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A CASE FOR OWLS

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Raptors are a diversified and fairly large group of birds with a number of interesting adaptations for efficient predation in various environments. They are carnivorous birds having feet with sharp claws for seizing prey. With most people they produce an image of a hawk or an eagle. Ornithologists frequently spend ample amounts of time studying majestic, large and easily observed diurnal raptors. Typically then, most discussions on raptors say little about the nocturnal raptors - owls. At this conference the lack of specific papers on owls and numerous papers on hawks, falcons and eagles is symptomatic of the plight of owls in California; they often are forgotten or only an afterthought.

Twenty-one species of diurnal raptors normally occur in California. Three of these are rare or endangered, and ten are on the California Department of Fish & Game's bird species of special concern list. There are 13 species of owls in the state; two of these species are endangered and four are on the Department's list of species of special concern. Therefore, there are about two-thirds as many species of owls as there are diurnal raptors, and the management needs are in about the same proportion as they are for diurnal raptors.

Owl management and the research needed are generally lacking. This can best be seen by a 1980 Department study (Antonius 1981) of university and college level research on raptors in California. Out of 27 Masters theses pertaining to raptors, 22 were written on hawks and only five were written on owls, and those only dealt with tree species.

Recent work on owls has been rather limited and I am aware of only 11 different studies on six species. Also, it is interesting to note that the last time owls were discussed before a large group was in this spot four years ago at a conference on owls put on by the National Audubon Society and the California Academy of Sciences. Prior to that time little research had been conducted on owls. It's only been in the last four years that people have looked at the status of the various species in the state and considered any of them for listing as rare or endangered species. Much of the recent work on owls stemmed from a situation not in California, but in Oregon. There, the conflict between the preservation of the Spotted Owl, and the old-growth forest habitat that it requires, and the value of this commercial timber has created a very controversial issue. This controversy has spilled over into California and the study of other species of owls has, at least in part, stemmed from political and economic issues and not from genuine interest in owls. However, once researchers start to work with owls their interest in this fascinating group of birds usually increases dramatically.

A review of the current status of the 13 species of owls and

their management is a relatively easy task. This review, by species, follows:

Barn Owl -- Barn Owls basically are nonmigratory and seem to be rather ubiquitous to most of us in California. They are found in the mild climate lowlands, open grasslands and agricultural areas in the state. A few studies have been made of this species. One by Pete Bloom (1979), found that populations of this species were variable along the south coast, abundant in the Central Valley where grasslands, marshes and oak-sycamore woodlands exist but are almost non-existant in areas of clean agriculture, uncommon east of and in the forests of the Sierra Nevada, and scarce in the Great Basin and California deserts except near agricultural areas. A recent article in American Birds (Stewart 1980) found that actually there has been an increase in Barn Owls in the last 30 years. He compared Christmas counts from the 1952-56 period to the 1975-77 period and recorded an increase from 38% to 62% in the number counts where Barn Owls were recorded in California. There are no current, statewide management activities involving Barn Owls.

Western Screech Owl -- This is another nonmigratory species, although there are some north-south and uphill-downhill movements in winter. Western Screech Owls are found in temperate woodlands, riparian forests and conifer forests up to the upper limit of the Ponderosa pine belt. Some recent concern has been expressed about a possible decline in populations of this species in the transverse ranges of southern California. Field ornithologists are not findings screech owls where they had been heard before nor is the cause for this decline apparent. There has been a recent study (Elliott, in press) of screech owls and their place in forest succession at Chew's Ridge, northern Monterey County. In 1977 the Marble Cone fire burned a densely forested area which normally supported Spotted Owls and Flammulated Owls. A great deal of moisture fell in the two years after the fire and the oaks and other hardwoods began to stump and limb sprout. Where no Western Screech Owls had been heard previously they are hearing as many as eight to a dozen. This is a clear demonstration of the screech owl's adaptability to more open woodlands.

-- Great Horned Owl -- Individuals of this species are nonmigratory but again there is some movement to slightly milder areas in winter. These large owls usually are found in open areas where there is low vegitation and where rabbits, their major food source, are common. Great Horned Owls utilize available cliff and treed areas for roosting cover and nesting. They are not forest birds but occupy habitats as varied as beaches, deserts, grasslands, agricultural areas, and meadows and tundra above timberline. No major research has been done on this species in California.

-- Snowy Owl -- Snowy Owls also occur in California but only irregularly in winters when lemming populations in northern latitudes crash. These owls are found almost exclusively on north coast beaches. These migrants are believed to be immature individuals and it is doubtful that they survive the winter to return north.

-- Saw-whet Owl -- Although some Saw-whet Owls winter in California these owls are migratory. They are noted for their

irrational and irregular movements as demonstrated by one that was found in Death Valley on June 10 in 110 degree weather. This is definitely odd as Saw-whets are deep forest owls inhabiting redwood and Douglas-fir forests along the coast and the mixed conifer forests of the Sierra Nevada. Little research has been done on this species in the state.

-- Flammulated Owl -- Flammulated Owls are highly migratory, leaving California to winter in Mexico and Guatemala. Except for Spotted Owls and the endangered species of owls, this species is the most studied in California, thanks to research by Jon Winter (1974) and Bruce Marcot (Marcot and Hill 1980). Flammulated Owls are dwellers of mid-elevation forests. They are very closely associated with Ponderosa pine habitat, although black oak also appears to be another very important component of the habitat. These owls are found most often along minor breaks in the habitat. These areas seem to support almost colonial aggregations of Flammulated Owls. Researchers have measured densities of 1.9 per 100 acres at Whittaker Forest, Tulare County (Marshall 1939), 2.1 per 100 acres at Duncan Peak, Placer County (Winter 1979), and at less than one per 100 acres in southern Humboldt and Trinity Counties (Marcot and Hill 1980). Ponderosa pine is one of the more common and heavily used timber types. At this time we don't know the effects of logging Ponderosa pine on Flammulated Owls.

-- Pygmy Owl -- Pygmy Owls are not migratory and they have not been studied in California. However, we do know that they inhabit open, low to mid-elevation forested areas where there are forest openings, wooded brushlands, and wooded canyons even in some of the more arid spots in the state.

-- Long-eared Owl -- Long-eared Owls are migratory and more common in California in the winter. They winter and nest in woodlands and forests near open areas. Most frequently these woodlands are lower elevation riparian areas. This species is adapted to hunt open areas but needs woodlands in which to nest. The numbers of Long-eared Owls have been reduced drastically as the riparian habitat in the state has been cleared for agriculture. There were 775,000 acres of riparian habitat in the Central Valley in 1848 and only 12,000 acres remained in 1972 (Gaines 1976). Clean farming is even more detrimental because it removes trees and agricultural waste areas around fields where rodents and other prey live. Because of the reduction in habitat Long-eared Owls are listed by the Department as a species of special concern (Remsen 1978). We are in drastic need of information of where and in what numbers Long-eared Owls breed in California.

-- Short-eared Owl -- Short-eared Owls are similar to Long-eared Owls in that they too are a species of special concern, highly migratory, occur in greater numbers in winter, and hunt open country like a Marsh Hawk. However, Short-eared Owls prefer open marshy areas, wet meadows, grassland and tall grassland habitats. They also nest in these same habitats and, like a Marsh Hawk, nest on the ground. Short-eared Owls also inhabit coastal marshes. These and inland wetland habitats have been drained, developed and generally degradated and most are no longer suitable for the nesting of Short-eared Owls. It is now believed that these birds only nest sparsely in northeastern California

and at a very few scattered areas in the Central Valley. Current marsh management doesn't meet the requirements of this species. Preserved coastal marshes often are close to urban areas where human activity and pets are unavoidable and disturb the owls to a degree where nesting is not possible. In interior wetlands there is a pattern of flooding in the winter for waterfowl and draining and cropping during the breeding season. In those areas not tilled grazing reduces cover necessary for nesting or is too disturbing to permit successful nesting.

-- Burrowing Owl -- Burrowing Owls are residents in the state but often there is considerable seasonal movement between areas of suitable habitat. They are found in the warmer valleys, grasslands, and agricultural areas of California. Although they may excavate their own burrows for roost and nest sites, they are very dependent on the burrows of small mammals, particularly those of the California ground squirrel. Also, they require good visibility from the mouth of their burrows. Vegetation must be relatively short around the burrow so grazing, to some extent, can help. Three major problems currently are decreasing Burrowing Owl populations. Ground squirrel and rodent control have been reducing the amount of prey and burrows available to the owls. Also the extent of secondary poisoning on Burrowing Owls isn't known. Clean farming and intensive grazing remove more vegetation and results in the reduction of prey through the loss of habitat or suitable cover needed by prey species in that habitat. Loss of habitat to urban sprawl continues to occur, especially in the Central Valley.

-- Spotted Owl -- Probably the most studied and most controversial species, sometimes called the western snail darter lately, is the Spotted Owl. It is an obligate of mature and old-growth, conifer or mixed conifer-hardwood forests. It has become the symbol of all wildlife in old-growth forest habitat, a habitat type which soon will be completely lost to to timber harvest activities.

Spotted Owls range throughout the montane forests of California. Currently we know of 1086 territories, in 41 counties, of this very sedentary species. Territories are documented so well because the United States Forest Service has done a great deal of survey work in conjunction of with their timber harvest activities. All of this has happened since 1973 when the "best" estimate of population size was 15 pairs. Our knowledge of the range has expanded dramatically because of the intensity of survey work. The areas containing the most habitat for Spotted Owls are north coast forests with 225 known pairs in Siskiyou County. Although there is considerably less available habitat in southern California, there are more owls per unit of available habitat. This may reflect a slight change in habitat preference or a greater adaptibility to non-conifer habitat by the California Spotted Owl. Current known densities vary from .32 to 8 territories (pairs) per township of available habitat depending upon the county. They may occur at high densities despite occupying home ranges of 1500 to 3500 acres (Solis 1982, Sisco, in press). In Oregon researchers have even found a pair using as much as 9000 acres on a poor quality site (Forsman 1981). Presently it is not known exactly how much habitat is necessary in the different areas throughout the state to maintain a pair of

Spotted Owls breeding at a rate to sustain the population.
Mature and old-growth forest is a necessity to Spotted Owls for a variety of reasons. Spotted Owls undergo heat stress when it gets hot (Barrows 1980). Mature and old-growth forests create a microhabitat under the forest canopy that is considerably cooler than an area that is not similarly shaded. When the forest canopy is opened, as occurs during and after logging, more sunlight enters the under-canopy area, heats this microhabitat, and can cause heat-stress in Spotted Owls. Spotted Owls also need old trees in which to nest. They, like most owls, don't build nests. Large old trees often are decadent in some manner and provide natural cavities in which nesting can take place. A typical old-growth forest also has some areas where young trees are growing, replacing old, dead trees. These areas of sapling trees are used for roosting by both adults and non-flying young. For the young these sites are most necessary to allow them to escape ground predators. The forest also provides the food, primarily arboreal rodents, of Spotted Owls. It appears that mature and old-growth forests support larger numbers of individuals and species of prey than younger, typical second-growth forests.
The U.S. Forest Service has taken the lead in manageing Spotted Owls in California, because the vast majority occur on their lands. Currently they are in a land management planning process, looking at their lands and determining the future for each parcel. With 20 to 25 years left before all the commercially available timber is cut in California (15 years for Oregon), it is imperative to set areas aside for Spotted Owls if they are to survive. The U.S. Forest Service has set guidelines to preserve a proportion of the known territories distributed throughout the species' range. These territories will be grouped and spaced according to the current biological knowledge of the habitat requirements, breeding and dispersal rates and population dynamics of Spotted Owls. Since research is ongoing, current guidelines (developed two years ago) don't consider the present knowledge and the ability of these guidelines to change with future knowledge depends on the willingness of government and industry to consider the future of this species. Since the requirements of Spotted Owls and timber harvesting most often are at odds, preservation of Spotted Owls means loss of revenue to government and industry.
Presently there are great problems with the use of management guidelines. In addition to not including current knowledge and the doubtful ability to include future data, the management guidelines are based on incomplete knowledge of: 1) the species' population dynamics; 2) whether the two subspecies (or even the different geographical populations) react similarly to habitat disturbances; 3) the effects of habitat disturbances to reproductive success; 4) the effects of isolation as densities are reduced; 5) dispersal patterns; and 5) effects of habitat disturbance on prey species density and diversity. As good as management guidelines could possibly be, there are 17 national forests in California and the application of the guidelines, and their ability to preserve Spotted Owls, can be expected to vary.
A number of biologists also are worried about the effects of timber harvesting on other species which constitute the forest

fauna. Many of the concerns about the Spotted Owl may be extended to other species, from red backed tree voles to Townsend's Warblers, which are dependent on mature and old-growth forests. There are a number of these species but the Spotted Owl seems to have become the most symbolic perhaps because, as a top predator, it is a very good indicator species of the health of forest ecosystems.

-- Great Gray Owl -- There are two endangered species of owls in California, the Great Gray Owl and the Elf Owl. Great Gray Owls are quite similar to Spotted Owls. Great Gray Owls are residents of mature and old-growth, montane forests; however, meadows must exist in close conjunction with the forest. They hunt meadows and nest and roost in the forest. Timber harvest is believed to have detrimental effects on Great Gray Owls because of disruption to the thermal forest cover and the destruction of nest sites.

Jon Winter, a field ornithologist working for the Department and the U.S. Forest Service, has studied this species for the last five years (Winter 1982). During this time we have only discovered 14 territories, all in the central Sierra Nevada, and not all sites have been occupied each year. Great Gray Owls are irregular breeders; in one area where we had one pair one year, we have had three pairs, no pairs and three pairs in the same area in successive years. Research (Winter 1982) has verified the use of forests for nesting and roosting, the use of meadows and meadow edges for hunting, and the much greater difficulty in locating Great Gray Owls than in locating Spotted Owls. Also, it has given us a good idea of how much area is necessary to support a pair of Great Gray Owls and a good insight into the population dynamics of this species.

Management of the Great Gray Owl should follow in the steps of the Spotted Owl. However, despite the research done so far and partially because of the species' scarcity management must proceed on an individual territory by individual territory basis. This has only occurred on the Stanislaus National Forest where placing artificial nest sites to enhance the nesting success of Great Gray Owls using a particular area has been tried.

-- Elf Owl -- Elf Owls are highly migratory, existing only along the Colorado River in California and migrating to Mexico in the winter. It is a forest edge species using riparian habitats of willow, cottonwood and mesquite. Presently we only know of two sites where Elf Owls occur with one of the areas of approximately one-quarter of a square mile supporting 5 to 10 pairs and the other slightly larger area supporting but a single pair (Cardiff 1980).

Suitable habitat for Elf Owls is fast disappearing along the Colorado River. During the mid-1970's I estimated that the amount of riparian forest along the California side of the Colorado River was disappearing at a rate of 10% annually. Irregated agriculture, depending on an already over-subscribed water source, is the cause for this riparian forest destruction. This situation has put the Elf Owl into dire straits; the two locations where it is still known to occur are the last remaining honey mesquite bosque, at one site, and screwbean mesquite bosque at the other site.

Of the 13 species of owls occurring in California, eight of these are forest dependent, two commonly nest in trees and one is

just an irregular visitor to the state. The variation in dependency upon forests and trees is as varied as the Elf Owl nesting and roosting in saguaros in desert areas to Great Gray Owls utilizing the cooling provided by a forest of red firs in the Sierra Nevada. In almost all cases the trees provide nest sites for this group of birds which is incapable of building its own nest. Also, many species are highly dependent on the cooling effects of a forest to moderate the microhabitat and allow occupation by species which are adapted to be active in the cooler evening hours.

Forest management is paramount in the management of most species of owls in the state. As the forests go so then will go the populations of owls. Forest conservation must involve everything from maintenance of old growth for Spotted Owls and Great Gray Owls to creating successional growth for Screech Owls and Pygmy Owls. However, recently we haven't had quite the problems maintaining successional stages as we have had in maintaining old growth stages. In order to achieve proper forest management for owls, the owls need advocates to educate management decision makers in the needs of this often over-looked group of birds. Only through the work and active participation by people advocating the conservation of this resource will the already degraded and deteriorating situation with owls be improved.

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