pine, and mixed evergreen forest types, however, are not well represented in these reserved areas.

The National Forest Management Act (NFMA) specifically mandates preservation of current biodiversity on national forest lands. Managers are also charged by NFMA to ensure that viable populations of all naturally occurring wildlife are maintained. These provisions are in the process of being implemented, primarily through regional guides and land management plans (LMPs) for each national forest. Elsewhere in this volume Hal Salwasser describes the USDA Forest Service's policy on maintaining biodiversity in our national forests. In general, the approach continues to be to disperse biodiversity concerns across a managed landscape, minimizing reserved and special-use land.

The Forest Service's "New Perspectives" program will attempt to combat the impact of forest fragmentation by retaining structural diversity and other key elements of native ecosystems in managed timber stands. It is an encouraging development and deserves support. There are indications, however, that the Forest Service plans to use this program as justification for building roads and conducting logging in the last remaining watersheds and ridge systems that provide natural, unfragmented linkages between larger blocks of reserved lands. These proposals should be deferred until it can be demonstrated (through implementation and monitoring in areas where timber management has already taken place) that "New Perspectives" forestry truly maintains biodiversity.

The Forest Service has recognized that species dependent on native and old-growth forests require special management programs. In West Coast national forests, the biodiversity and viable population provisions of NFMA have been approached by identifying management indicator species (MISs) that stand for complexes of species dependent on particular ecosystems. In the case of Northwest and northern California native forest ecosystems, the northern spotted owl was selected as the indicator species. Forest Service biologists and managers have identified a system of habitat islands, ranging in size from 1,000 to 2,400 acres, intended to ensure maintenance of viable populations of spotted owls and all other species for which the spotted owl is considered the indicator. Creating smaller islands between the larger reserves is a strategy that attempts to combat the effects of forest fragmentation with a system of fragmented habitat islands.

In April 1990 an interagency group of eminent biologists charged by Congress to study the spotted owl's status called the Forest Service's habitat island plan "flawed" and recommended much larger habitat islands utilizing wherever possible lands already in reserves (Thomas et al. 1990). While the larger habitat islands are an improvement over the present small-island strategy, it remains a system that does not ensure connectivity of native forest habitat.

Controversy surrounding study of the spotted owl for listing as threatened or endangered under provisions of the Endangered Species Act has obscured the owl's assigned role as an indicator species. This role has itself been questioned by many biologists, most notably by the Interagency Spotted Owl Study Group. The group's report emphasized that the strategy proposed for the spotted owl would not necessarily ensure survival of all wildlife species that depend on native forest habitat. Many biologists believe the spotted owl is not a good indicator for the Pacific fisher and other terrestrial forest animals with extensive home ranges.

THE KLAMATH CORRIDORS PROPOSAL

The Klamath Corridors Proposal is based on the logical deduction that the most effective way to combat fragmentation is to retain or reestablish natural connectivity. The proposal makes maximum use of already reserved lands. Although they are not well represented at lower elevations, these lands are the largest blocks of unfragmented habitat remaining. The proposal also incorporates the history of human disturbance. The best landscape linkages available today are those few watersheds and ridge systems that remain substantially free of roads and clearcuts. While major rivers once provided the primary avenues for plant and animal dispersal, today human development centers on these rivers. Consequently, it is the more remote watersheds and ridge systems that now offer the best opportunities for maintaining, enhancing, or reestablishing the connectivity of native forest habitat.

In June 1989 the Klamath Forest Alliance, Klamath National Forest, and California Department of Fish and Game cosponsored a workshop to investigate strategies for preserving biodiversity in the Klamath Forest. Reed Noss and John Lehmkuhl, a USDA Forest Service

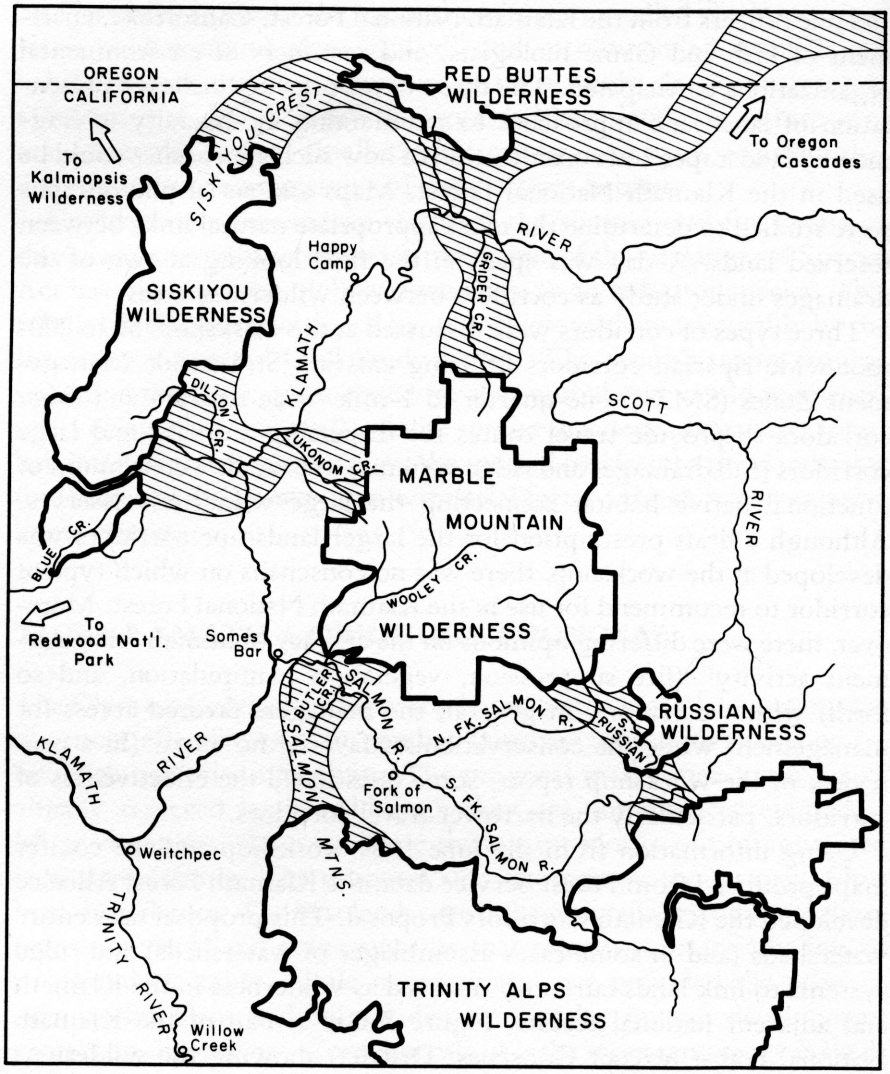
research biologist, were featured speakers. Forest Service biologists and line officers from the Klamath National Forest, California Department of Fish and Game biologists, and members of environmental organizations participated. The three-day workshop included presentation of landscape approaches to maintaining biodiversity in fragmented landscapes and consideration of how such approaches could be used in the Klamath National Forest. Maps and aerial photographs were studied to determine the most appropriate natural links between reserved lands. A day was spent in the field looking at two of the drainages under study as corridors between wilderness areas.

Three types of corridors were discussed at the workshop: 50 to 200-foot-wide riparian corridors utilizing existing Streamside Management Zones (SMZs); one-quarter to 1-mile-wide riparian and ridge corridors to provide travel routes for dispersing animals; and large corridors (full drainages and ridge systems) to provide a continuum of functional native habitat connecting the large wilderness reserves. Although a draft prescription for the larger landscape corridors was developed at the workshop, there was no consensus on which type of corridor to recommend for use in the Klamath National Forest. Moreover, there were differing opinions on the efficacy of human "management activity" (fire suppression, vegetation manipulation, and so forth) within corridors. In general, the managers favored access for management while the conservationists favored no entry. (In a peer review of the workshop report, some questioned the effectiveness of corridors, particularly the narrower travel corridors.)

Using information from the June 1989 workshop and the conifer maps produced from Forest Service data, the Klamath Forest Alliance developed the Klamath Corridors Proposal. This proposal uses entire watersheds (and in some cases assemblages of watersheds) and ridge systems to link lands currently reserved as wilderness in the Klamath and adjacent national forests. Figure 7.1 is a map of the Klamath National Forest (except Goosenest District) showing the wilderness areas and the proposed corridors. The corridors are designed to be large enough to encompass large natural disturbances—for example, forest fires. When ridge systems were utilized, we aimed for a width of at least 4 miles adjusted to conform with topographic and vegetation boundary features.

Some critics of the proposal point out that there are no studies demonstrating the minimum effective size for a landscape linkage. We

FIGURE 7.1 The Klamath Corridors Proposal.



must remember, however, that such studies are probably not feasible because of the many factors that must be considered and because adequate controls are not available. To suggest that we should not act unless we have conclusive data is to divorce the goal of conservation from the discipline of biology. In this case it would mean foreclosing options that may prove critical to maintaining biodiversity in the Klamath National Forest. While monitoring should be done to evaluate how strategies perform, we should not hesitate to use what knowledge we have to design and implement management strategies.

A MODEL FOR THE FUTURE?

The Klamath Forest Alliance believes the Klamath Corridors Proposal applies the best available scientific thinking on how to maintain biodiversity. While there is no consensus on specific requirements, we can say with assurance that connectivity is superior to isolation, that continuity is preferable to fragmentation, and, with respect to corridors, that larger is better than smaller. The Klamath Forest Alliance, with support from other conservation organizations, has taken action in federal court to block logging in one of the Klamath Corridors while advocating study of the need for biological connectivity in the land management plan being prepared for the Klamath National Forest. We are also working to extend the proposal to encompass the entire Klamath Mountain Province. And, finally, we are exploring options for landscape linkages to reestablish native forest habitat connectivity between the Klamath Mountain Province and both the Oregon Cascades to the northeast and the Sierra Nevada to the southeast.

Within the native forests of the West Coast there remain promising options for ensuring maintenance of biodiversity through retention of natural habitat connectivity. In another decade these options will be gone. If we are to apply the strategies pioneered by Larry Harris and Reed Noss, the time to act is now. Biologists in the agencies and in academia, with the support of an informed public, should develop landscape linkage proposals and advocate their adoption. We think the Klamath Corridors Proposal could well serve as a model for such efforts.

EDITOR'S NOTE: On September 13, 1990, a federal appeals court ruled in favor of the Marble Mountain Audubon Society, which had challenged USDA Forest Service timber sales in the Grider Creek drainage of the Klamath National Forest. In the landmark decision, the court ruled that federal agencies must consider an area's importance as a "biological corridor" linking wilderness zones before permitting logging. This ruling represents the first federal court recognition of the significance of biological corridors.

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