

Alternative 2 represents current practices that have been developed through interaction among soil scientists, hydrologists, foresters, biologists and other professionals. Compliance with these requirements is in large part a result of cooperation with the State of Oregon. Specialists from state and federal land management agencies agreed to the watershed Standards (specifications) that were written and included in the Malheur National Forest Draft EIS. Changing the methods for achieving the specifications may require new state certification processes

By implementing Alternative 2 the Forest would meet minimum state water quality Standards throughout the planning period while minimizing Present Net Value and Allowable Sale Quantity opportunity costs

d. Implications for Forest Plan Alternatives

Final Environmental Impact Statement Chapter II and Appendix B discuss the effects of this alternative way of meeting water quality requirements in Final EIS alternatives. The analysis of opportunity costs of selected means of water quality protection shown in Table G-4 shows the maximum Present Net Value and Allowable Sale Quantity effects. Actual Plan alternatives will have somewhat less opportunity costs as overlaps from lands withdrawn for wildlife, scenery, recreation or other nontimber objectives will help to provide shade producing vegetation

e. Role of Monitoring and Research

The assumption that leaving shade producing vegetation on riparian areas is based on extensive research that describes the importance of water temperature for water quality and habitat that maintains viable populations of fish.

Continued monitoring will be done on water temperature fluctuations due to removal and growth of stream shade-producing vegetation. See the Forest Plan monitoring program

**D. MANAGEMENT
REQUIREMENTS FOR
VIABLE POPULATIONS
OF EXISTING NATIVE
VERTEBRATE SPECIES**

**1. Source Of The
Management Requirement**

The NFMA regulations require that.

"Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired nonnative vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to ensure continued existence in the planning area. In order to ensure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." (36 CFR 219.19)

2. Description Of
The Management
Requirements

All vertebrate species in Region 6 were assessed with regard to population numbers and/or distribution that could result in either Forest or Regional extinction during the Plan period for the next five decades. Management Requirements were developed for species whose viability would be at risk if no management actions were taken to protect their habitats

The focus was on habitats that were likely to be limiting in the future (in short supply either in total acreage or in distribution) and on identification of particular species that could be used to represent all species dependent on those habitats. This identification was done on a subregional basis, recognizing the variability of situations within the Region. Once these species were identified, the Region defined their habitat requirements and biological characteristics. The species are included in the list of Management Indicator Species (MIS) that the Forests address in forest planning and subsequent monitoring

Table G-5 displays current Regional Management Requirement direction regarding limited habitats and wildlife species by sub-regional zones. The Malheur National Forest is in Zone IV, Blue Mountains

The pileated woodpecker and pine marten are the only species for which alternative ways of meeting Management Requirements are evaluated. Management requirements were not established for three-toed woodpecker habitat because the timber management strategy for lodgepole pine habitat should provide a significant amount of old-growth type Forest-wide. Furthermore, large acreages of old-growth lodgepole pine habitat have recently been attacked by mountain pine beetles, which precludes designation in many areas at the present time. Management Requirements for Threatened and Endangered Species, sensitive species, special habitats, and dead and defective tree habitat are not addressed in this analysis because opportunity costs associated with providing sufficient habitat to maintain viable populations are less than two percent. The Management Requirements for fish are met with the same Management Practices which provide the requirements for water quality and riparian area management, therefore further analysis is not provided



TABLE G-5

SPECIES MATRIX FOR ADDRESSING MANAGEMENT REQUIREMENTS FOR WILDLIFE AND THREATENED AND ENDANGERED SPECIES

ZONE HABITAT	Zone 1 NORTH COASTAL	Zone 2 WESTSIDE CASCADES	Zone 3 EASTSIDE CASCADES	Zone 4 BLUE MOUNTAINS
Mature and Old- Growth (Seral stages V & VI)	*Northern Spotted Owl Marten Pileated Wood- pecker	*Northern Spotted Owl Marten Pileated Wood- pecker	*Northern Spotted Owl Marten Pileated Woodpecker Three-toed Woodpecker	Pine Marten Pileated Wood- pecker Three-toed Woodpecker
	*The Final Supplemental Environmental Impact Statement and subsequent Record of Decision will establish direction for management of spotted owl habitat in Region 6			
Dead and Defective	Primary Cavity Excavators	Primary Cavity Excavators	Primary Cavity Excavators	Primary Cavity Excavators
Riparian	The Forest determined and documented as part of the planning records that there was not a need to address wildlife in addition to fish species as indicators for Management Requirements in riparian zones. Coordination of this process with adjacent Forests was necessary to determine consistency.			
Big-game		Mt. Goat	Mt. Goat (Wenatchee)	
T&E Species	Bald Eagle Peregrine Falcon Brown Pelican Aleutian Canada Goose	Bald Eagle Peregrine Falcon	Bald Eagle Peregrine Falcon Grizzly Bear Woodland Caribou (Colville)	Bald Eagle Peregrine Falcon

Habitat Needs

Once the species needing Management Requirements were identified, the Region defined habitat requirements and biological characteristics. These are the bases for providing habitat and also for deciding how best to represent the species' needs in the planning process and in the FORPLAN model

→Habitat needs were defined using information from existing research whenever possible (see bibliography). This information was used to define the habitat conditions, habitat dispersal, and habitat size necessary to meet the Management Requirement. When information was available, but did not fit the Management Requirement context exactly, professional judgement was used to apply the information in estimating habitat needs. When information was not available, habitat needs were developed using professional judgement of a number of the more knowledgeable biologists on the subject. Information from existing research was used whenever possible.

Specific information on habitat needs, specifications for meeting habitat requirements, and alternative ways of meeting the Management Requirements for pine marten and pileated woodpecker are presented in the following sections. For each species, information is provided for these three habitat factors.

Principal Habitats Used.

Information about the seral stages and Kuchler vegetation types which are used by the various species is documented in many research papers for individual species. Information as to which Kuchler type and/or seral stage are primary or secondary habitat, and the amount of dependency upon each habitat, is based mostly on professional judgement (Guenther and Kucera 1978, Phillips et al., 1981.)

Dispersal Distance Between Habitats:

The guideline on distribution of habitat areas is intended to establish a network that allows individuals of a species to successfully disperse to adjacent habitat areas. This provides interactions among individuals and prevents isolation of sub-populations. This guideline is called the dispersal distance. Research information alone is generally not adequate to establish reasonable dispersal distances between habitats. As a result, dispersal distance is often determined on the basis of observations, experience, and professional judgement. In establishing the network of habitat areas for each species, consideration is given to habitats in reserved areas and to habitat areas being established for other species.

Size of Habitat Areas.

The size of individual habitat areas provided for each wildlife species is based on the habitat acreage needed to support the basic social or reproductive unit of the species, (i e., breeding pairs). Both home range and species density information are used to estimate the needed size of habitat area. This was supplemented with professional judgement where no data were available for the specific habitat types being managed.

**3. Specifications
For Meeting Habitat
Requirements For
Pileated Woodpecker
and Pine Marten**

Approximately 35 wildlife species are known to depend on or prefer mature conifer habitat during some part of their life cycle on the Malheur National Forest. By providing a dispersion of mature/old-growth conifer habitat sites for the pileated woodpecker and pine marten, we are assuming that the other species preferring these types of habitats will have adequate habitat to maintain viable populations throughout the planning period. Timber management strategies for lodgepole pine habitat will provide a substantial excess of old growth Forest-wide for indicator species such as the three-toed woodpecker.

Regional specifications for pileated woodpecker and pine marten are discussed in the following sections. The specifications are summarized from "A Report on Management Requirements for Forest Planning on the National Forests of the Pacific Northwest Region, USDA Forest Service", (June 1986). In developing the report, various habitat sizes and dispersal distances were considered. Based on that analysis, minimum habitat sizes and maximum dispersal distances were identified for each species. This information is based on the best available data. There is no data specific that would indicate that smaller habitat size or greater dispersal distances (biological requirements or specifications) would be appropriate minimum levels. Therefore, alternatives which addressed changes to size or distribution were not considered in developing the Forest Plan for the Malheur National Forest.

Habitat specifications for pileated woodpecker and pine marten are summarized in Tables G-6 and G-7.



TABLE G-6

FILEATED WOODPECKER HABITAT REQUIREMENTS (ZONE IV, BLUE MOUNTAINS) ^{1/}

Principal Habitats Used	Dispersal Distance Between Habitats	Size of Area to which Wildlife Prescriptions Apply	Habitat Requirements to be Used in Analyses
1 Reproducing		600 acres/pair	Within a 1,000 acre unit:
Seral Stages V and VI of Kuchler types K11, K12, K14, K15, and riparian.	One habitat area for every 12,000 acres		a. Maintain 300 acres of conifers in seral stages V and/or VI, per pair for reproducing
2 Feeding			
All seral stages of Kuchler types listed for reproducing habitat, provided snags are present			a. Maintain a minimum average of 2 hard snags per acre greater than or equal to 12 inches dbh, within the 300 acre reproductive area. Of these 600 snags, 42 should be greater than or equal to 20 inches dbh.
			b. When possible, maintain reproductive area in 300 contiguous acres. If not possible, habitat may be arranged in blocks no less than 50 acres and no more than 1/4 mile apart
			c. Maintain a minimum average of 2 hard snags per acre greater than or equal to 10 inches dbh on an additional 300 acres for feeding.

^{1/}Malheur National Forest is in Zone IV, Blue Mountains. Principal habitats used vary by zone in the Region.

TABLE G-7

PINE MARTEN HABITAT REQUIREMENTS (ZONES III AND IV)^{1/}

Principal Habitats Used	Dispersal Distance Between Habitats	Size of Area to Which Wildlife Prescriptions Apply	Habitat Requirements to be Used in Analyses
1. Reproducing			
Seral stages V and VI of Kuchler types K4, K12, K13, K14, K15, and lodgepole climax.	One habitat area for every 4,000 to 5,000 acres	160 acres per habitat area (This figure represents the territory of one female and part of the territory for a male).	Maintain 160 contiguous acres of conifer in seral stages V or VI with a crown closure 50 percent or greater. Within the 160 acre unit Maintain an average of 2 hard snags per acre greater than or equal to 12 inches dbh. Of these 320 snags, 24 should be greater than or equal to 20 inches dbh.
2. Feeding			
Seral stages III-VI of Kuchler types K4, K11, K12, K13, K14, K15, and lodgepole climax			Maintain a minimum average of 6 down logs per acre at least 12 inches dbh and 20 feet long.

^{1/} Malheur National Forest is in Zone IV, Blue Mountains. Principal habitats used vary by zone in the Region.

a. Pileated Woodpecker Specifications

Principal Habitats Used:

Pileated woodpeckers need mature or old-growth stands of timber for nesting and feeding. Habitats were identified in Bull and Meslow (1977), Guenther et al. (1978), and Thomas (1979).

Dispersal Distance Between Habitats:

An initial five-mile maximum dispersal distance between habitats resulted from professional judgement documented in Phillips and Roberts (1985). In June of 1986, the distance between habitats was modified to one habitat for every 12,000 to 13,000 acres (about 5 miles apart) to allow greater flexibility in application. Irwin (1987) suggested that this distance could be greater, but also noted that dispersal distances of juvenile pileated woodpeckers are poorly known. He offered no concrete alternative to the five-mile distance.

Size of Habitat Areas

The size of areas used for nesting and roosting by pileated woodpeckers in Region 6 has been identified as a range of from 100 to over 810 acres. The Region defined 300 acres of old growth or mature timber for nesting and roosting sites, plus 300 acres of feeding area as a Region-wide requirement to meet the needs of pileated woodpeckers both east and west of the Cascades. A nesting and roosting area of 300 acres appears to be an average for different habitats. As more data specific to westside and eastside habitats (eastside may be further subdivided) becomes available, the size of the nesting area may be adjusted (Bull and Meslow, 1977, Bull, 1975, Mannan, 1982, Mellen, 1987). Mellen (1987) has already suggested an increase in foraging and nesting habitat area in westside habitats based on results from radiotelemetry of pileated woodpeckers in the Oregon Coast Range. A 1,000 acre unit was established as the minimum size territory that a pair of woodpeckers would defend. This was determined from research data. Snag size and density were taken from Thomas (1979), and acreage figures from Bull (1975), and Bull and Meslow (1977). See Table G-6 for summary of habitat specifications.

b. Pine Marten Specifications

Principal Habitats Used

The pine marten uses seral stages IV-VI closed sapling-pole, large mature, and old growth (Thomas, 1979, Guenther and Kucera, 1978, Phillips et al., 1981). The Kuchler types used are from Guenther and Kucera (1978). The principal habitat for pine marten is seral stages V and VI (mature and old growth).

Dispersal Distance Between Habitats

Burke (1982) recommends that the maximum dispersal distance between habitat areas for pine marten should be two miles. In 1984 the Regional Forester changed the dispersal distance from two to three miles. This change was made because it was felt where more than one adjacent habitat is available for dispersal, the dispersal distance can be extended to three miles for pine marten. This change has been reviewed by a number of biologists within and outside the Forest Service and most agree that it would appear not to create a population viability problem for represented species. In June of 1986, the dispersal distance specification for pine marten habitat was changed to one habitat for every 4,000 to 5,000 acres (about three miles apart) to allow greater flexibility in application.

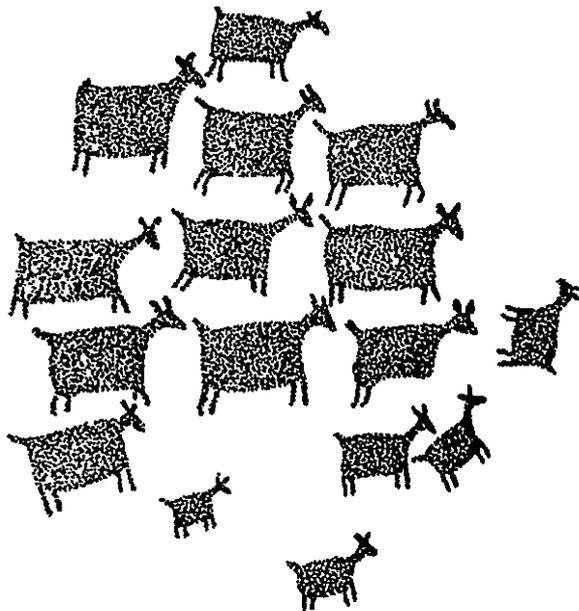
Juvenile marten dispersal up to 25 miles has been observed (Hawley and Newby, 1957 and Jonkel, 1959), and average juvenile dispersal distances greater than six miles were observed in these studies and in Burnett (1981). Based on this information, Irwin (1987) concluded that "the dispersal distance used in the MMR standards might be increased without reducing probabilities for interactions among adults or dispersing young". However, he did not provide a specific alternative, and concluded that there was little empirical insight into the probability of maintaining a viable marten population using the MR guidelines. As Burke (1982) noted, the distance covered by dispersing individuals is not an absolute guide to appropriate spacing between areas. The probability of dispersing individuals locating habitat areas and other individuals decreases rapidly as habitat areas are spaced further apart. Burke suggested that the observed range of population densities might be a better guide to spacing of habitat areas. He noted that the three mile spacing would result in a marten density 1/9 to 1/27 of normal densities in the literature.

Size of Habitat Areas.

In the professional judgement of the biologists listed in Phillips and Roberts (1985), a breeding female pine marten can be supported on 160 acres of quality habitat. Research is variable as to the size of area needed, but the female pine marten home range is estimated to be 160 acres (Campbell, 1979). The biologists listed in Phillips and Roberts (1985) judged that this area should be contiguous to ensure that there would be enough habitat within the home range of the female. They also judged that crown closure should equal or exceed 50 percent. Research papers indicate that areas with a low percent crown closure receive little or no use by pine marten. Therefore, to ensure an adequate crown closure, a minimum requirement of 50 percent closure was selected.

Research shows that pine marten require dead and down material for foraging, cover, and denning. A minimum down material requirement of 6 down logs/acre was selected (Burke, 1982). The number and size of snags required were selected to ensure that the amount of down material was achieved. The specifications for pine marten habitat are summarized in Table G-7.

Irwin (1987) noted that the MR guidelines contained an implied hypothesis that 160-acre areas would meet reproductive and winter range needs, and that marten would use broader areas containing a mix of less suitable habitat types at other times. He concluded that monitoring and research could provide appropriate tests of this hypothesis



4. Alternative Ways of Meeting the Management Requirement for Pileated Woodpecker and Pine Marten

On the Malheur National Forest, mature conifer habitat is defined as a stand of conifers which are predominantly over 160 years old.

Habitat areas for pileated woodpeckers and pine marten were identified using Regional spacing, size, and habitat suitability criteria. Pine marten sites are to be located every 4,000 to 5,000 acres and pileated woodpecker sites every 12,000 to 13,000 acres. However, there is no MR for the three-toed woodpecker indicator species at this time. A mountain pine beetle epidemic has effectively eliminated much of the old growth lodgepole pine component on the Forest for the next three decades, at minimum (USDA - Malheur National Forest, 1986).

Whenever possible, sites were placed within Wilderness, other no-harvest areas, and in areas of reduced harvest levels, wherever these met habitat quality and distribution requirements.

Table G-8 summarizes the number of mature conifer sites for pileated woodpecker and pine marten located on unsuitable and suitable land.

**TABLE G-8
MATURE CONIFER HABITAT SITES**

SPECIES	DISTRIBUTION REQUIREMENTS	UNSUITABLE TIMBER LAND	SUITABLE TIMBER LAND
Pine Marten	Every 4-5,000 ac.	17 sites	69 sites
Pileated Woodpecker	Every 12-13,000 ac.	7 sites	125 sites

Once the minimum number of habitat sites was determined using Regional spacing and habitat suitability specifications, the Forest considered two options or ways to provide mature conifer habitat. One way was to dedicate the required number of acres of suitable habitat in each site. These areas would not be managed for timber production and would be expected to remain in suitable habitat condition for at least five decades. The second way was to manage timber stands on a larger area in order to harvest timber and produce replacement stands over time.

a. Alternative 1: Managed Sites

Sites occurring on lands suitable for timber production are managed on a 240-year rotation. This means that for every acre of suitable habitat, two acres would be managed as replacement stands when the original acre is harvested. A rotation length of 240 years was selected over other rotation lengths because it maximized the allowable sale quantity while meeting habitat requirements. Information on this analysis is found in the Final Environmental Impact Statement Appendix B, section VI.B.

There were 29 pileated woodpecker and pine marten sites which overlapped with areas that were unsuitable or not appropriate for timber production. The remaining 103 pileated woodpecker sites and 57 pine marten sites were modeled by estimating an assignment to those analysis areas (or portions thereof) that would receive the mature conifer prescription, which harvests timber on a 240-year rotation. Managed habitat areas for the pileated woodpecker average 1260 acres in size, of which at least 300 acres must be mature at any point in time. Managed habitat areas for the pine marten will average 800 acres in size, of which at least 160 acres will be mature at any point in time.

Using the three-tiered replacement strategy, the Forest would be constrained to provide mature conifer on at least 48,720 acres of suitable timber land at any one time. This required approximately 146,460 acres to be harvested on 240-year rotations, rather than at some earlier rotation age such as 80-100 years.

Managing for mature conifer sites on long rotations assumes that existing stands can be harvested as other stands grow into a mature conifer condition to replace them. If replacement stands fail to develop desired structural characteristics (i.e., large diameter snags and down material) as predicted, mature conifer habitat would either be lost for a period of time or a further delay in harvesting the existing mature conifer stands would occur.

b. Alternative 2: Dedicated Sites

Under a dedicated mature conifer strategy, the required amount of mature conifer is withdrawn from timber production. Dedication of mature conifer sites has the advantage that the location of the stand does not change over time, making implementation less complicated. Dedication also assures that desired structural characteristics will be available for wildlife. There may be some risk of loss of individual stands through catastrophe.

c. Analysis of Opportunity Costs

Table G-9 displays the opportunity costs associated with the two ways of meeting the Management Requirement for the pine marten and pileated woodpecker. Allowable Sale Quantity and Present Net Value are slightly different when mature conifer habitat sites are managed on a long rotation compared to dedicating areas. Similar conditions may not exist on other Forests. Table G-10 (displayed later in this appendix) compares the first decade changes in Present Net Value and Allowable Sale Quantity associated with each of these alternatives when applied to the PNV Benchmark.

TABLE G-9

OPPORTUNITY COST OF ALTERNATIVE WAYS OF MEETING THE MATURE CONIFER MANAGEMENT REQUIREMENT
FOR PILEATED WOODPECKER AND PINE MARTEN

	FIRST DECADE		PRESENT NET VALUE MMS ^{4/}	CHANGE IN PRESENT NET VALUE
	ALLOWABLE SALE QUANTITY MMCF/YR ^{1/} (MMBF/YR) ^{2/}	CHANGE IN ALLOWABLE SALE QUANTITY ^{3/}		
PNV Benchmark	53.3 (304.9)	--	638.6	--

Opportunity Cost
Approximate Change

Opportunity Cost of
Meeting Mature Conifer
Management Requirements
with Long Rotations

2.0	4%	15.7	2%
(11 2)			

Opportunity Cost of
Meeting Mature Conifer
Management Requirements
with Dedicated Habitat

2 6	5%	20 9	3%
(14 9)			

^{1/}MMCF/YR = Millions of cubic feet per year

^{2/}MMBF/YR = Millions of board feet per year

^{3/}Percent change calculated on cubic foot basis

^{4/}MMS = Millions of dollars

d Consequences of the Different Ways of Meeting the Management Requirements

Populations of pileated woodpeckers and pine marten would not be expected to differ significantly under either habitat alternative. Both would maintain the same amount and distribution of habitat. There are, however, differences in the opportunity costs (see Table G-10).

e. Rationale for the Selected Method

In the Final Environmental Impact Statement, the Malheur National Forest chose to provide mature conifer habitat by dedicating sites occurring on suitable timberland, rather than managing this habitat on a 240-year rotation. This alternative achieves the desired habitat with roughly similar effect on timber outputs and Present Net Value. Although it is slightly more costly to manage dedicated habitat, it is believed to be an economically efficient way of meeting the Management Requirement considering the potential for long rotation management to affect three times the land area. If future old growth habitat needs are identified that have an influence on rotation length requirements, the stability of the dedicated habitat alternative may become more desirable.

f. Implications for Forest Plan Alternatives

Plan alternatives were designed to address public issues. As a result, most alternatives, including the preferred alternative, incorporate objectives for retention of mature and old-growth timber for wildlife, scenery, and recreational purposes. Pine marten and pileated woodpecker areas will be overlapped with areas selected for other purposes, such as unroaded recreation areas and special interest areas, wherever these meet habitat suitability and distribution requirements. Methods resulting in the opportunity cost shown in Table G-10 would benefit other resource uses as well.

g. Role of Monitoring and Research

The Forest Monitoring Plan (Forest Plan, Chapter V) calls for monitoring populations and habitats of pileated woodpecker and pine marten. At scheduled plan reviews, these data will be considered in determining the suitability and effectiveness of the selected way for meeting the Management Requirement for viable populations. This is important in testing the appropriateness of the selected modeling assumptions.

Information needs include.

Dispersal distances for pileated woodpeckers and pine marten:

- How far can juveniles successfully disperse?
- As habitat becomes increasingly fragmented, what is the ability of dispersing individuals to locate habitat islands?
- What effect does the size of habitat sites have on the ability of dispersing individuals to locate these sites?

Size of the mature/old growth conifer habitat sites:

- Utilization of habitat sites, particularly as the sites become more isolated.
- Reproductive success within habitat sites.
- Home range size in fragmented forests.

Utilization and reproductive success of pileated woodpeckers and pine marten in mature/old growth conifer sites managed on a 240-year rotation (i.e., are managed sites meeting habitat needs as compared to natural stands)?

Population density, home range size and distribution of pine marten in eastern Oregon.

**E. SPECIFICATIONS FOR
MEETING REQUIREMENTS
FOR DISPERSAL OF
CREATED OPENINGS**

**1. Source of the
Management Requirement**

Direction for harvest dispersion comes from several sources. The National Forest Management Act [Section 6(g)(3)(F)] sets broad direction that the Forest Service is to, among other things, identify maximum sizes for openings created by harvest activities (created openings). This is further defined in the National Forest Management Act implementing regulations [36 CFR 219.27(d)] and in the Regional Guide for the Pacific Northwest Region (pages 3-7 and 3-8).