3.10 WILDLIFE

The Project Area is characterized by a rich diversity of wildlife species and a wide variety of habitat types. Approximately 244 vertebrate species of wildlife are known or suspected to occur in the vicinity (within one mile) of the Project Area, including 17 amphibian species, 17 reptile species, 132 bird species, and 78 mammal species (PALCO, 1998; CDFG, 1998a). Ten species of wildlife known or suspected to occur near the Project Area are federal- or state-listed as threatened or endangered (Tables 3.10-1 through 3.10-4).

Over the past approximately 150 years, the composition, abundance, and distribution of various wildlife populations occurring in the vicinity of the Project Area have probably changed markedly as a result of changes in habitat quantity and quality, increased human presence, and shifts in predator/prey relationships. Species that have experienced the greatest changes in population generally tend to (1) be associated with habitat types (late seral/old-growth forest habitat [LSH], riparian areas, and wetlands) that are heavily affected by intensive timber management and agriculture (farming and livestock grazing); (2) be locally distributed with limited dispersal capabilities; (3) have a relatively low tolerance of human presence; and/or (4) have experienced heavy hunting or trapping pressure (e.g., fisher and marten). As defined for this analysis, LSH consists of late-seral forest (areas with trees that average over 24 inches dbh), uncut (i.e., unentered) old-growth forest (areas with multiple canopy layers dominated by trees over 30 inches dbh), and residual old-growth forest (managed forest with old-growth tree remnants) (also see Sections 3.9.1.4 and 3.10.1.1 and the glossary for definitions of these habitat types).

Historic timber management and agricultural activities have considerably altered the landscape and reduced the quantity and quality of LSH, riparian, and wetland habitat used by a number of wildlife species near the Project Area (see Section 3.9.1.1). Redwood LSH, in particular, has been significantly reduced within its range. Approximately 10 percent of the original coastal old-growth redwood forest habitat remains in its historical range. About 90 percent of this habitat occurs in parks and other reserves; the remaining approximately 10 percent is privately owned, nearly all of which occurs on PALCO lands (Green, 1985; Fox, 1988) (see Section 3.9). Loss of LSH is an ongoing concern for the southern area of Humboldt County encompassing the Project Area. For example, from 1992 to 1996, old-growth forest declined in the southern Humboldt region by 1.5 percent, while residual old-growth forest declined by almost 40 percent; little decline in such habitat occurred during 1996 to 1997 (SEI Headwaters Project Science Advisory Panel, 1997). In Humboldt County, the quality of LSH forest has been reduced by fragmentation and decreased structural complexity (e.g., snags, large trees, woody debris, and multi-layered canopy), primarily due to timber management and agricultural activities. Habitat connectivity, especially connectivity of LSH and riparian corridors, plays an important role in the distribution and dispersal of species and is essential to maintaining gene pools of low-mobility species dependent on forest habitat. Activities that isolate and

Table 3.10-1. Status, Habitat Associations, and Occurrence of Terrestrial Invertebrate Priority Species That Are Known or Suspected to Occur in the Vicinity (Within 1 Mile) of the Project Area

Species[1/]	Federal Status[2/]	Priority Habitat Association	Occurrence[3/]
Ground beetle *(Scaphinotus behrensi)*	SC	Cool damp woods, including logs and tree trunks[4/]	S
Humboldt ground beetle *(Scaphinotus longiceps)*	SC	Old-growth redwood and Douglas-fir forests[5/]	S
Klamath shoulderband[5/] *(Helminthoglypta talmadgei)*	ROD	Limestone rockslides, litter in coniferous forests, old mine tailings, and along shaded streams[6/]	S

1/ Species list based on lists provided by the FWS and identified in Frest and Johannes (1993) and USDI and USDA (1994).

2/ SC = Species of Concern; ROD = ROD Survey and Manage species. None of the species listed has special state status.

3/ S = Suspected to occur based on known range of species and the occurrence of potentially suitable habitat.

4/ Powell and Hogue (1979).

5/ Weber and Kavanaugh (1992).

6/ Frest et al. (1993).

Source: Foster Wheeler Environmental Corporation, 1998

Table 3.10-2. Status, Habitat Associations, and Occurrence of Priority Amphibian and Reptile Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
AMPHIBIANS								
Del Norte salamander (*Plethodon elongatus*)	SC, ROD	-	-	-	Various stages of valley-foothill riparian, montane hardwood-conifer, Douglas-fir, and redwood forest	Talus or surface rock[7/,8/]	S	S
Southern torrent salamander (*Rhyacotriton variegatus*)	SC	SSC	A	RFS	Late-seral stages of most major habitat types, particularly redwood and montane riparian	In or very near cold, clear streams, seepages or waterfalls[7/, 9/,10/]	D	S
Tailed frog (*Ascaphus truei*)	SC	SSC	A	G	Montane hardwood-conifer, ponderosa pine, redwood, and Douglas-fir forest	Riparian areas, primarily in LSH forest[7/,11/,12/]	D	D
Northern red-legged frog (*Rana aurora*)	SC	SSC	A	G	Coastal scrub, fresh emergent wetland, and riverine habitat types	Wetlands and riparian areas in forested ecosystems[7/,9/]	D	S

Table 3.10-2. Status, Habitat Associations, and Occurrence of Priority Amphibian and Reptile Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
Foothill yellow-legged frog (*R. boylei*)	SC	SSC	A	RFS	Valley-foothill riparian and riverine habitat types	Permanent clear streams with rock, gravel or sand bottoms [7/, 9/]	D	S
REPTILES								
Northwestern pond turtle (*Clemmys marmorata marmorata*)	SC	SSC	A	RFS	Riverine habitat type	Marshes, sloughs, moderately deep ponds, and slow-moving water[13/]	D	S

1/ Species list compiled from information obtained from the FWS (1997) and PALCO SYP/HCP. Species organized based on federal status, then taxonomic group.
2/ SC = Species of concern; SSC = Species of special concern; ROD = ROD survey and manage; A = HCP List A species; B = HCP List B species.
3/ Habitat guild association identified in PALCO SYP/HCP; G = Generalist, RFS = Riparian forest and shrub.
4/ Habitat types identified by the CWHR database as having the highest overall importance to the species for reproduction, feeding and cover.
5/ Priority habitat consists of the breeding habitat if the species is known to breed in the project region, winter roosting or foraging habitat if the species is not known to breed in the project region, or the habitat known or suspected to be the current limiting factor for certain species or species groups.
6/ D = Documented to occur; S = Suspected to occur based on known range of species and the occurrence of potentially suitable habitat. Occurrence information based on PALCO SYP/HCP, CDFG Natural Heritage Program Natural Diversity Database, and FWS (1995, 1997) species list.
7/ Jennings and Hayes (1994).
8/ Diller and Wallace (1994).
9/ Leonard et al. (1993).
10/ Diller and Wallace (1996).
11/ Welsh et al. (1993).
12/ FRAWG, (1997).
13/ Brown (1985) and Storm and Leonard (1995).
Source: Foster Wheeler Environmental Corporation, 1998

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
American peregrine falcon (*Falco peregrinus anatum*)	E	E, BOF, CFP	A	-	Wet meadows, most major forest types, and cliff habitat types	Cliffs, wetlands, croplands and meadows[7/]	D	S
Aleutian Canada goose (*Branta canadensis leucopareia*)	T	-	-	-	Grassland, wet meadow; fresh emergent wetland, and lacustrine habitat types	Agricultural fields and pastures[8/]	S	S
Bald eagle (*Haliaeetus leucocephalus*)	T	E, BOF, CFP	A	-	Late-seral stages of ponderosa pine, Sierra mixed conifer, white fir, lacustrine, and riverine habitat types	Mature and old-growth forests near water; lakes, reservoirs, and rivers[9/]	D	S
Western snowy plover (*Charadrius alexandrinus nivosus*)	T	SSC	A	-	Barren, marine, estuarine, and lacustrine habitat types	Winters mainly on sandy or gravelly marine and estuarine shores; nests mainly on salt pond levees and shores of alkali lakes [8/,10/]	S	S
Marbled murrelet (*Brachyramphus marmoratus*)	T, ROD	E, BOF	A	OG	Marine and late seral stages of Douglas fir and redwood habitat types	Mature and old-growth conifer forests [8/, 11/]	D	N

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
Northern spotted owl (*Strix occidentalis caurina*)	T, ROD	SSC, BOF	A	MLS/OG	Redwood, Douglas-fir, Klamath mixed conifer, and Sierra mixed conifer habitat types	Mature and old-growth conifer forests, second-growth conifer forest with residual old-tree component [12/]	D	D
Great gray owl (*S. nebulosa*)	ROD	E, BOF	B	-	Late-seral stages of most major forest habitat types	Boreal and dense conifer forests near wet montane meadows [13/]	S	S
Little willow flycatcher (*Empidonax traillii*)	SC	E	-	RS	Valley foothill-riparian, montane riparian, desert riparian, and wet meadow habitat types	Extensive thickets of low, dense willows edge on wet meadows, ponds, or backwaters. Common spring and fall migrant in riparian habitats.[8/]	S	S
Bank swallow (*Riparia riparia*)	-	T	A	RS	Valley-foothill riparian, montane riparian, coastal scrub, grasslands, fresh emergent wetland, and agriculatural habitat types	Nests in vertical banks and cliffs with sandy soils near water; forages over riparian areas during breeding and over grassland, brushland and cropland during migration[8/]	S	S

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
Golden eagle (*Aquila chrysaetos*)	-	SSC, BOF, CFP	A	-	Oak woodlands and most major forest habitat types	Rolling foothills and mountain terrain, wide arid plateaus deeply cut by streams and canyons, open mountain slopes, cliffs and rock outcrops[8/]	D	S
Harlequin duck (*Histrionicus histrionicus*)	SC	SSC	-	-	Marine and riverine habitat types	Swift shallow rivers[8/]	S	S
Northern goshawk (*Accipiter gentilis*)	SC	SSC, BOF	A	MLS/OG	Late seral stages of most major forest types and alpine dwarf shrub habitat types	Mature and old-growth forests[10/]	D	S
Ferruginous hawk (*Buteo regalis*)	SC	SSC	A	-	Oak woodlands, eastside pine, juniper, grassland, and desert riparian habitat types	Open habitats (e.g., grasslands, scrub-shrub) with elevated structures for nesting and roosting[10/]	D	S
Mountain quail (*Oreotyx pictus*)	SC	-	-	S/FO/YS	Coastal oak woodland, valley-foothill riparian, ponderosa pine, montane hardwood, montane hardwood-conifer, and Sierra mixed conifer habitat types	Brushy vegetation interspersed with grass/forb areas; steep slopes and thickets for cover [8/]	D	S

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
Osprey (*Pandion haliaetus*)	-	SSC, BOF	A	-	Valley-foothill riparian, ponderosa pine, montane hardwood, montane hardwood-conifer, Sierra mixed conifer, Klamath mixed conifer, saline emergent wetland, lacustrine, and riverine habitat types	Large trees, snags and dead-topped trees in open forest habitats near large bodies of water [8/]	D	D
Double-crested cormorant (*Phalacrocorax auritus*)	-	SSC	A	-	-	Forages in the vicinity of fresh, salt and estuarine water usually along coast; nests on piers and other structures on coast and large inland lakes[8/]	D	S
Cooper's hawk (*Accipiter cooperii*)	-	SSC	A	-	Oak woodlands, valley-foothill riparian, montane hardwood-conifer, and montane riparian habitat types	Dense stands of live oak, riparian deciduous, other forest habitats near water[8/]	D	S
Northern harrier (*Circus cyaneus*)	-	SSC	B	GR	Grasslands, wet meadow, and fresh emergent wetland habitat types	Flat or hummocky open areas of tall dense grasses, moist or dry shrubs, and edges for nesting, cover and feeding[8/]	D	S

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
Sharp-shinned hawk (*Accipiter striatus*)	-	SSC	A	MLS/OG	Oak woodlands, valley-foothill riparian, and most major forest habitat types	Dense stands in proximity to open areas; north-facing slopes with plucking perches are essential habitat[8/]	D	S
Prairie falcon (*Falco mexicanus*)	-	SSC	-	-	Oak woodlands, valley-foothill riparian, grasslands, and most major forest habitat types	Open terrain for foraging; nests in open terrain with canyons, cliffs, escarpments, and rock outcrops [8/]	S	S
Merlin (*F. columbarius*)	-	SSC	-	-	Agricultural fields, marine, estuarine, lacustrine, and riverine habitat types	Open habitats at low elevation near water and tree stands[8/]	S	S
Ruffed grouse (*Bonasa umbellus*)	-	SSC	-	MLS/OG	Late seral stages of valley-foothill riparian, montane hardwood, montane hardwood-conifer, Sierra mixed conifer, white fir, Klamath mixed conifer, Douglas-fir, and montane riparian habitat types	Riparian stands with young and old deciduous trees, brushy areas interspersed with herbaceous inclusions, and conifer stands for cover [8/]	D	S
Burrowing owl (*Speotyto cunicularia*)	-	SSC	A	-	Early seral stages of oak woodland and most desert habitat types	Open, dry grasslands, shrublands, and deserts with perches and burrows[8/, 14/]	N	N

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
Short-eared owl (*Asio flammeus*)	-	SSC	B	-	Grasslands, wet meadow, fresh and saline emergent wetlands, and agricultural habitat types	Open treeless areas with elevated sites for perches and dense vegetation for roosting and nesting [8/]	S	S
Long-eared owl (*A. otus*)	-	SSC	-	-	Oak woodlands, desert riparian, chapparal, grassland, and wet meadow habitat types	Dense, riparian and live oak thickets near meadow edges and nearby woodland and forest habitats [8/]	S	S
Vaux's swift (*Chaetura vauxi*)	-	SSC	A	MLS/OG	Douglas-fir and redwood forest habitat types	Mature and old-growth conifer forests [8/]	D	S
Purple martin (*Progne subis*)	-	SSC	A	S/FO/YS	Oak woodland, montane riparian, grassland, fresh emergent wetland, lacustrine, and riverine habitat types	Breeds in old-growth, multi-layered, open forest with snags; forages over riparian areas and forest [8/]	D	S
Black-capped chickadee (*Parus atricapillus*)	-	SSC	-	RS	Montane riparian habitat type	Montane riparian habitat with alder, willow, birch and other deciduous riparian trees[8/]	S	S

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
Yellow warbler (*Dendroica petechia*)	-	SSC	A	RS	Oak woodlands, valley-foothill riparian, ponderosa pine, Sierra mixed conifer, white fir, Klamath mixed conifer, and montane riparian habitat types	Dense riparian habitats for nesting, roosting, and foraging [8/]	D	S
Yellow-breasted chat (*Icteria virens*)	-	SSC	A	RS	Valley-foothill riparian, desert riparian, and montane riparian habitat types	Dense brushy thickets and tangles near water, and thick understory in riparian woodland [8/]	D	S
Great blue heron (*Ardea herodias*)	-	BOF	A	MLS/OG	Coastal oak woodland, valley-foothill riparian, montane riparian, grassland, lacustrine, and riverine habitat types	Shallow estuaries and fresh and saline emergent wetlands; nests in secluded groves of tall trees within 10 miles of shallow-water feeding areas [8/]	D	D
Great egret (*Casmerodius albus*)	-	BOF	A	MLS/OG	Estuarine, lacustrine, and riverine habitat types	Fresh and saline emergent wetlands along the margins of estuaries, lakes and slow-moving streams, on mudflats and salt ponds, and in irrigated croplands and pastures; nests in large trees in the vicinity of foraging areas[8/]	D	S

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence[6/]	
	Federal	State	HCP List				PALCO	ERTC
Black-crowned night heron (*Nycticorax nycticorax*)	-	-	A	MLS/OG	Oak woodlands closed cone pine-cypress, and montane riparian habitat types	Margins of lacustrine, large riverine, and fresh and saline emergent habitats[8/]	D	S
Snowy egret (*Egretta thula*)	-	-	A	MLS/OG	Riverine, emergent wetland, lacustrine, and estuarine habitat types	Dense emergent wetland or trees within daily commuting range of suitable aquatic or wetland feeding areas; nests in large trees in the vicinity of foraging areas [8/]	S	S
Black-shouldered kite (*Elanus caeruleus*)	-	-	B	G	-	Herbaceous lowlands with variable tree growth and dense population of voles; substantial groves of dense, broad-leaved deciduous trees used for nesting and roosting[8/]	D	S
Pileated woodpecker (*Dryocopus pileatus*)	-	-	A	MLS/OG	Late-seral stages of ponderosa pine, Douglas-fir, Klamath mixed conifer, white fir, Sierra mixed conifer and montane hardwood-conifer habitat types	Mature and old-growth conifer forests[8/]	D	S

Table 3.10-3. Status, Habitat Associations, and Occurrence of Priority Bird Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

1/ Species list compiled from information obtained from the FWS (1997), PALCO SYP/HCP, and USDI and USDA (1994). Species organized based on the following hierarchy: 1) Endangered or threatened federal status, then state status; 2) Federal species of concern status; 3) other state status but no federal status; 4) HCP list status only. Species organized taxonomically within these categories.

2/ E = Endangered; T = Threatened; SC = Species of concern; ROD = ROD survey and manage; BOF = Board of Forestry sensitive; CFP = California fully protected; A = HCP List A species; B = HCP List B species.

3/ Habitat guild association identified in PALCO SYP/HCP: RS = Riparian forest and shrub; G = Generalist; OG = Old growth; MLS/OG = Mid and late seral/old growth; S/FO/YS = Shrub/forest opening/young seral; GR = Grassland.

4/ Habitat types identified by the CWHR database as having the highest overall importance to the species for reproduction, feeding, and cover.

5/ Priority habitat consists of the breeding habitat if the species is known to breed in the project region, winter roosting or foraging habitat if the species is not known to breed in the project region, or the habitat known or suspected to be the current limiting factor for certain species or species groups.

6/ D = Documented to occur ; S = Suspected to occur based on known range of species and the occurrence of potentially suitable habitat; N = Not expected to occur. Occurrence information based on PALCO SYP/HCP, CDFG Natural Heritage Program National Diversity Database, FWS (1997) species list, and Zeiner et al. (1990a).

7/ PFRT, 1982.

8/ Zeiner et al., 1990b.

9/ ODFW, 1996.

10/ Brown, 1985.

11/ Ralph and Nelson, 1992.

12/ Thomas et al., 1990.

13/ Ehrlich et al., 1988.

14/ Zarn, 1974.

Source: Foster Wheeler Environmental Corporation, 1998

Table 3.10-4. Status, Habitat Associations, and Occurrence of Priority Mammal Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence [6/]	
	Federal	State	HCP List				PALCO	ERTC
California wolverine (*Gulo gulo luteus*)	SC	T, CFP	B	MLS/OG	Late-seral stages of red fir, logdepole pine, subalpine conifer forest, and alpine dwarf shrub habitat types	Remote montane forest areas; riparian and wet meadow habitats; mature conifer forests along north coast[7/,8/,9/]	S	S
Yuma myotis (*Myotis yumanensis*)	SC, ROD	-	-	G (cave)	Oak woodland types, valley-foothill riparian, desert riparian, coastal scrub and desert wash habitat types	Habitats near open water, including grass, shrub, and forest containing suitable roost sites (e.g., caves, mines, buildings)[10/]	S	S
Long-eared myotis (*M. evotis*)	SC, ROD	-	-	MLS/OG	Valley-foothill riparian, ponderosa pine, Douglas fir, montane riparian, Jeffrey pine, and juniper forest habitat types	Riparian wetland areas and conifer forest with roost sites (e.g., caves, snags, buildings, bridges)[10/]	S	S
Fringed myotis (*M. thysanodes)*	SC	-	-	G (cave)	Blue oak, valley oak, coastal oak woodland, and juniper forest habitat types	Roost sites (e.g., caves, mines, rock crevices, buildings); most frequent in coastal and montane forests and meadows[7/,10/]	S	S

Table 3.10-4. Status, Habitat Associations, and Occurrence of Priority Mammal Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence [6/]	
	Federal	State	HCP List				PALCO	ERTC
Long-legged myotis (*M. volans*)	SC, ROD	-	-	G (cave)	Montane riparian and most major conifer forest habitat types.	Riparian wetland areas, shrub habitat, and conifer forest with roost sites (e.g., buildings, mines, caves, snags, loose tree bark) [10/]	S	S
Small-footed myotis (*M. ciliolabrum*)	SC	-	-	-	Valley-foothill riparian habitat type	Suitable roost sites near water (e.g., buildings, caves, mines, crevices) mostly in relatively arid wooded and shrubby uplands[11/]	S	S
Spotted bat (*Euderma maculatum*)	SC	SSC	-	-	Water, flying insects, and invertebrates essential	Suitable roost sites near water (e.g., cliffs, rock crevices, occasionally caves and buildings)[11/]	S	S
Townsend's western big-eared bat (*Plecotus townsendii townsendii*)	SC, ROD	SSC	B	G (cave)	Desert riparian, coastal scrub, and sagebrush habitat types	Diverse habitats containing suitable roost sites (e.g., caves, mines and buildings)[10/]	S	S

Table 3.10-4. Status, Habitat Associations, and Occurrence of Priority Mammal Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence [6/]	
	Federal	State	HCP List				PALCO	ERTC
Humboldt marten (*Martes americana humboldtensis*)	SC	SSC	A	MLS/OG	Mid- and late-seral stages of Douglas fir, montane riparian, redwood, and wet meadow habitat types	LSH coniferous and deciduous forests with suitable den sites (e.g., cavities, snags, down logs) along Coast Range in northwestern California[11/, 12/]	S	S
Pacific fisher (*Martes pennanti pacifica*)	SC	SSC	A	MLS/OG	Late seral stages of most major forest types, including ponderosa pine, montane hardwood-conifer and white fir habitat types	Mature and old-growth conifer-dominated forest and forested riparian areas with suitable den sites (e.g., cavities, snags, down logs)[13/]	D	D
White-footed vole (*Arborimus albipes*)	SC	SSC	B	RS	Montane riparian habitat type	Known from streamside thickets in redwood forests of northern California[7/]	S	S
California red tree vole (*A. pomo*)	SC, ROD	SSC	A	MLS/OG	Late seral stages of Douglas fir and redwood habitat types	Mid- and late-seral Douglas-fir forests [14/]	D	D

Table 3.10-4. Status, Habitat Associations, and Occurrence of Priority Mammal Species That Are Known or Suspected to Occur on PALCO and Elk River Timber Company (ERTC) Lands in the Vicinity (Within 1 Mile) of the Project Area [1/]

Species	Status[2/]			PL Habitat Association[3/]	WHR Habitat Association[4/]	Priority Habitat Association[5/]	Occurrence [6/]	
	Federal	State	HCP List				PALCO	ERTC
Pallid bat (*Antrozous pallidus*)	-	SSC	B	G (cave)	Oak woodland habitat type	Suitable roost sites (e.g., caves, crevices, mines) primarily in open, dry habitats but also forests[11/]	D	S
American badger (*Taxidea taxus*)	-	SSC	-	GR	Jeffrey pine, eastside pine, mixed chapparal, and pinyon-juniper habitat types	Open areas with sandy soils including deserts[7/]	D	S

1/ Species list compiled from information obtained from the FWS (1997), PALCO SYP/HCP, and USDI and USDA (1994). Species organized based on the following hierarchy: 1) Endangered or Threatened federal status, then state status; 2) Federal Species of Concern status; 3) other state status but no federal status. Species organized taxonomically within these categories.
2/ T = Threatened; SC = Species of concern; ROD = ROD survey and manage; SSC = Species of special concern; CFP = California fully protected.
3/ Habitat guild association identified in PALCO's HCY/SYP: MLS/OG = Mid and late seral/old growth, G = Generalist, RS = Riparian forest and shrub, GR = Grassland, G (cave) = suitable roost sites in varied habitats.
4/ Habitat types identified by the CWHR database as having the highest overall importance to the species for reproduction, feeding, and cover.
5/ Priority habitat consists of the breeding habitat if the species is known to breed in the project region, winter roosting or foraging habitat if the species is not known to breed in the project region, or the habitat known or suspected to be the current limiting factor for certain species or species groups.
6/ D = Documented to occur; S = Suspected to potentially occur. Occurrence information based on PALCO SYP/HCP, CDFG Natural Heritage Program Natural Diversity Database, and FWS (1997) species list.
7/ Jameson and Peeters, 1988.
8/ Brown, 1985.
9/ Butts, 1992.
10/ Maser et al., 1984.
11/ Zeiner et al., 1990b.
12/ Kucera et al., 1995.
13/ USDA, 1994.
14/ Hayes, 1996.

Source: Foster Wheeler Environmental Corporation, 1998

fragment important habitats may affect associated species. As a result of declines in habitat, as well as increased abundance of introduced species, many wildlife species closely associated with LSH and riparian and wetland habitats are presumed to have experienced reductions in population size and distribution. Effective protection of many such species generally requires landscape-level planning, including conservation of interconnected tracts of priority wildlife habitats into areas with low human impact through coordinated management among federal, state, and private landowners.

PALCO identified two lists of wildlife species (Lists A and B) in its multi-species HCP, which included listed and other sensitive species potentially affected by activities in the HCP Planning Area (PALCO, 1998). List A includes those species that are or may be listed within the HCP planning period for which PALCO is seeking ITPs at this time. List B consists of those species that PALCO believes may be listed within the HCP planning period and for which PALCO may seek to amend the Plan and ITPs at a later date. Notably, the CDFG cannot authorize take of CDFG-designated fully protected species under any circumstances. However, the CDFG can approve conservation/mitigation measures for such species that the agency agrees are likely to avoid both take and the need for further consultation. Five California fully protected species are on List A in PALCO's HCP.

For the purposes of this EIS/EIR, analysis focused on effects of the proposed action on (1) priority habitat types within the Project Area and (2) priority species. Priority species include those species with special federal or state status or subject to heightened public awareness or concern, generally due to reductions in population size or distribution. Based on this definition, priority species include the following:

- Federal- or state-listed threatened and endangered species
- Species proposed for federal listing
- Federal candidate (former Category 1 candidates) species
- Federal species of concern (generally former Category 2 and 3 candidates)
- CDFG-designated species of special concern and fully protected species
- BOF sensitive species
- Northwest Forest Plan "Survey and Manage" and "protection buffer" species (i.e. Record of Decision (ROD) species) (USDI and USDA, 1994)
- Species identified on PALCO's HCP Lists A and B

ROD species were included as priority species because the BLM would be expected to be a cooperative manager of the proposed Headwaters or the 63,000-acre reserve which is currently within the bounds of the Northwest Forest Plan. These areas are currently under PALCO ownership primarily, with a small portion under current Elk River Timber Company ownership (see Chapter 2) . Thus, any ROD species that currently occur on private lands to be included in Reserve lands would be provided additional protection under the Standards and Guidelines of the Northwest Forest Plan, once those lands came into federal ownership. Notably, all wildlife species with any federal or state status, plus all PALCO HCP List A species (i.e., species proposed to be covered under PALCO's ITP), were considered "Endangered, Rare or Threatened" with respect to CEQA (Article 20, Section 15380 of the CEQA USDA Guidelines).

Although the priority and other wildlife species addressed in this analysis may occur in a variety of habitat types, evaluation of the proposed alternatives focused on the availability of certain priority habitats on which these species depend. Priority habitat was determined based on current available literature. Priority habitat generally included the breeding habitat if the species was known to breed in the project vicinity, winter roosting or foraging habitat if the species was not known to breed in the project vicinity, or the habitat known or suspected to be the current limiting factor for certain species or species groups. Species were assumed to occur in their respective priority habitat(s) unless surveys confirmed absence or available information indicated that the Project Area was outside the expected range of the species as indicated in the text.

Terrestrial wildlife resources known or suspected to occur in the vicinity of the Project Area and the anticipated effects of the proposed alternatives on these resources and related resource issues are described in the following subsections. Riparian and aquatic habitats are also discussed in Section 3.8, and vegetation (including priority species of plants) is described in detail in Section 3.9. In addition, effects on wildlife resources due to acquisition and coverage of "Additional Lands" by PALCO under the HCP and a finding of "Changed Circumstances" as described in the HCP IA are addressed in Section 3.20 (also see Chapters 1 and 2 for further discussion of the IA).

Wildlife resources in general was evaluated at multiple landscape scales, including the local level, the watershed level, and the regional (county) level. For PALCO and Elk River Timber Company lands in the Project Area, six major watersheds encompassing these lands were addressed in this analysis: the Bear-Mattole, Eel, Humboldt, Mad River, Van Duzen, and Yager, WAAs (PALCO, 1998).

3.10.1 Affected Environment

Terrestrial wildlife resources known or suspected to occur in the vicinity of the Project Area are described in the following subsections: (1) wildlife habitats and associated species, (2) habitat fragmentation and connectivity, (3) priority species, (4) neotropical migratory birds, and (5) game species. Each subsection provides an overview of the status and ecological importance of the habitat type/feature or priority wildlife species or species group in the region relative to the proposed alternatives.

The known and suspected occurrence of wildlife habitat and/or species in the Project Area was based primarily on the following:

- PALCO's HCP/SYP, including inventories and surveys conducted by PALCO (PALCO, 1998)
- FWS species lists
- The CDFG wildlife habitat relationships (WHR) predictive habitat model (CDFG, 1998a)
- The CDFG Natural Heritage Program Natural Diversity Database (Rarefind Version 6.0) (CDFG, 1998b)
- CDF information and databases
- Readily available scientific literature

The suspected occurrence of various species was evaluated based on the known occurrence of various habitat types and the documented geographic distributions and habitat associations of various species based on available scientific literature, the CDFG WHR database (CDFG, 1998a), and results of surveys conducted on PALCO and Elk River Timber Company lands.

Considerably more information on the occurrence and distribution of wildlife species in the Project Area was available for PALCO lands than for Elk River Timber

Company lands. As part of developing the HCP/SYP analyzed in this document, PALCO conducted extensive species-specific and multi-species monitoring studies on its lands, particularly for species with special federal or state status. In comparison, systematic surveys for priority species have not been completed on Elk River Timber Company lands. Available information on these lands is limited to primarily site-specific surveys associated with specific timber sales, incidental sightings, or long-term monitoring of known nest sites. Thus, data presented in this analysis are generally more detailed for PALCO lands than for Elk River Timber Company lands in the Project Area.

3.10.1.1 Wildlife Habitats and Associated Species

Species communities can be defined based on similarity in habitat use and other life history characteristics and similarity in expected response to changes in landscape conditions. The analysis of such species habitat associations is useful in determining the effects that current habitat conditions and future expected changes in habitat conditions (e.g., due to timber management) may have on groups of species that are known or suspected to occur in a Project Area. This section describes the acreage, distribution, and/or physical characteristics of the primary wildlife habitat types that are known or suspected to occur in the Project Area and the general types and number of species associated with such habitats, based primarily on the WHR model (CDFG, 1998a) and the HCP/SYP (PALCO, 1998).

Eight primary wildlife habitats are known or suspected to occur in the Project Area and may be affected by the proposed alternatives. These habitats include the following: (1) young forest, (2) mid-seral forest, (3) LSH, (4) hardwood forest, (5) riparian habitats, (6) wetland habitats (7) unique habitats (e.g., cliffs, gravel bars, and rock outcrops), and (8) open habitats (e.g., prairie, brush, and open forest). Thus, analyses focused on the current acreages and distribution of these eight habitats in the Project Area. These habitats were characterized by combinations of various vegetation types described in the glossary and in Sections 3.7 and 3.9. The definitions, acreage, and distribution of all vegetation types occurring on PALCO and Elk River Timber Company lands (as identified in the SYP) in the Project Area are presented in Sections 3.7 and 3.9, the glossary (Section 7), Table 3.9-1, and/or Figure 3.9-1. A description of the databases used to classify vegetation types is also provided in Section 3.9, and a crosswalk between vegetation classes used in this analysis, PALCO's HCP/SYP, and by the WHR model is provided in Appendix Table L-1.

Current and projected acreage for the various habitat types described in this section was based on PALCO's vegetation inventory, which was expanded to include Elk River Timber Company lands being considered for acquisition. This database was derived from delineation of vegetation based on aerial photographs taken in 1986, and updated to reflect recent timber harvesting and vegetation growth. To project growth, PALCO applied a modeling program (FREIGHTS) to simulate how the vegetation would grow and be harvested in each decade. This model produces numbers that are intended to correspond to the HCP/SYP; however, for the purposes of this analysis, a further distinction was added to identify stands containing residual old-growth trees because of the importance of these stands to wildlife. Therefore, acreage of the various seral stages described in this section is not directly comparable to the HCP/SYP due to the addition of a residual old-growth vegetation category. Furthermore, due to subsequent analyses run using the output of the FREIGHTS model (e.g., patch analyses), slight

discrepancies in some numbers can be expected. However, these variations in the data are minimal.

Young Forest Habitat

Young forest habitat consists of conifer saplings that are approximately 1 to 11 inches dbh and generally 10 to 20 years old (see Glossary and Section 3.9). Approximately 70 species of wildlife known or suspected to occur in the Project Area and its vicinity are associated primarily with young forest habitat for reproduction and/or foraging, including priority species such as the mountain quail, ruffed grouse, and sharp-shinned hawk (CDFG, 1998a).

Approximately 44,402 acres (20 percent) of the Project Area consists of young forest habitat (Table 3.9-1). Young forest habitat occurs predominantly in the Yager Creek WAA (15,537 acres), followed in descending order by the Eel (14,916 acres), Humboldt (8,366 acres), Van Duzen (3,237 acres), and then the Bear-Mattole (2,346 acres) WAAs (Appendix Table M-1). The current acreage of young forest habitat on PALCO and Elk River Timber Company lands in the Project Area is presented in Table 3.9-1.

Mid-Seral Forest Habitat

Mid-seral forest habitat consists of coniferous trees approximately 12 to 24 inches dbh that are generally 20 to 50 years old (see Glossary and Section 3.9). Approximately 80 species of wildlife known or suspected to occur in the Project Area and vicinity are associated primarily with mid-seral forest habitat for reproduction and/or foraging, including priority species of wildlife such as the Cooper's hawk (CDFG, 1998a).

Mid-seral forest is the predominant habitat type in the Project Area. Approximately 82,301 acres (38 percent) of the Project Area consists of this habitat (Table 3.9-1). Mid-seral forest occurs predominantly in the Eel WAA (23,928 acres), followed by the Bear-Mattole (18,664 acres), Van Duzen (13,788 acres), Humboldt (12,988 acres), Yager Creek (9,566 acres), and Mad River (3,367 acres) WAAs (Appendix Table M-1). The current acreage of mid-seral forest habitat on PALCO and Elk River Timber Company lands in the Project Area is presented in Table 3.9-1.

LSH

For this analysis, as defined previously, LSH includes late-seral forest, and uncut and residual old-growth forest. Notably, the definition of LSH used in this analysis differs from that used by CDF in the FPRs for "late succession" forest. Based on the FPRs, late succession forest consists of patches of LSH of at least 20 acres that are dominated by trees which meet the criteria of WHR Class 5M, 5D, or 6 with an open, moderate, or dense canopy closure classification, often with multiple layers (see Appendix Table L-1). In addition, functional characteristics of such stands based on the FPRs include large decadent trees, snags, and large downed logs. To facilitate comparison of these definitions, in this analysis, LSH is further classified by patch-size classes and by interior forest habitat, as described in Section 3.10.1.2.

For this analysis (as in the HCP/SYP), riparian LSH is treated as a component of LSH acreage, although riparian habitat is described separately in the following subsection and in Section 3.7.3. Because connectivity and patch size of LSH (particularly uncut and residual old growth) are important to wildlife, a detailed description of the current distribution, acreage, and size distribution of LSH on patches (including interior LSH) in and near the Project Area is presented in a separate section (Section 3.10.1.2).

According to the California WHR database (CDFG, 1998a), LSH is an important habitat for reproduction and/or foraging of approximately 60 species of wildlife known or suspected to occur in the Project Area and vicinity. These species include various

priority species such as three species of invertebrates, the tailed frog, southern torrent salamander, marbled murrelet, northern spotted owl, northern goshawk, pileated woodpecker, Vaux's swift, California red tree vole, marten, and fisher. Notably, none of the priority species associated with forested habitat known to occur in the Project Area is known to prefer redwood over Douglas-fir, except for the marbled murrelet, based on available literature (see Section 3.10.1.3). However, the tendency for relatively fast-growing redwood to develop large trees at an earlier age than Douglas-fir and other tree species may provide structural characteristics suitable for LSH associates sooner than other tree species (see Section 3.9).

LSH (mostly late-seral forest) is the second-most common habitat type in the Project Area. The two components of LSH, late-seral forest and old growth, are discussed briefly below.

LATE-SERAL FOREST

Of the approximately 68,474 acres of LSH in the Project Area, approximately 42,249 acres (62 percent) consists of late-seral forest (Figure 3.10-1). This habitat type consists of managed stands of large trees, usually averaging over 24 inches dbh and sometimes multi-storied (see Section 3.9.1.4). Approximately 15 percent (6,325 acres) of this late-seral forest is on Elk River Timber Company lands in the Humboldt WAA, with the remainder occurring on PALCO lands (Table 3.9-1). Overall, in the Project Area, most (83 percent) late-seral forest occurs in the Eel (19,623 acres) and Humboldt (15,411 acres) WAAs (Figure 3.10-1). Although these managed stands of late-seral forest typically do not provide as many snags, large downed logs, and large decadent trees as old-growth forest, their large tree size and high canopy closure is important to many species of wildlife, including the northern spotted owl (see species-specific subsections).

OLD GROWTH

Of the approximately 68,474 acres of LSH in the Project Area, approximately 9,314 acres (14 percent) consists of uncut old growth, and 16,911 acres (25 percent) consists of residual old growth. Most (5,140 acres) uncut old growth in the Project Area is dominated by redwood, with the remainder (4,174 acres) dominated by Douglas-fir (Table 3.9-1). All of the old growth mapped in the Project Area occurs on PALCO lands. Elk River Timber Company lands do contain some old growth; however, the trees are so scattered that they are not mappable (PALCO, 1998; Appendix N). Old growth on PALCO lands occurs in all six WAAs of the Project Area (Figure 3.10-1). The greatest acreage of uncut old-growth forest in the Project Area occurs on PALCO lands in the Humboldt (3,517 acres), and Bear-Mattole (3,275 acres) WAAs, followed by the Yager (1,729 acres), Eel (1,017 acres) and Van Duzen (138 acres) WAAs (Appendix Table M-1). The greatest acreage of residual old growth occurs in the Eel (6,520 acres) and Yager Creek (3,924 acres) WAAs. Almost all of the Douglas-fir old growth on PALCO lands is found in the southern portion of the ownership, in the Bear-Mattole and Eel WAAs.

Approximately 3,117 acres of uncut redwood old growth and 666 acres of residual redwood old growth occur in the proposed Headwaters Reserve, all of which is currently on PALCO lands (Figure 3.9-1). Approximately 756 acres of stands that contain a significant percentage of Douglas-fir (either as a co-dominant or subdominant canopy species) were delineated as redwood habitat because of the importance of the redwood component for marbled murrelets.

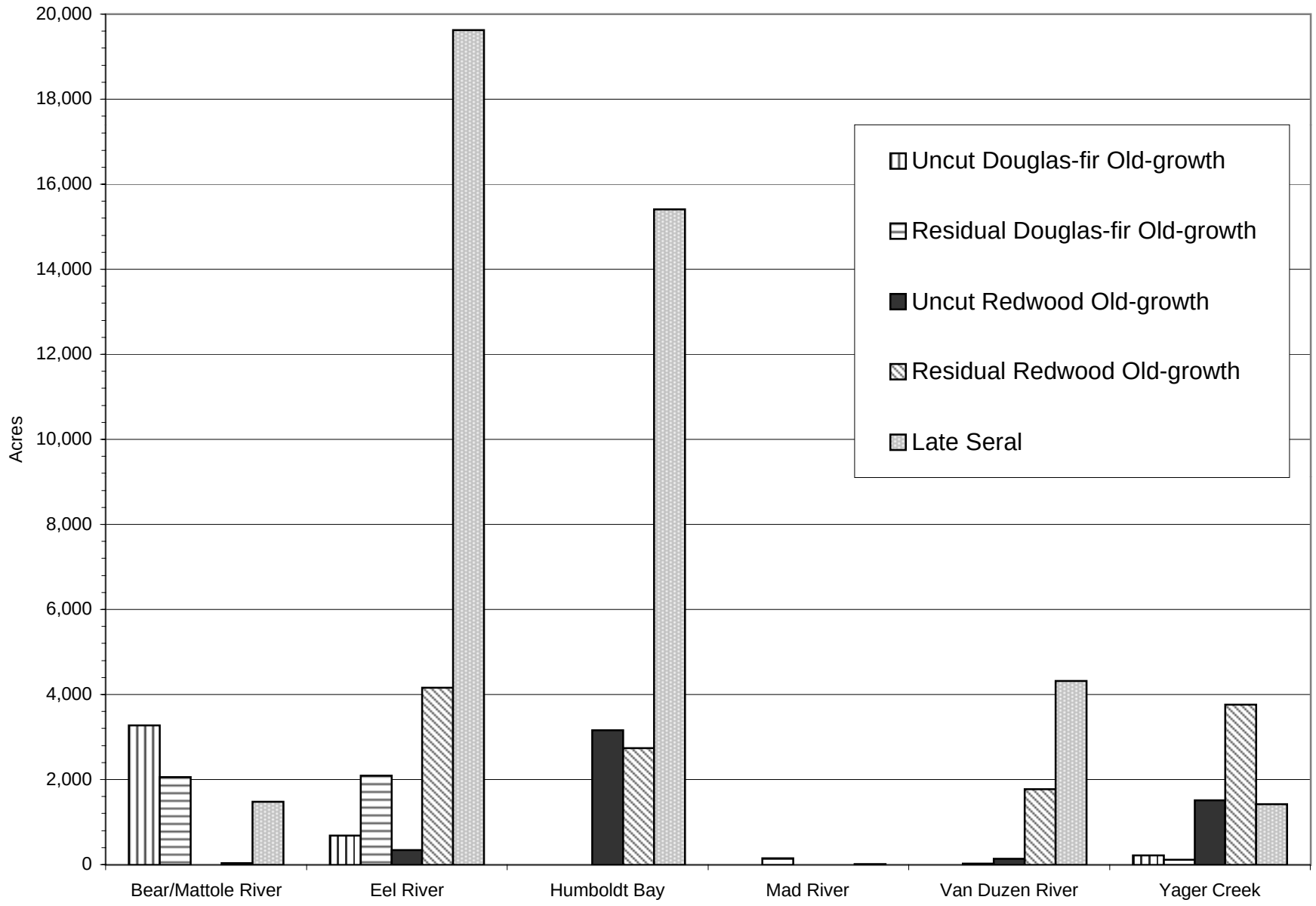

Figure 3.10-1. Current Acreage of Late-Successional Habitat (LSH) in the Project Area Occurring Within Each WAA
Source: Foster Wheeler Environmental Corporation, 1998

Hardwood Forest Habitat

Hardwood forest habitat is defined as deciduous forest stands dominated by tanoak, madrone, or alder (see Glossary and Section 3.9). Hardwood forest habitat, as defined, occurs primarily in the drier and higher elevation sites of the Project Area, some of which were originally conifer forest, but were converted to hardwood forest by past timber management activities (PALCO, 1998). Approximately 50 species of wildlife known or suspected to occur in the Project Area and vicinity are associated with hardwood forest habitat (particularly in riparian areas) for reproduction and/or foraging, including priority species such as the long-eared owl, ruffed grouse, black-capped chickadee, great blue heron, black-shouldered kite, and several bat species (CDFG, 1998a) (Tables 3.10-3 and 3.10-4).

Approximately 1,563 acres (1 percent) of the Project Area consists of hardwood forest habitat, all of which occurs on PALCO lands (Table 3.9-1). Hardwood forests in the Project Area are most abundant in the Eel WAA (740 acres), followed by the Bear-Mattole (487 acres), Humboldt (158 acres), Mad River (89 acres), Van Duzen (62 acres), and Yager Creek (27 acres) WAAs.

Riparian Habitat

Riparian (i.e., streamside) habitats provide important reproductive, foraging, and/or dispersal/movement corridors for many priority and other terrestrial and semi-aquatic species of wildlife. Approximately 200 species of wildlife known or suspected to occur in the Project Area and vicinity are associated primarily with wetland/riparian habitat for reproduction and/or foraging (CDFG, 1998a). Twenty-two of these are priority species of wildlife, including 3 invertebrates, 3 reptiles, 13 birds, and 3 mammals (Tables 3-10-1 through 3.10-4). Benefits to wildlife species associated with riparian habitats are derived from the availability of water and/or unique microclimates within riparian areas, particularly forested riparian areas. Numerous species are also associated primarily with a particular seral stage of forest within riparian areas; for example, the southern torrent salamander and tailed frog are known to be associated particularly with riparian areas dominated by LSH.

The acreage of riparian habitats, including seral stage, on PALCO and Elk River Timber Company lands is described in detail in Section 3.7. Approximately 18,173 acres (8 percent) of the Project Area consists of riparian habitat, as defined in Section 3.7 (Tables 3.7-3 and 3.7-8). Riparian habitat occurs predominantly in the Eel WAA (6,199 acres), followed by the Yager Creek (3,065 acres), Bear-Mattole (2,975 acres), Humboldt (2,929 acres), Van Duzen (1,943 acres), and Mad River (326 acres) WAAs (Table 3.7-8). Most of this riparian habitat occurs along Class I, II, and III streams. PALCO has approximately 263 miles, 773 miles, and 575 miles of Class I, II, and III streams, respectively, on its current property in the Project Area. The existing acreage of riparian habitat in the Project Area on current PALCO and Elk River Timber Company lands by seral type is presented for each HU in Table 3.7-8. Notably, the acreage of riparian LSH was included in the acreage of LSH reported in the previous subsection. Most riparian habitat in the Project Area is dominated by mid-seral forest (44 percent), followed by late-seral (24 percent) or young (14 percent) forest, with 5 percent composed of uncut old-growth forest (Table 3.7-8). Notably, acreage of current riparian habitat consisting of residual old-growth forest is not available in the GIS database.

Wetland Habitat

Wetland habitats provide important reproductive and foraging habitat for many priority and other terrestrial and semi-aquatic species of wildlife. Species of wildlife associated with wetland habitats that are known or suspected to occur in the

Project Area include five priority species: the northwestern pond turtle, northern red-legged frog, great blue heron, snowy egret, and great egret.

The acreage of wetland habitats on PALCO and Elk River Timber Company lands was described in detail in Section 3.7.2. Less than one percent (486 acres) of the Project Area consists of mappable wetlands as identified by the NWI (Table 3.7-3). Most (approximately 80 percent) of the wetlands in the Project Area are forested and 70 percent are located within existing WLPZs in the Eel (38 percent) and Van Duzen (21 percent) WAAs (Table 3.7-3). Notably, many important wetland microhabitats such as seeps and springs that are crucial to species such as the southern torrent salamander are not mappable at the landscape level.

Unique Habitats

Unique habitats known or suspected to occur in the vicinity of the Project Area include rock outcrops, talus slopes, river gravel bars, sandy or silty streambanks, snags, downed logs, cliffs, bridges, and abandoned buildings. No caves are known or suspected to occur in the Project Area because no carbonate rocks are known or likely to occur there (see Section 3.5). Most of the unique habitats typically provide critical breeding sites, as well as feeding or resting/roosting sites for a number of specialized species dependent on these features. Approximately 50 species of wildlife known or suspected to occur in the Project Area and vicinity are associated primarily with unique habitats for reproduction and/or foraging (CDFG, 1998a). These species include priority species or species groups such as western snowy plovers, cavity-nesting birds, peregrine falcons, bank swallows, Pacific fishers, martens, and a number of bat species (Tables 3.10-3 and 3.10-4).

Separate acreages for unique habitat types are not mapped as part of the vegetation inventory for the Project Area. Therefore, the acreage of non-timber habitat, defined in Section 3.9, is used as an approximation of the amount of gravel bar, rock outcrop, cliff, and talus habitats in the Project Area As such, approximately 5,166 acres (two percent) of the Project Area consists of non-timber habitat, all of which occur on PALCO lands (Table 3.9-1). These unique habitat features in general are assumed to be relatively isolated and scattered in the Project Area; however, gravel bars and streambanks are found in riparian areas.

Snags, large downed logs, and LWD are expected to occur in the greatest concentrations in LSH. Thus, given the lack of mapped information and the minimal systematic data available on the distribution and abundance of snags and downed logs in the Project Area, the amount of LSH was considered an index to the availability of snags and downed logs (see LSH section). As mentioned previously under LSH, large snags and downed logs considered most suitable for wildlife associated with these features are expected to be less abundant in managed late-seral forest than in uncut old-growth or even residual old-growth forests. Moreover, snags present in managed late-seral forest of the Project Area are usually suppressed, thin young trees rather than large old trees typically associated with uncut old-growth forests. In addition, downed wood in managed late-seral forest generally consists of remnant cull from timber harvest rather than complete downed logs, particularly since marketable large redwood logs are often removed due to their high market value. Information provided in PALCO's HCP, based on a relatively small sample of 139 vegetation plots, showed that sampled mid-seral forests had an average of 2.26 snags per acre, and late-seral forests had an average of 2.56 snags per acre (PALCO, 1998). These snag densities are generally considered inadequate to sustain snag-associated species of concern at the

100 percent potential population level, and it is lower than the minimum number of snags recommended for snag-associated species based on FWS and CDFG analyses (Brown, 1985; FWS, 1997a; PALCO, 1998). Notably, 83 percent of the snags in the late-seral stage are over 24 inches dbh, meaning that many of these trees may serve as habitat not only for species that require large cavities, but also for species that require small ones as well (PALCO, 1998).

Open Habitat

Open habitat in the Project Area was categorized into two basic types: natural and human-caused. Natural open habitats in the Project Area include naturally occurring climax stages of grassland/prairies, meadows, and brush where soil or site conditions do not support the growth of commercial timber. Human-caused open habitats primarily consist of forest openings (i.e., clearcuts) created predominantly by timber harvest but also by agricultural activity. Forest open habitat as defined in the SYP (PALCO, 1998) consists of areas characterized by grass, brush, and conifer seedlings up to approximately one inch dbh. In the Project Area, human-caused open habitat also includes prairie/grassland areas that have been created by clearing for timber harvest or other purposes. These areas are maintained as grassland/prairie habitat largely by livestock grazing. Analyses focused on the availability of naturally occurring open habitat, because such habitat is more limited on the landscape and is typically used by selected priority species for reproduction or foraging.

Approximately 100 species of wildlife known or suspected to occur in the Project Area and vicinity are associated primarily with naturally occurring open habitat for reproduction and/or foraging (CDFG, 1998a). These species includes 11 priority species: the golden eagle, northern harrier, merlin, ferruginous hawk, prairie falcon, burrowing owl, short-eared owl, great gray owl, American badger, deer, and elk (Tables 3.10-3 and 3.10-4). As described in Section 3.10.1.2, open habitats adjacent to forested habitats in particular can be either beneficial or detrimental to forest-dwelling wildlife, depending on the species. For example, the great gray owl benefits from this juxtaposition of habitats, nesting in forested habitat but requiring open meadows adjacent to forested habitat for foraging. In contrast, the marbled murrelet and other "interior forest" species are generally detrimentally affected by nearby open habitat, due to associated edge effects creating increased vulnerability to predation, changes in microclimate, etc. (see Section 3.10.1.2).

Virtually all of the open habitat in the Project Area occurs on current PALCO lands. Approximately 10,945 acres (5 percent) of the Project Area consists of forest open habitat (clearcuts) (Table 3.9-1) and 5,686 acres (3 percent) consists of both natural and human-caused prairie habitat. Approximately 40 percent of the prairie habitat consists of human-caused open areas converted from forest to pasture for livestock grazing.

3.10.1.2 Habitat Fragmentation and Connectivity

Some of the most important concerns for wildlife in the vicinity of the Project Area relate to the amount of fragmentation and connectivity of LSH and riparian areas. Thus, for this analysis, the terms habitat fragmentation and connectivity refer to the quality, size, and spatial arrangement of patches of LSH and forested riparian corridors across the landscape. Habitat connectivity and fragmentation are important issues with respect to populations of many priority and other species of wildlife occurring in the Project Area that are associated with LSH for reproduction, roosting, wintering, thermal cover, and/or dispersal. Such species

include the marbled murrelet, northern spotted owl, northern goshawk, Humboldt marten, Pacific fisher, and various species of invertebrates, amphibians, and big game (see Section 3.10.1.3).

Uncut and residual old-growth forest remaining in the Project Area is currently highly fragmented, with the largest uncut patch consisting of an approximately 2,777-acre, redwood-dominated patch in the Headwaters Forest. As a result, connectivity of remaining large- (≥1,000 acres) and medium-size (80 to 999 acres) patches of uncut and residual old growth is an important issue with respect to wildlife movement and dispersal. Redwood National Park, Humboldt Redwoods State Park, the Headwaters Forest, and the Elkhead Springs Forest create important ecological links in the region for north-south wildlife movement due to the large expanses of intensively managed forest and Highway 101, which separate these areas.

Habitat fragmentation can occur naturally or be created by human-related activities (e.g., timber harvest), the latter of which is the primary concern for wildlife in the Project Area. Natural fragmentation often occurs where LSH is interrupted by open prairies, meadows, emergent or shrubby wetlands, cliffs/rock outcrops, or ridges, particularly at higher elevations. Human-caused fragmentation is primarily the result of habitat removal, especially intensive forest management activity (including road construction and use), agricultural activities, and urbanization (Morrison et al., 1992). These activities have increasingly isolated populations of wildlife species dependent on forest habitats (especially LSH forest, snags, and downed logs), including forested riparian corridors. The cumulative effects of fragmentation and isolation of habitat on state, federal, and private lands have reduced the size, quality, and amount of interior forest (see below for definition of interior forest), LSH patches, increased the spacing between such patches, and decreased the width and quality of riparian corridors. The combined effects of high road densities, highly fragmented forest, and high year-round recreational use reduce the potential for dispersal through remaining habitats and increase the vulnerability of species dependent on forest interior habitat such as the marbled murrelet. Current levels of habitat fragmentation and connectivity in the Project Area and the importance of forest interior and edge habitat, patch size, and habitat connectivity, including potential wildlife movement corridors, are described in detail in the following subsections.

Forest Interior and Edge Habitat

Forest interior habitat generally consists of the portion of LSH that is not significantly influenced by nearby transitional or intervening habitats. Forest interior habitat is capable of retaining moisture, temperature, and vegetation characteristics unique to conditions of old-growth forest habitat. In contrast, "edge" habitat is defined as the boundary or transition zone between LSH and other habitat. Uncut, undisturbed interior forest conditions are important to many species associated with LSH. Thus, activities which disturb or remove interior forest or its components (e.g., timber management activities, including salvage logging and selective harvesting) degrade the suitability of LSH for such species. In addition, many species have adapted to interior forest conditions and thus are vulnerable to the encroachment of edge habitat (i.e., edge effects) and associated invasive species and predators. Increased forest fragmentation and the associated increase in edge habitat reduces the suitability of habitat for species dependent on forest interior conditions. As a result, LSH-associate species often decline as patches of LSH decrease in size (see Patch Size subsection below), become fragmented or degraded, and more isolated.

Notably, some species require both LSH (or components of LSH) and open habitat and may benefit from the intermingling of these habitats and the resultant edge habitat (see Great Gray Owl subsection and Section 3.10.1.5 Game Species).

For the purposes of this analysis, interior forest is defined as the area within an LSH stand greater than 400 feet from the edge of the stand. This definition of interior forest is based on the terrestrial vertebrate habitat components model (Vandemoer, 1995) developed by the U.S. Forest Service and applied in analysis of various landscape level projects (e.g., Snoqualmie Pass Adaptive Management Area EIS), as supported by available literature. A buffer width of 400 feet to define interior forest accounts for most reported effects of nest predation, and represents an approximate median value for microclimate based on edge effects reported in the literature (see Section 3.7.4.1 under Microclimate and Figure 3.7-2e). Edge effects on microclimate are considered particularly important with respect to low-mobility species such as amphibians and invertebrates (see species subsections that follow). However, conclusions about the impact of distance to edge can vary depending on the relative isolation of the patch and the quality of adjacent habitat (Harris, 1984).

Most of the available information on edge effects related to predation comes from studies of avian nest predation and parasitism, although estimates vary regarding the distance into a stand such effects extend (see also Section 3.10.1.3, Marbled Murrelet). Some authors have shown that nest predation extends 150 to 250 feet into a stand (Paton, 1994; Nelson and Hamer, 1995b), while others report predation and cowbird parasitism extending 1,000 to 2,000 feet into a stand (Gates and Gysel, 1978; Wilcove, 1985; Niemuth and Boyce, 1997; Kilgo et al., 1998). Edge effects on forest microclimate appear to vary with microclimate component. Studies have shown that changes in solar radiation, soil temperature, and soil moisture penetrate 300 feet into a stand, while air temperature, wind, and relative humidity penetrate much farther, up to 800 feet (Chen, 1991; Chen et al., 1992, 1993, 1995). These same studies found that changes in vegetation (which reflect these microclimatic changes) were detectable up to 450 feet into a stand for shade-tolerant species such as western hemlock, and 170 feet for shade-intolerant species such as Douglas-fir. Harris (1984) summarized the buffer necessary to insulate the forest interior microclimate of an old-growth forest stand from edge effects as the "three tree height rule," which roughly equals a 600-foot buffer.

Patch Size

The size and shape of LSH patches affect the quality of interior forest conditions for LSH-associate species. According to Harris (1984), three factors determine the effective size of a patch of old-growth forest: (1) actual patch size, (2) distance from similar patches of old-growth forest, and (3) the degree of habitat difference (transition) between the old forest and the intervening adjacent habitat. Large, round-shaped patches of LSH minimize the amount of edge habitat per acre of forest compared to linear-shaped forested areas. The quality of an LSH patch for interior forest species would be more influenced by an adjacent clearcut than an adjacent patch of mid-seral forest. Harris (1984) determined that a 200-acre circular patch of old-growth forest, surrounded by a clearcut, would be composed of only 25 percent interior forest. Thus, not only the size of the LSH patch, but the arrangement of these patches with respect to other habitat types, largely dictates the amount of suitable habitat available for LSH species across the landscape.

As described for LSH, under FPRs, late-succession forest stands (patches) must be at least 20 acres to meet the definition of such habitat with respect to wildlife. Notably, based on a circular-shaped patch and the definition of interior forest used in this analysis (i.e., areas at least 400 feet from edge habitat), a circular patch less than 11 acres provides no interior forest relative to the amount of edge. For this analysis, any patch containing at least one acre of interior forest was considered to provide potential interior forest habitat for at least some LSH associates, particularly low-mobility species such as priority species invertebrates. Under FPR, project areas characterized by such late-seral forest must also be evaluated for late-seral habitat continuity by estimating the amount of area comprised of late-seral patches greater than 80 acres in size and less than 1 mile apart or connected by a corridor of similar habitat. Based on the above, LSH patches were classified into the following size categories: small (0 to 19 acres), small/medium (20 to 79 acres), medium (80 to 999 acres), and large (greater than or equal to 1,000 acres).

Habitat Connectivity

Similar to quality and quantity of LSH patches, the connectivity of LSH is important to the movement, dispersal, and gene flow of species across the landscape. Habitat can become isolated not only due to large-scale removal of habitat (e.g., timber harvest), but also through the construction of long, linear projects (e.g., roads and powerlines) that bisect contiguous patches of forest, and encroachment of human activity. For example, roads facilitate access for other human activities that may disturb wildlife (e.g., illegal hunting, recreation). However, patches of forest need not be directly connected to facilitate adequate movement of some wildlife. Patches can also be situated in relatively close proximity and serve as "stepping stones" between other patches of suitable habitat. These stepping stones, if properly arranged on the landscape, can effectively connect habitats for some species where the distribution of land ownership or physical features on the landscape precludes providing a direct link between patches. Other habitat types can also connect patches of LSH, particularly mid-seral habitats with dense canopies or understories that provide cover from potential predators.

In general, the scale of habitat connectivity depends on the dispersal capability for particular species of animals and plants. Some species often avoid crossing unsuitable areas between patches of suitable habitat because they are more vulnerable to predation and/or desiccation. Some species require more closely spaced patches of suitable habitat to successfully move between patches to disperse or forage. For example, birds (e.g., the marbled murrelet and northern spotted owl) can fly a number of miles between patches of LSH appropriately spaced across the landscape. In contrast, species with restricted mobility, limited dispersal capabilities, and/or small home ranges (e.g., flightless invertebrates, amphibians, small mammals) must have connectivity on a microscale to effectively disperse; for some species, separation between patches of habitat on the order of several hundred feet may be isolating (Harris, 1984). Thus, depending on the distance between adjacent LSH patches, species populations associated with LSH may become isolated, limiting genetic interchange and increasing their vulnerability to stochastic events (e.g., fire) that may extirpate entire gene pools. As a result, networks of relatively contiguous or closely spaced patches of LSH and/or forested riparian corridors are important in providing adequate cover for movement and dispersal of wildlife across an otherwise fragmented landscape. A number of large wide-ranging mammals (e.g., wolverine, fisher, and marten) also utilize closely

spaced (on the order of several hundred feet) LSH patches for dispersal (Ruggiero, 1994). These species generally utilize areas away from high levels of human activity, often use forested riparian corridors for movement between patches of suitable habitat, and/or tend to avoid clearcuts as described in the respective species subsections in Section 3.10.1.3.

As described above under Patch Size, based on FPR standards, for the purposes of this analysis, connectivity of LSH under the alternatives was evaluated by assessing changes in the number and distribution of LSH patches greater than or equal to 80 acres in size (i.e., medium- and large-size patches) and less than 1 mile apart.

Current Conditions in the Project Area

Currently, most of the LSH in the Project Area is highly fragmented primarily due to intensive timber management and agricultural activities, particularly at readily accessible mid and low elevations. Since approximately the mid-1800s, operations such as timber harvest and road building have resulted in more openings than would occur by natural disturbance events alone. Contiguous blocks of old-growth forest have largely been replaced by small, isolated patches of younger seral forest. Habitat connectivity in the Project Area is also limited by the distribution of naturally occurring topographic features (e.g., drainages, ridges). Remaining LSH (particularly old-growth) patches are relatively isolated from one another and from other, large contiguous LSH patches in Humboldt County (see Figure 3.9-1 and Sections 3.9; 3.10.2.1, Priority Habitats; and 3.10.2.3). With respect to wildlife movement and dispersal, connectivity of these patches and potential movement for some wildlife species through the landscape are somewhat restricted to a few LSH corridors and relatively narrow riparian corridors provided by FPRs (see Section 3.7, Table 3.7-10, and Figure 3.7-2).

A description of the acreage of LSH was provided in Sections 3.9 and 3.10.1.1. This analysis describes the connectivity of LSH, focusing on the number and distribution of patches of LSH (including interior forest) relative to potential movement and dispersal of wildlife in the Project Area. As described in Section 3.10.1.1, no old growth occurs on current Elk River Timber Company lands, and most late-seral forest on these lands is connected to LSH on PALCO lands (see Figure 3.9-1). Thus, PALCO and Elk River Timber Company lands are discussed jointly in terms of current levels of habitat fragmentation and connectivity in the Project Area. The current road density in the Project Area ranges from 0.1 mile of road per square mile in the Giants Avenue HU to 5.1 road miles per square mile in the Lower Yager HU (see Table 3.6-4 and Section 3.6 for a detailed discussion of current roads). The size-class distribution of LSH patches (including interior forest habitat), connectivity of these patches, and key wildlife movement corridors in the Project Area are described below.

PATCH CHARACTERISTICS

Approximately 23,108 acres of LSH currently exist on PALCO lands in medium-size patches, and approximately 35,806 acres of LSH exists in large patches (Figure 3.10-2). Thus, most LSH (86 percent) in the Project Area exists in medium-or large-size patches. Approximately 20,011 acres of the total 68,474 acres of LSH in the Project Area is interior forest. Of this interior forest, 9,522 acres exist in medium-size patches, followed by 6,281 acres in large patches, 2,431 acres in small/medium patches, and 1,272 acres in small patches (Appendix Table M-3).

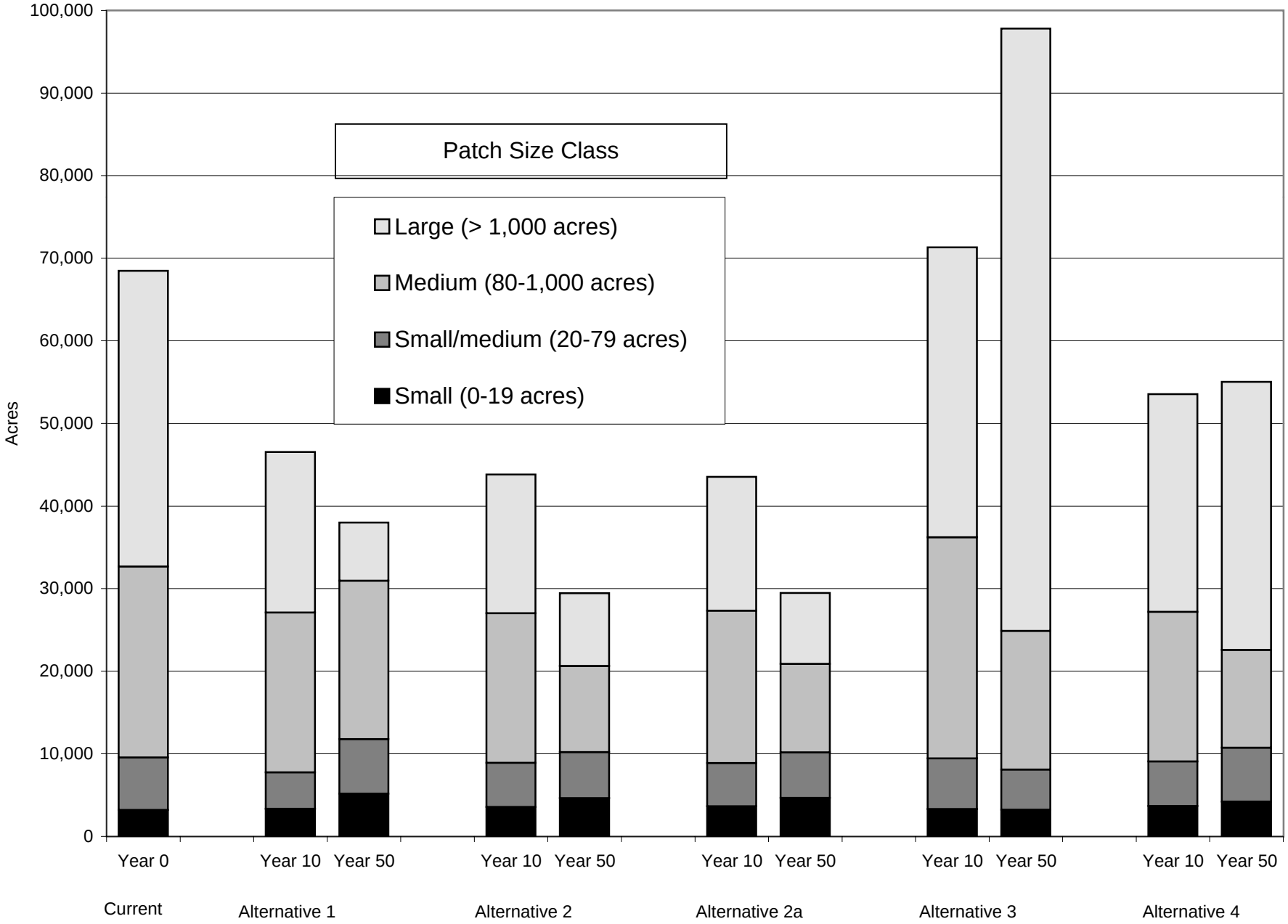

Figure 3.10-2. Current and Projected Acres of LSH in Various Patch Size Classes in the Project Area Among the Proposed Alternatives
Source: Foster Wheeler Environmental Corporation, 1998

The largest patch of LSH is centered in the redwood-dominated Headwaters Forest located on PALCO lands in the Humboldt WAA. This patch is 5,300 acres consisting of 3,712 acres of interior LSH and 3,117 acres of uncut old growth. The two next-largest patches of LSH are located in the Humboldt Bay and Eel WAAs (Figures 3.9-1 and 3.10-3).

The distribution of redwood- versus Douglas-fir-dominated patches of uncut and residual old growth differs across the Project Area and is related to various ecological conditions described in Section 3.9. Table 3.9-2 describes the size and species composition of the 12 largest remaining old-growth redwood stands in the Project Area. Most remaining medium- and large-size patches of uncut old growth redwood are located in the Humboldt and Yager WAAs. However, approximately 60 medium-size patches of residual redwood are located in the Eel WAA between Highway 101 and Humboldt Redwoods State Park (Figure 3.9-2). Most uncut and residual old-growth Douglas-fir patches occur in the Bear-Mattole and Eel WAAs (Figure 3.9-2). In particular, most of the uncut old-growth Douglas-fir in the Project Area is in the North Fork Mattole River watershed.

HABITAT CONNECTIVITY

Currently, patches of LSH that are greater than or equal to 80 acres (i.e., medium- and large-size) and less than 1 mile apart are well-distributed throughout the Project Area, with a few notable exceptions. Ninety-eight of the patches of LSH in the Project Area are greater than or equal to 80 acres in size. Overall, these patches are separated by a mean distance of 0.4 miles (ranging from a minimum distance of less than 200 feet to approximately 4 miles) of predominantly early and mid-seral forest (Figure 3.10-3 and Table 3.10-10). Almost all (95 percent) of these LSH patches are less than one mile apart, with only five patches more than one mile apart (Table 3.10-10). Based on the distribution of patches greater than or equal to 80 acres in size (medium and large patches), habitat connectivity (especially with respect to uncut and residual old growth) is particularly poor in four portions of the Project Area: (1) the northeastern portion of the Humboldt WAA; (2) the Van Duzen WAA; (3) the Eel WAA along the northeastern side of Highway 101; and (4) the Bear-Mattole WAA (see the following subsection) (Figures 3.9-1 and 3.10-3). Several of the large patches of LSH in the Yager Creek WAA (Figure 3.10-5) are more than a mile apart. Similarly, more than a mile separates some patches ≥80 acres in size in the Van Duzen and Eel WAAs (Figure 3.10-3).

KEY WILDLIFE CORRIDORS

In general, the potential benefits of remaining networks of LSH patches to wildlife are limited due to their relative isolation with respect to the surrounding managed landscape. With the exception of Humboldt Redwoods State Park, the Project Area is surrounded almost exclusively by privately owned lands zoned primarily for timber production (see Section 3.17 and Figures 1.1-1 and 1.1-2). The closest relatively large, contiguous patches of old-growth redwood forest are located in the adjacent Humboldt Redwoods State Park and in Redwood National Park, approximately 30 miles north of the Project Area. The nearest large patches of Douglas-fir-dominated LSH are located in the King Range National Conservation Area and approximately five miles southwest and the Six Rivers National Forest and approximately 29 miles northeast of the Project Area. In addition, remnant, smaller old-growth stands under BLM management are scattered around the Project Area. Forested riparian corridors between these patches likely facilitate wildlife movement and dispersal.

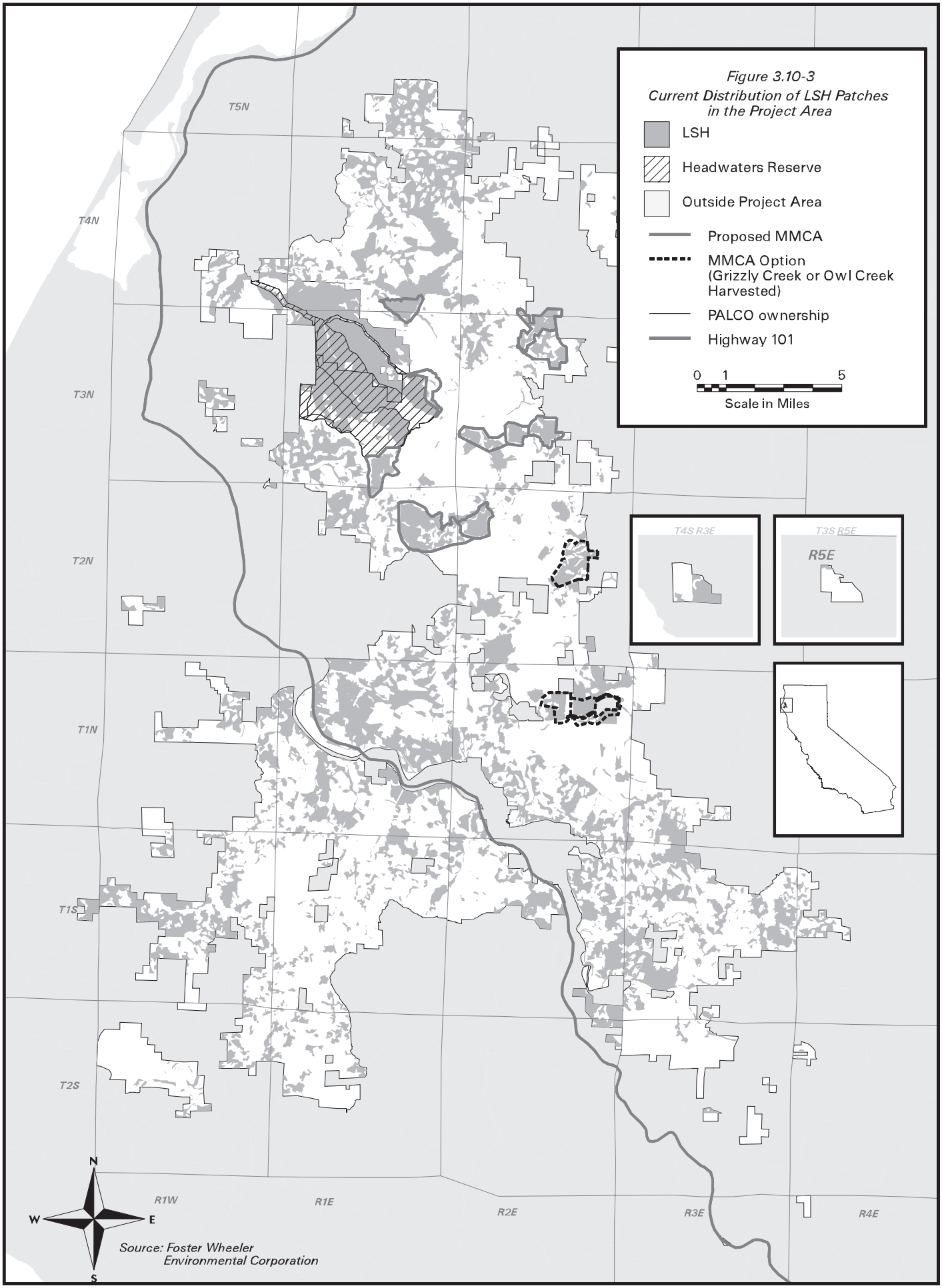
Figure 3.10-3
Current Distribution of LSH Patches in the Project Area
LSH
Headwaters Reserve
Outside Project Area
Proposed MMCA
MMCA Option (Grizzly Creek or Owl Creek Harvested)
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
W
E
S
Source: Foster Wheeler Environmental Corporation

Based on visual inspection of vegetation maps, three prominent potential dispersal barriers appear to interrupt the connectivity of LSH and riparian corridors in the Project Area: (1) Highway 101, (2) a natural gap in riparian connectivity between the Van Duzen and Yager WAAs, and (3) and a human-created gap in LSH through the Van Duzen WAA in the central portion of the Project Area (Figure 3.9-1 and Figure 3.10-3). These features likely significantly limit the potential for north-south movement of wildlife through the Project Area. Thus, the maintenance, protection, and/or enhancement of the remaining potential habitat corridors in these areas are likely important for allowing genetic exchange between populations of organisms to the north and south of these potential barriers described in detail below.

Highway 101 bisects the Eel WAA, which likely significantly interrupts the current potential for wildlife movement from the Project Area north of Highway 101 to Humboldt Redwoods State Park to the south (Figures 3.9-1 and 1.1-2). The forested habitats adjacent to the highway corridor are thus considered important to maximize the opportunity for organisms to disperse north and south of the highway. Most PALCO and Humboldt Redwoods State Park lands along the highway consist of early or mid-seral forest, particularly within about two miles northeast of the highway. The second potential dispersal barrier is a prominent, approximate 0.5-mile naturally occurring gap in riparian connectivity on a ridge separating the Van Duzen and Yager WAAs (Figure 3.9-1). The effect of this natural gap is exacerbated by surrounding predominantly early seral forest created by timber management activities (Figure 3.9-1). The third potential dispersal barrier is a minimum two-mile-wide stretch of mostly mid-seral forest occurring to the south of the ridge between the Van Duzen and Yager WAAs and encompassing most of PALCO lands in the Van Duzen WAA (Figure 3.9-1). The combination of the aforementioned features may restrict north-south movement and dispersal of some wildlife species between the Headwaters Forest and other old-growth patches in and north of the Humboldt WAA to Humboldt Redwoods State Park to the south, particularly those species that depend on closely spaced patches of LSH for refuge or cover (e.g., invertebrates associated with LSH).

Given the limitations stated above, two notable networks of LSH patches in and/or near the Project Area may currently provide important wildlife movement/dispersal corridors based on their proximity (less than 0.25 mile apart). These areas include (1) a network of mostly medium-size patches of LSH distributed from the northern portion of the Humboldt WAA through the large-size Headwaters Forest south to the Eel WAA in the northern one-third of the Project Area (i.e., "the Humboldt-Eel Corridor"); and (2) a network of mostly medium-size patches of LSH in the Eel WAA linking to LSH in Humboldt Redwoods State Park in the southeastern one-third of the Project Area (i.e., the "Eel-Park Corridor") (Figure 3.9-1). The Eel-Park Corridor may also provide an important link from the eastern side of Highway 101 to the western side of Highway 101 into the Park. These networks in combination with RMZs may facilitate movement of LSH associates such as fishers and martens to and from refugia in the park and/or patches of LSH in the Project Area.

3.10.1.3 Priority Species

Fifty-nine priority species (or subspecies) of wildlife are currently known or suspected to occur in the vicinity of the Project Area, including 3 species of invertebrates, 5 species of amphibians, 1 species of reptile, 36 species of birds, and 14 species of mammals. The status, habitat associations,

and occurrence of these priority species are summarized in Tables 3.10-1, 3.10-2, 3.10-3, and 3.10-4, respectively. The FWS (1997a) identified two species as potentially occurring in the Project Area, but that are not expected to occur there based on the absence of suitable habitat in the Project Area and/or the known range of the species: the California brown pelican (*Pelecanus occidentalis californicus*) (a federal- and state-endangered species); and the Newcomb's littorine snail (*Algumorda newcombiana*) (a federal species of concern) (FWS, 1997a; Zeiner et al., 1990a). Therefore, these species are not further addressed in this document.

The following subsections describe the natural history and occurrence of those priority species that are currently known or suspected to occur in the Project Area and are federal- or state-listed as threatened or endangered, state-listed as fully protected, or proposed for coverage under PALCO's ITP (i.e., List A, PALCO, 1998). These descriptions are organized first by status, then by taxonomic order. The occurrence of each of these species is described separately for current PALCO and Elk River Timber Company lands at the end of each species subsection. Priority species descriptions are presented in the following subsections: (1) invertebrates, (2) amphibians, (3) reptiles, (4) birds, and (5) mammals.

Notably, draft or final recovery plans have been completed for four priority species that are known to occur in the Project Area. A draft plan has been completed for the northern spotted owl (*Strix occidentalis caurinus*) and final plans have been completed for the marbled murrelet (*Brachyramphus marmoratus*), peregrine falcon (*Falco peregrinus anatum*), and bald eagle (*Haliaeetus leucocephalus*).

Invertebrates

Three priority species of invertebrates are suspected to occur in the Project Area: the ground beetle (*Scaphinotus behrensi*) and the Humboldt ground beetle (*S. longiceps*), both of which are federal species of concern, and a mollusk, the Klamath shoulderband (Table 3.10-1). Information on the occurrence of invertebrates in the Project Area is virtually nonexistent, as specific surveys have not been conducted. None of these species are on PALCO's List A, and thus are not proposed for coverage under the ITP (Table 3.10-1).

Many species of arthropods and mollusks (slugs and snails) are highly endemic, rare, and specialized, and are threatened by loss and degradation of moist forest habitats, such as LSH, riparian, and wetland habitat, primarily due to timber-management activities (including burning and salvage harvesting), as well as grazing (FEMAT, 1993; Forest Service, 1995). In particular, ground-disturbing activities threaten the microclimates required by many invertebrates inhabiting the floor of old-growth conifer forests, especially species that are wingless or flightless, since they have limited ability to colonize new areas (Lattin, 1990; Olson, 1992). Invertebrates in general are particularly abundant in most moist forest habitats, such as LSH, wetland, riparian, and aquatic habitats, and represent a significant source of biodiversity. Approximately 100,000 species of insects are estimated to occur in California (CWWR, 1996). Although relatively little is known about how invertebrates interact with various forest processes, they are believed to play an important role in the LSH ecosystem based on the high diversity and abundance of these organisms in LSH. Within forests, arthropods are important in preparing forest litter, soil, and decaying logs for processing by fungi and bacteria (Shaw et al., 1991). Most land snails and slugs are herbivores that feed mainly on tree leaves,

understory vegetation, large fungi, and inner bark layers, although animal matter and other species of snails are consumed by some species. Many species of mammals, snakes, and birds also prey on mollusks and other invertebrates (Forest Service, 1995). Aquatic invertebrates in particular are a primary source of food for many fish species (see Sections 3.7 and 3.8).

None of these three priority invertebrate species have been documented in the Project Area, although they may occur there based on the availability of potentially suitable habitat. Additional research and inventories are needed to further understand habitat requirements and population status of these and the many other species of invertebrates that may occur in the Project Area. Although the habitat requirements of these priority invertebrate species are not well known, they appear to be associated with habitat elements most commonly found in LSH, such as moist forest conditions, downed woody debris, snags, and undisturbed canopy (USDA and USDI, 1994, Appendix J2). Given these considerations, these species would be expected to be associated with LSH, particularly in riparian and wetland areas (Table 3.10-1). Thus, approximately 68,474 acres of potential priority habitat consisting of LSH occurs in the Project Area (Table 3.9-1 and Appendix Table M-1, and Figure 3-10-1).

Amphibians

Five priority species (or subspecies) of amphibians are known or suspected to occur in the vicinity of the Project Area: the Del Norte salamander (*Plethodon elongatus*), southern torrent salamander (*Rhyacotriton variegatus*), tailed frog (*Ascaphus truei*), foothill yellow-legged frog (*Rana boylei*), and northern red-legged frog (*R. aurora aurora*). The status, priority habitats, and occurrence of each of these species are summarized in Table 3.10-2. All five are federal species of concern and four of them are identified on PALCO's A list and thus proposed for coverage in the ITP. The four species listed under the ITP (the southern torrent salamander, tailed frog, northern red-legged frog, and foothill yellow-legged frog) are described in detail below. The Del Norte salamander is not known to occur on or in the vicinity of the Project Area. The nearest known location for this species is over four miles north of PALCO's property (Jennings and Hayes, 1994). This species is not addressed further in this document.

In general, amphibians depend upon components of both the aquatic and terrestrial environments, with some species more dependent on the aquatic environment than others. Reproduction occurs primarily along the edges of or on substrate associated with waterbodies, while foraging occurs both in water and on land. Forest-dwelling amphibians tend to be associated with cool, moist environments typically found along the margins of streams, lakes, or ponds, in forested wetlands, and on the floor of LSH forest. As such, timber harvesting and road building in and adjacent to these areas degrade the habitat of many species of amphibians. However, the humid coastal climate of the redwood zone of northwestern California may contribute to the maintenance of these suitable conditions in a wider range of habitats, such as previously harvested areas (Welsh and Lind, 1996; Diller and Wallace, 1996).

SOUTHERN TORRENT SALAMANDER

The southern torrent salamander is a federal species of concern, and a California species of special concern (CDFG, 1998c). This species is identified on PALCO's HCP List A and, thus, is proposed for coverage under the ITP (Table 3.10-2). Following a petition for listing in May 1994, the FWS determined listing of this species was not warranted based on insufficient information (USDI, 1995). No formal status review has

been completed to date (Personal communication, S. Lawrence, FWS, 7/27/98). The range of the southern torrent salamander includes the Coast Ranges in northwestern Oregon to southern Mendocino County, California (Leonard et al., 1993) at elevations of approximately 0 to 3,950 feet (Nussbaum et al., 1983; Jennings and Hayes, 1994). Populations of this species may be threatened by removal of riparian old-growth forests, changes in seep hydrology, and increased deposition of fine sediments in streams, primarily due to timber management activities (Corn and Bury, 1989; Jennings and Hayes, 1994b; Diller and Wallace, 1996).

Breeding habitat for the southern torrent salamander is generally considered to be forested permanent seeps, streams, and waterfalls with rocky substrates and cold temperatures (optimum 8 to 13°C); foraging occurs in moist areas in or near streams and seeps (Corn and Bury, 1991; Leonard et al., 1993; Diller and Wallace, 1996; Welsh and Lind, 1996). Welsh and Lind (1996) found that percent seep habitat was the single best variable for predicting abundance of southern torrent salamanders in their northwestern California study area. The ecological conditions found in LSH (complex structure, deep litter layer, abundant downed woody debris, and dense herbaceous layer) are assumed to provide adequate terrestrial and aquatic habitat conditions for the species (Bury and Corn, 1988; Welsh and Lind, 1996). Significantly greater numbers of southern torrent salamanders have been found in older (greater than 200 years old) forest stands than in younger stands (Welsh and Lind, 1988, 1991; Welsh, 1990; Corn and Bury, 1991). However, younger, managed forests are also known to provide habitat for this species (Bury and Corn, 1989; Diller and Wallace, 1996; Welsh and Lind, 1996). Although Diller and Wallace (1994) and Corn and Bury (1989) found southern torrent salamanders in some managed forests, they do not believe that this species favors a landscape dominated by young forests. Where the salamanders persist in previously harvested areas, other factors such as riparian canopy cover, coastal climate, and aspect help maintain favorable microclimate conditions.

The "cementing" of stream substrate from the accumulation of fine sediments appears to be the most readily measured negative impact to southern torrent salamander habitats (FRAWG, 1997). Optimum substrate size and proportions to maintain adequate interstitial space used for cover and oviposition by this species consist of at least 68 percent gravel, boulder and bedrock, and less than 50 percent cobble with gravel, with a low percent sand component (Diller and Wallace, 1996; Welsh and Lind, 1996). High-gradient stream reaches provide suitable habitat because they are transport areas where finer sediments do not accumulate and gravel and cobble do not become embedded (Diller and Wallace, 1996). In particular, gradient may be an important feature to allow southern torrent salamanders to persist in logged streams (Corn and Bury, 1989).

The southern torrent salamander is widely distributed on PALCO lands, where observations have been made in the Bear-Mattole, Yager, Eel, Humboldt, and Van Duzen WAAs (PALCO, 1998). This species has not been documented to occur on Elk River Timber Company lands of the Project Area (CDFG, 1998b), although it is suspected to occur there based on the occurrence of potentially suitable habitat. In general, this species is limited to non-fish-bearing streams and seeps, although it has been found in seeps draining Class I streams (Personal communication, P. Detrich, FWS, September 2, 1998). Therefore, for the purposes of this analysis, priority habitat for the southern torrent salamander is considered to be riparian areas dominated by LSH along Class II

streams. As such, approximately 243 miles of Class II streams likely provide habitat for this species in the Project Area.

TAILED FROG

The tailed frog is a federal species of concern and a species of special concern in California. This species is identified on PALCO's HCP List A and is thus proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-2). The current range of this species occurs between the Pacific Coast and the Cascades from southwest British Columbia through western Washington and Oregon into California where it is primarily limited to the northwestern corner of the State in Humboldt, Del Norte, Trinity, Siskiyou, and Mendocino counties. Elevations where this species occurs range from near sea level to 6,500 feet (Bury, 1968; Jennings and Hayes, 1994; Leonard et al., 1996). Notably, most of what is known about tailed frogs is based on data collected outside of California (Jennings and Hayes, 1994). Tailed frogs are sensitive to canopy disturbance and increased sedimentation associated with timber harvest and management operations, modification of historical flooding regimes, and grazing (Corn and Bury, 1989; Welsh, 1990; Jennings and Hayes, 1994).

Breeding and developmental habitat for the tailed frog generally consists of permanent, cool (usually less than 15°C) streams with cobble/boulder substrate and woody debris (DeVlaming and Bury, 1970; Welsh et al., 1993). These microclimatic conditions are typically associated with cold, clear headwater to mid-order streams in older forest ecosystems that are non-fish-bearing (Welsh et al., 1993). Breeding occurs during late August and September, eggs are laid during the summer, and larvae remain in water for several years (Nussbaum et al., 1983). Adults forage mainly on land along streambanks but also underwater, and seek cover under rocks and woody debris in streams (Zeiner et al., 1990a). The tailed frog has been associated with many different forest types, including Douglas-fir, redwood, Sitka spruce, ponderosa pine, and western hemlock (Jennings and Hayes, 1994). Older (greater than 200 years), multi-layer forests, downed woody material, ground-level vegetation, ground cover, and canopy closure are all important predictors of the occurrence of tailed frogs in northwestern California and southern Washington (Aubry and Hall, 1991; Welsh et. al., 1993). Logged sites have been shown to have significantly lower densities of tailed frogs than forested sites in British Columbia (Dupuis and Friele, 1995) and the coastal mountains of Oregon (Corn and Bury 1989). The suitability of the forested sites is probably related to two primary factors: water temperature and sedimentation (FRAWG, 1997).

The tailed frog has been observed on PALCO lands in the Eel, Bear-Mattole, Yager, Humboldt and Van Duzen WAAs (CDFG, 1998b; PALCO, 1998). The tailed frog has also been documented to occur on Elk River Timber Company lands of the Project Area in the Salmon Creek drainage (CDFG, 1998b). Based on the above, for the purposes of this analysis, priority habitat for the tailed frog is considered to be riparian areas dominated by LSH along Class II streams. As such, approximately 243 miles of Class II streams likely provide habitat for this species in the Project Area.

NORTHERN RED-LEGGED FROG

The northern red-legged frog subspecies (*Rana aurora aurora*) is a federal species of concern, and a California species of special concern (CDFG, 1998c). This species is identified on PALCO's HCP List A, and, thus, is proposed for coverage under the ITP (PALCO, 1998; Table 3.10-2). The southern subspecies, California red-legged frog (*R.a. draytonii*), is a federal threatened species; however, the northern extent of its range is south of the Project

Area. The current range of the northern subspecies extends from southwest British Columbia through western Washington and Oregon into California, where it is primarily limited to the coast ranges from northern Humboldt County south to Marin County (Leonard et al., 1996; Zeiner et al., 1990a; Jennings and Hayes, 1994). Red-legged frogs are known to inhabit the coast ranges up to elevations of 3,900 feet (Zeiner et al., 1990a). Primary threats to this species in California include predation by introduced species, particularly the bullfrog, and destruction of wetland and riparian habitat from timber harvest and urban development in coastal watersheds, as well as intensive grazing.

Breeding habitat for red-legged frogs includes streams, small ponds, reservoirs, springs and marshes (Nussbaum et al., 1983; Blaustein et al., 1995). Within these habitats, the red-legged frog usually frequents temporary and permanent pools that are bordered by dense grasses or shrubs (Jennings and Hayes, 1994). Although not restricted to old-growth forests, the red-legged frog is frequently found in this habitat (Bury and Corn, 1988). In southern Washington, Aubry and Hall (1991) found that this species was most abundant in mature stands and least abundant in young stands. Presence of the red-legged frog in these stands may be correlated more with downed woody debris and ponds than stand age (Aubry and Hall, 1991). In the coastal redwood zone of northwestern California, red-legged frogs are commonly found on streamside benches with dense swordfern undergrowth (Twedt, 1993).

The red-legged frog has been observed on PALCO lands in the Eel, Humboldt, Mad River, and Van Duzen WAAs as well as Elk River Timber Company lands in the Humboldt Bay WAA (CDFG, 1998b; PALCO, 1998). It is likely that this species is distributed in suitable habitat throughout the Project Area. Priority habitat for this species in the Project Area is considered to be wetlands and riparian areas along Class I and II streams. Approximately 18,173 acres of this priority riparian habitat occurs on PALCO and Elk River Timber Company lands in the Project Area (Table 3.7-8). Approximately 86 acres of wetlands occur in the Project Area (Table 3.7-3).

FOOTHILL YELLOW-LEGGED FROG

The foothill yellow-legged frog is a federal species of concern and a California species of special concern. This species is also identified on PALCO's HCP List A and, thus, is proposed for coverage under the ITP (CDFG, 1998c; PALCO, 1998; Table 3.10-2). Its current range occurs from western Oregon south into California coastal mountains and Sierra Nevada foothills to San Bernardino and Los Angeles counties (Leonard et al., 1996). Historically, the range of this species in California extended throughout the foothill areas of most drainages from the Oregon border south to the San Gabriel River at elevations from near sea level to 6,365 feet (Hemphill, 1952; Jennings and Hayes, 1994). This species is threatened by increasing numbers of exotic aquatic predators (mainly bullfrogs) and artificially high and low water levels associated with hydroelectric projects (Jennings and Hayes, 1994). The foothill yellow-legged frog is one of the least understood species of ranid frog in California (Jennings and Hayes, 1994).

Breeding, larval, and developmental habitat for the foothill yellow-legged frog consists of shallow, low-velocity, small- to moderate-sized streams with cobble and boulder substrate, particularly near gravel bars, and vegetated streambanks (Kupferberg, 1996). Oviposition generally occurs between March and early June, with maturity reached after about two years (Jennings and Hayes, 1994). Foraging occurs within or near (approximately 15

feet) streams (Zeiner et al., 1990a; Kupferberg, 1996). This species is associated with streams in a variety of habitats, including meadows, shrub, and young (less than 100 years old) and old forests (greater than 200 years old) and tolerates warm (less than 24 to 27°C) water conditions (Zeiner et al., 1990a et al., 1988; Welsh and Lind, 1991; Jennings and Hayes, 1994; Kupferberg, 1996). LWD along lentic river margins such as side pools and channels is also an important component of cover habitat for this species (FWS, 1997a).

Observations of the foothill yellow-legged frog have been recorded incidentally on PALCO lands (CDFG, 1998b; PALCO, 1998). This species has been commonly observed along major watercourses with relatively open, sunny banks such as the Eel and the Van Duzen rivers and has also been observed in the Yager and Bear-Mattole WAAs (PALCO, 1998). Anecdotal observations of this species have been made in areas along smaller Class II streams with low canopy cover (Personal communication, P. Detrich, FWS, July 28, 1998). The foothill yellow-legged frog has not been documented to occur on Elk River Timber Company lands of the Project Area, although it is suspected to occur there based on the availability of potentially suitable habitat (CDFG, 1998b). Based on the above, for the purposes of this analysis, riparian habitat along Class I and II streams is considered the priority habitat for this species. As such, approximately 1,081 miles of Class I and II streams provide habitat for the foothill yellow-legged frog in the Project Area.

Reptiles

One priority subspecies of reptile is known or suspected to occur in the vicinity of the Project Area, the northwestern pond turtle (*Clemmys marmorata marmorata*).

NORTHWESTERN POND TURTLE

The northwestern pond turtle is a federal species of concern and a state species of special concern. It is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; PALCO, 1998; Table 3.10-2). This subspecies is distributed throughout California west of the Sierra Nevada crest and outside of desert regions at elevations of approximately under 4,700 feet, north to the Columbia River and Puget Sound (Jennings and Hayes, 1994). Populations of this subspecies are threatened by introduced predatory and/or competitor species including bullfrogs, sunfish, bass, and raccoons, but also habitat destruction from agriculture, timber management, livestock grazing practices, and human-related disturbance (Holland, 1994; Jennings and Hayes, 1994; Reese, 1996). Relatively little is known about northern California populations of the northwestern pond turtle (Jennings and Hayes, 1994).

The northwestern pond turtle is an aquatic species that generally leaves the aquatic environment to reproduce, estivate, and overwinter on land. Priority habitat for the northwestern pond turtle is considered to be primarily riparian and wetland waterbodies and margins that provide deep, slow-flowing pools with underwater cover and emergent basking sites and/or warm water (Reese and Welsh, 1998). This subspecies forages in still and slow-moving bodies of water such as marshes, sloughs, ponds, and sluggish creeks and rivers (Nussbaum et al., 1983). Pond turtles require basking sites such as partially submerged logs, rocks, mats of floating vegetation, or exposed mud banks where they can avoid predators while resting (Zeiner et al., 1990a). Nesting usually occurs in May and June within about 650 feet of water, but upland nests have been found up to 1,319 feet from water; nesting habitat includes meadows as well as young-seral stages of most forest types such as

hardwoods, mixed hardwoods, and conifer forests (Storer, 1930; Rathburn et al., 1992; Jennings and Hayes, 1994). Hatchlings may overwinter in the nest and until one year of age require shallow water habitat characterized by relatively dense submergent or short emergent vegetation for foraging (Holland, 1985; Jennings and Hayes, 1994). Pond turtles hibernate in bottom mud of streams or ponds, or on land up to approximately 1,600 feet from water (Ernst and Barbour, 1972; Holland, 1989; Slavens, 1992). This species may require wetland and riparian buffers of up to 500 meters to encompass the full range of their terrestrial movements and behaviors (Reese, 1996).

The northwestern pond turtle has been observed on PALCO lands in the Yager and Eel WAAs (CDFG, 1998b; PALCO, 1998). This subspecies has not been documented on Elk River Timber Company lands (CDFG, 1998b), although it may occur there based on the availability of priority habitat. Based on the above, for this analysis, riparian and wetland habitats along Class I streams are considered the priority habitats for this species. As such, approximately 281 miles of Class I streams and 486 acres of mapped wetlands provide potential habitat for the northwestern pond turtle in the Project Area (Table 3.9-3).

Birds

Thirty-six priority species (or subspecies) of birds are known or suspected to occur in the vicinity of the Project Area. The status, habitat associations, and occurrence of each of these species in the project vicinity are summarized in Table 3.10-3. More detailed information for the 26 species (or subspecies) that are federal- or state-listed as endangered, threatened, or fully protected, or are identified on the PALCO HCP A list, are described in the following sections. The marbled murrelet and spotted owl are described first and in greater detail than the other species due to the elevated concern for these two species relative to the proposed project. The remaining priority species of birds are described in the following order: federal-, then state-, endangered, threatened or fully protected status, and finally HCP list status.

Marbled Murrelet

The marbled murrelet is a federal-threatened, state-endangered, and BOF sensitive species. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3) This species is distributed in coastal waters and forests from Alaska to central California (Ralph et al., 1995). Its at-sea distribution becomes fragmented in California. The marbled murrelet forages almost exclusively in the marine environment within a few kilometers of shore, but flies inland to nest in mature conifers. Most nesting habitat likely occurs within 50 miles of shore throughout the breeding range.

Based on studies of radio-tagged marbled murrelets, nesting birds may fly as far as 30 to 42 miles between nest sites and marine waters (Ralph and Miller, 1996). Hamer and Nelson (1995) reported that marbled murrelet nest sites in California have been found up to 18 miles inland of marine waters. Large patches of contiguous older forest are considered likely to provide higher quality suitable nesting habitat and to minimize threats (e.g., predation) to nesting survival than small fragmented patches providing little or no interior forest habitat (FWS, 1996).

Based on the conservative movements of other alcids, Divoky and Horton (1995) suggested that breeding murrelets would typically be expected to disperse within a distance of one km. However, the authors also pointed out that murrelets have the capacity to disperse long distances (greater than 60 km) during the breeding season,

potentially allowing birds to explore patches of potential habitat distributed widely over the landscape.

Marbled murrelet populations in Washington, Oregon, and California was federally listed in September 1992 due to the substantial loss and modification of nesting habitat (e.g., fragmentation, loss of interior forest habitat, increased edge effects including predation) largely due to timber harvest of low-elevation coastal old forest, but also disturbance of nesting birds, and mortality in gill-nets and oil spills (Nelson and Hamer, 1995b; Ralph et al., 1995; FWS, 1996).

The population status, habitat associations, occurrence, and habitat status for the marbled murrelet, including critical habitat, are described below.

Population Status

In the final recovery plan for the marbled murrelet (FWS, 1997b), six marbled murrelet recovery zones were identified to correspond to the current, relatively patchy distribution of murrelets in Washington, Oregon, and California (i.e., the three-state region) which reflects the patchy distribution of suitable LSH murrelet habitat. The Siskiyou Coast Range (Zone 4) encompasses the Project Area and covers the coastal area from North Bend, Oregon, south to the southern end of Humboldt County, extending inland a distance of 35 miles from the shoreline of the Pacific Ocean (Figure 3.10-4). The Project Area is also encompassed by the Southern Humboldt Bioregion (the Bioregion) which extends from the Mad River south to Shelter Cove and inland to a distance of up to 35 miles, including portions of the Eel, Van Duzen, and Elk river drainages (Ralph and Miller, 1996, 1997) (Figure 3.10-4). [Notably, this Bioregion is a geographic construct used only in conjunction with analyses of marbled murrelets.]

Based on surveys conducted in marine waters, the total population of marbled murrelets in California is estimated to be about 6,000 birds; an estimated 1,479 of these birds inhabit the Bioregion covering the coastal area from near Trinidad to Shelter Cove, a portion of which is believed to nest on PALCO lands (Ralph and Miller, 1995, 1996; Appendix N). Based on available data, whether populations of marbled murrelets in Zone 4 or the Bioregion are stable or decreasing is unclear, although most studies indicate that populations of marbled murrelets are declining by possibly 4 to 7 percent each year (Beissinger, 1995, Beissinger and Nor; 1997; Ralph et al., 1998). Preliminary unconfirmed results of marbled murrelet surveys suggest that almost no productivity occurred in this bioregion during 1996 (FWS, 1996). Occurrence in the Project Area is described in the subsection that follows.

Priority Habitat

Marbled murrelets are known to nest predominantly in old-growth conifer forests and occasionally in mature forests characterized by a residual old-growth component (FWS, 1997b). Suitable nesting habitat typically consists of large trees (greater than 32 inches dbh), a multi-storied stand, and moderate-to-high canopy closure. Nest trees are characterized by suitable nest platforms consisting of large branches or deformities. In California, marbled murrelet nests have been found predominantly in coastal redwood, but also in western hemlock and Douglas-fir trees (FWS, 1997b). Nesting occurs from March through August, and the nestling period extends through mid- to late-September (Hamer and Nelson, 1995). In redwood forests, most marbled murrelets have been associated with uncut old-growth stands, although some birds have been detected in

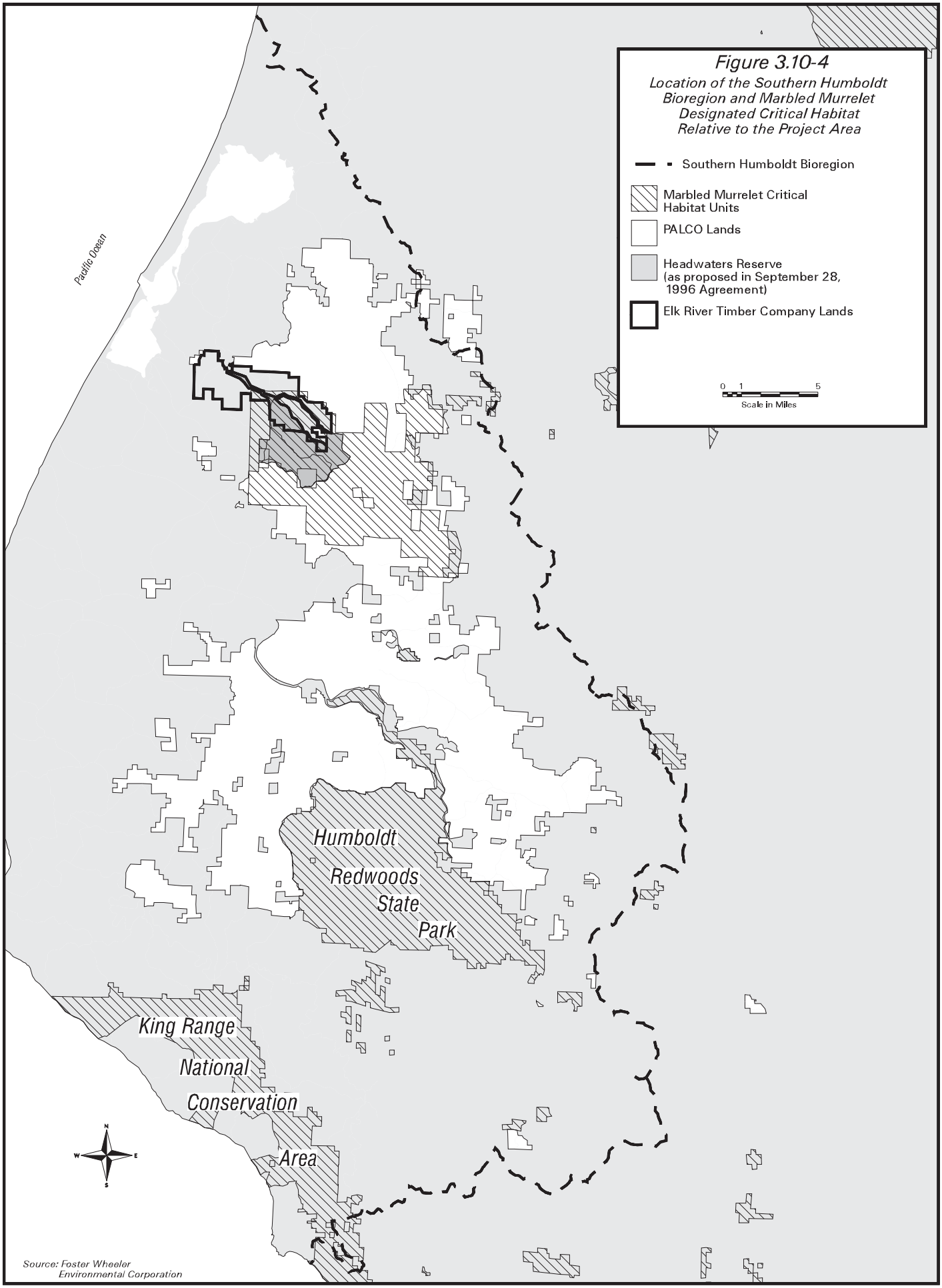

Figure 3.10-4
Location of the Southern Humboldt Bioregion and Marbled Murrelet Designated Critical Habitat Relative to the Project Area

Source: Foster Wheeler Environmental Corporation

stands characterized by residual redwood trees as well (Ralph and Miller, 1996).

The availability of interior forest habitat in particular is considered an important habitat feature for the marbled murrelet to minimize the potential for predation. Although there is substantial evidence that reproductive success of some species of birds is negatively affected by proximity to edge habitats and timber management activities (Rudnicky and Hunter, 1993; Paton, 1994), specific studies on the effects of fragmentation on marbled murrelet nesting success are limited. However, because the marbled murrelet's primary nest defenses appear to include secretive behavior and the hidden location of its nest (Nelson and Hamer, 1995b), it is generally assumed that habitat fragmentation can substantially increase the risk of predation on these nests through increased access and exposure to predators generally associated with edge. Corvid bird species, particularly the Steller's jay and common raven, are of primary concern with respect to predation on murrelets in the interior coast ranges of northwestern California (Ralph et al., 1995; Hunter and Ralph., 1996; Hunter et al., 1997). Nelson and Hamer (1995b) found that successful marbled murrelet nests were located significantly further from edge habitat (defined as human-caused openings) than unsuccessful nests, and that vegetative cover directly around the nest was significantly greater at successful nests. This information suggests that activities that reduce connectivity and increase edge habitat by reducing patch size and interior forest may negatively affect marbled murrelet reproduction. Conversely, increases in forest interior habitat and LSH would be expected to reduce nest predation on murrelets, thereby potentially increasing their reproductive success.

Thus, although habitat fragmentation has likely limited the potential distance for murrelet breeding dispersal (at least in areas where stand size is small), it has also probably increased the rates and extent of natal dispersal (Divoky and Horton, 1995). Notably, Ralph et al. (1995) recommended that occupied marbled murrelet habitat should be maintained in reserves in large contiguous blocks surrounded by buffer areas to assist in recovery of populations.

The status of marbled murrelet habitat and results of inland surveys for the Project Area and Humboldt Redwoods State Park are described below. Information from the Park is included because, as stated above, a significant proportion of the murrelet population and habitat in the Bioregion occurs in this area. Thus, the availability of habitat in Humboldt Redwoods State Park is important in assessing potential impacts of activities in the Project Area on marbled murrelets.

Despite a substantial amount of research and survey effort during recent years, a large degree of uncertainty remains regarding the status of marbled murrelets and their habitat use in the Project Area and the surrounding region. In the forested inland sites where murrelets breed, they are virtually impossible to count reliably with currently available methods due to their behavior and the limits imposed by the heavy forest cover. Surveys that successfully detect murrelets are possibly subject to important biases related to the survey location (density of surrounding cover, position within or outside the stand, etc.) rendering comparison of detection rates from various sites problematic. In particular, detection rates in residual stands may be higher than in uncut old-growth stands because of increased visibility, even though the quality of residual habitat is believed to be considerably lower than uncut old growth. Additionally, while over 100 of the species' nest sites throughout the range have been described, very little is known about the

actual density of nest sites relative to various characteristics of surrounding timber stands.

Therefore, determinations of the relative value of timber stands as habitat for successful nesting must be founded on assumptions. Based on aspects of the species' biology that are fairly well known, as discussed above, assumptions have been applied to the assessment of available habitat. Primary among these assumptions is that large, dense stands of very large trees with a minimum of contrasting edge provide habitat greatly superior to small stands, recently harvested residual stands with scattered large trees with no development of second-growth, or long, narrow, linear stands with high ratios of edge-to-interior habitat. All discussions of marbled murrelet breeding habitat quality incorporate this assumption.

PROJECT AREA

There are 17,618 acres of uncut and residual redwood old growth on PALCO lands, including approximately 3,783 acres in the Headwaters and Elkhead Springs stands proposed as part of the Headwaters Reserve (Table 3.9-1, 3.10-2 and Figure 3.10-1). This acreage represents all of the suitable or possibly suitable marbled murrelet habitat in the Project Area This suitable habitat consists of uncut and residual redwood that is known to be occupied by murrelets, as well as uncut and residual redwood that has not been surveyed to protocol but may be occupied and is thus assumed to be occupied for the purposes of this analysis (see below for a description and definition of occupied habitat). Notably, timber appraisals found no mappable old growth on Elk River Timber Company lands in the Project Area , and thus no suitable or possibly suitable murrelet habitat (PALCO, 1998; Table 3.9-1). Suitable habitat on PALCO lands occurs up to 26 miles from the nearest marine waters; little or no other suitable habitat occurs between PALCO lands and the nearest marine waters.

Surveys for marbled murrelets have been conducted on some potential murrelet habitat on PALCO lands following the Pacific Seabird Group (PSG) protocol (Ralph et al., 1994) from 1991 through 1997, and continued during 1998 (PALCO, 1998). This survey effort has not been comprehensive, but has been undertaken primarily to determine whether a specific stand of uncut or residual old growth could be harvested without resulting in "take." Stands are determined to be "occupied," "present," or "not occupied," depending on results of surveys following PSG protocol. A stand is considered "occupied" if, at any survey station in a stand, certain specific behavior (e.g., "subcanopy" behavior) or other indices indicative of nesting (e.g., eggshell fragments) are observed at least once. "Present" indicates that murrelets were observed, but that occupied behavior was not observed. For the purposes of approving a stand for harvest, a stand is considered "not occupied" if it is not contiguous with an occupied station and if there are sufficient negative survey results based on PSG protocol. Based on these stand occupancy definitions, approximately 9,800 acres of PALCO lands are presumed to be occupied by marbled murrelets (Thomas Reid Associates, 1998) (Table 3.10-5).

Ralph and Miller (1998) reported that approximately 31 percent of all occupied detections in the Bioregion came from the Headwaters Forest. This percentage is considerably higher than the value for the Elkhead Springs Forest, which has the next highest percentage of occupied detections on PALCO lands with eight percent of the detections (PALCO, 1998, Volume IV, Part B, Section 10). See Appendix N for more detailed discussion of the value of Headwaters Reserve as marbled murrelet habitat.

Table 3.10-5. Acreage of Suitable and Possibly Suitable Marbled Murrelet Habitat in the Project Area, Including the Proposed MMCAs and Headwaters Reserve, Under the HCP Alternative (Alternative 2) (Adapted from Table 1.A, Thomas Reid Associates, 1998. See Appendix N).

PALCO Lands	Total Uncut Old Growth Redwood	Total Residual Old Growth Redwood	Total Old Growth Redwood	Other Habitats	Total Old Growth Douglas-Fir	Total Area
Available for Complete Harvest [1/]	501	8321	8822	176225	8304	193351
Available for Partial Harvest						
Buffer Zones [2/]						
buf1320	0	205	205	1632		1837
buf300	0	90	90	331		421
Not Available for Harvest						
MMCA Options [3/]						
Grizzly Creek	117	530	647	410		1057
Owl Creek	317	240	557	350	19	926
MMCA Reserves						
Allen Creek	394	595	989	740		1729
B Road 7 & 9	21	238	259	232		491
Bell Lawrence	339	107	446	187		633
Booths Run	0	216	216	403	166	785
Cooper Mill	0	396	396	307		703
Elkhead Residual	0	65	65	286		351
LNF Elk	0	237	237	214		451
Road 3	0	374	374	189		563
Rt Road 9	77	112	189	128		317
Shaw Gift	256	54	310	162	31	503
MMCA Reserve Subtotal	1087	2394	3481	2848	197	6526
All HCP (Keep Grizzly)	1204	2927	4131	5221	197	9841
All HCP (Keep Owl)	1404	2636	4040	5161	216	9710
Headwaters	3117	665	3782	1927		5709
PALCO Total	5139	12445	17584	183723	8520	209827
Elk River Timber Company Lands				9469		9469
All HCP and Purchase Conservation [4/]						
Preserve Grizzly	4321	3592	7913	8943	197	17345
Preserve Owl	4521	3301	7822	8883	216	17214

1/ Available for harvest = available for harvest planning, not taking into account watercourse protection.

2/ Buffer Zones = restricted harvest to protect adjacent old-growth habitat; buf1320 = within 1/4 mile of Humboldt/Redwoods State Park
buf300 = within 300 feet of old-growth off-site.

3/ MMCA Options = Either Owl Creek or Grizzly Creek MMCA would be available for harvest if the other is conserved.

4/ Area subject to some form of protection under the Headwaters purchase and PALCO's HCP.

Source: Table 1.A, Thomas Reid Associates, 1998. See Appendix N.

Of the total 17,618 acres of suitable and possibly suitable habitat (all uncut and residual old-growth redwood) occurring on PALCO lands, about 63 percent is found in the Humboldt and Yager Creek WAAs (See Figure 3.10-1). In general, estimates of the current acreage of suitable and possibly suitable habitat on PALCO lands are variable and have not been thoroughly assessed because surveys for marbled murrelets have not been completed in all possibly suitable stands, and the suitability of all stands has not been field-verified.

Humboldt Redwoods State Park

The quality of old-growth redwood stands for marbled murrelets in Humboldt Redwoods State Park is less certain than for the PALCO ownership. Although extensive areas of old-growth redwood are mapped in the Park, estimates of the acreage of suitable and possibly suitable marbled murrelet habitat occurring in Humboldt Redwoods State Park adjacent to the southern boundary of the PALCO ownership vary dramatically. Stuart et al. (1993) estimated approximately 2,200 acres, the FWS assumes approximately 5,000 acres (Personal communication, P. Detrich, FWS, July 22, 1998), Perry (1995) estimated 7,930 acres, and Ralph and Miller (1997) estimated 23,264 acres. These estimates vary greatly due to differences in methodology used to identify and define habitat. Most of the potential habitat in the Park occurs largely along Bull Creek and the Eel River (Figure 3.9-2).

Of the total 23,264 acres of possibly suitable habitat identified by Ralph and Miller (1997) as occurring in the Park, approximately 15,744 acres consisted of uncut old growth with greater than or equal to 50 percent canopy cover, 4,198 acres was old growth with less than 50 percent canopy cover, 367 acres was residual old growth with greater than or equal to 50 percent canopy cover, and 2,959 acres was residual old growth with less than 50 percent canopy cover. Most of this possibly suitable habitat appears to occur in one or two largely contiguous stands (Figures 3.9-2 and 3.10-5). However, the suitability/quality of this habitat for nesting marbled murrelets has not been thoroughly ground-truthed, and surveys for marbled murrelets have been conducted in only a portion (approximately 10 percent) of the approximately 23,264 acres of potentially suitable habitat in the Park (Ralph and Miller, 1997). Ralph and Miller (1998) estimated that 35 percent of occupied murrelet detections in the Bioregion could be attributed to Humboldt Redwoods State Park (PALCO, 1998, Volume IV, Part B, Section 10). See Appendix N for a more-detailed discussion of the value of old-growth redwood habitat in Humboldt Redwoods State Park as marbled murrelet habitat.

Designated Critical Habitat

Critical habitat for federally endangered and threatened species is mandated under Section 3(5)(A) of the federal ESA. Critical habitat is defined as "(i) the specific areas within the geographical area occupied by the species, at the time it is listed … on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed … upon determination that such areas are essential for the conservation of the species" (16 U.S.C. 1532[5][A]).

In 1996, the FWS (1996) designated approximately 3.9 million acres of critical habitat distributed in 32 critical habitat units (CHUs) for the marbled murrelet to identify habitat considered most essential to eventual recovery of populations and delisting of the species in terms of habitat, distribution, and ownership. This designated critical habitat (DCH) includes predominantly federally owned lands

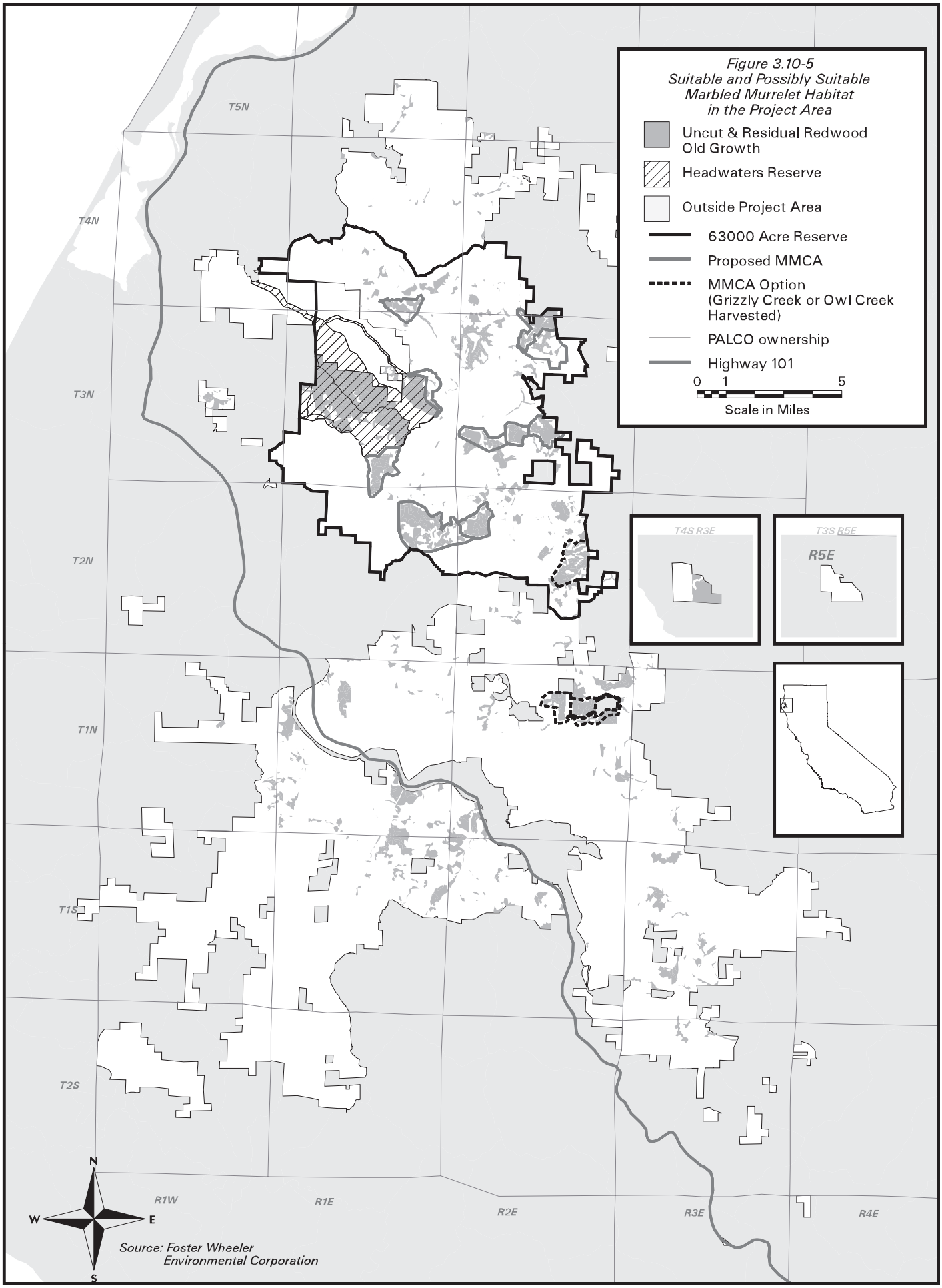
Figure 3.10-5
Suitable and Possibly Suitable
Marbled Murrelet Habitat
in the Project Area
Uncut & Residual Redwood Old Growth
Headwaters Reserve
Outside Project Area
63000 Acre Reserve
Proposed MMCA
MMCA Option (Grizzly Creek or Owl Creek Harvested)
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
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Source: Foster Wheeler Environmental Corporation

(approximately 78 percent), followed by state and local land (21 percent), and private land (1 percent) (FWS, 1996). Much of the DCH on federal lands consists of large, contiguous blocks of late-successional forest and/or areas expected to develop into such habitat in the range of the species within the Late-Successional Reserve system identified in the Northwest Forest Plan (USDA and USDI, 1994). Non-federal lands were also included as DCH where large blocks of federal land were inadequate or unavailable and where protection of habitat was considered crucial to sustaining the distribution of populations, such as in the Project Area (FWS, 1997). Notably, DCH is protected under Section 7 of the federal ESA.

Approximately 32,663 and 4,121 acres of land occur within the boundaries of a marbled murrelet CHU on PALCO and Elk River Timber Company lands of the Project Area, respectively. Most of this land occurs in the Eel and Humboldt WAAs, representing nearly 1 percent of all the CHU, and approximately 75 percent of all marbled murrelet DCH under private ownership (FWS, 1997b; PALCO, 1998) (Table 3.10-6 and Figure 3.10-4). Within the boundaries of the CHU, only those areas that contain one or both primary constituent elements are, by definition, critical habitat. These elements are (1) individual trees with potential nesting platforms, and (2) forested areas within 0.5 mile of individual trees with potential nesting platforms, and a canopy height of at least one-half the site-potential tree height (FWS, 1997b). Thus, most of the DCH on PALCO and Elk River Timber Company lands is currently not suitable for murrelet nesting, but was identified by the FWS as important to develop suitable habitat for marbled murrelet conservation in the future as described previously (FWS, 1997b) (Table 3.10-6). However, because much of this area does not currently contain constituent elements of DCH, it is not subject to regulatory requirements pertaining to DCH.

Murrelet Recovery Plan

The six marbled murrelet recovery zones identified in the species' recovery plan, as described previously (FWS, 1997b), were designed to facilitate identification and recommendation of recovery actions addressing differing needs in various portions of the species' range. Recovery actions include maintaining a well-dispersed three-state population and a viable population within most zones, including Zone 4. Notably, the marbled murrelet recovery team (MMRT) concluded that, while the murrelet population has a higher likelihood of survival in Zone 4 than in several other zones, the current acreage and quality of existing marbled murrelet habitat protected in parks in Zone 4 alone is probably inadequate to guarantee the survival of Zone 4 populations in the long term (FWS, 1997b). Thus, protection of marbled murrelet habitat on PALCO lands is considered essential by the MMRT for recovery of the marbled murrelet in Zone 4 (FWS, 1997b). The Bioregion is believed to encompass a portion of the marbled murrelet population in Zone 4 that forages in nearby coastal waters, a large proportion of which is believed to nest in uncut and residual old growth on PALCO lands and in Humboldt Redwoods State Park, where most of such habitat in the Bioregion occurs, as described above.

Delisting of the marbled murrelet can be considered after research and monitoring have provided necessary information on present populations and life history requirements for the development of recovery criteria. These criteria should be realistic and adequate to maintain the species over the short (50 years) and long term (greater than 200 years). Interim delisting criteria identified in the marbled

Table 3.10-6. Current (Year 0) and Projected Acreage of Suitable and Possibly Suitable Marbled Murrelet Habitat (Uncut and Residual Old Growth Redwood Forest) Within Marbled Murrelet Designated Critical Habitat (Critical Habitat Unit CA-03-a) in the Project Area Under the Proposed Alternatives

	Current	Alternative 1		Alternative 2		Alternative 2a		Alternative 3		Alternative 4	
Redwood Old Growth	**Year 0**	**Year 10**	**Year 50**	**Year 10**	**Year 50**	**Year 10**	**Year 50**	**Year 10**	**Year 50**	**Year 10**	**Year 50**
Uncut	4,622	4,574	4,574	4,203	4,203	4,203	4,203	4,622	4,622	4,622	4,622
Residual	4,698	3,610	3,610	2,892	2,892	2,892	2,892	4,698	4,698	4,698	4,698
Total	**9,320**	**8,184**	**8,184**	**7,095**	**7,095**	**7,095**	**7,095**	**9,320**	**9,320**	**9,320**	**9,320**
% of Total CHU in Redwood OG[1/,2/]	23%	20%	20%	18%	18%	18%	18%	23%	23%	23%	23%
% of DCH in Project Area[3/,4/]	25%	22%	22%	19%	19%	19%	19%	25%	25%	25%	25%

1/ Defined as percentage of the total CHU CA-03-a that consists of redwood old growth.
2/ Total CHU size is 40,434 acres, of which 32,663 acres is on current PALCO lands and 4,121 acres is on current ERTC lands.
3/ Defined as the percentage of total DCH in the Project Area that consists of redwood old growth.
4/ Total Designated Critical Habitat in the Project Area is 36,784 acres.

Source: Foster Wheeler Environmental Corporation, 1998

murrelet recovery plan (FWS, 1997b) are (1) that trends in estimated population size, densities, and productivity have been stable or increasing in four of the six zones over a 10-year period (this period will encompass at least one to two El Niño events, based on recent frequency of occurrences); and (2) management commitments (marine and terrestrial) and monitoring have been implemented that provide for adequate protection of marbled murrelets in the six conservation zones for at least the near future (50 years).

NORTHERN SPOTTED OWL

The northern spotted owl is a federally threatened and BOF sensitive species. This species is identified on PALCO's HCP List A and is thus proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). This subspecies occurs in suitable habitat throughout the Pacific Northwest and northwestern California (Thomas et al., 1990). The species' listed range in California includes the Coast Range north of San Francisco Bay, the Klamath Mountains, and the southern Cascades southeast to the Pit River (USDI, 1990). The Draft Recovery Plan for the Northern Spotted Owl (FWS, 1992) identified 11 physiographic provinces to describe the range of the northern spotted owl and to develop recovery objectives specific to the needs of populations in these provinces. The province encompassing the Project Area is the California Coast Province, which extends from the Oregon border south to San Francisco Bay and from the ocean to the western border of National Forest System lands. At the time of the owl's listing, primary concerns were over the rate of habitat loss and modification and the absence of regulatory mechanisms or adequate management plans which could ensure the long-term viability of the species (USDI, 1990). Since that time, these concerns have been reduced with the implementation of the Northwest Forest Plan which establishes a large reserve network, riparian reserve protection, and matrix management prescriptions. These factors, combined with the designation of Critical Habitat, should provide stable populations for the long term (FWS, 1994). Disturbance to nesting pairs has also been identified as a concern; however, the regulatory mechanisms put in place at the time of listing have significantly reduced this threat due to the application of limited operating periods, thereby avoiding potential disturbance to the birds during the breeding season.

The FPRs state that the Director of the CDF shall not approve THPs that would result in take of species listed under the federal or state ESAs. When the northern spotted owl was listed under the federal ESA in 1990, the California BOF, with technical assistance from the FWS, enacted rules to protect the species. These rules establish that, to avoid take of northern spotted owls, 40 percent of the area (1,336 acres) within a 1.3-mile radius of an owl activity center must be maintained in habitat suitable for foraging, and 500 acres of this habitat must be provided within 0.7 mile. Habitat within 500 feet of the activity center may not be substantially altered, and no disturbance may take place within 500 feet during the breeding season.

The population status, habitat association and status, and occurrence of sites for the northern spotted owl are described in the following subsections.

Population Status

The primary management effort for the northern spotted is directed toward public lands. The Northwest Forest Plan, which provided management direction for Forest Service and BLM lands within the range of the northern spotted owl, established a system of late-successional reserves (LSRs) that are intended to provide habitat for the species in the long term (USDA and USDI, 1994). This and earlier long-term strategies (Thomas et al., 1990; FWS, 1992)

recognized that the species' numbers may continue to decline until habitat in reserves stabilizes and begins to increase. The FWS determined that implementation of the Northwest Forest Plan strategy would not jeopardize the continued existence of the species (FWS, 1994).

Burnham et al. (1994) reported that populations of resident territorial female owls on 11 demographic study areas throughout the range of the northern spotted owl were declining at a significant rate. This trend was not unexpected given extensive habitat loss in recent decades (USDA and USDI, 1994). While Harris (1996) regarded the species as uncommon in northwestern California, increased survey efforts in recent years have located a substantial number of occupied sites. In particular, population levels within the California Coast Province are relatively high, and owls are generally abundant and widespread across the northern and western portions of the Province, including the Project Area, where redwood and coastal Douglas-fir are the predominant forest types (FWS, 1992; Gould, 1995). Between 1987 and 1991, 3,602 pairs and 957 territorial single individuals were located within the range of the northern spotted owl in Washington, Oregon, and California (FWS, 1994). Approximately 30 percent of the known population of northern spotted owls in California occurs within the California Coast Province, which encompasses approximately 35 percent of the range of this subspecies in California (FWS, 1992). Gould (1995) reported that 978 northern spotted owl sites were known in this Province in the three coastal California counties of Del North, Humboldt, and Mendocino. Sixty-seven percent of these sites were on private lands where timber management has occurred for decades.

In northwestern California, two demographic studies have been conducted on northern spotted owls in the vicinity of the Project Area. In the Willow Creek study area, Franklin et al. (1996) and Franklin (1997) reported that a population mostly on federal land in Humboldt and Trinity counties was apparently stable or declining slightly. Little habitat removal had occurred in that study area in recent years, and the most important variable affecting population stability was weather. The second demographic study occurred on managed private timberlands bordering the Project Area, where the northern spotted owl population was apparently stable from 1990 to 1994, but more recently has been declining (Simpson Timber Company, 1998). Low adult survival and reproduction related to bad weather are believed to be the primary causes of the decline. Population densities in the Project Area range from 10 to 19 sites per township, which is among the highest densities reported for the species (Franklin et al., 1990; Gould, 1995).

The current status of the northern spotted owl population on PALCO lands is uncertain because long-term banding studies have not been conducted, and because many sites are not checked every year. However, PALCO has been conducting surveys for northern spotted owls on its lands since 1988 in conjunction with timber harvest planning, and since 1990 all proposed THPs have been surveyed and every known site has been protected from timber harvest under the protection of the federal and state ESAs and California FPRs. Results of surveys are summarized in Table 3.10-7. Based on results of PALCO's most recent 1997 surveys, approximately 303 northern spotted owls in 147 sites are known to occur on PALCO lands, including 43 nesting and 40

Table 3.10-7. Number and Status of Northern Spotted Owl Sites Occurring on PALCO Lands, 1992-1997

Site Status	1992	1993	1994	1995	1996	1997
Nesting Pair	37	10	27	16	21	43
Non-nesting Pair	13	21	33	45	35	40
Pair Status Unknown	7	5	25	28	47	33
Known Juveniles Produced	18	11	35	21	38	40
Single Male	3	12	17	11	13	27
Single Female	3	7	8	3	5	4
Total Number of Pairs	**57**	**38**	**85**	**89**	**103**	**116**
Total Number of Owls	**138**	**102**	**230**	**213**	**262**	**303**

1/ Data from PALCO's HCP/SYP (PALCO, 1998)

non-nesting pairs (Personal communication, S. Chinnici, Wildlife Biologist, PALCO, April 23, 1998) (Table 3.10-7). Data from 1998 surveys are not yet compiled. As of 1996, of the owls detected on current PALCO lands, one non-nesting pair was detected on lands proposed as part of the Headwaters Reserve in the Elkhead Springs stand (these sites were not monitored in 1997). In addition, one owl of unconfirmed status was detected in the Headwaters stand. Known owl circles in the Project Area encompass a range of seral types, including young growth, residual and uncut old growth, and hardwoods (PALCO, 1998).

As of 1996, six northern spotted owl sites were known to occur on Elk River Timber Company lands of the Project Area (data from 1997 were not available). These sites include three nesting pairs, two non-nesting pairs, and one single owl (Personal communication, S. Chinnici, Wildlife Biologist, PALCO, May 16, 1997).

Priority Habitat

Suitable northern spotted owl habitat is considered to be forests that can support either nesting/roosting/foraging (NRF) or roosting/foraging (RF) of owls (Thomas et al., 1990). Nests are usually located in either tree cavities or on platforms (Thomas et al., 1990). Breeding occurs from March through June, nestlings usually fledge by August, and the fledgling period ends in late September (Forsman et al., 1984). Habitat selection by spotted owls appears to be related to forest structure and abundance and composition of prey. Throughout most of its range, including most of Oregon and Washington, the northern spotted owl uses primarily old-growth and mature conifer forests characterized by large old-tree components and high canopy closure for nesting, roosting, and foraging, preying predominantly upon the flying squirrel, which is most abundant in LSH (Thomas et al., 1990; Carey et al., 1992; Noon and McKelvey, 1996). However, in northwestern California, northern spotted owls have also been found to nest in mature second-growth stands of coastal redwood forest, and to forage in young-forest habitat, preying primarily upon the dusky-footed woodrat, which occurs in highest densities in early seral stage habitats and along edges between LSH and sapling or brush (PALCO, 1992, 1996; Folliard, 1993; Sakai and Noon, 1993; Zabel et al., 1995; Thome, 1997; Ward et al., 1998). An abundance of prey adapted to early seral habitat and the tendency for relatively fast-growing redwood trees to exhibit old-growth (e.g., large-sized trees) structural characteristics

at a relatively young age compared to other tree species (e.g., Douglas-fir) may allow spotted owls to persist in highly managed landscapes in northwestern California (Thomas et al., 1990; Sakai and Noon, 1993). As stated above, of 978 known northern spotted owl sites in the California Coast Province, 67 percent are located on industrial timberlands where intensive management occurred for many years prior to federal listing of the species (Gould, 1995), suggesting that spotted owls persist in heavily managed landscapes in this Province. Notably, the majority of the existing redwood forest habitat type occurs in this Province (FWS, 1992).

In addition to NRF and RF habitat, Thomas et al. (1990) developed the 50-11-40 rule for management of a dispersal landscape for the northern spotted owl. This guideline suggests that a dispersal landscape should provide 50 percent of a quarter township with coniferous forest stands having a minimum average dbh of 11 inches and a canopy closure of 40 percent (Thomas et al., 1990). Studies indicate that 75 percent of quarter townships in the three north coastal counties (Del Norte, Humboldt, and Mendocino) encompassing PALCO and Elk River Timber Company lands exceed the 50-11-40 standard for dispersal habitat (Berbach et al., 1993).

The Northwest Forest Plan estimated that there were about 1.2 million acres of northern spotted owl habitat on federal lands in California (USDA and USDI, 1994). More recently, federal biologists have revised that estimate to about 1.9 million acres (FWS, unpublished data). In the California portion of the owl's range, the present conditions of the LSRs closest to the PALCO ownership (on the Six Rivers and Shasta-Trinity National Forests) are in relatively good condition (FWS, unpublished data).

For the purposes of this analysis, potentially suitable spotted owl habitat for PALCO and Elk River Timber Company lands of the Project Area was classified into five categories described in PALCO's HCP/SYP: high-quality nesting habitat, medium-quality nesting habitat, low-quality nesting habitat, roosting habitat, and foraging habitat. As described in the HCP/SYP (PALCO, 1998), definitions of nesting habitat quality were adapted from the CDFG WHR classification system (Version 5.2 DB Spotted Owl Habitat Matrix), descriptions of preferred habitat elsewhere in the species' range (see above), and experience on the PALCO ownership (Appendix Table L-1 and Appendix Table M-4). Only high- and medium-quality nesting habitats are considered potentially suitable for the purposes of this analysis. Approximately 197,433 acres of potential spotted owl habitat occur in the Project Area as follows: 80,717 acres of high-quality habitat, 12,390 acres of medium-quality habitat, 70,694 acres of low-quality habitat, 10,144 acres of roosting habitat, and 23,488 acres of foraging habitat (Appendix Table M-5). High-quality nesting habitat is the most abundant habitat type, and it occurs in all six WAAs. The largest contiguous patches of high-quality nesting habitat are located in the Humboldt WAA, including the Headwaters and Elkhead Springs forests.

Designated Critical Habitat

In 1992, the FWS designated critical habitat for the northern spotted owl to identify areas considered essential for conservation of the subspecies (FWS, 1992). The nearest DCH for the northern spotted owl to the Project Area occurs in a CHU (CA-48) approximately one mile east of PALCO lands in the Humboldt WAA. This CHU is approximately 1,700 acres and currently contains no suitable spotted owl habitat (Personal communication, K. Hoffmann, Wildlife Biologist, FWS, July 28, 1998).

AMERICAN PEREGRINE FALCON

The American peregrine falcon (*Falco peregrinus anatum*) is a federal- and state-listed endangered species, a CDFG fully protected species, and a CDF sensitive species. This species is identified on PALCO's HCP List A and, thus, is proposed for coverage under the ITP (CDFG, 1998; Table 3.10-3). In 1995, the FWS published an intent to propose delisting the American peregrine falcon (USDI, 1995) attributable to success of ESA provisions, successful reintroduction programs, and the reductions of organochloride use in the United States. The formal proposal to delist this species was published in the Federal Register on August 26, 1998, and it will be followed by a final decision within 12 months. This subspecies breeds from northern Alaska, northern Mackenzie, Banks, Victoria, southern Melville, Somerset, and northern Baffin islands, and Labrador south locally along the Pacific Coast to southern Baja, and throughout the western and Rocky Mountain states as well as Arkansas, Louisiana, Tennessee, Alabama, and Georgia. Southern populations of this subspecies typically are resident, but the northern populations are relatively migratory, wintering at least to the Gulf Coast (Johnsgard, 1990). American peregrine falcon population estimates are based on census and direct observation of nesting and breeding activity. The population parameters of interest are the numbers and the reproductive success of breeding pairs. The FWS reports a total of 239 breeding pairs in California, Oregon, and Washington, breeding at a mean annual rate of 1.5 young per pair (USDI, 1998a). Breeding and/or wintering peregrine falcons occur throughout most of California except in desert habitat (Zeiner et al., 1990a). In the North Coast Region of California, the peregrine falcon is considered an uncommon migrant and winter visitor, and a rare local breeder and summer resident (Harris, 1991; 1996). Declines in populations have been attributed primarily to DDT contamination, although peregrine falcons are also sensitive to human disturbance (Zeiner et al., 1990a).

Potential nesting and roosting habitat for the American peregrine falcon usually includes cliffs or high escarpments that dominate the nearby landscape, although office buildings, bridges, and river cutbanks have been used for nesting as well (Peregrine Falcon Recovery Team [PFRT], 1982; Craig, 1986). Most preferred nesting cliffs are at least 150 feet high, and can occur from sea level to 11,000 feet in elevation (PFRT, 1982). The critical reproductive period for the peregrine falcon is February 1 to July 15 (PFRT, 1982). Foraging habitat for this species includes open areas with a high abundance of potential prey, such as marshes, lakes, river bottoms, croplands, and meadows, where peregrines prey on songbirds, waterfowl, and shorebirds (Porter and White, 1973; Zeiner et al., 1990a).

Two historical peregrine falcon nest sites are known to occur on or adjacent to the PALCO ownership. One of these sites is located on a cliff adjacent to the Eel River in the Eel WAA (PALCO, 1998). During winter 1995, this site may have been damaged or eliminated by failure of the cliff rock face (PALCO, 1998). Observations of peregrine falcons on Elk River Timber Company lands of the Project Area have not been documented (CDFG, 1998b). This species would not be expected to nest on Elk River Timber Company lands because of the lack of known suitable cliff nesting sites. However, peregrine falcons could forage there, since the wetland and riparian areas may support potential prey. Based on the known breeding requirements of this species, as described above, priority habitat for the peregrine falcon is considered cliffs. Although this habitat type is not mapped on PALCO and Elk River Timber Company

lands, very few cliffs are known to exist (see below).

Under FPRs currently regulating PALCO and Elk River Timber Company lands, a minimum 10-acre buffer zone must be provided around active peregrine falcon nest sites in consultation with the CDFG and RPF (Appendix Table M-2). No timber operations are permitted within the buffer zone during the critical nesting period (February 1- April 1 for active nests, extended through July 15 for occupied nests). Hauling during the critical period on existing roads that are normally used during the critical period may be allowed within the buffer zone if the Director, in consultation with the CDFG, determines that peregrine falcons have been shown to tolerate such activity. Notably, consultation with CDFG usually results in more restrictive protection measures. Helicopter yarding is prohibited within 0.5 mile of an active nest during the critical period. Special cutting prescriptions may be required by the Director within the buffer during the non-critical period, and nesting habitat must be protected

ALEUTIAN CANADA GOOSE

The Aleutian Canada goose (*Branta canadensis leucopareia*) is a federally threatened subspecies with no state status in California (Table 3.10-3). This subspecies winters in the Sacramento and San Joaquin valleys and crosses the north coastal mountains during fall and spring migrations when it is a locally common migrant along the coast of northwestern California; breeding occurs primarily in Alaska but also in Oregon (Harris, 1996; Oregon Department of Fish and Wildlife [ODFW], 1996). Crescent City is an important staging area during migration, although many birds are using south coastal pasture land in Oregon for several weeks in the spring (USDI, 1998b). Additional staging areas are occasionally recorded from near Humboldt Bay and the Eel River delta during winter and migration periods (Harris, 1996). The Aleutian Canada goose forages in pastures and croplands (particularly grasses and grains) along the North Coast and roosts on offshore rocks (ODFW, 1996). Significant declines in populations of this subspecies in the early to mid-1900s were attributed to predation by introduced Arctic and red foxes on Alaskan breeding grounds and overhunting and loss of wintering habitat (Harris, 1996; ODFW, 1996; USDI, 1998b). When recovery efforts were initiated in the mid-1970s, the population was estimated to be less than 800 (USDI, 1998b). The population currently is approximately 24,000 (Drut and Trost, 1997). Despite the success of the recovery program, this species is still vulnerable to disease, given the high concentration of waterfowl using reduced areas of wetland habitat in their wintering grounds (USDI, 1998b). The FWS is currently conducting a status review and anticipates to propose delisting the species.

The Aleutian Canada goose has not been recorded in the Project Area (CDFG, 1998b), although this subspecies may forage in agricultural areas on PALCO and Elk River Timber Company lands of the Project Area during spring and fall migrations, particularly the lower Eel River drainage. Approximately 5,686 acres of open grassland/prairie occurs on PALCO lands of the Project Area, a proportion of which may provide potential foraging habitat for this species (Table 3.9-1).

BALD EAGLE

The bald eagle is a federally threatened species, a state-endangered species, a CDFG fully protected species, and a CDF sensitive species. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). Take of any individuals, nests, or eggs of this species is prohibited under Section 3503.5 of the Fish

and Game Code of California (birds-of-prey prohibition). Take is also prohibited under the federal Bald Eagle Protection Act. The FWS has recently reviewed the recovery status of the bald eagle and determined that delisting throughout the range may be appropriate. Factors leading to this proposal include reductions of organochlorides in the United Status, ESA provisions, and success of direct recovery activities such as relocations of eggs and young, and captive-breeding and release programs (USDI, 1998c). The FWS is currently proceeding with a status review that will consider the recovery of the bald eagle in those states included in the Pacific Bald Eagle Recovery Plan. In the west, the bald eagle breeds from most of Alaska and Canada, along the Pacific Coast south to Baja California. Primary wintering grounds occur along the Alaskan coast to interior Washington. Eastern residents are found along coastal areas from New Jersey to Florida, and along the Gulf coast to Texas (Johnsgard, 1990). Both breeding and wintering bald eagles occur in California, with breeding limited primarily to the northern quarter of the state (Zeiner et al., 1990a). Approximately half of the wintering population of bald eagles in California occurs in the Klamath Basin on the Oregon border, where more than 900 eagles gathered in 1987 (Steinhart, 1990; Zeiner et al., 1990a). The two most recent estimates of bald eagle populations were reported by the FWS (USDI, 1995a) and the CDFG (CDFG, 1997b). In both agency reports the population parameter of interest was occupied breeding territories, based on direct observation and census. The FWS reported 4,450 occupied territories (as of 1994) in the lower 48 states, and 1,192 occupied territories in the Pacific Recovery Region (California, Oregon, Washington, Idaho, Montana, Nevada). The CDFG used two reporting areas: statewide (California) and the California-Oregon coastline. In 1996, CDFG reported 124 occupied territories statewide and 10 on the California-Oregon coastline. In 1997, CDFG reported 142 and 11 territories for the two areas, respectively. Although past population declines were attributed to exposure to the chemical DDT, current threats to the recovery of bald eagle populations include disturbance of nesting, roosting, and foraging birds; loss of potential nest and roost sites in LSH near waterbodies due to human-related activities, including timber management; and impacts to food sources (FWS, 1986; Zeiner et al., 1990a).

Breeding habitat for the bald eagle typically includes uncut old-growth or residual old-growth forest within one mile of water supporting fish populations (Brown, 1985; FWS, 1986; Zeiner et al, 1990a; ODFW, 1996). Nest sites in California are generally located in the upper canopy of live conifer trees near water bodies (CDFG, 1992). Nest trees are usually at least 30 inches dbh (Anthony et al., 1982). The critical reproductive period for the bald eagle extends from January 15 until either August 15 or four weeks after fledging (CDF, 1997a). Roosting sites are usually located in mature or old-growth stands providing thermal and wind protection close to rich food sources, but can occur more than 20 miles from feeding sites (ODFW, 1996). Large trees with horizontal limb structure adjacent to water areas providing food are important for day perching (ODFW, 1996). On the north coast of California, wintering eagles are commonly sighted in trees with open crowns near large creeks, rivers, and lakes, where they prey predominantly on anadromous fish, and around Humboldt Bay, where they prey upon waterfowl aggregations (Harris, 1996).

Nesting bald eagles have not been documented on the PALCO ownership (PALCO, 1998), but the species nests along the Mad River within a few miles of PALCO land (FWS, unpublished data). Wintering bald eagles are rare to relatively common in

certain watersheds of the PALCO ownership depending on water conditions along Yager Creek, and the Eel, Elk, and Van Duzen rivers (PALCO, 1998). Wintering bald eagles have also been observed along lower Larabee Creek near its confluence with the Eel River (PALCO, 1998). Observations on the PALCO ownership have been recorded in the Yager Creek WAA (three to seven eagles), Eel WAA (one to two eagles), and Humboldt WAA (one to two eagles) generally from November through March during periods of anadromous fish runs (PALCO, 1998). The CDFG (1997b) has no records of observations of bald eagles on Elk River Timber Company lands of the Project Area, although they are suspected to occur there based on the availability of potentially suitable habitat. Based on the above, for this analysis, priority habitat for the bald eagle is considered to be riparian areas dominated by LSH along Class I streams. As such, approximately 88 miles of Class I streams likely provide priority habitat for this species in the Project Area.

Under FPRs currently regulating PALCO and Elk River Timber Company lands, a minimum 10-acre buffer zone must be provided around active bald eagle nest sites in consultation with the CDFG and a RPF (Appendix Table M-2). No timber operations are permitted within the buffer zone during the critical nesting period (January 15 to either August 15 or four weeks after fledgling). However, hauling within the buffer zone on existing roads that are normally used during this time may be allowed by the Director, after consultation with the CDFG, during the critical nesting period. Notably, consultation with CDFG usually results in more restrictive measures. Helicopter yarding is prohibited within 0.25 mile of an active nest during the critical period. Helicopter yarding 0.25 to 0.5 mile from the active nest tree is allowed when timber operations are conducted so that helicopter yarding gradually approaches the 0.25-mile-radius limit. No clear cutting is permitted within the buffer zone at any time of year. However, selection, commercial thinning, sanitation-salvage, and the shelterwood regeneration method (except for the removal step) are allowed during the non-critical period as long as all trees are marked before preharvest inspection. In addition, all nest trees containing active nests, and all designated perch trees, screening trees, and replacement trees must be left standing and unharmed.

WESTERN SNOWY PLOVER

The western snowy plover (*Charadrius alexandrinus nivosus*) is a federally threatened species, a state species of special concern. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG 1998c; Table 3.10-3). Federal listing for this species occurred in 1993, and critical habitat was proposed in 1995. However, no final rule establishing critical habitat has been approved. Two subspecies of the snowy plover are recognized, the western and the Cuban (*C. a. tenuirostris*). The western subspecies breeds on the Pacific coast from southern Washington to southern Baja California, Mexico, and in interior areas of Oregon, California, Nevada, Utah, New Mexico, Colorado, Kansas, Oklahoma, and in southern and possibly extreme northeastern Mexico, with small numbers breeding in Arizona (Monson and Phillips, Davis and Russell *in* Page et al., 1991). Specifically in California, this subspecies breeds along the entire coast of California (Zeiner et al., 1990a). Nesting occurs in loose colonies from April through August (Zeiner et al., 1990a; Stokes and Stokes, 1996). Nests are located in shallow sand and gravel depressions often near or under objects including driftwood, rocks, or defoliated bushes (Zeiner et al., 1990a). A sandy, gravely, or friable soil substrate is required

for nesting (Zeiner et al., 1990a). Nesting also occurs on barren ground away from cover (Bent, 1929; Jurek and Leach, 1973). Adult nesting birds tend to remain close to the nest (Page et al., 1977). Significant reductions of known nesting pairs in numerous California counties have occurred. Data from recent coast-wide surveys indicate an approximate 21 percent decline in numbers of breeders in California as well as in Humboldt and Del Norte counties. Declines in populations of this species have been attributed to disturbance of nesting areas along sandy marine beaches; gravel mining of river bars is also of concern in the vicinity of the Project Area (Zeiner et al., 1990a; PALCO, 1998). Additional threats include the modification of nesting habitat from introduced vegetation, human development, and predation (USDI, 1993). Recent surveys indicate that the western snowy plover also nests on inland river bars of northwestern California from the Eel River Delta upstream to at least the mouth of the Van Duzen River (Harris, 1996; PALCO, 1998). However, since listing of the species, known nesting territories are still subjected to direct disturbance during the nesting season and attempted efforts to minimize this have been largely unsuccessful along the northern California coast (Personal communication, L. Roberts, Wildlife Biologist, FWS, July 1998).

Although avian surveys and other monitoring efforts have been conducted along portions of the Eel and Van Duzen rivers in areas of gravel extraction and summer crossing maintenance activities, western snowy plovers have not been documented on PALCO lands (CDFG, 1998b; PALCO, 1998). The CDFG (1998b) has no record of this species occurring on Elk River Timber Company lands of the Project Area, and it is not expected to occur there based on the known distribution of the species and the lack of wide river gravel bars. Potentially suitable habitat may occur on gravel river bars of PALCO lands; however, the acreages of these habitats are not available.

GREAT GRAY OWL

The great gray owl is a state-endangered species and a CDF sensitive species (CDFG, 1998c; Table 3.10-3). This species is on PALCO's List B, and thus is not proposed for coverage under the ITP. Take of any individuals, nests, or eggs of this species is prohibited under Section 3503.5 of the California Fish and Game Code. The species occurs from northern Yukon, northern Saskatchewan, Manitoba, and Ontario south through British Columbia, and Quebec, and central and southern Alaska. The species is unevenly distributed through its southern range in central to northwestern Washington, central Idaho, western Montana, northwestern Wyoming, and northeast and central Oregon (USDA, 1994). Eighteen known breeding pairs occur in southeastern Oregon on National Forest System lands (Personal communication, C. Tyson, Biologist, Winema National Forest, 8/4/98). Recent surveys have located newly discovered breeding pairs on National Forest System and BLM ownership in southern Oregon (Personal communication, M. Mamone, USFS, Rogue River National Forest, and R. Saunders, Medford BLM, 8/4/98). In California, this species is considered a rare resident of the Sierra Nevada from near Quincy in Plumas County south to the region of Yosemite (Zeiner et al., 1990a). Occasional incidental sightings have been reported from northwestern California during winter (Harris, 1996). Only 10 breeding pairs were known in California in 1992, all in or near Yosemite National Park and nearby National Forests, with approximately 60 owls occurring state-wide (CDFG, 1992). A few reliable detections have been made in high-elevation wilderness meadows on the Klamath National Forest in north-central California, and one incidental road-killed individual

was found near Grass Lake near Butte Valley in the mid-1980s (Personal communication, B. Woodbridge, Wildlife Biologist, USFS, Klamath National Forest, August 13, 1998). No detections are known to occur on the Six Rivers National Forest in the northwestern portion of the state. Declines in populations have been attributed to loss of suitable nesting habitat due to timber management activities but also destruction of foraging habitat by livestock grazing in montane meadows (CDFG, 1992). More recently, however, CDFG (1996) indicates populations within California may not be decreasing when considering the stable number of statewide observations and sites with confirmed reproduction.

Nesting and roosting habitat for the great gray owl consists of dense coniferous forests near wet montane meadows (Zeiner et al., 1990a). Breeding generally occurs in old-growth red fir, mixed conifer, or lodgepole pine forests, with nests located in large, broken-topped snags generally greater than 24 inches dbh (Zeiner et al., 1990a). Nesting occurs from about March through July in both old-growth and second-growth forests that contain suitable nest sites (Winter, 1982; Zeiner et al., 1990a). Foraging occurs from low, exposed perches (e.g., small trees and snags) in or on the edge of wet meadows (Zeiner et al., 1990a).

The great gray owl has not been recorded on PALCO or Elk River Timber Company lands of the Project Area (CDFG, 1998b) and is likely to occur there only as an occasional winter migrant (Harris, 1996). However, approximately 68,474 acres of LSH occur in the Project Area, an unknown proportion of which has potential to provide priority nesting habitat (LSH snags near meadows, as described above) for the great gray owl. In addition, an unknown amount of potential priority foraging habitat (consisting of wet meadows) for this species occurs in the Project Area.

LITTLE WILLOW FLYCATCHER

The willow flycatcher (*Epidomax trailii*) is a wide-ranging species with breeding ranges throughout the United States and in Canada. Breeding ranges include central British Columbia, southern Alberta, Saskatchewan, Manitoba, North Dakota, the southern regions of Minnesota, Wisconsin, Ontario, and Quebec, central Michigan, Maine, into Nova Scotia, south through California, northern Baja California, southern Arizona, southern New Mexico, Texas, Oklahoma, Arkansas, Tennessee, northern Georgia, North Carolina, and Virginia. Three subspecies of willow flycatchers in California are recognized. The southwestern subspecies (*E. t. extimus*) was federally listed as endangered in 1995. This subspecies breeds from the Mexican border north to Independence in the Owen's Valley, the South Fork Kern River, and the Santa Ynez River in Santa Barbara County (USDI, 1995b).

The subspecies *E.t. adastus*, which breeds in the eastern portions of California from the Sierra/Cascade axis, from the Oregon border south and possibly into northern Inyo County. The American Ornithologists' Union (1983) documents this subspecies as wintering in Mexico and Panama. The little willow flycatcher (*E. t. brewsterii)* is a state endangered species, a federal species of concern , and is on PALCO's List B (CDFG, 1998c; Table 3.10-3). This subspecies is currently known to breed from Fresno County north along the western side of the Sierra Nevada and Cascades, extending to the coast in northern California (USDI, 1995b). The little willow flycatcher was once a common summer resident throughout California, but in 1992 was known to be limited to five populations of significance totaling approximately 200 pairs in disjunct meadows of the Sierra Nevada and southern California (CDFG, 1992). Recently, two new populations were discovered, the first in southeastern

Siskiyou County (72 pairs) and the second in northern Plumas County (42 pairs) (William and Craig, 1998). This species is considered a rare to uncommon migrant, summer resident, and breeder in northwestern California (Harris, 1996). Nesting occurs from June through early July (Zeiner et al., 1990a). Populations of the little willow flycatcher appear to be declining primarily due to parasitism by cowbirds and loss of riparian nesting habitat, particularly due to heavy livestock grazing (Zeiner et al., 1990a; CDFG, 1992). During the breeding season, this species inhabits primarily riparian swamps and thickets and montane meadows, especially extensive riparian willow thickets, at elevations of 2,000 to 8,000 feet (Zeiner et al., 1990a; CDFG, 1992). Larger rivers may act as corridors for dispersing individuals, as mist net data from the Seiad station along the Klamath River in Siskiyou County indicates (Personal communication, J. Alexander). There, a phenomenon called "flushing" has been observed, where large numbers of birds, particularly "after hatch year birds," occur in a given time period, typically in early June.

The little willow flycatcher has not been documented on PALCO or Elk River Timber Company lands of the Project Area (CDFG, 1998b), although this species may occur there based on the availability of potentially suitable habitat. Based on the above, for this analysis, priority habitat for the little willow flycatcher is considered to be riparian shrub habitat (consisting of hardwood and open natural habitat). As such, approximately 1,732 acres of potential priority habitat for this species occurs in the Project Area (Table 3.10-8).

BANK SWALLOW

The bank swallow (*Riparia riparia*) is a state-listed threatened species with no federal status. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). Its breeding range occurs from western and central Alaska and central Yukon to central Quebec and southern Labrador, south to southern California, western Nevada, southern New Mexico, southern Texas, and southeastern states. This species winters in South America (Zeiner et al., 1990a). The bank swallow is considered a rare migrant and locally rare breeder in northwestern California (Harris, 1996). Approximately 100 widely distributed nesting colonies occur in California (Garrison, 1998), with the majority of breeders occurring in the Sacramento and Feather rivers and their major tributaries north of their confluence (Garrison, 1998). Known breeding populations in northern California occur along the Scott River and Lake Shastina in Siskiyou County, and along the Smith River in Del Norte County (Garrison, 1998). Remaining populations are scattered in portions of northern, north coastal, central coastal, and Inyo-Mono regions of the state. Primary threats to this species are channelization and stabilization of riverbanks and other disturbances to nesting areas (Zeiner et al., 1990a; Garrison et al., 1987). Since being listed by the state, protection of some nesting sites has occurred, although some sites have been lost due to emergency flood control projects (Garrison, 1998). As with other neotropical migratory species, the bank swallow also faces threats on wintering grounds as well.

Nesting by bank swallows is restricted to riparian and other lowland habitats near streams, rivers, ponds, lakes, and the ocean where this species prefers fine-textured sandy or silty loam for digging its nests in vertical banks and cliffs (Zeiner et al., 1990a; CDFG, 1992; Garrison, 1998). Breeding occurs from early May through July (Zeiner et al., 1990a). Foraging occurs primarily over open riparian areas during the breeding season and over brushland, grassland, and cropland during migration (Zeiner et al., 1990a). As such, Garrison et

Table 3.10-8. Habitat Associations of Neotropical Migratory Bird Species That Are Known or Suspected to Occur in the Vicinity (Within 1 Mile) of the Humboldt Project Area[1/]

	Old-growth	Shrub[2/]	Young Forest	Broad Leaf Forest	Riparian	Meadow/ Pasture	Marsh	Subalpine	Cliff
Late-successional Forest Associates									
Sharp-shinned hawk[3/]	X		X		X				
Cooper's hawk[3/]	X		X	X	X				
Northern goshawk[3/]	X								
Band-tailed pigeon[4/]	X		X						
Flammulated owl	X		X						
Vaux's swift	X				X				
Red-breasted sapsucker[3/]	X		X	X					
Olive-sided flycatcher	X	X	X		X				
Pacific-slope flycatcher	X	X		X	X	X			
Western wood-pewee	X		X	X					
Hammond's flycatcher	X		X	X	X				
Golden-crowned kinglet[3/,4/]	X		X						
Ruby-crowned kinglet[3/]	X				X			X	
Swainson's thrush	X	X	X	X	X				
Hermit thrush[3/]	X		X						
Solitary vireo[4/]	X		X	X	X				
Yellow-rumped warbler	X		X						
Townsend's warbler	X		X						
Hermit warbler	X	X	X						
Western tanager	X		X	X	X				
Dark-eyed junco	X	X	X	X					
Pine siskin[3/]	X								

Table 3.10-8. Habitat Associations of Neotropical Migratory Bird Species That Are Known or Suspected to Occur in the Vicinity (Within 1 Mile) of the Humboldt Project Area[1/]

	Old-growth	Shrub[2/]	Young Forest	Broad Leaf Forest	Riparian	Meadow/ Pasture	Marsh	Subalpine	Cliff
Early/Mid-seral Forest Associates									
Turkey vulture[3/]		X							X
Golden eagle[3/,4/]		X	X	X		X			
Merlin	X	X	X		X				
Peregrine falcon[3/]									X
Common poorwill		X	X	X		X			
Black swift					X		X		X
White-throated swift									X
Anna's hummingbird[3/]		X			X				
Calliope hummingbird					X	X		X	
Allen's hummingbird		X		X	X				
Black-chinned hummingbird		X							
Costa's hummingbird		X							
Rufous hummingbird	X								
Lewis' woodpecker	X		X						
Dusky flycatcher			X						
Ash-throated flycatcher		X	X			X			
Ruby-crowned kinglet								X	
Blue-gray gnatcatcher			X			X			
Cedar waxwing[3/]		X		X	X				
Loggerhead shrike		X	X	X					
European starling		X	X	X		X			
Orange-crowned warbler[4/]		X		X	X				
Black-throated gray warbler			X	X	X	X			
Indigo bunting									
Wilson's warbler[3/]	X		X	X					

Table 3.10-8. Habitat Associations of Neotropical Migratory Bird Species That Are Known or Suspected to Occur in the Vicinity (Within 1 Mile) of the Humboldt Project Area[1/]

	Old-growth	Shrub[2/]	Young Forest	Broad Leaf Forest	Riparian	Meadow/ Pasture	Marsh	Subalpine	Cliff
Green-tailed towhee		X	X						
Spotted towhee[3/]		X		X	X				
Sage sparrow		X	X						
Fox sparrow[3/]		X			X				
White-crowned sparrow		X	X		X				
Clay-colored sparrow		X							
Brown-headed cowbird[3/]		X		X	X				
Blue grosbeak					X				
Lesser goldfinch[3/]			X			X			
Meadow/Pasture Associates									
Burrowing owl						X			
Short-eared owl		X				X			
Western kingbird					X				
Horned lark[3/]		X				X			
Lark bunting					X	X			
American tree sparrow					X				
Vesper sparrow			X			X			
Lark sparrow		X				X			
Black-throated sparrow		X							
Savannah sparrow[3/]		X	X			X			
Grasshopper sparrow		X	X	X		X			
Western meadowlark		X				X			
Lawrence's goldfinch		X			X	X			
Marsh, Lake, and Pond Associates									
Osprey					X		X		
Northern harrier[3/]						X	X		
Belted kingfisher[3/]					X	X			

Table 3.10-8. Habitat Associations of Neotropical Migratory Bird Species That Are Known or Suspected to Occur in the Vicinity (Within 1 Mile) of the Humboldt Project Area[1/]

	Old-growth	Shrub[2/]	Young Forest	Broad Leaf Forest	Riparian	Meadow/ Pasture	Marsh	Subalpine	Cliff
Purple martin							X		
American pipit							X		
Cliff swallow		X			X	X	X		X
Barn swallow[4/]		X			X		X		
Marsh wren[3/]							X		
Common yellow-throat					X	X	X		
Swamp sparrow							X		
Lincoln's sparrow		X					X		
Red-winged blackbird[3/]					X		X		
Yellow-headed blackbird							X		
Riparian Associates									
Red-shouldered hawk[3/]			X	X	X				
Red-tailed hawk[3/]	X		X	X	X	X			X
American kestrel[3/]				X	X	X		X	X
Long-eared owl					X	X			
Common nighthawk		X			X				
Rufous hummingbird[4/]	X	X	X	X	X	X			X
Least flycatcher					X		X		
Willow flycatcher		X			X				
Tree swallow					X	X	X		
Violet-green swallow		X			X		X		
Northern rough-winged swallow		X			X		X		
Bank swallow		X			X		X		
House wren		X		X	X				
American robin[3/]	X	X	X	X	X	X			
Red-eyed vireo				X	X				
Warbling vireo		X		X	X				
Philadelphia vireo					X				

Table 3.10-8. Habitat Associations of Neotropical Migratory Bird Species That Are Known or Suspected to Occur in the Vicinity (Within 1 Mile) of the Humboldt Project Area[1/]

	Old-growth	Shrub[2/]	Young Forest	Broad Leaf Forest	Riparian	Meadow/ Pasture	Marsh	Subalpine	Cliff
Canada warbler					X				
Yellow-throated warbler					X				
Black and white warbler				X	X				
Black-throated warbler					X				
Tennessee warbler					X				
Nashville warbler		X			X				
Yellow warbler[4/]				X	X				
MacGillivray's warbler		X			X				
American redstart				X	X				
Yellow-breasted chat					X				
Summer tanager					X				
Black-headed grosbeak				X	X				
Lazali bunting		X		X	X				
Chipping sparrow[4/]	X	X	X						
Lincoln's sparrow					X	X			
Brewer's blackbird[3/]		X	X		X	X			
Bullock's oriole				X	X				
American goldfinch[3/]					X				
Subalpine Associates									
Cassin's finch								X	

1/ Table modified from Andelman and Stock (1994). Additional species habitat information obtained from WHR (CDFG, 1998a), Verner et al. (1980), and Harris (1996).

2/ Includes clearcut habitat.

3/ These species are technically considered "neotropical" but local populations are resident, and can be found year-round or for significant portions of the year in the vicinity of the Project.

4/ Population trends declining based on data for species for which population trends are known (Andelman and Stock, 1994).

Source: Foster Wheeler Environmental Corporation, 1998

al. (1987) found that 57 percent of bank swallow colonies were located adjacent to grasslands and 16 percent were located adjacent to riparian or oak forests.

No bank swallow nesting colonies are known to occur on or near PALCO lands (CDFG, 1998b; PALCO, 1998). The CDFG (1998b) has no record of bank swallows occurring on Elk River Timber Company lands of the Project Area. However, the bank swallow may occur on PALCO and Elk River Timber Company lands based on the availability of potentially suitable priority habitat. Based on the above, for this analysis, priority habitat for the bank swallow is considered to be streambanks along Class I and II streams, although likely only a small portion of these areas would actually provide nesting habitat for this species. As such, up to 1,081 miles of potential priority habitat for the bank swallow occurs in the Project Area. Although potential nesting habitat occurs along approximately 1,081 miles of Class I and II streams on PALCO and Elk River Timber Company lands of the Project Area, only a small proportion of these areas are likely to provide nesting habitat for the bank swallow.

GOLDEN EAGLE

The golden eagle (*Aquila chrysaetos*) is a CDFG fully protected species, a California species of special concern, and a BOF sensitive species. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). This species has no federal status under the ESA but is protected under BEPA. In addition, take of any individuals, nests, or eggs of this species is prohibited under Section 3503.5 of the Fish and Game Code of California (birds-of-prey prohibition). Also found in Eurasia and northern Africa, the North American breeding range for this species extends from Alaska across Yukon, western and southern Mackenzie, northwest Manitoba, northern Ontario, and northern Quebec to Labrador, and south to Baja California, the highlands of northern Mexico, west central Texas, and portions of Oklahoma, Nebraska, and the Dakotas (Johnsgard, 1990). The golden eagle winters from south central Alaska throughout the western portion of its breeding range (Johnsgard, 1990). Golden eagles occur throughout most of California as an uncommon permanent resident and migrant (Zeiner et al., 1990). In northwestern California, the golden eagle is considered a "rare-to-uncommon resident and breeder" (Harris, 1996). Current threats to golden eagles include disturbance of nesting birds due to human-related activities (Zeiner et al., 1990a).

Nesting by golden eagles typically occurs on cliffs or large trees in rugged open areas such as canyons and escarpments (Zeiner et al., 1990a). The critical reproductive period for the golden eagle is from January 15 to September 1 or until young have fledged (CDF, 1997a). Foraging occurs in open terrain such as grasslands, deserts, sage-juniper flats, savannahs, early successional stages of forest and shrub habitats, desert edges, farms, or ranches (Small, 1974; Zeiner et al., 1990a). Large trees and secluded cliffs with overhanging ledges are used for cover.

Observations of the golden eagle have been recorded on PALCO lands in the Yager, Bear-Mattole, Eel, and Humboldt WAAs, although no nesting is known to occur on PALCO lands (PALCO, 1998). The CDFG (1998b) has no record of golden eagle observations on Elk River Timber Company lands of the Project Area. Based on the above, for this analysis, priority habitat for the golden eagle is considered to be cliff habitat and LSH. Known potentially suitable cliff nesting sites for this species in the Project Area are very limited (see the Peregrine Falcon section). However, approximately 68,474 acres of LSH occurs

in the Project Area, a proportion of which may provide potential priority nesting habitat (isolated large trees) for this species (Table 3.9-1 and Figure 3.10-1).

NORTHERN GOSHAWK

The northern goshawk (*Accipiter gentilis*) is a federal species of concern, a California species of special concern, and a BOF sensitive species. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). In 1997, this species was petitioned for listing under the federal ESA. However, following a status review, the FWS declared that listing was not warranted (USDI, 1998d). This finding stated that available data did not indicate that the goshawk population was declining or that there were significant areas of extirpation, and that the species was well distributed throughout its range. The goshawk is a wide-ranging species occurring in temperate and boreal forests of Europe, Asia, and North America. Goshawks are "rare-to-uncommon year-round residents" in the North Coast Ranges through the Sierra Nevada, Klamath, Cascade, and Warner mountains (Zeiner et al., 1990a; Harris, 1996). The most recent synthesis of goshawk population information is found in the FWS's status review (Martin et al., 1998), encompassing forested lands in the continental United States west of the 100th meridian. The review area was divided into six geographic subareas (Assessment Areas). The population parameter reported in each Assessment Area was a census of individual breeding territories known (through field surveys) to have been occupied at least once between 1988 and 1998. The authors of the status review caution that there are substantial differences in survey effort between public and private lands, and between different field units within the reporting public agencies. The review team reported 3,242 breeding territories in the continental U.S., west of the 100th meridian, including 751 territories in Oregon and Washington, and 816 territories in California. Concern for this species stems from loss of mature and old-growth forest types necessary for foraging and nesting (primarily as a result of timber management activities), reduced nesting success and reproductive failure from pesticides, and human disturbance (Reynolds, 1992). However, due to the implementation of management plans such as the Northwest Forest Plan, Mexican Spotted Owl Recovery Plan, and goshawk guidelines developed in the Southwest Region, much of the federal ownership occurring within the range of western goshawk populations is currently managed for late-successional species which is expected to benefit goshawks. Over the past decade, loss of habitat from timber harvesting within the western range of goshawks has slowed considerably (USDI, 1998e). Within the Coast Range of California private ownership, which has been subject to extensive logging over the past century, dominates (87 percent) the land base. In the absence of a large-scale management plan, future habitat trends are difficult to estimate. However, these lands will be subject to California FPRs and Habitat Conservation Agreements. Of the federal ownership, 16 percent is considered "matrix" land allocation where timber harvest is expected, compared with the remainder of allocations which either prohibit logging or allow only prescriptions that are designed to enhance or accelerate the development of late-successional or mature forest (USDI, 1998d).

Nesting habitat for the northern goshawk typically occurs in mature and old-growth forest, often in moist areas on north-facing slopes (Zeiner et al., 1990; ODFW, 1992). A primary factor in habitat selection appears to be prey availability; goshawks are known to use small patches of mature habitat to meet their nesting requirements within mosaics of tree age classes (USDI, 1998d).

Ninety-five percent of nest sites in Oregon were found in old-growth forest (Reynolds et al., 1982 *in* ODFW, 1992). Nests are usually found in dominant trees, frequently near small openings in the stand (Zeiner et al., 1990; ODFW, 1992). Goshawks usually have two to four nest areas within the home range, alternating sites from year to year (Reynolds et al., 1992). This species is well adapted for hunting below the forest canopy in dense forests, where goshawks forage on a variety of birds and mammals, including grouse, jays, woodpeckers, ground squirrels, hares, and rabbits (Jones, 1979; Zeiner et al., 1990a). Goshawks use snags, large logs, rocks, and other prominent perches as plucking posts, where prey are cleaned before being consumed or passed to nestlings; ODFW, 1992). Commencement of the breeding period varies geographically, ranging from April in southern California to mid-June in northern California.

No goshawk nests have been documented on the PALCO ownership (PALCO, 1998). Surveys of approximately 5,200 acres of potentially suitable nesting habitat on PALCO lands between 1993 and 1995 produced no goshawk sightings (PALCO, 1998). Six incidental observations of northern goshawks have been reported in or near PALCO lands: one in the Allen Creek MMCA, one in the Headwaters Reserve, one in the Bear-Mattole WAA, and three off property (PALCO, 1998). The CDFG (1998b) has no record of this species occurring on Elk River Timber Company Lands of the Project Area, although it may occur there based on the presence of late-successional forest habitat. Based on the above, for this analysis, LSH is considered to be the priority habitat for goshawks in the Project Area. As such, approximately 68,474 acres of potential priority nesting habitat occurs for the northern goshawk in the Project Area (Table 3.9-1, Appendix Table M-1 and Figure 3.10-1).

Under FPRs currently regulating PALCO and Elk River Timber Company lands, a minimum 5-acre buffer zone must be established (in consultation with the CDFG and RPF) around goshawk nest sites where breeding efforts have occurred during the last three years (Appendix Table M-2). No timber operations are permitted within the buffer zone during the critical nesting period (March 15 until August 15); however, new road construction is permitted if the Director determines that there is no feasible alternative. Notably, consultation with CDFG usually results in more restrictive measures. Helicopter yarding is prohibited within 0.25 mile of an active nest during the critical period. No designated nest trees, screening trees, perch trees, or replacement trees may be harmed or removed within the buffer zone at any time of year. However, commercial thinning, sanitation-salvage, and selection regeneration methods are allowed during the non-critical period.

FERRUGINOUS HAWK

The ferruginous hawk (*Buteo regalis*) is an FWS species of concern and a California species of special concern. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). In addition, take of any individuals, nests, or eggs of this species is prohibited under Section 3503.5 of the Fish and Game Code of California (birds-of-prey prohibition). The ferruginous hawk is a common breeder in Colorado, Idaho, Montana, Utah, and Wyoming. Populations in northern states and the Great Plains tend to be migratory. The current range of this species in California is primarily limited to open habitats in the central and southern parts of the state, where it is generally considered an uncommon winter resident and migrant species. In 1992, the FWS evaluated a petition to list the ferruginous hawk under ESA, and due to evidence of an increased breeding population it concluded that

listing was not warranted at that time (57 Federal Register 37507). One breeding site has been documented in Modoc County, California, but there are no other breeding records from the state (PALCO, 1998). However, breeding has been recorded in eastern Oregon (ODFW, 1996). In northwestern California, the ferruginous hawk is considered a locally rare winter visitor (Harris, 1996). Wintering birds generally arrive in California in September and depart by mid-April (Zeiner et al., 1990a). Primary threats to this species include any activities that could significantly alter abundance of prey species, including destruction of prairie habitat.

The ferruginous hawk inhabits open grasslands, sagebrush flats, desert areas, pastures, and other open habitats (Zeiner et al., 1990a; Harris, 1996). Ferruginous hawks in California will use telephone poles, utility poles, lone trees, or high earthen mounds for roost sites (Zeiner et al., 1990a; PALCO, 1998). This species is a diurnal forager, making low flights over open areas to search for prey such as rabbits, ground squirrels, mice, birds, and reptiles. Jackrabbits are the most important prey item in many areas (USDA, 1992). Studies of some populations of ferruginous hawks indicate that densities of this species may be directly related to cyclic abundance of some rabbit species (USDA, 1982; Zeiner et al., 1990a). Availability of water and cover do not seem to be limiting factors.

The ferruginous hawk has been observed on PALCO lands in the Eel and Van Duzen WAAs (PALCO, 1998). Sightings of an individual bird have been recorded in the Van Duzen WAA in multiple years (PALCO, 1998). Based on the above, for this analysis, priority habitat for this species is considered to be open habitats such as prairie and grassland. As such, approximately 5,686 acres of priority habitat for the ferruginous hawk occurs in the Project Area (Table 3.9-1 Appendix Table M-1).

OSPREY

The osprey (*Pandion haliaetus*) is a California species of special concern and a BOF sensitive species. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). Take is prohibited under California state law (Section 3505, California Fish and Game Code). The osprey breeds along most major seacoasts, lakes, and rivers in the United States. In California, the osprey breeds from the Cascade Ranges south to Lake Tahoe, and along the coast south to Marin County (Zeiner et al., 1990a). Most birds undergo a seasonal migration to Central and South America, although a small proportion of the population overwinters along the coast of southern California and at major foraging areas such as San Francisco Bay and Lake Shasta (Zeiner et al., 1990a; Harris, 1996). In northwestern California, Harris (1996) describes the osprey as a common summer resident and breeder, and a rare winter resident. Migrating osprey usually arrive at nesting grounds between early March and early April (Zeiner et al., 1990a; Harris, 1996). Timber harvest has the potential for negative impacts on this species through disturbance of active nests or harvest of potential nest and perching trees. Gravel mining along major rivers may also disturb nest sites or eliminate potential foraging habitat.

The osprey is strictly associated with large, fish-bearing bodies of water, and requires tall, large trees near water for nesting and perching. Nests usually consist of a large platform of sticks at the top of snags, dead-topped trees, cliffs, or artificial nest platforms, and are usually within 400 meters of (but up to 1 mile from) a fish source (Zeiner et al., 1990a). Nest trees

must allow easy access for landing and take-off (FWS, 1984). Suitable nest trees are generally at least 75 feet high and 40 inches dbh (FWS, 1984). Tall, open-branched "pilot" trees are also required near the nest to allow easy access to the nest and to provide launch sites for young practicing flight.

Ospreys nest along all major rivers throughout the southern Humboldt region, and loose-nesting colonies occur along the Elk River in the project vicinity (Harris, 1996; PALCO, 1998). The osprey has been observed on the PALCO ownership in the Eel, Van Duzen, and Humboldt WAAs (PALCO, 1998). Approximately 63 historic and active osprey nests are located on or immediately adjacent to PALCO property (PALCO, 1998). Most of the nests are immediately adjacent to large streams in the Project Area (Eel, Van Duzen, and Elk) rivers. The CDFG (1998b) has no records of observations of ospreys on Elk River Timber Company lands of the Project Area, although this species is expected to occur there based on the availability of potentially suitable habitat. Based on the above, for this analysis, riparian areas along Class I streams are considered priority habitat for this species. As such, approximately 281 miles of potential priority breeding habitat for the osprey occurs in the Project Area.

Under FPRs currently regulating PALCO and Elk River Timber Company lands, a minimum 5-acre buffer zone must be established (in consultation with the CDFG and RPF) around osprey nest sites where breeding efforts have occurred during the last 3 years (Appendix Table M-2). No timber operations are permitted within the buffer zone during the critical nesting period (March 15 until May 15); however, new road construction is permitted if the Director determines that there is no feasible alternative. Notably, consultation with CDFG usually results in more restrictive measures. Helicopter yarding is prohibited within 0.25 mile of an active nest during the critical period. No designated nest trees, screening trees, perch trees, or replacement trees may be harmed or removed within the buffer zone at any time of year. However, commercial thinning, sanitation-salvage, and the selection regeneration methods are allowed during the non-critical period.

DOUBLE-CRESTED CORMORANT

The double-crested cormorant (*Phalacrocorax auritus*) is a California species of special concern. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c, Table 3.10-3). Of all species of North American cormorants, the double-crested cormorant is the most common and widespread, and is the only cormorant likely using inland lakes or rivers. In North America, this species nests from southwestern Alaska, central Alberta, James Bay, and Newfoundland south to the Gulf of Mexico. In California, this species ranges throughout the coast, on inland waters of the Central Valley and Sierras, the Modoc Plateau and Klamath Basin, south into the Colorado River Valley and Salton Sea (Zeiner et al., 1990a). In northwestern California, this cormorant is a locally abundant, year-round resident and breeder.

Increased predation and nest abandonments have been observed after human disturbance, habitat destruction, and predation (Remsen, 1978; Ellison and Cleary, 1978). Additionally, the species is susceptible to toxins, with deformities still occurring in some areas (Graham, 1995). Portions of the North American population were significantly affected by control programs in the 1930s and 1940s and the use of organochlorides and other pesticides in the 1950s and 1960s, particularly in the Great Lakes region. However, societal changes and reductions of toxic chemicals

in those areas resulted in relatively stable cormorant populations where they are found. Breeding Bird Survey data indicate profound increases in population trends during the time period from 1966 to 1996, most notably in the prairie/plain region. Carter et al. (1995) noted recent declines apparently attributable to El Niño oceanographic conditions, habitat loss, and use of artificial nesting habitats. Overall, in California, data show upward trends for this species (Sauer et al., 1997). The double-crested cormorant typically forages in sheltered bays, lagoons, coves, and along lower reaches of coastal rivers, feeding mainly on fish, crustaceans, and amphibians. Roost sites are adjacent to water, consisting of offshore rocks, cliffs, jetties, old wharf ruins, or trees. Cormorants are colonial nesters that require undisturbed off-shore sea stacks and rock ledges adjacent to an adequate food supply.

Based on the above, for this analysis, priority habitat for the double-crested cormorant is considered to be low-lying areas next to larger streams and rivers that may offer foraging habitat for this species. As such, approximately 281 miles of Class I streams provides potential priority habitat for this species.

COOPER'S HAWK

The Cooper's hawk (*Accipiter cooperi*) is a California species of special concern. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP. Take of this species is prohibited in California (Section 3503.5 California Fish and Game Code; CDFG, 1998c; Table 3.10-3). Cooper's hawks breed from southern Canada south through most of the U.S. to central Florida and northern Mexico. This species has a more southern distribution than other North American accipiters. The Cooper's hawk winters throughout the southern portion of the range, with partial migration occurring in some areas, where males remain on or near their territories year-round, and females and younger birds migrate as far south as Florida, Mexico, and Central America (Cornell Laboratory of Ornithology, 1998). The Cooper's hawk is an uncommon year-round resident throughout California (Zeiner et al., 1990a; Harris, 1996). Concern for this and other accipiter species stems from loss of breeding and wintering habitat (primarily as a result of timber-management activities), reduced nesting success and reproductive failure from pesticides, and human disturbance (ODFW, 1992).

Cooper's hawks generally frequent landscapes where wooded areas occur in patches and groves. Nesting usually occurs near streams in dense, second-growth conifer or deciduous riparian stands with moderate crown depths (Zeiner et al., 1990a). Dense forest also provides cover for Cooper's hawks while they hide, attack, and approach prey; in addition, this species hunts in fragmented landscapes and along forest edges (Zeiner et al., 1990a).

Incidental observations of Cooper's hawks have occurred on PALCO lands during avian surveys for the PALCO HCP/SYP (PALCO, 1998). One nest site has been documented on PALCO lands in the Van Duzen WAA. Other observations have come from the Yager, Eel, and Bear-Mattole WAAs (CDFG, 1998b; PALCO, 1998). The CDFG (1998) has no record of this species occurring on Elk River Timber Company Lands of the Project Area, although it may occur there based on the presence of hardwood and mid-seral forest habitat. Based on the above, for this analysis, priority habitat for the Cooper's hawk is considered to be hardwood and mid-seral forest. As such, approximately 84,550 acres of potential priority nesting habitat for this species occurs in the Project Area (Table 3.9-1 and Appendix Table M-1).

SHARP-SHINNED HAWK

The sharp-shinned hawk (*Accipiter striatus*) is a California species of special concern (CDFG, 1998c; Table 3.10-3). This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP. Take is prohibited in California (Section 3503.5, California Fish and Game Code). Sharp-shinned hawks are fairly common migrants and winter residents throughout the United States and California; their breeding distribution, however, is poorly documented (Harris, 1996). This species is the least common breeding accipiter in California (Zeiner et al., 1990a). Concern for this and other accipiter species stems from loss of breeding and wintering habitat (primarily as a result of timber-management activities), reduced nesting success and reproductive failure from pesticides, and human disturbance (ODFW, 1992).

Sharp-shinned hawks typically use dense forest stands near open areas. Nesting habitat generally consists of dense pole- to small-tree conifer stands that are cool, moist, well shaded, near water, and with little ground cover (Zeiner et al., 1990a). Ponderosa pine, black oak, riparian deciduous, mixed conifer, and Jeffrey pine habitats commonly provide nesting habitat, especially on north-facing slopes (Zeiner et al., 1990a). Sharp-shinned hawks often forage in openings at edges of woodlands, hedgerows, brushy pastures, and shorelines, especially where migrating birds are found. Small birds, usually no larger than jays, make up the bulk of this species' diet (Zeiner et al., 1990a).

Infrequent incidental observations during the breeding season indicate that sharp-shinned hawks are present on PALCO lands, albeit in low numbers; no documented nesting records are known from PALCO lands (PALCO, 1998). Documented occurrences during the winter period have been recorded from the Humboldt, Yager, and Bear-Mattole WAAs (PALCO, 1998). The CDFG (1998b) has no record of this species occurring on Elk River Timber Company lands of the Project Area, although it may occur there based on the presence of priority habitat. Based on the above, for this analysis, priority habitat is considered to be young forest. As such, approximately 44,425 acres of potential priority habitat for this species occurs on PALCO and Elk River Timber Company lands within the Project Area (Table 3.9-1 and Appendix Table M-1).

BURROWING OWL

The burrowing owl (*Speotyto cunicularia*) is a California species of special concern (CDFG, 1998c; Table 3.10-3). This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP. Take is prohibited under California state law (Section 3503.5, California Fish and Game Code). It occurs from the southern portions of western Canada through the western United States and Mexico through Central America, South America to southern Argentina (Haug et al., 1993). In California, distribution is not uniform, occurring as a year-round resident of open, low-lying valleys, basin bottoms and coastal plain habitats of central and southern California (Zeiner et al., 1990a, DeSante and Ruhlen, 1995). The burrowing owl inhabits open habitats such as grasslands, prairies, deserts, agricultural areas, coastal dunes, for reproduction and foraging (USDI, 1974; Zeiner et al., 1990a). In particular, the burrowing owl uses grass, forb, and open shrub stages of pinyon-juniper and ponderosa pine habitats (Zeiner et al., 1990a). Burrow availability, short vegetation, and openness are important factors in determining quality of habitat for the burrowing owl (USDI, 1974). Burrow availability is almost always determined by the presence of colonies of burrowing mammals, particularly ground squirrels and prairie dogs (USDI, 1974).

An estimated 9,450 pairs occur within the state (DeSante and Ruhlen, 1995); approximately 70 percent of the population occurs in the Imperial Valley (Buchanan, 1998). In northwestern California, the burrowing owl is considered to be a locally rare migrant and winter visitor, where it has been observed most frequently in coastal and delta areas among driftwood, on log decks, in bay dikes, or along river bottomlands. Most records occur from the months of October - February (Harris, 1996). Small, isolated colonies occur in north/northeastern California in Siskiyou and Shasta counties, mainly on private lands (Personal communications; B. Woodbridge, Klamath National Forest, and T. Burton, CDFG, August, 1998).

Throughout its range, the burrowing owl has been declining in abundance in recent decades (USDI, 1974; Zeiner et al., 1990a; DeSmet, 1998) due to numerous factors. Population losses have been attributed primarily to loss of burrow habitat from urban, industrial, and agricultural development (USDI, 1974; Zarn, 1974; Wellicom and Haug, 1995; Buchanan, 1998). In a survey conducted by the Institute for Bird Population, California populations indicate a decline of over 50% in the last decade (DeSante and Ruhlen, 1995). These losses occurred in areas subjected to the greatest human population growth during this time (DeSante and Ruhlen, 1995; Medvitz and Sokolow, 1995). Other impacts to the species result from predation, vehicle collisions, inclement weather (Personal communication, K. DeSmet, Manitoba Department of Natural Resources, August 14, 1998; Clayton and Schmutz, 1998) and poor productivity (DeSmet, 1998). Eradication of burrowing mammals that provide nest sites (Butts, 1973, Zarn, 1974), or activities that reduce populations of burrowing animals, such as brush control and poisoning, threaten burrowing owl populations by reducing their prey base (USDI, 1974). The invasive spread of non-native vegetation also may have a role in reducing suitable habitat by limiting visibility near burrow mounds and altering composition of vegetation used by prey of the burrowing owl. This may be a factor contributing to population declines in Siskiyou County, California (Personal communication, B. Woodbridge, Klamath National Forest, August 13, 1998). In the Project Area, activities with the greatest potential for negative impacts are road building and livestock grazing in prairie habitats (PALCO, 1998).

Burrowing owls have not been recorded in the Project Area (CDFG, 1998b; PALCO, 1998), and are not expected to nest there based on the current known range of the species. However, this species may occur in the project vicinity as an occasional winter migrant (Harris, 1996). Approximately 5,686 acres of prairie habitat exists in the Project Area on PALCO and Elk River Timber Company lands, all of which is considered potential priority breeding/foraging habitat for the burrowing owl (Table 3.9-1 and Appendix Table M-1).

VAUX'S SWIFT

The Vaux's swift (*Chaetura vauxi*) is a California species of special concern with no federal status. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). The Vaux's swift breeds from southeastern Alaska and northwestern British Columbia, south to northern Mexico (DeGraaf et al., 1991). Roughly one-third of the species' breeding range in the U.S. is in California (USDA, 1994) where it is common as a migrant, but breeds only from Del Norte County south to Santa Cruz County and in the Sierra Nevada, where it is a common summer resident (Zeiner et al., 1990a; Harris, 1996). This species is vulnerable to loss of priority habitat consisting of old-growth forest, primarily due to timber-management activities.

The abundance of the Vaux's swift in the Pacific Northwest is closely associated with old-growth forests (Carey et al., 1991; Manuwal, 1991). This species nests in hollow trees, snags, chimneys, and cavities excavated by pileated woodpeckers from early May to mid-August (Zeiner et al., 1990a; Bull and Cooper, 1991; Lundquist and Mariani, 1991). Vaux's swifts prefer dead trees greater than 20 inches dbh for nesting, particularly broken-topped trees (Bull and Cooper, 1991; Bull and Hohmann, 1993; Bull et al., 1992). Preferred nest tree species include Douglas-fir, redwood, and western white pine, although tree size and cavity type are considered more important than tree species (Zeiner et al., 1990a). The Vaux's swift forages over ponds and streams, with grasslands and forests used secondarily (Manuwal, 1991; Bull and Beckwith, 1993). This species is vulnerable to loss of priority habitat, particularly the removal of standing dead or dying trees with cavities. Effects from other activities in nesting areas are unknown, although stream alteration may have some effect on abundance of insects and foraging habitat (USDA, 1994b).

The Vaux's swift has been observed in all PALCO WAAs where suitable nesting habitat (LSH) occurs (PALCO, 1998). The CDFG (1998b) has no records of its occurrence on Elk River Timber Company lands of the Project Area, although this species may occur there based on the availability of priority habitat. Based on the above, for this analysis, priority habitat for the Vaux's swift is considered to be LSH. As such, approximately 68,474 acres of priority habitat for this species occurs on PALCO and Elk River Timber Company lands of the Project Area (Table 3.9-1 and Appendix Table M-1).

PURPLE MARTIN

The purple martin (*Progne subis*) is a California species of special concern with no federal status. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). This species breeds from southwestern British Columbia south to Baja California; and from northeastern and east-central British Columbia and central Alberta to southern Ontario and New Brunswick south to Mexico, the Gulf Coast, and southern Florida; and west to eastern Idaho and central Utah. It is found locally in the Rocky Mountains but it avoids most other mountainous areas. The species winters in South America (DeGraaf et al. 1991). The purple martin is an "uncommon-to-rare, local summer resident" in suitable low-elevation habitats throughout the state (Zeiner et al., 1990a). The current estimated population of purple martins is 200 to 300 pairs in northwestern California (Klamath North Coast Region) (Sieving and Williams, 1996). Declines in populations have been attributed to the loss of riparian habitat, snag removal, fire suppression, and competition with non-native bird species for nesting cavities (Zeiner et al., 1990a; Sieving and Williams, 1996).

Nesting habitat generally consists of relatively open (less than 50 percent canopy cover) riparian and wooded areas with suitable nest sites near open water, including deciduous and old-growth coniferous forest habitats along the north coast of California (Zeiner et al., 1990a; Sieving and Williams, 1996). Purple martins in northwestern California and the Sierra Nevada are known to nest primarily in tall, large-diameter (greater than 100 cm dbh) conifer snags (including coastal redwood snags), hollow bridges, and downed snags, but also buildings (Sieving and Williams, 1996). This species appears to prefer relatively open habitat, and increased numbers of purple martins have been reported in logged areas where large snags persist (Sieving and Williams, 1996). Purple martins nest from April into August, usually in colonies (Zeiner et al., 1990a;

Sieving and Williams, 1996). Various open habitats are used for foraging during migration (Zeiner et al., 1990a).

The purple martin has been observed on PALCO lands in the Bear-Mattole WAA (PALCO, 1998). The CDFG (1998b) has no record of this species occurring on Elk River Timber Company lands of the Project Area, although it is suspected to occur there based on the availability of potentially suitable habitat. Based on the above, for this analysis, priority habitat for the purple martin is considered to be LSH occurring in riparian areas along Class I, II, and III streams. As such, approximately 500 miles of priority habitat for this species occurs along Class I, II, and III streams on PALCO and Elk River Timber Company lands of the Project Area.

YELLOW WARBLER

The yellow warbler (*Dendroica petechia*) is listed as a California species of special concern with no federal status. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). It is the most widespread North American wood warbler. It breeds from the Arctic Circle in Alaska across Canada to central Labrador and Newfoundland south to southern California, across northern Oklahoma and Georgia to the Florida keys and West Indies, south through Mexico and Central America to Columbia and Peru, and even on the Galapagos Islands (Farrand, 1983). Given this wide distribution, California composes a small percentage of its breeding range; however, federal lands within California provide a critical component of breeding and migratory habitat (USDA, 1994b).

In northern California, yellow warblers are "uncommon-to-common summer residents" (USDA, 1994b; Harris, 1996). Yellow warblers are closely tied to dense riparian habitats for nesting, foraging, and migration. Foraging and breeding occurs in alder-cottonwood-willow stands. Harris (1991) noted scattered winter occurrences of this species throughout Humboldt County.

Habitat loss for the yellow warbler in both breeding and wintering habitats has placed pressures on this species. Breeding Bird Survey data indicate that western United States populations declined from 1966 to 1996, with severely declining trends in regions such as the Sierra Nevada, Pacific Northwest, and California foothills (Sauer et al., 1997). Additional pressures are placed on this species from the common role they play as cowbird hosts. Terborgh (1989) suggests this species has a greater incidence of cowbird parasitism in habitats with more edge and lower cover, which has resulted in severe declines in some populations due to the increase in edge within its range (Bent, 1953; Remsen, 1978; Garrett and Dunn, 1981). Zeiner (1990) also reported the use of montane shrubs in coniferous forests. Preference for moist habitats with vertical structure and 60 to 80 percent crown cover of mostly deciduous shrubs greater than 2 m in height has been documented (Stauffer and Best, 1980). Nests are located above the ground in deciduous saplings or shrubs. Post-breeding observations have included mid-elevation coniferous forests (Hebard, 1961). Diet consists almost entirely of insects and arachnids gleaned from the outer part of the canopy.

The yellow warbler has been documented on PALCO lands within mid- and late-successional habitat (PALCO, 1998). It is likely that this species is distributed in suitable habitat throughout the Project Area. Based on the above, priority habitat for the yellow warbler is considered to be riparian areas with shrub components such as alders and willows along Class I and Class II streams. As such, approximately 110 miles of priority habitat associated with Class I and II streams occur on PALCO

Timber Company lands in the Project area; none occurs on Elk River Timber Company lands.

YELLOW-BREASTED CHAT

The yellow-breasted chat (*Icteria virens*) is a California species of special concern with no federal status. This species is identified on PALCO's HCP List A and, thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). This species is the largest warbler with a wide breeding range throughout the lower 48 states, southern Canada, and northern Mexico. Within California, this species is an uncommon summer resident, and migrants are strictly associated with marsh and riparian habitats. Much of its current range is located on National Forest System lands (USDA, 1994b). Yellow-breasted chats nest in dense, shrubby growth on woodland edges, old pastures, hedgerows, streams, swamps, pond edges, and scrub country near water (Harrison, 1978; Verner and Boss, 1980). Harris (1991) noted this species as a "locally uncommon-to-common resident and breeder" in the Humboldt Area associated with well-developed riparian cover along streams from the inner edges of the coastal plain throughout the inland river valleys.

Like most riparian-dependent neotropical species, the yellow-breasted chat is subject to decline with alteration of riparian habitats and other indirect effects tied to habitat fragmentation occurring on both breeding and winter grounds. Parasitism also appears to have contributed to the decline of this species (Gaines, 1974; Remsen, 1978). Breeding Bird Survey data indicate an overall stable population in the western United States populations from 1966 to 1996, in most other areas of the United States, however, the trend shows continual declines since 1966 (Sauer et al., 1997).

The yellow-breasted chat was documented in forest openings during terrestrial vertebrate surveys on PALCO land (PALCO, 1998). It was also detected during surveys done for gravel extraction. Based on the above, for this analysis, priority habitat for the yellow-breasted chat is considered to be riparian areas along Class I and II streams. As such, approximately 1,081 miles of priority habitat for this species occurs within the Project Area, especially along the larger creeks and rivers in lower-lying areas.

GREAT BLUE HERON

The great blue heron (*Ardea herodius*) is not currently under federal threatened or endangered species protection, but is considered sensitive by the CDF. This species is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). It is a large wading heron with a wide range, breeding from southern Alaska, coastal and southern British Columbia, and southern Keewatin, and central Manitoba east to Nova Scotia and south. It winters from coastal areas of southern Alaska and British Columbia across the central United States and southern New England, south into northern South America (USDA, 1991). This species is widespread throughout California and is a locally common resident and breeder in Humboldt and Del Norte counties, with breeding colonies located near local rivers, creeks, and Humboldt Bay (Harris, 1996).

Great blue herons use upland habitats such as forest ponds, rivers, and dry grasslands, feeding mainly on fish, but will also seek amphibians, snakes, lizards, invertebrates, and small mammals. For nesting, the great blue heron prefers secluded groves of tall trees near shallow water feeding areas, but feeding areas may be up to 10 miles away (Krebs, 1974). Nesting colonies in California may be mixed with great egrets (Zeiner et al., 1990a).

Colonies of herons are susceptible to disturbance, pesticides, and herbicides (Gould, 1974; Jackman and Scott, 1975), and habitat destruction from wetland declines. Human disturbance has been documented to be a major cause of nest abandonment in great blue herons, causing colony-wide nest failures (Gould, 1974; Jackman and Scott, 1975). No range-wide threats occur to great blue herons, but reproductive success can be affected by localized storms that remove rookeries, and eggs/young are subject to predation by corvids, birds of prey, and raccoons. Breeding Bird Survey data show variable population trends throughout different regions of the United States, with western states indicating slight population increases (Sauer et al., 1997).

Individual great blue heron nests and small aggregations of nests have been located along river corridors on PALCO lands, but no large rookeries have been documented (PALCO, 1998). Incidental observations have been reported from all WAAs. CDFG has no records of heron or egret rookeries occurring on PALCO lands, although survey data are lacking (Personal communication, K. Kovacs, wildlife biologist, CDFG, July, 1998). Known multi-species rookeries occur in the vicinity of the Project Area, at Indian Island and in Southern Humboldt Bay (Personal communication, K. Kovacs, wildlife biologist, CDFG, July, 1998). Other known great blue heron sites have been located on private lands along the Eel and Mad rivers. Priority nesting, roosting, and foraging habitat for this species is limited within the Project Area. Large trees adjacent to low-lying Class I streams or other water bodies may provide nesting/roosting habitat, and wet meadows, fields, and riparian areas adjacent to Class I and Class II streams could provide foraging habitat. The most important contribution of suitable riparian areas adjacent to Class II streams is as foraging habitat, but as stands develop, this habitat may provide attributes suitable for nesting and/or roosting in the future. Based on the above, for this analysis, priority habitat for the great blue heron is considered to be Class I and II wetlands and riparian areas along Class I and II streams. As such, approximately 1,081 miles of potential priority breeding/foraging habitat for the great blue heron (defined as Class I and II wetlands and areas along Class I and II streams) occur on PALCO and Elk River Timber Company lands within the Project Area.

GREAT EGRET

The great egret (*Casmerodius albus*) is not currently under state or federal threatened endangered species protection, but is considered sensitive by CDF, and take is prohibited under California state law (Section 3505, California Fish and Game Code). This species is identified on PALCO's HCP List A, and, thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-3). This species' range extends from southeastern Saskatchewan, southwestern Manitoba, southern Ontario, and the eastern United States, south through the Gulf states and into Mexico and northern Central America. It winters from northern California across the southern United States and south along the Atlantic Coast through South America. This species is common yearlong throughout California with the exception of upper elevations and deserts (Zeiner et al., 1990a). In northwestern California, it is a common resident and breeder, with breeding colonies found on Humboldt Bay.

The great egret is a large wading bird utilizing lowland pastures, sloughs, marshlands, estuaries, rivers, and small creeks, foraging on fish, amphibians, snakes, invertebrates, and small mammals. It is also known to forage in upland habitats, including forest ponds, rivers, and dry grasslands (Harris, 1996). Like great blue herons, great egrets nest in large trees

(usually 6-12 m high) near foraging areas; foraging habitat consists of shallow water and shorelines of estuaries, lakes, ditches, slow-moving streams, salt ponds, mudflats, irrigated croplands, and pastures (Zeiner et al., 1990a). In California, great blue herons and great egrets often nest together in mixed colonies (Zeiner et al., 1990a). Great egrets may forage up to 32 km from nesting areas, but usually remain much closer (Custer and Osborn, 1978).

This species experienced serious declines in the latter 19th and early 20th centuries due to pressures from the plumage trade. The population also was affected by use of organochlorides in the 1950s and 1960s, but the population has been increasing rapidly since the 1972 ban on DDT. Great egret eggs collected in 1980 and 1981 from the Malheur National Wildlife Refuge in Oregon, however, exhibited substantial DDT residues and eggshell thinning, indicating that the threat posed by organochloride pesticides still persists (ODFW, 1996). Breeding Bird Survey data (Sauer et al., 1997) show variable population trends from 1966 to 1996 for the great egret throughout different regions of the United States, with western populations increasing. Local records indicate a gradual increase in the numbers of these birds within Del Norte and Humboldt counties over the past 50 years, in part due to the conversion of mudflats into pastureland (Harris, 1996). Winter populations, especially, benefit from the availability of foraging habitat provided by the pastures, since mudflats are not available as foraging habitat during daylight due to winter high tide patterns (Harris, 1991). As with other wading birds, rookeries are susceptible to human disturbance and pesticides (Ives, 1972).

CDFG has no records of heron or egret rookeries occurring on PALCO lands, although survey data are lacking (Personal communication, K. Kovacs, wildlife biologist, CDFG, July, 1998). Great egrets have been seen foraging individually and in small groups along the Eel and Van Duzen rivers during spring and summer, but no rookeries have been documented on PALCO lands (PALCO, 1998b). Groups of 10 or 20 have also been seen among grazing cattle in winter months. The CDFG (1998b) has no records of this species occurring on Elk River Timber Company lands of the Project Area, although it may occur there based on the presence of suitable foraging habitat. Known multi-species rookeries occur in the vicinity of the Project Area, at Indian Island and in Southern Humboldt Bay (Personal communication, K. Kovacs, wildlife biologist, CDFG, July, 1998). Priority nesting, roosting, and foraging habitat is limited within the Project Area. Large trees adjacent to low-lying Class I streams or other water bodies would provide nesting/roosting habitat, and wet meadows, fields, and riparian areas adjacent to Class I and Class II streams could provide foraging habitat. The most important contribution of suitable riparian areas adjacent to Class II streams is as foraging habitat, but as stands develop, this habitat may provide attributes suitable for nesting and/or roosting in the future. Based on the above, for this analysis, priority habitat for the great egret is considered to be Class I and II wetlands and riparian areas along Class I and II streams. As such, approximately 1,081 miles of potential priority breeding/foraging habitat for the great egret occurs on PALCO and Elk River Timber Company lands within the Project Area, as well as 486 acres of mapped wetlands (Table 3.7-3).

SNOWY EGRET

The snowy egret (*Egretta thula*) is not currently under federal or state threatened or endangered protection, but take is prohibited under California state law. The snowy egret is identified on PALCO's HCP List A, and, thus, is proposed for coverage under the ITP (Section 3505, California

Fish and Game Code; Table 3.10-3). The snowy egret breeds from northern California and Montana south to central and eastern Texas, along the Mississippi Valley, and along the east and Gulf Coasts to South America; this species winters from northern California south through Arizona and the southern portion of its breeding range to the Atlantic states. The snowy egret is widespread throughout California along coastal estuaries, wetlands, ponds, slow-moving rivers, irrigation ditches, and pastures (Zeiner, et al., 1990a). Previous to 1954, the snowy egret was unrecorded in the North Coast region but has been increasing in this area since then. Christmas Bird Count records of this species increased dramatically starting in 1980 (Harris, 1996). Declines of some populations have been noted such as in Salton Sea, but other new, more recent populations have been noted in other areas throughout the state (Garrett and Dunn, 1981; Cogswell, 1977; Airola, 1980). Breeding Bird Survey data indicate upward population trends for most areas throughout the range of the snowy egret, with significant (97 percent) annual increases in Louisiana. Data indicate a 9.8 percent increase per year throughout the western states (Sauer et al., 1997).

A common resident and locally uncommon breeder in some years, the snowy egret is closely associated with water for foraging, and has not been observed feeding in dry grasslands or upland pastures (Harris, 1996). The snowy egret feeds on small fish, crustaceans, and invertebrates (Cogswell, 1977), from wetlands during local foraging. Snowy egrets nest colonially, usually close to the ground, in wetland, riparian, and other habitats described above. Colonies in San Francisco Bay nested 0.5 - 2 m above ground, on low-growing shrubs or perennial herbaceous plants (Gill, 1977; Gill and Mewaldt, 1979). Nests have also been reported low in trees, typically 1.5 - 3 m above ground (Palmer, 1962; Cogswell, 1977).

High-quality habitat is limited within the Project Area. However, habitat associated with Class I streams and forested areas adjacent to fields and meadows could by used by this egret. Large trees adjacent to low-lying Class I streams or other water bodies may provide nesting/roosting habitat, and wet meadows and riparian areas adjacent to Class I and Class II streams could provide foraging habitat. No snowy egrets were detected during terrestrial species surveys (PALCO, 1998). CDFG has no records of egret rookeries occurring on PALCO lands, although survey data are lacking (Personal communication, K. Kovacs, wildlife biologist, CDFG, July, 1998). Known, multi-species rookeries occur in the vicinity of the Project Area at Indian Island and in Southern Humboldt Bay (Personal communication, K. Kovacs, wildlife biologist, CDFG, July, 1998). The most important contribution of suitable riparian areas adjacent to Class II streams is as foraging habitat, but as stands develop, this habitat may provide attributes suitable for nesting and/or roosting in the future. Based on the above, for this analysis, priority habitat for the snowy egret is considered to be riparian wetland habitat along Class I and II streams. As such, approximately 1,081 miles of priority habitat for this species occurs within the Project Area.

BLACK-CROWNED NIGHT HERON

The black-crowned night heron (*Nycticorax nycticorax*) is identified on PALCO's HCP List A and thus, is proposed for coverage under the ITP (Table 3.10-3). This species breeds from central Washington and east-central Alberta to southern Quebec, northeastern New Brunswick and Nova Scotia south locally through the United States to South America. This species winters in the Southwest and lower Ohio Valley, Gulf Coast, and southern New

England south throughout the breeding range. It is a fairly common year-long resident in lowlands and foothills throughout most of California. This species is a common resident and breeder in Del Norte and Humboldt counties. Breeding Bird Survey data note declines in some populations, likely due to wetland drainage or other habitat removal, most notably in the southeast. From 1988 to 1996, western populations have increased by approximately 12 percent per year; California populations have increased by approximately 14 percent per year (Sauer et al., 1997).

Harris (1996) documented black-crowned night herons utilizing lowland habitats, including pastures, sloughs, marshlands, and estuaries associated with Humboldt Bay, rivers, and small creeks within the Eel, Arcata, and Smith river bottoms. These herons are nocturnal or crepuscular, feeding on fishes, crustaceans, amphibians, reptiles, small mammals, or invertebrates. Winter roosts have been located in coastal residential areas in dense conifers and riparian areas. Dense cover is required for nesting and/or roosting, such as tree foliage, vine tangles, or dense shrubs near fresh or brackish water (CDFG, 1990; Zeiner et al., 1990).

Priority nesting, roosting, and foraging habitat for the black-crowned night heron is limited within the Project Area. PALCO (1998) reported occasional sightings of this species in the Project Area, but no rookeries are known to occur on company lands; however, this species may occur there based on the presence of suitable foraging habitat. Known, multi-species rookeries occur in the vicinity of the Project Area at Indian Island and in Southern Humboldt Bay (Personal communication, K. Kovacs, wildlife biologist, CDFG, July, 1998). Large trees adjacent to low-lying Class I streams or other waterbodies may provide nesting/roosting habitat, and wet meadows, fields, and riparian areas adjacent to Class I and Class II streams could provide foraging habitat. The most important contribution of suitable riparian areas adjacent to Class II streams is currently as foraging habitat, but as stands develop, this habitat may provide attributes suitable for nesting and/or roosting in the future. Based on the above, for this analysis, priority habitat for the black-crowned night heron includes all riparian and wetland habitats. As such, approximately 1,081 miles of priority habitat for this species occurs within the Project Area.

PILEATED WOODPECKER

The pileated woodpecker (*Dryocopus pileatus*) is not currently federal- or state-listed, but is identified on PALCO's HCP List A and thus in proposed for coverage under the ITP (Table 3.10-3). Most information on this species comes from areas outside California. The pileated woodpecker is an uncommon year-round resident of mature, montane conifer habitats in the North Coast, Klamath, Cascade, and Sierra Nevada ranges (Zeiner et al., 1990a). Declines in population have been attributed to loss of priority LSH due to timber-management activities, particularly removal of snags; this species is also sensitive to disturbance by humans (Zeiner et al., 1990a). This species is considered particularly sensitive to timber harvest due to its dependence on large snags and downed logs for nesting cavities and roosting habitat (Mellen et al., 1992).

Abundance of pileated woodpeckers is strongly associated with old-growth conifer forests (Huff and Raley, 1991; Lundquist and Mariani, 1991; Ralph et al., 1991). Nesting and roosting occur in deciduous or coniferous late-successional forests of sufficient size and structure (greater than 70 years old) to provide functional nesting habitat (e.g., snags) (Mellen et al., 1992). Nesting occurs in trees greater than 20 inches dbh from early March to early July

(Bull, 1987; Mellen, 1987; Zeiner et al., 1990a). Suitable habitat also includes access to a permanent water source, as pileated woodpeckers consume copious amounts of water while nesting (Pfitzenmeyer, 1956). Roosting is known to occur in Douglas-fir, red alder, western red cedar, and big leaf maple (Mellen, 1987). Pileated woodpeckers generally forage on snags, live trees, stumps, and logs in forests greater than 40 years old (Bull and Holthausen, 1993; Bull and Jackson, 1995).

Pileated woodpeckers have been observed on PALCO lands in the Bear-Mattole, Eel, and Humboldt WAAs (CDFG, 1998b; PALCO, 1998). The CDFG (1998b) has no record of the pileated woodpecker on Elk River Timber Company lands in the Project Area, although this species may occur there based on the availability of potentially suitable habitat. Based on the above, priority habitat for the pileated woodpecker is considered to be LSH. As such, approximately 68,474 acres of potential priority breeding/roosting/foraging habitat occurs on PALCO and Elk River Timber Company lands of the Project Area (Table 3.9-1 and Appendix Table M-1).

Mammals

Fourteen priority species (or subspecies) of mammals are known or suspected to occur in the vicinity of the Project Area. The status, priority habitats, and occurrence for each of these species in the project vicinity are summarized in Table 3.10-4. More-detailed information for the four species or subspecies that are federal- or state-listed as endangered, threatened, or fully protected, or are identified on the PALCO HCP A list, is provided in the following sections.

CALIFORNIA WOLVERINE

The California wolverine (*Gulo gulo luteus*) is a state-threatened species, a federal species of concern, and a CDFG fully protected species (CDFG, 1998c; Table 3.10-4). This species is on PALCO's HCP B List and thus is proposed for inclusion on the ITP. Wolverines occur across the boreal and tundra zones of Eurasia. In North America, wolverines are considered to breed from the 38th parallel northward. The species' current North American range includes portions of Montana, Idaho, Wyoming, Colorado, Washington, Oregon, and California. This current range is more restricted than in the past, based on historical accounts. Wolverines are considered an uncommon resident of the North Coast mountains (Zeiner et al., 1990b). Declines in populations of this species have been attributed to trapping, human disturbance, and grazing of high-elevation meadows in the Sierra Nevada (Zeiner et al., 1990b). Notably, recent attempts to find wolverines in the northern Sierras have been unsuccessful (Kucera and Barrett, 1993).

The wolverine is a wide-ranging species with home ranges that may encompass several hundred square miles (CDFG, 1992). Size and shape of home ranges does not appear to be hampered by mountains, rivers, highways, or other major topographical features (Zeiner et al., 1990b). Wolverines inhabit a variety of habitats, but are generally found in remote, montane forest areas and open terrain above the timberline at elevations of about 1,600 to 14,200 feet (Hatler, 1989; Butts, 1992; CDFG, 1992). In north coastal areas of California, wolverines have been recorded in Douglas-fir and mixed-conifer habitats and are likely to utilize red fir, lodgepole pine, wet meadow, and montane riparian habitats (Zeiner et al., 1990b). Den sites are usually located in caves, rocks, cliffs, hollow logs, and other cavities in areas with an abundance of fallen logs and deep snow. Reproduction and resting occur in dense cover while foraging occurs in relatively open areas (Zeiner et al., 1990b). This species avoids clearcuts but will travel through them if necessary.

Wolverines will use managed lands as long as the land is adjacent to a refugium, such as a protected reserve.

The California wolverine has not been recorded on PALCO or Elk River Timber Company lands of the Project Area (CDFG, 1998b; PALCO, 1998). Although the reported range of the California wolverine does not overlap the Project Area, this species is identified on PALCO's HCP B list and could occur on PALCO or Elk River Timber Company lands as an occasional transient based on its tendency to travel long distances while foraging. The range of this species in coastal California extends only as far south as Del Norte County, approximately 40 miles north of the Project Area. Downed logs (primarily associated with LSH), cliffs, and rock outcrops may provide potential denning habitat in the Project Area. Notably, almost no talus habitat, which could provide potential denning habitat for the wolverine, exists in the Project Area.

HUMBOLDT MARTEN

The Humboldt marten (*Martes americana humboldtensis*), a subspecies of the marten, is a federal species of concern and a California species of special concern. This species is identified on PALCO's HCP A List and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-4). Hall (1991) reports that the species ranges from temperate to arctic habitats, spanning North America, including off-shore islands. The marten is considered to have a smaller distribution currently than in pre-settlement times (Gibilisco, 1994). The main part of the distribution is in the boreal and taiga zones of Canada and Alaska, with southward distribution in small islands and peninsulas following western mountain ranges (Ruggiero et al., 1994). Little is known about the Humboldt marten subspecies in northern California. Thus, it is assumed that habitat requirements of the Humboldt marten subspecies are the same as those for the marten species in general. Historically, the Humboldt marten was distributed from the Oregon border south to Fort Ross, Sonoma County, in the coastal redwood zone at elevations below about 3,000 feet (Kucera et al., 1995; Zielinski and Golightly, 1996). Zielinski and Golightly (1996) report limited marten sightings (subspecies unverified) in the northern California coastal ranges since 1991 despite intensive surveys designed to detect forest mustelids. Additional tracks and photographs of marten have been observed at eight separate locations within southeastern Del Norte County (Personal communication, B. Zielinski, Wildlife Biologist, USFS, 8/3/98) since that publication. The Humboldt marten is currently considered extremely rare or possibly extinct within its original range largely due to trapping and loss of habitat (Kucera et al., 1995). Human disturbance, extensive even-aged timber management, and loss of LSH forest habitat are considered detrimental to martens (Zeiner et al., 1990b).

Priority breeding, resting, and foraging habitat for the marten consists of mature and old-growth conifer forests with limited human use where nest cavities and LSH-associated prey species are available (Koehler et al., 1990). Martens den in live trees with cavities, snags, downed logs, stumps, burrows, caves, crevices in rocky areas, and occasionally in wood piles (including log piles created by logging operations), cabins, and other human artifacts (Zeiner et al., 1990b; Self and Kerns, 1992). Young are generally born in March and April (Zeiner et al., 1990b). Resting sites are known to include live trees with large limbs and/or cavities and snags (Zielinski and Barrett, 1995). Primary foraging habitat used by martens consists of downed logs and snags, but also small clearings, meadows, and riparian areas, especially during snow-free periods (Zeiner et al., 1990b; Sherburne and Bissonette,

1994). Martens tend to travel along ridgetops and generally avoid crossing large areas lacking canopy cover (Zeiner et al., 1990b). Riparian areas serve as travel corridors for this species (see Pacific Fisher below).

The Humboldt marten has not been recorded on PALCO or Elk River Timber Company lands of the Project Area (CDFG, 1998b; PALCO, 1998b), although this species could occur there based on its historical range and the availability of potentially suitable habitat. Based on the above, for this analysis, priority habitat for the Humboldt marten is considered to be LSH forest. As such, approximately 68,474 acres of potential priority breeding/foraging habitat for this species occurs on current PALCO and Elk River Timber Company lands of the Project Area (Table 3.9-1 and Appendix Table M-1).

PACIFIC FISHER

The Pacific fisher (*Martes pennanti*) is a federal species of concern and a species of special concern in California. This species is identified on PALCO's HCP A List and thus, is proposed for coverage under the ITP; (CDFG, 1998c; Table 3.10-13). Following a petition for listing in 1991, the FWS determined there was insufficient scientific information on habitat needs, population size and trends, and demographic parameters to justify federal listing for the fisher (USDI, 1991). This species is found only in North America, including the Georgia-Pugent Basin, Thompson-Okanogan Highlands, Columbia Plateau Shining Mountains, Northern Rocky Mountains, Snake River Basins, Pacific Northwest coast and ranges, and the Sierra Nevada. The species most commonly occurs in northwestern California, southern Sierra Nevada, northern Idaho, and northwestern Montana (Ruggiero et al., 1994). Historically in California, this species was considered an uncommon permanent resident of the Sierra Nevada, Cascades, Klamath Mountains, and parts of the North Coast Range (Grinnell et al., 1937; Zeiner et al., 1990b), but currently appears to be absent from significant portions of its range between northwestern California and the southern Sierras (Zielinski et al., 1995). Declines in the range and abundance of fisher have been attributed to hunting, trapping, and habitat loss (Ruggiero, 1994). Recent surveys have regularly detected fisher concentrations in northwestern California interior to the redwood zone (Zielinski and Golightly, 1996). Removal of LSH forest, primarily due to timber-management activities, is of concern for populations of the Pacific fisher.

Priority breeding, resting, and foraging habitat for fishers usually consists of mature and old-growth coniferous forests with greater than 40 to 70 percent canopy closure (Buck et al., 1983, 1994; Arthur et al. 1989; Zeiner et al., 1990b). Denning and resting occur in live trees with cavities, snags, downed logs, and a variety of other cavities (Zielinski, 1995). Young are born between February and May (Zeiner et al., 1990b). The fisher is considered an old-growth associate in the redwood habitat type (CWHR, 1990). In northern California, natal and maternal dens have been found in medium-to-large (21 to 58 inches dbh) live trees and snags and in a 39-inch downed log (Zielinski, 1995; Zielinski and Barrett, 1995). Natal and maternal dens of fishers on Simpson Timber Company lands in the vicinity of the Project Area have also been found in medium-to-large (25 – 73 inches dbh) live trees and snags of a variety of tree species (tanoak, chinkapin, Douglas-fir, western red cedar) (Personal communication, R. Klug, Wildlife Biologist, Simpson Timber Company, September 16, 1998). Notably, all den structures were in cavities. Riparian areas serve as travel corridors for fishers. Although Pacific fishers tend to avoid open areas with less than or equal to 40 percent canopy cover, they are known to use heavily harvested

riparian areas for travel (Buck et al., 1983, 1994; Jones and Garton, 1994). However, connected forested (at least 60 percent canopy cover), riparian corridors at least 300 to 600 feet wide are considered important for adequate movement and dispersal of both fishers and martens through harvested areas (Heinemeyer and Jones, 1994; FWS, 1997a). Notably, in contrast to the above studies, Klug (1996) found no relationship between fisher occurrence, old-growth habitats, stand age, or topography (e.g., riparian corridors) on managed lands in Humboldt and Del Norte counties bordering the Project Area. However, application of these results may be limited due to the minimal amount of old growth in the study area, the focus on travel and foraging rather than resting and denning habitat, and the presence of relatively high (greater than 80 percent average) canopy cover throughout the study area, which may have made much of the area, suitable travel and foraging habitat for the fisher.

Fishers have been detected on PALCO lands in the Yager and Humboldt WAAs during multi-species surveys using remote cameras (CDFG, 1998b; PALCO, 1998). Approximately 68,474 acres of potential priority breeding/foraging habitat (LSH) for this species occurs on current PALCO and Elk River Timber Company lands of the Project Area (Table 3.9-1 and Appendix Table M-1).

CALIFORNIA RED TREE VOLE

The California red tree vole (*Arborimus pomo*) is a federal species of concern and a California species of special concern. This species is identified on PALCO's HCP A List and thus, is proposed for coverage under the ITP (CDFG, 1998c; Table 3.10-4). The documented range of this species extends from the Oregon Coast and Cascade ranges south to the coastal forests of northern California (Zeiner et al., 1990b). Relatively little is known about the red tree vole, particularly in California. This species is believed to be rare to common throughout its range and has been commonly observed during PALCO studies in the Project Area (Zeiner et al., 1990b; PALCO, 1998). Declines in the availability of LSH and fragmentation of LSH are of concern to populations of this species.

The red tree vole consumes Douglas-fir and grand-fir needles (Zeiner et al., 1990b). As such, this species has been associated with LSH Douglas-fir forests in some studies (Meiselman 1987; Meiselman and Doyle, 1996; Aubry et al., 1991), but has also been known to nest in second-growth stands (Maser, 1966; PALCO, 1998). Mieselmann and Doyle (1996) found that 77 percent of red tree vole nests occurred in old-growth (greater than 200 years old) or mature (100 to 200 years old) forests characterized by a canopy cover of greater than 93 percent. All nests were found in Douglas-fir trees (mean nest tree was 46.5 inches dbh and 185 feet tall). Early seral forest may limit dispersal capabilities of this LSH associate (Hayes, 1996).

The red tree vole is widespread throughout PALCO lands, where its nests have been primarily associated with mid- and late-seral forests with Douglas-fir trees (PALCO, 1998). The CDFG (1998b) has records of this species occurring outside the Project Area in the Humboldt and Eel WAAs (Larabee, Jacoby, and Freshwater Creek drainages). Based on the above, for this analysis, LSH is considered to be the priority habitat for the red tree vole in the Project Area because this nesting habitat type is more limited on the landscape than mid-seral forest. As such, approximately 68,474 acres of potential priority breeding/foraging habitat for this species occurs on current PALCO and Elk River Timber Company lands of the Project Area (Table 3.9-1 and Appendix Table M-1).

3.10.1.4 Neotropical Migratory Birds

Neotropical migratory (NTM) birds include those species that breed in continental North America and winter regularly south of the Tropic of Cancer (latitude 23.5 degrees N), usually in Central and South America (Sharp, 1992). Many of these species use the Pacific Flyway during migration. Severe population declines in species of forest-dwelling NTM birds were observed between the late 1940s and the late 1980s (Askins et al., 1990). Two main factors are believed to explain these recent and dramatic declines in forest-dwelling species of NTM birds: (1) fragmentation of forest habitat on breeding grounds in North America, and (2) severe deforestation on wintering grounds south of the border (Terborgh, 1992).

A recent report by Andelman and Stock (1994) summarized the habitat associations of the various NTM birds that occur in Washington, many of which also occur in California. Of the 14 NTM habitat associations identified in this report, six occur in the vicinity of the Project Area, as presented in Table 3.10-8. This table, adapted from Andelman and Stock (1994), lists the 118 NTM species of birds known or suspected to occur in the vicinity of PALCO and Elk River Timber Company lands of the Project Area, and the habitats with which they are associated, as described by Sharp (1992), Andelman and Stock (1994), Harris (1996), and the WHR database (CDFG, 1998a). Notably, 30 of these species, although technically considered "neotropical," have resident local populations and can be found year-round or for significant portions of the year in the Project Area (Harris, 1996) (Table 3.10-8). These NTM birds include many common passerine songbirds, hawks, and owls. The highest percentage of these species is associated with riparian habitat (29 percent or 35 species) and early/mid-seral forest (29 percent or 34 species) followed by LSH (19 percent or 22 species), marsh, lakes, and ponds (11 percent or 13 species), meadow habitat (11 percent or 13 species), and subalpine habitat (less than 1 percent or 1 species).

The relationship of neotropical migrant bird species to forest tree species composition, diversity, and stand age is not well understood. Several studies have indicated that land managers should implement different silvicultural systems in order to maintain the appropriate mix of habitat types, stand size, tree species, and stand age on the landscape level (DeGraaf et al., 1991). Although some studies in northern California indicate that overall bird species richness is not dependent on age-class of vegetation (Raphael, 1991), abundance of many bird species has been shown to be positively correlated with stand age (Ralph et al., 1991). Notably, these studies show no difference in abundance between mature and old-growth forests, indicating that the difference in age between these two habitat types may not be significant for NTM species. However, for some of the 22 NTM species potentially occurring in the vicinity of the Project Area that are primarily associated with LSH, a more important characteristic than stand age may be presence of snags and decaying logs. In managed LSH stands, this dead and downed woody debris may be lacking, and NTM species associated with LSH may not be able to find appropriate cavities for nesting or crevices for foraging (see Section 3.10.1.1 under LSH and Unique Habitats).

3.10.1.5 Game Species

Numerous game species and fur-bearing mammals are known or suspected to occur on PALCO and Elk River Timber Company lands of the Project Area. Such species include ducks, geese, the California and mountain quail, blue grouse, tree squirrel, mink, bobcat, black bear, black-tailed deer, and elk. The primary species of game hunted on PALCO lands include California quail, blue grouse, deer, and black bear. All four species are widespread throughout PALCO lands, although population studies

have not been conducted. Quail are associated with shrub, scrub, and brush, open stages of conifer and deciduous forests, and margins of grasslands and croplands at mid-to-low elevations for reproduction and foraging (Zeiner et al., 1990a). Blue grouse require a mixture of conifer forest, open brushy conifer stands, and open grass/forb areas near water at mid-to-high elevations (Zeiner et al., 1990a). LSH is generally important in providing escape and thermal cover for deer, while adjacent open habitat is used for foraging (Zeiner et al., 1990b). Recently harvested early-seral areas on PALCO lands often show evidence of deer browsing. Black bears forage in most habitat types on PALCO lands, but require mature forest habitat and associated components for escape cover and denning, including cavities, hollows in trees, snags, stumps, and logs (Zeiner et al., 1990b). Notably, a small number of remnant or recently reestablished Roosevelt elk reportedly occur in the Yager and portions of the Eel WAA. In general, seclusion from human-related activities is important for many game species, particularly for reproduction (Zeiner et al., 1990b). Riparian areas provide important foraging, travel, and dispersal corridors for a number of game species, particularly big game.

Both public and private hunting are allowed in certain areas of the PALCO ownership as permitted by CDFG. Public hunting for deer and California quail is allowed as permitted on PALCO lands in the Eel River drainage between Scotia and Shively. Approximately 500 hunting permits have been issued to the public for deer hunting in this area (Personal communication, R. Bettis, PALCO, June 24, 1997). Approximately 300 to 400 PALCO employees are allowed to hunt for deer on the PALCO property each year, primarily at four ranches and in the area north of the Van Duzen River. Approximately 150 to 200 deer are killed annually during these hunts. In addition, black bear are hunted each year by PALCO employees as permitted by CDFG to curtail damage of young redwood trees by bear. Such hunting occurs in redwood areas in the Freshwater and Elk River drainages as well as some areas of the Yager Creek drainage and near Scotia. Illegal hunting (i.e., poaching) may occur in the Project Area, since many areas are accessible to non-permitted hunters via the existing road system.

3.10.2 Environmental Effects

This section describes the anticipated direct, indirect, and cumulative effects of Alternatives 1 through 4 on wildlife resources in the vicinity of the Project Area and the proposed mitigation for each alternative. Direct and indirect effects and associated mitigation are presented jointly for each priority habitat, species, or species group, while cumulative effects are presented in a separate subsection (Section 3.10.2.2). Effects on wildlife resources due to acquisition and coverage of "Additional Lands" by PALCO under the HCP and a finding of "Changed Circumstances" as described in the HCP Implementation Agreement are addressed in Section 3.20. Effects were considered in the context of actions proposed under each alternative, including mitigation presented in the proposed HCP/SYP.

Effects of the alternatives on wildlife resources were evaluated primarily based on the following criteria: (1) the potential for occurrence, known population status, and type of use (e.g., nesting, foraging, wintering) of the Project Area by priority species or species groups; (2) current federal or state definitions of "take" and anticipated types/levels of such take; (3) species-specific habitat requirements as identified in available literature; (4) estimated changes in the quantity, quality, and distribution of priority habitats with which the various priority species or groups of species are associated; and (5) the minimum anticipated level of protection to be provided under current FPRs and/or the PALCO HCP/SYP.

"Take" as defined under the federal ESA includes to harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, and/or collect a protected species, or the attempt to engage in such activities. Harm may include significant habitat modification or degradation where wildlife is killed or injured due to the significant impairment of essential behavioral patterns, including breeding, feeding, or sheltering. The definition of take under California state law is to "hunt, pursue, catch, capture, or kill or attempt to hunt, pursue, catch, capture or kill" (Fish and Game Code, Section 86). Species-specific measures of potential take with respect to this definition have been further refined for some species based on existing regulations or guidelines under the FPRs or other regulations as noted (e.g., conducting certain activities within certain distances of active nest sites). Notably, FWS can authorize incidental take of listed species in conjunction with preparation and approval of an HCP; however, the CDFG cannot authorize take of any species designated under California regulations as Fully Protected, regardless of an HCP. The CDFG can only approve conservation/ mitigation measures that are likely to avoid both take and the need for further consultation.

Thresholds of Significance

Thresholds of significance for wildlife resources were defined relative to CEQA and NEPA (see Section 3.1). Timber harvest and associated activities affect wildlife and wildlife habitat. Whether the threshold of significance is exceeded (i.e., significant adverse effect) is based on the type and level of effect considered in relationship to the mitigation proposed in the individual alternative over the short and long term. If this proposed mitigation minimizes or mitigates those effects, they are considered to be less than significant. For example, an effect would be considered significant if it caused a wildlife population to drop below self-sustaining levels or was a threat to the continued existence of a population. As mentioned in Section 3.10.1, for this analysis, all wildlife species with any federal or state status plus all PALCO HCP list "A" and "B" species were considered "endangered, rare or threatened" with respect to CEQA (CEQA Guidelines, Article 20, Section 15380).

Parameters used to measure or assess thresholds of significance for wildlife resources addressed in this analysis are summarized in Table 3.10-9 and the following subsections. Identification of effects with respect to species' habitat requirements was based on the best scientific information available. An extensive literature review was conducted as well as analyses to identify habitat components likely required to support a species. The most current, peer-reviewed published data as well as other data available were used, in consultation with local experts. Thus, where applicable, effects of the alternatives were evaluated relative to species-specific habitat requirements, current or baseline conditions, and the known status of populations. Significant effects were defined as effects exceeding thresholds of significance. However, the final decisions regarding the level of significance of the alternatives on various wildlife resources will be made in the FEIS/FEIR, ROD, and the state notice of determination.

Effects of the various alternatives were evaluated based on an analysis of the worst-case scenario. As such, the level of protection each priority habitat or species would be expected to receive was based on (1) the current or proposed land ownership under each alternative, and (2) the associated minimum level of protection anticipated under either state regulations (e.g., FPRs) and/or the specifications identified in PALCO's proposed HCP/SYP, other management plans or each alternative. The current or proposed

FACTOR/ SUBFACTORS	THRESHOLDS OF SIGNIFICANCE	ALTERNATIVE 2 (and 2a) PROPOSED ACTION	ALTERNATIVE 3 PROPERTY-WIDE SELECTIVE HARVEST	ALTERNATIVE 4 63,000-ACRE RESERVE
WILDLIFE	Thresholds based on CEQA and NEPA[1/]			
PRIORITY HABITATS				
Habitat Fragmentation and Connectivity	Substantial degradation in connectivity of LSH as measured by: • decrease in acreage of interior LSH forest • decrease in amount of LSH in patches >80 acres in size and <1 mile apart (CFPR analysis criteria)	Less-than-significant effect. Decreases in acreage of interior LSH forest and in amount of LSH in patches ≥80 acres in size and <1 mile apart are minimized and mitigated by the OG protected and/or buffered in Headwaters Reserve, MMCAs, and other protected areas. In addition, OG characteristics would likely develop in Headwaters Reserve in extended long term. Also, effects would be minimized by the need for 10% of PALCO's ownership to be maintained as late-seral forest and habitat for spotted owls.	No effect or beneficial effect; no loss or salvage harvest of interior OG forest; buffering of interior OG patches through development of LSH in surrounding areas (protected and selective harvest areas) in mid and long term; habitat corridors would improve; OG characteristics would likely develop in Headwaters Reserve in extended long term.	Less than significant; short-term decreases in acreage of interior LSH forest and in the amount of LSH in patches >80 acres in size and <1 mile apart would be minimized by the development of interior LSH in the 63,000-acre Reserve in the long term as well as the likely development of OG characteristics in the extended long term.
PRIORITY SPECIES OF WILDIFE				
Priority Amphibians and Reptiles				
Foothill yellow-legged frog	Substantial loss or degradation (e.g., stream sedimentation) of occupied priority habitat (Class I and II streams), assumed to result in substantial decline in population or restricted species' range.	Less-than-significant effect. Overall, RMZs and other HCP mitigation (e.g., amphibian/reptile monitoring) expected to improve habitat, minimizing and mitigating effects to less than significant, and meeting habitat conditions required by this highly aquatic species. Monitoring program expected to ensure adequate protection of habitat. Potential effects include: incidental harm of individuals in RMZs on Class I and II streams during various activities (e.g., timber management, gravel mining, instream habitat restoration, scientific collection); some risk of localized fine sediment delivery to rivers from road sediment in some HUs may degrade some potential breeding habitat in short term; and moderate risk of increased peak spring flows in localized areas through long term due to new road building may scour eggs.	Less-than-significant effect. Overall, mitigation would likely improve habitat conditions, minimizing and mitigating effects to less than significant. However, individuals may be harmed incidentally in RMZs on Class I and II streams during timber management or gravel mining activities. Low risk of localized fine sediment delivery to rivers from road sediment in some HUs may degrade some potential breeding habitat in short term. Low risk of increased peak spring flows in localized areas through long term due to new road building may scour eggs.	Less-than-significant effect. Overall, HCP mitigation would likely improve habitat conditions, minimizing and mitigating effects to less than significant. However, individuals may be harmed incidentally in RMZs on Class I and II streams during timber management, gravel mining, instream habitat restoration, and scientific collection activities. Low risk of localized fine sediment delivery to rivers from road sediment in some HUs may degrade some potential breeding habitat in short term. Very low risk of increased peak spring flows in localized areas through long term since new road building may scour eggs.

[1/] As defined by CEQA, a significant effect on priority species consists of a potential substantial decline in population numbers or change in distribution (e.g., restricted species' range) due to anticipated changes in habitat. For California Fully Protected species where no take is permitted, any take (i.e., harm or loss) of individuals, whether or not it results in a substantial decline in population numbers, is considered significant for this analysis. As defined by NEPA, a significant effect consists of a threat to continued existence of a population. See individual wildlife resources/species for identification of parameters used to assess thresholds of significance. Notably, there are no findings of significance under CEQA for Alternative 1, primarily because of protective measures that would be expected to be applied through the THP process.

FACTOR/ SUBFACTORS	THRESHOLDS OF SIGNIFICANCE	ALTERNATIVE 2 (and 2a) PROPOSED ACTION	ALTERNATIVE 3 PROPERTY-WIDE SELECTIVE HARVEST	ALTERNATIVE 4 63,000-ACRE RESERVE
Northwestern pond turtle	Substantial loss or degradation (e.g., inadequate provision of LWD) of occupied priority habitat (Class II streams and wetlands), assumed to result in substantial decline in population or restricted species' range.	Less-than-significant effect. Overall, RMZs and other HCP mitigation (e.g., amphibian/ reptile monitoring) expected to improve habitat, minimizing and mitigating potential effects to less than significant, and meeting habitat conditions required by this species. Monitoring program expected to ensure adequate protection of habitat. Potential effects include incidental harm of individuals or degradation of habitat in or near RMZs on Class I and II streams or wetlands during various activities (e.g., timber management, gravel mining, instream habitat restoration, scientific collection).	Less-than-significant effect; activities (e.g., harvest, gravel mining) within or near RMZs on Class I and II streams and wetlands may incidentally take some individuals or degrade some terrestrial or wetland habitat potentially used by this species; however, overall, RMZs and other measures would be expected to improve habitat, minimizing and mitigating potential effects to less than significant.	Less-than-significant effect; activities (e.g., harvest, instream habitat restoration) within or near RMZs on Class I and II streams and wetlands may incidentally take some individuals or degrade some terrestrial or wetland habitat potentially used by this species; however, overall, RMZs and other HCP measures would be expected to improve habitat, minimizing and mitigating potential effects to less than significant.
Southern torrent salamander and tailed frog	Substantial loss or degradation (e.g., inadequate protection of stream temperature, inadequate provision of LWD) of occupied priority habitat (Class II streams in LSH), assumed to result in substantial decline in population or restricted species' range.	Less-than-significant effect. Overall, RMZs and other HCP mitigation (e.g., amphibian/ reptile monitoring) expected to improve habitat, minimizing and mitigating potential effects to less than significant, and meeting habitat conditions (e.g., cool stream temperatures). required by these highly aquatic species. Monitoring program expected to ensure adequate protection of habitat. Potential effects include incidental harm of individuals or degradation of habitat in or near RMZs on Class II streams during various activities (e.g., timber management, instream habitat restoration, scientific collection).	Less-than-significant effect; activities (e.g., harvest) in RMZs on Class I and II streams may incidentally take some individuals or degrade riparian habitat potentially used by these species; however, RMZs generally meet or exceed riparian conditions recommended in literature and overall would be expected to improve habitat, minimizing and mitigating potential effects to less than significant.	Less-than-significant effect; activities (e.g., harvest, instream habitat restoration) in RMZs on Class I and II streams may incidentally take some individuals or degrade riparian habitat potentially used by these species; in particular, RMZs may be insufficient to protect water temperatures, humidity, and LWD on Class II streams; however, overall, HCP measures would be expected to minimize and mitigate potential effects to a less than significant level.
Priority Birds				
American peregrine falcon and Golden eagle	***California Fully Protected Species***; thus, no take (e.g., harm, loss) of individuals permitted. Any take of individuals or substantial loss or degradation of priority habitat (cliffs or isolated large trees in open areas) used by these species for nesting considered significant.	Less-than-significant effect. Take of nesting birds unlikely due to HCP nest site protection measures and low likelihood of nesting in Project Area. In addition, HCP mitigation for snags may increase potential nesting habitat for Golden eagle. However, potential temporary disturbance of foraging birds possible.	Less-than-significant effect; take of nesting birds unlikely due to FPR nest site protection measures and low likelihood of nesting in Project Area; potential temporary disturbance of foraging birds possible; substantial increase in LSH in mid and long term may increase potential nesting habitat for Golden eagle.	Less-than-significant effect; take of nesting birds unlikely due to HCP nest site protection measures and low likelihood of nesting in Project Area; potential temporary disturbance of foraging birds possible; mitigation for snags under HCP may increase potential nesting habitat for Golden eagle.
Bald eagle	***California Fully Protected Species***; thus, no take (e.g., harm, loss) of individuals permitted. Any take of individuals or substantial loss or degradation of priority habitat (LSH) used as nesting or roosting habitat considered significant.	Less-than-significant effect. Take unlikely due to HCP nest and winter foraging site protection/monitoring and low likelihood of nesting in Project Area. In addition, improved quality and increased acreage of LSH in Class I RMZs and other HCP mitigation (e.g., Headwaters Reserve) may benefit species directly and indirectly (e.g., potential for increased prey base). However,	Less-than-significant effect; loss of LSH in short and mid term may preclude some nesting or roosting; substantial gain in potential LSH habitat in mid and long term may benefit species; take of nesting birds unlikely due to FPR nest site protection measures and low likelihood of nesting in Project Area; disturbance of wintering/foraging birds	Less-than-significant effect; loss of LSH through long term may preclude some nesting or roosting; take unlikely due to HCP nest and winter foraging site protection and other mitigation measures, and low likelihood of nesting in Project Area.

FACTOR/ SUBFACTORS	THRESHOLDS OF SIGNIFICANCE	ALTERNATIVE 2 (and 2a) PROPOSED ACTION	ALTERNATIVE 3 PROPERTY-WIDE SELECTIVE HARVEST	ALTERNATIVE 4 63,000-ACRE RESERVE
		substantial loss of LSH through long term may preclude some nesting or roosting.	possible due to timber- management activities.	
Bank swallow	Substantial loss or degradation of occupied priority habitat (sand/silt streambanks used for nesting along Class I and II streams), assumed to result in substantial decline in population or restricted species' range.	Less-than-significant effect. Low likelihood of occurrence. Species-specific mitigation under HCP (e.g., nest site protection measures, surveys/ monitoring) and other mitigation likely to avoid or minimize take of individuals. RMZs likely to protect potential streambank nesting habitat in long term on Class I and II streams (e.g., streambank stability—see Riparian Lands).	Less-than-significant effect; low likelihood of occurrence; RMZs would likely protect potential streambank nesting habitat in long term on Class I and II streams (e.g., streambank stability—see Riparian Lands); potential disturbance of individuals from gravel mining possible.	Less-than-significant effect; low likelihood of occurrence; species-specific mitigation under HCP (e.g., nest site protection measures, surveys/monitoring) and other mitigation would likely avoid or minimize take of individuals; RMZs would likely protect potential streambank nesting habitat in long term on Class I and II streams (e.g., streambank stability—see Riparian Lands).
Great gray owl	Substantial loss or degradation of occupied priority habitat (snag nesting habitat generally in LSH adjacent to open meadows), assumed to result in substantial decline in population or restricted species' range.	Less-than-significant effect. Low likelihood of occurrence. Mitigation for snags under HCP expected to protect or increase potential nesting habitat. However, disturbance or displacement of individuals possible due to timber management and other activities.	Less-than-significant effect; low likelihood of occurrence; disturbance or displacement of individuals possible due to timber management and other activities in LSH; gain in LSH in long term may increase potential nesting habitat.	Less-than-significant effect; low likelihood of occurrence; disturbance or displacement of individuals possible due to timber management and other activities; mitigation for snags under HCP may increase potential nesting habitat.
Marbled murrelet	Substantial loss or degradation of FWS-defined suitable habitat, assumed to result in substantial decline in population or restricted species' range.	Effects may be significant in short term, but HCP measures along with MMCAs and no-harvest RMZs would minimize and mitigate the effects to less than significant effect in long term; long-term effects post-HCP unknown[2/]. In short term, permitted take (through harvest) of some lower-quality (residual old-growth) suitable habitat during non-nesting season expected to result in loss and fragmentation of suitable habitat and presumably loss of individuals. In addition, loss of currently unoccupied potential habitat may preclude some nesting. However, by long term, establishment of MMCAs, Headwaters Reserve, buffers, and other HCP mitigation expected to significantly improve lower quality (residual) suitable habitat through buffering and development of late-seral, second-growth forest within residual habitat, are expected to minimize and mitigate the effects to less than significant.	No effect or beneficial effect; PALCO would manage its lands to avoid take, following FWS/CDFG/CDF guidelines; all suitable habitat and remaining intact and residual old growth protected from harvest, including salvage harvest; fragmentation of LSH reduced and substantial increase in LSH primarily due to property-wide selective harvest outside of protected areas which may benefit murrelet through buffering of suitable habitat.	Effects may be significant in short term, but HCP measures along with creation of the 63,000-acre Reserve would minimize and mitigate the effects to less than significant in long term; long-term effects post-HCP unknown[2/]; permitted take through harvest of some suitable habitat during non-nesting season in short term would result in substantial loss and fragmentation of suitable habitat and presumably substantial loss of individuals in short term; loss of currently unoccupied potential habitat may preclude some nesting; establishment of MMCAs, 63,000-acre Reserve, and other HCP mitigation would be expected to result in a substantial increase in the quality of suitable habitat in mid term, potentially reducing significant effects to less than significant; development of OG characteristics in extended long term in 63,000-acre Reserve may increase and improve potential habitat.

[2/] At the end of the 50-year HCP period (i.e., the long term), effects on marbled murrelets with respect to fate of MMCAs are unknown. However, two general potential scenarios include: (1) continued no-harvest of MMCAs due to continued listed status of the murrelet; or (2) less or no restrictions on harvest of MMCAs (e.g. due to recovery of species).

FACTOR/ SUBFACTORS	THRESHOLDS OF SIGNIFICANCE	ALTERNATIVE 2 (and 2a) PROPOSED ACTION	ALTERNATIVE 3 PROPERTY-WIDE SELECTIVE HARVEST	ALTERNATIVE 4 63,000-ACRE RESERVE
Northern spotted owl	Substantial loss or degradation of occupied suitable habitat (generally LSH and mid-successional redwood LSH used for nesting within owl sites), assumed to result in substantial decline in population or restricted species' range.	Less-than-significant; effects may be significant in short and long term due to potential substantial decline in population; however, HCP mitigation and monitoring (including implementation of PALCO's Northern Spotted Owl Conservation Plan) expected to minimize and mitigate effects to less than significant. Permitted take of owls through harvest of suitable habitat within owl sites below FPR take threshold allows for potential reduction of baseline owl population in Project Area by 33%. In addition, substantial decrease in suitable nesting habitat in short and long term may preclude some nesting.	Less-than-significant effect; no take of individual owl sites; disturbance of foraging birds possible due to timber-management activities; substantial increase in suitable habitat through long term may benefit species.	Less than significant; effects may be significant in short term; however, HCP mitigation and monitoring (including implementation of PALCO's Northern Spotted Owl Conservation Plan) would minimize and mitigate effects to less than significant by the long term. Take of owls permitted through harvest of suitable habitat within owl sites below FPR take threshold; allows for potential reduction of baseline owl population in Project Area by 33%; substantial decrease in suitable nesting habitat in short term may preclude some nesting; substantial increase in suitable nesting habitat in mid and long term may benefit species.
Western snowy plover	Substantial loss or degradation of occupied suitable habitat (gravel bar nesting habitat), assumed to result in substantial decline in population or restricted species' range.	Less-than-significant effect. Take of nesting birds unlikely due to low likelihood of nesting in Project Area, and HCP surveys and measures to avoid take of nesting birds during gravel mining. In addition, no substantial loss of potential gravel bar nesting habitat expected. However, disturbance of birds due to recreational activities and grazing possible.	Less-than-significant effect; take of nesting birds unlikely due to low likelihood of nesting in Project Area and implementation of surveys and measures to avoid take of nesting birds in association with permitted gravel mining; disturbance of birds due to recreational and grazing activities possible; no substantial loss of potential gravel bar nesting habitat.	Less-than-significant effect; take of nesting birds unlikely due to low likelihood of nesting in Project Area and HCP surveys and measures to avoid take of nesting birds in association with permitted gravel mining; disturbance of birds due to recreational and grazing activities possible; no substantial loss of potential gravel bar nesting habitat.
Priority Mammals				
California wolverine	***California Fully Protected Species;*** thus, no take (e.g., harm, loss) of individuals permitted. Any take of individuals or substantial loss or degradation of occupied priority habitat (denning habitat generally consisting of logs and talus in large tracts of remote, dense montane forests) considered significant.	Less-than-significant effect. Project Area outside species' known range and current habitat there likely marginal, but potential for occasional transient. Improved riparian travel corridors, no-harvest areas (e.g., MMCAs, Headwaters Reserve), and HCP snag and downed log mitigation may benefit species in mid and/or long term. However, disturbance of occasional transient possible due to timber management activities.	Less-than-significant effect; Project Area outside species' known range and current habitat likely marginal, but potential for occasional transient; disturbance of occasional transient possible due to timber-management activities; improved integrity of riparian travel corridors and Headwaters Reserve may benefit species in mid and long term.	Less-than-significant effect; Project Area outside species' known range and current habitat likely marginal, but potential for occasional transient; disturbance of occasional transient possible due to timber-management activities; improved riparian travel corridors and no-harvest areas (e.g., 63,000-acre Reserve) may benefit species in mid and/or long term; HCP snag and downed log mitigation may benefit species.
Other Priority Species/Groups *(also see Priority Habitats above)*				
Young forest associates[3/]	Substantial loss or degradation of occupied priority young forest habitat, assumed to result in substantial decline in population or	Less-than-significant effect. No substantial loss or degradation of young forest habitats (see Priority Habitats). Priority habitat is not expected to be limited in the Project Area.	Less-than-significant effect; disturbance or minimal loss of individuals possible due to timber management or road construction; no substantial loss or	Less-than-significant effect; disturbance or minimal loss of individuals possible due to timber management or road construction; no substantial loss or

[3/] Includes mountain quail, ruffed grouse, and sharp-shinned hawk.

FACTOR/ SUBFACTORS	THRESHOLDS OF SIGNIFICANCE	ALTERNATIVE 2 (and 2a) PROPOSED ACTION	ALTERNATIVE 3 PROPERTY-WIDE SELECTIVE HARVEST	ALTERNATIVE 4 63,000-ACRE RESERVE
	restricted range of priority species associated with such habitat.		substantial modification of young forest habitats; priority habitat is not expected to be limited in the Project Area and in the vicinity of the Project Area.	substantial modification of young forest habitats; priority habitat is not expected to be limited in the Project Area.
Mid-seral forest associates[4/]	Substantial loss or degradation of occupied priority mid-seral forest habitat, assumed to result in substantial decline in population or restricted range of priority species associated with such habitat.	Less-than-significant effect. No substantial loss or degradation of mid-seral forest habitats (see Priority Habitats). However, temporary disturbance or minimal loss of individuals due to timber management or road construction possible but unlikely due to HCP nest site protections; priority habitat expected to be plentiful in Project Area.	Less-than-significant effect; temporary disturbance or minimal loss of individuals possible due to timber management or road construction; no substantial loss or substantial modification of mid-seral forest habitats; priority habitat expected to be plentiful in Project Area.	Less-than-significant effect; temporary disturbance or minimal loss of individuals possible due to timber management or road construction possible but unlikely due to HCP protections; no substantial loss or substantial modification of mid-seral forest habitats; priority habitat expected to be plentiful in Project Area.
Other LSH associates[5/]	Substantial loss or degradation of occupied priority mid-seral and LSH habitat, assumed to result in substantial decline in population or restricted range of priority species associated with such habitat.	Less than significant; effects may be significant through long term due to substantial loss of LSH and thus potential substantial decline in populations (see Priority Habitats); however, development of late-seral forest in MMCAs, availability of suitable Douglas-fir nest-areas in other seral stages, no-harvest RMZs, and PALCO's commitment to maintain 10% of their lands as late-seral forest would all be expected to minimize and mitigate the effects to less than significant.	Less-than-significant effect; substantial loss of LSH in short term and potential loss of individuals due to selective and salvage harvest but effects minimized and mitigated to less than significant due to substantial increase in LSH through long term.	Less than significant; effects may be significant through long term due to substantial loss of LSH and thus potential substantial decline in populations (see Priority Habitats); however, development of late-seral forest in MMCAs, no-harvest RMZs, and PALCO's commitment to maintain 10% of its lands as late-seral forest would be expected to minimize and mitigate the effects to less than significant.
Other wetland/riparian associates[6/]	Substantial loss or degradation of occupied wetland/riparian priority habitat, assumed to result in substantial decline in population or restricted range of priority species associated with such habitat.	Less-than-significant effect. Overall, RMZs expected to protect or improve quality of wetland/riparian habitats, potentially benefiting associated priority species (see Priority Habitats). In addition, some priority species protected by HCP/FPR nest-site protection measures or unlikely to breed in Project Area. However, loss or disturbance of individuals possible due to timber manage-ment, gravel mining, or other activities in or near RMZs (include. Class I and II wetlands).	Less-than-significant effect; loss or disturbance of individuals possible due to timber management, gravel mining, or other activities in or near RMZs (including Class I and II wetlands); however, effects would be minimized and mitigated to less than significant by RMZs expected to protect or improve quality of these habitats (see Priority Habitats), and most wetland/priority species unlikely to breed in Project Area or protected by nest-site protection measures.	Less-than-significant effect; loss or disturbance of individuals possible due to timber management, gravel mining, or other activities in or near RMZs (including Class I and II wetlands); however, effects would be minimized and mitigated to less than significant by RMZs expected to protect or improve quality of these habitats (see Priority Habitats), and most wetland/priority species unlikely to breed in Project Area or protected by nest-site protection measures.
Other cliff/rock outcrop associates[7/]	Substantial loss or degradation of occupied priority cliff/rock outcrop habitat, assumed to result in substantial decline in population or	Less-than-significant effect. Temporary disturbance or displacement of individuals by noise and activities and degradation of microclimates due to timber removal possible	Less-than-significant effect; temporary disturbance or displacement of individuals by noise and activities and degradation of microclimates due to	Less-than-significant effect; temporary disturbance or displacement of individuals by noise and activities and degradation of microclimates due to

[4/] Includes Cooper's hawk.
[5/] Includes three species of invertebrates (ground beetle, Humboldt ground beetle, and Klamath shoulderband), California red tree vole, and 22 species of neotropical migratory birds associated primarily with LSH.
[6/] Includes black-capped chickadee, black-crowned night heron, black-shouldered kite, double-crested cormorant, great blue heron, great egret, Harlequin duck, little willow flycatcher, northern red-legged frog, osprey, snowy egret, yellow-brested chat, yellow warbler, and white-footed vole.
[7/] Includes Del Norte salamander, fringed myotis, long-eared myotis, long-legged myotis, Pacific western big-eared bat, pallid bat, small-footed myotis, spotted bat, and Yuma myotis.

FACTOR/ SUBFACTORS	THRESHOLDS OF SIGNIFICANCE	ALTERNATIVE 2 (and 2a) PROPOSED ACTION	ALTERNATIVE 3 PROPERTY-WIDE SELECTIVE HARVEST	ALTERNATIVE 4 63,000-ACRE RESERVE
	restricted range of priority species associated with such habitat.	(see Priority Habitats).	timber removal possible (see Priority Habitats).	timber removal possible (see Priority Habitats).
Other snag/downed log associates[8/]	Not providing the minimum number of snags or downed logs considered necessary to support wildlife species dependent on this habitat or not meeting LWD standard identified in Aquatic Matrix (see Riparian Lands), assumed to result in substantial decline in populations or restricted range of priority species associated with such habitat.	Less-than-significant effect (see Priority Habitats). Loss or disturbance of individuals possible due to timber- management activities. However, HCP snag and downed log mitigation and other measures expected to minimize and mitigate effects to less than significant.	Less-than-significant effect; in short term, substantial loss of LSH and presumed substantial loss of snags/downed logs and associated species; however, anticipated substantial increase in LSH and thus availability of snags and down logs in long term expected to minimize and mitigate effects to less than significant; loss or disturbance of individuals possible due to timber- management activities.	Less-than-significant effect (see Priority Habitats); loss or disturbance of individuals possible due to timber-management activities; however, HCP snag and downed log mitigation and other measures expected to minimize and mitigate effects to less than significant.
Other open habitat associates[9/]	Substantial loss or degradation of occupied priority naturally occurring open habitat, assumed to result in substantial decline in population or restricted range of priority species associated with such habitat.	Less-than-significant effect. No substantial loss or degradation of naturally occurring open habitats (see Priority Habitats). In addition, HCP nest-site protection measures and monitoring would minimize potential for take of burrowing owls. However, disturbance or minimal loss of individuals possible due to road construction activities possible, but unlikely due to low likelihood of occurrence.	Less-than-significant effect; disturbance or minimal loss of individuals possible due to road construction; no substantial loss or substantial modification of naturally occurring open habitats.	Less-than-significant effect; disturbance or minimal loss of individuals possible due to road construction; no substantial loss or substantial modification of naturally occurring open habitats.
Game species	Substantial loss or degradation of priority habitat used by game species, assumed to result in substantial decline in populations or restricted range of game species associated with such habitat.	Less-than-significant effect. Loss or disturbance of individuals possible through timber harvest and other activities; however, populations not considered to be in decline and suitable habitat not a limiting factor in Project Area. Species may benefit from improved quality of riparian travel corridors and refugia provided in Headwaters Reserve and other no-harvest areas.	Less-than-significant effect; loss or disturbance of individuals possible through timber harvest and other activities; however, populations not considered to be in decline and suitable habitat not a limiting factor in Project Area; species may benefit from increased integrity of riparian travel corridors, refugia provided in Headwaters Reserve, and substantial increase in and improved connectivity of LSH through long term.	Less-than-significant effect; loss or disturbance of individuals possible through timber harvest and other activities; however, populations not considered to be in decline and suitable habitat not a limiting factor in Project Area; species may benefit from increased integrity of riparian travel corridors, refugia provided 63,000-acre Reserve, and substantial increase in LSH in long term.

[8/] Includes Humboldt marten, Pacific fisher, pileated woodpecker, purple martin, and Vaux's swift.
[9/] Includes Aleutian Canada goose, American badger, burrowing owl, ferruginous hawk, merlin, northern harrier, prairie falcon, and short-eared owl.

Notes:
1. Analysis assumes that FPR nest site protection measures are adequate to avoid take of species where applicable.
2. Species-specific analyses are presented only for species federal- or state-listed as endangered, threatened or fully protected, or proposed for coverage under the PALCO ITP; however, some of these species are also grouped under "other priority species".
3. For the purposes of this analysis, all wildlife species with any federal or state status plus all PALCO HCP list "A" and "B" species were considered "endangered, rare or threatened" with respect to CEQA (Article 20, Section 15380).
4. For the purposes of analysis, species are assumed to occur in priority habitat unless surveys have confirmed non-occurrence/non-occupancy.

Source: Foster Wheeler Environmental Corporation, 1998

management requirements that would apply to private lands of the Project Area under FPRs and the management specifications proposed in PALCO's HCP (including mitigation) under the various alternatives relative to the specific priority habitats, species, or species groups addressed in this assessment are summarized in Table 3.10-10 (Riparian Lands) and Appendix Table M-2. PALCO lands would compose the majority of the Project Area under all alternatives (from approximately 67 percent under Alternative 4 to 97 percent under Alternatives 2 and 3 [see Figures 2.6-1a-d and 2.6-2a-c]). PALCO would manage its lands primarily for commercial timber production under various silvicultural prescriptions. A detailed management plan for the various designs of the Headwaters or 63,000-acre Reserve as proposed under Alternatives 2, 2a, and 4 has not been developed. However, because the primary management direction for the Reserve would prioritize complete protection and management of priority species and their habitats (particularly old-growth redwood forest), commercial timber harvest would be prohibited (although habitat rehabilitation or restoration would perhaps occur); thus, no significant adverse effects on wildlife resources would be expected to occur in the Reserve (see Section 2.0). Consequently, analysis of potential adverse effects on wildlife resources in the Project Area and HCP Planning Area was focused on activities proposed on PALCO lands.

Finally, it is important to note that the state and federal assumptions for assessing environmental impacts under the No Action alternative (Alternative 1) differ due to differences in analysis approach required by CEQA and NEPA. The following section describes the general effects analysis for all wildlife resources under CEQA for Alternative 1 (No Action/No Project). Throughout the rest of this section, impacts on wildlife resources are quantitatively analyzed in both the short and long term, as required by NEPA.

Alternative 1 (No Action/No Project) - CEQA

The state and federal assumptions for assessing environmental impacts to aquatic resources under the No Action alternative differ due to differences in analysis approach required by CEQA and NEPA. CEQA-implementing regulations require that an EIR discuss "the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved" [14 C.C.R. 15126(d)(4)]. CEQA does not require either a projection into the long-term future that could be deemed to be speculative, nor does it require a quantitative analysis of the No Project alternative for comparison with the other alternatives. Accordingly, the state version of the No Action/No Project alternative analyzed here contemplates only the short term and is based on individual THPs that would be evaluated on a case-by-case basis. The CDF version of No Action/No Project does not attempt to forecast how PALCO's entire property would look in 50 years (the length of the proposed ITP). Since it is unknown how many THPs there would be, where they would lie geographically, and how they would differ in detail, no quantitative analysis of THPs is presented (see Section 2.5.1).

The likely No Action/No Project alternative would consist of PALCO operating in a manner similar to current THP practices and subject to existing CDF regulatory authority. In reviewing individual THPs, CDF is required to comply with the FPA, FPRs, and CEQA through its certified functional equivalent program (see Section 1.6.1). The specific criteria for evaluating THPs contained in the FPRs are combined with the case-by-case evaluation of each THP for significant effects on the environment, followed by consideration of

Table 3.10-10. Current (Year 0) and Projected Changes in Various Habitat Fragmentation and Connectivity Parameters in the Project Area Under the Proposed Alternatives

Parameter	Current	Alternative 1		Alternative 2		Alternative 2a		Alternative 3		Alternative 4	
	Year 0	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50
Acreage of LSH Patches > 1,000 acres [1/]	35,806	19,426	7,032	16,777	8,816	16,187	8,570	35,099	72,933	26,344	32,450
Acreage of Interior LSH Patches > 1,000 acres [1/]	6,281	5,219	2,559	5,169	3,488	5,457	2,568	6,653	9,573	6,726	12,912
Mean Nearest Distance Between LSH Patches ≥ 80 acres (feet)	1332	1317	1418	1463	2448	1448	2334	1619	1169	1469	1703
Range of Nearest Distance Between LSH Patches ≥ 80 acres (min-max feet)	60-19,308	134-20,314	84-11,787	84-20,345	60-12,814	84-20,345	60-12,814	120-20,326	60-9,927	84-20,345	60-22,634
Acreage of LSH Patches ≥ 80 acres and < 1 mile apart [2/]	57,938	38,477	25,420	32,882	16,234	33,411	16,269	54,161	82,480	42,307	45,569
Acreage of Uncut and Residual Old-growth Patches ≥80 acres and < 1 mile apart [2/]	18,143	9,652	9,262	9,409	7,960	9,409	7,960	18,143	18,143	11,453	10,412
Level of Protection of Riparian Corridors [3/]	5	1		4		5		2		3	

1/ See Table 3.10-3 for further breakdown of LSH and interior LSH acreage by all patch size classes.

2/ Based on FPR standard for assessing habitat connectivity.

3/ Qualitative comparison to current conditions under FPR; Ranking from highest (1) to lowest (5) level of protection of riparian habitat.

Source: Foster Wheeler Environmental Corporation, 1998

alternatives and mitigation measures to substantially lessen those effects. Under CEQA and the FPRs, CDF must not approve a project including a THP as proposed if it would cause a significant effect on the environment and there is no feasible alternative or feasible mitigation measure available to avoid or mitigate the effect. An adverse effect on a listed threatened or endangered species would be a significant effect under CEQA.

In addition, the present FPRs provide that the Director of CDF shall disapprove a THP as not conforming to the rules if, among other things, the plan would result in either a taking or a finding of jeopardy of wildlife species listed as rare, threatened, or endangered by the California Fish and Game Commission or a federal fish or wildlife agency or would cause significant, long-term damage to listed species. To determine the effect of a THP on listed fish or wildlife species, CDF routinely consults with the CDFG and notifies federal fish and wildlife agencies. These processes and independent internal review by CDF biologists can result in a THP containing additional, site-specific mitigation measures similar to the ones described in the Proposed Action/Proposed Project. CDF believes that its existing process using the FPRs and the CEQA THP-by-THP review and mitigation are sufficient to avoid take of listed species.

The mitigation by which an individual THP is determined to comply with FPRs, the federal and California ESAs, and other federal and state laws is determined first by compliance with specific standards in the FPRs and then by development of site-specific mitigation measures in response to significant effects identified in the CEQA functional equivalent environmental analysis of the individual THP. A wide variety of detailed mitigation measures tailored to local conditions is applied with the purpose of avoiding significant environmental effects and take of listed species. These include, but are not limited to, consideration of slope stability, erosion hazard, road and skid trail location, WLPZ width, BMPs on hillslopes and within WLPZs, and wildlife and fish habitat. Consequently, most significant effects of individual THPs can be expected to be mitigated to a level of less than significant through implementation of the No Action/No Project alternative. In some cases, CDF may determine that it is not feasible to mitigate a significant effect of a THP to a level of less than significant. In such a situation, CDF would need to determine whether specific provisions of the FPRs such as not allowing take of a listed threatened or endangered species would prohibit CDF from approving the THP. If approval is not specifically prohibited, CDF would need to weigh a variety of potentially competing public policies in deciding whether to approve the THP. A THP with a significant remaining effect could be approved with a statement of overriding considerations, but such an approval is expected to be rare.

As noted in Section 2.5.1, under NEPA the degree of analysis devoted to each alternative in the EIS is substantially similar to that devoted to the Proposed Action/Proposed Project. The federal agencies recognize that a wide variety of potential strategies could be applied that could represent a No Action/No Project scenario and that they would involve consideration of the same mitigation measures as described above. For the purposes of analysis under NEPA, however, these additional mitigation measures are represented as RMZs, rather than management options developed for site-specific conditions. Consequently, the analysis of the No Action/No Project alternative in the sections below considers the implementation of wide, no-harvest RMZs as well as restrictions on the harvest of old-growth redwood forest to model

conditions over the short and long term. Ranges of RMZ width are considered qualitatively because adequate buffer widths could vary as a result of varying conditions on PALCO lands.

3.10.2.1 Direct and Indirect Effects

For the purposes of this analysis, direct effects are those effects that are a direct result of activities proposed under the alternatives (e.g., timber-management activities or gravel-mining operations) that would immediately displace animals or remove or destroy habitat currently used by a species. Indirect effects are those that would occur later as an indirect result of activities proposed under the alternatives (e.g., the loss of potential suitable habitat currently not used by a species, or the loss of suitable prey habitat for a species).

As applicable, analysis of potential direct and indirect effects on wildlife resources in the Project Area focuses on the following activities proposed to occur on PALCO and/or Elk River Timber Company lands: (1) commercial timber harvest (including all associated activities, such as yarding and hauling), (2) road construction and maintenance, (3) gravel mining and quarrying, (4) grazing, (5) stream-restoration projects, (6) scientific surveys and studies, (7) application of herbicides, and (8) operation of PALCO's fish hatchery. All of these activities are ongoing to various extents as permitted and/or in compliance with applicable county, state, and federal laws, primarily on current PALCO lands, and would be expected to continue on the PALCO ownership under each alternative. Although the eight types of activities listed above may affect an individual species to some degree, the following subsections primarily address potential effects of the first six. Potential effects on wildlife resources from herbicide use in the Project Area under the alternatives are described in Section 3.14, Herbicides. Because operation of PALCO's fish hatchery is an existing activity that would not be expected to change under any of the alternatives, potential effects on wildlife resources would likely continue status quo into the future. Effects of the operation of PALCO's fish hatchery on listed species would be avoided and/or mitigated by current restrictions that are in place to avoid take. Effects of the operation of PALCO's existing fish hatchery on listed species will be voided and/or mitigated by current restrictions that are in place to avoid take. Thus, no new effects are expected and impacts of these activities are not further addressed in this section. Potential impacts on the aquatic environment from stream-restoration projects and operation of PALCO's fish hatchery are addressed in relevant subsections and in detail in Section 3.8.

Anticipated direct and indirect effects of the alternatives on wildlife resources known or suspected to occur in the vicinity of the Project Area were based on an analysis of the effects on the following: (1) priority habitats; (2) habitat fragmentation and connectivity; (3) priority species; (4) neotropical migratory birds; and (5) game species. Anticipated effects (beneficial, no change/no effect, less than significant, significant) relative to thresholds of significance and specific criteria used to assess significance of effects are summarized in the following sections and Tables 3.10-9 and 3.10-10. Significant effects are assumed to be adverse unless otherwise indicated. Effects on species associated with riparian and aquatic habitats are also discussed in Section 3.8.2, and effects on vegetation (including priority species of plants) are described in detail in Section 3.9.2. Where relevant, anticipated effects of similar alternatives are discussed jointly. Detailed descriptions of the components of each alternative, including the acreage of lands under various land ownerships and management scenarios, are

described in Section 2.6 and Tables 2.6-1 and 2.6-2.

Priority Habitats

Abundance and distribution of priority habitats were assumed to be the primary factors that currently limit or may limit numbers, population levels, and distribution of various wildlife species addressed in this assessment. For the priority species and groups of species addressed in Section 3.10.1.3, five primary priority wildlife habitats were identified that are known or suspected to occur in the project vicinity and that are currently limited in abundance in the Project Area and surrounding landscape region largely due to timber management and other development activities: (1) LSH, (2) riparian habitats, (3) wetland habitats, (4) unique habitats, and (5) naturally occurring, open habitats. This section discusses the anticipated effects of the alternatives on these five priority habitats primarily based on changes in the acreage or quality of such habitats, and thus the general anticipated effects on species associated with these habitats, as well as mitigation as proposed under the HCP/SYP. Resultant effects of the proposed alternatives on wildlife species associated with these habitat types in general are discussed in separate subsections under Other Priority Species. Species-specific effects for priority species are addressed in the individual species subsections that follow.

Anticipated effects of each of the alternatives on the five primary priority habitats (except unique habitats) were based primarily on the anticipated changes in acreage of each habitat in Years 10 and 50, as quantified by the FREIGHTS model and/or other GIS modeling and summarized in Section 3.9 and Table 3.9-1. For the purposes of this analysis, with respect to priority wildlife habitats and the FREIGHTS model, projected changes in acreages of habitat supporting timber represent a worst-case analysis (i.e., the most conservative model results in terms of growth projections). Potential ranges of error associated with growth projections used in the FREIGHTS model are discussed in detail in Section 3.9, Vegetation and Timber Resources. Year 10 corresponds to the short term and CDF review of the first decade of the SYP, and Year 50 corresponds to the long term and the end of the PALCO HCP planning period.

Detailed information on the effects of the alternatives on all vegetation types in the Project Area is provided in Sections 3.7, Wetlands and Riparian Lands, and 3.9, Vegetation and Timber Resources. For each alternative, where relevant, anticipated changes in the quantity and quality of priority habitats are discussed for each of the following land bases: the Project Area and the proposed HCP Planning Area under each alternative (i.e., the acreage under PALCO ownership in the HCP Planning Area differs under some alternatives).

LSH

As described in Section 3.10.1.2, LSH is currently protected directly but only incidentally to avoid take of federal- and state-listed species or as required within riparian buffers (see Table 3.7-10 and Appendix Table M-2). Consultation with the CDF by individual THP is, however, required when harvest would "significantly reduce" the acreage and distribution of LSH or its functional value as wildlife habitat in a manner which results in "significant adverse" environmental impacts as described in the FPRs. See Section 3.10.1.2 for further description of protection of LSH under FPRs relative to habitat fragmentation and connectivity with respect to functional values for wildlife.

Issues that may affect priority wildlife species associated with LSH with respect to

the proposed alternatives include (1) the overall acreage of LSH available in the Project Area, and (2) connectivity and fragmentation of LSH throughout the Project Area and the surrounding landscape. This section addresses the anticipated changes in acreage of LSH in the short and long term due to the proposed alternatives. Effects on connectivity and fragmentation of LSH (including patch size distribution and availability of interior forest) are addressed in a separate subsection that follows. Resultant effects on LSH-associate species in general are addressed in a separate subsection (LSH Associates) under Other Priority Species.

Notably, the FREIGHTS model used in this analysis estimated only acreages of LSH that would develop through Year 50 (i.e., the long term). Thus, only the "late-seral" forest component of LSH would be expected to develop through this period (see Section 3.9.1 and glossary for definitions of "late-seral," "old-growth," and "residual old-growth" forest). However, old-growth forest characteristics (e.g., large-diameter trees, snags, downed logs, multi-layered canopy) would likely develop in the proposed Headwaters or 63,000-acre Reserve within approximately 200 to 300 years after implementation of the HCP (i.e., the "extended long term"). Anticipated changes in the acreage of old growth in the extended long term in proposed reserves are discussed in the Vegetation and Timber Resources Section (3.9).

Overall, Alternatives 1, 2, 2a, and 4 would be expected to decrease the amount of LSH in the Project Area in the short and long term. However, loss of LSH in the Project Area would be considerably greater under Alternative 1 than under Alternatives 2, 2a, and 4, especially with respect to the wildlife species dependent upon this habitat (see LSH Associates). Decreases in LSH under Alternative 1 are considerably more substantial primarily due to lack of establishment of MMCAs (under Alternatives 2 and 2a) and a permanent Reserve (Headwaters or 63,000-acre Reserve) around uncut and residual old growth, thus rendering all LSH in the Project Area vulnerable to harvest except within the established no-harvest RMZs or while habitat is occupied by listed species, such as the marbled murrelet and northern spotted owl. In contrast, Alternative 3 would be expected to substantially increase the amount of LSH in the Project Area in the short and long term by protecting all current uncut and residual old growth from harvest, excluding salvage logging, and allowing development of late-seral forest in relatively large, protected no-harvest areas. In terms of projected acreage of LSH, overall, in the long term, Alternative 3 would be expected to provide the greatest acreage of such habitat (primarily late-seral forest) in the Project Area and HCP Planning Area compared to all other alternatives, followed in descending order by Alternatives 4, 2, and 1 (Table 3.9-1). Notably, although Alternative 3 provides the greatest amount of LSH in the short and long term, Alternative 4 protects the greatest acreage of LSH within a permanent reserve (i.e., the 63,000-acre Reserve), where old-growth characteristics would be guaranteed to develop in the extended long term and perhaps exceed that which would be expected under Alternative 3. The minimum percentage of LSH that PALCO proposes to retain (as defined in the SYP) on its lands within each WAA under the HCP proposed in Alternatives 2, 2a, and 4 is 10 percent, with no specific retention requirement for old growth. Notably, these retention specifications are less than the amount of LSH occurring under existing conditions (approximately 32 percent LSH property wide, comprising four percent old growth, eight percent residual, and 19 percent late-seral forest) (Table 3.9-1 and Table 3.9-3). A detailed discussion of the effects of the

alternatives on LSH is provided in the following subsections and in Section 3.9.2.

Alternative 1 (No Action/No Project)

As noted in Section 2.5.1 and Section 3.10.2, the evaluation of the No Action/No Project alternative differs under CEQA and NEPA. For CEQA the No Action alternative is not projected into the long-term future. In the short term, the conformance with the FPRs, the federal and California ESAs, and other federal and state laws is determined on a THP- and site-specific basis. A wide variety of detailed mitigation measures tailored to local conditions is applied with the purpose of avoiding significant environmental effects and take of listed species. Consequently, most environmental effects of individual THPs on LSH can be expected to be mitigated through implementation of the No Action/No Project alternative.

As noted in Section 2.5.1 and Section 3.10.2, the NEPA evaluation of the No Action alternative considers the implementation of wide, no-harvest RMZs as well as restrictions on the harvest of old-growth redwood forest to model conditions over the short and long term. Ranges of RMZs are considered qualitatively because adequate buffer widths could vary as a result of varying conditions on PALCO lands.

Alternative 1 would be expected to decrease or degrade the amount of LSH in the Project Area, primarily due to harvest of most uncut and residual old growth outside occupied marbled murrelet stands and no-harvest RMZs, and because limited salvage logging would be allowed as currently permitted by CDF and FWS within uncut and residual old-growth stands (including stands occupied by marbled murrelets). Approximately 27,325 acres (40 percent) of the LSH in the Project Area would be expected to be harvested by Year 50 (Table 3.9-1). Under Alternative 1, harvest of LSH would occur primarily in the short term in the Eel and Humboldt Bay (Tables 3.9-1 and 3.9-3). As a result of such harvest and harvest of late-seral forest, the net acreage of LSH would decrease in the short and long term in the Project Area.

Alternatives 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property)

Similar to Alternative 1, Alternatives 2 and 2a would be expected to substantially decrease the amount of LSH in the Project Area; however, in contrast to Alternative 1, the impact of this decrease would be offset with respect to the wildlife species associated with LSH in general (see LSH Associates) by the permanent establishment of the proposed Headwaters Reserve, and the protection of LSH within the MMCAs and no-harvest RMZs for the next 50 years. Approximately 39,030 acres (57 percent) of LSH in the Project Area would be removed by this alternative in the long term (Table 3.9-1). Harvest of LSH would occur in the short and long term primarily in the Humboldt, Eel, and Bear-Mattole WAAs (Table 3.9-3). The acreage of LSH would decrease through the long term, despite development of LSH within RMZs primarily on Class I and II streams and in the Headwaters Reserve (Tables 3.9-1 and 3.9-3). Anticipated decreases in LSH would be slightly greater under Alternative 2a than Alternative 2. This would occur because under Alternative 2a, Elk River Timber Company would be expected to harvest most LSH remaining in its ownership, and less acreage would be allocated to the proposed Headwaters Reserve (Tables 2.6-1, 2.6-2, and 3.9-1). However, at least 10 percent of late-seral forest would be maintained within each watershed and property wide on PALCO lands under Alternative 2 (Tables 2.6-2 and 3.9-3). Notably, this percentage would likely be higher due to maintenance of northern spotted owl habitat. More than 10 percent of PALCO's ownership is expected to remain in LSH due to requirements for maintenance of late-seral nesting habitat for the northern spotted owl (PALCO, 1998). In comparison, approximately

32 percent of the HCP Planning Area proposed under Alternative 2 currently consists of LSH; approximately 20 to 42 percent of each WAA in this area consists of LSH, with the exception of the Mad River WAA (four percent). However, the Mad River WAA contains a relatively small amount of PALCO property (3,904 acres) (Appendix Table M-1 and Figure 3.10-1).

Alternative 3 (Property-wide Selective harvest)

Alternative 3 is the only proposed alternative under which the amount of LSH would be expected to increase in the short and long term, providing the greatest amount of LSH among all proposed alternatives in the long term in the Project Area. LSH in the Project Area would increase approximately 29,345 acres (43 percent) in the long term (Table 3.9-1). Increases would occur primarily due to (1) protection of all remaining uncut and residual old growth (both redwood and Douglas-fir); (2) development of LSH within large no-harvest areas; and (3) selective harvest outside no-harvest areas as opposed to other types of prescriptions. Under Alternative 3, no-harvest areas would include all remaining uncut and residual old-growth stands and 600-foot buffers surrounding this habitat, the proposed Headwaters Reserve, and no-harvest portions of RMZs (Table 2.5-2 and Figure 2.5-4). Selective harvest of LSH would be substantially offset by development of LSH within these no-harvest areas and across all of PALCO's ownership. Under this alternative, a minimum of 20 percent of PALCO lands property wide and within each WAA would be maintained in late-seral forest (see Tables 2.6-1, 2.6-2, and 3.9-3). In comparison, approximately 32 percent of the HCP Planning Area proposed under these alternatives currently consists of LSH, ranging from 20 to 42 percent of PALCO lands in each WAA, except Mad River (Appendix Table M-1 and Figure 3.10-1).

Alternative 4 (63,000-acre No-harvest Public Reserve)

Similar to Alternatives 2 and 2a, Alternative 4 would be expected to decrease the amount of LSH in the Project Area; however, this decrease is not considered substantial with respect to the wildlife species associated with LSH (see LSH Associates). Establishment of a permanent 63,000-acre Reserve proposed under this alternative is anticipated to offset effects on wildlife due to harvest of LSH elsewhere in the Project Area in areas outside the proposed 63,000-acre Reserve and no-harvest RMZs. Development of LSH within the reserve and no-harvest RMZs would substantially lessen the adverse effect of harvest on the remainder of PALCO's property. Approximately 13,442 acres (20 percent) of LSH in the Project Area would be lost in the long term (Table 3.9-1). Notably, Alternative 4 would protect the greatest acreage of LSH within a reserve where old-growth characteristics would likely develop in the extended long term. Under Alternative 4, a minimum of 10 percent of PALCO lands property wide and within each WAA would be maintained in late-seral forest (see Tables 2.6-1, 2.6-2, and 3.9-3). Notably, this percentage would likely be higher due to maintenance of northern spotted owl habitat. As was the case under Alternatives 2 and 2a, more than 10 percent of PALCO's ownership would be expected to remain in LSH over the next 50 years due to requirements for maintenance of late-seral nesting habitat for the northern spotted owl (PALCO, 1998). In comparison, approximately 32 percent of the HCP Planning Area proposed under this alternative currently consists of LSH, ranging from 4 to 42 percent in each WAA (Appendix Table M-1 and Figure 3.10-1).

RIPARIAN HABITAT

Detailed analysis of the effects of the proposed alternatives on riparian habitat is addressed in Section 3.7.3, Riparian Lands. The following is a summary of those effects as they pertain to providing habitat for riparian-associated wildlife. Resultant effects of the proposed alternatives on wildlife species associated with this habitat in general are discussed in a separate subsection (Riparian Associates). Species-specific effects on priority species are addressed in the individual subsections that follow under Other Priority Species.

As described in Section 3.7, riparian (streamside) habitats in the Project Area would be expected to receive both some level of direct protection in RMZs and incidental protection in areas protected from timber harvest (e.g., the proposed Headwaters or 63,000-acre Reserve and MMCAs) as proposed under each alternative (see Table 3.7-10). Issues that may affect priority wildlife species associated with riparian habitat relative to the proposed alternatives include changes in the amount and quality of riparian habitat as determined by the following: (1) the level of protection of six components of the riparian (streamside) ecosystem with respect to a properly functioning aquatic system (see Section 3.7); (2) the acreage and harvest prescriptions allocated to RMZs; and/or (3) the level of protection of riparian areas relative to minimum FPR WLPZs.

Overall, none of the alternatives would be expected to substantially decrease or degrade riparian habitat conditions for associated wildlife in general. All the alternatives would generally meet or exceed almost all minimum buffer widths and/or prescriptions recommended by the literature for Class I and II streams through the long term (Figures 3.7-3a through 3.7-3c). The least effects would be expected under Alternative 1 (assuming wider buffers), followed in descending order by Alternatives 3, 4, 2 and 2a. Notably, assuming wider buffers under Alternative 1, all the alternatives would be expected to improve streamside microclimate conditions compared to current conditions (Figures 3.7-3a through 3.7-3c). The total acreage within RMZs (including portions allocated to no-harvest or minimal harvest) under PALCO ownership and/or in proposed reserves would be greatest under Alternative 1 (61,321 acres assuming wide buffer widths), followed in descending order by Alternative 3 (60,170 acres), Alternative 2 (28,915 acres), and then Alternative 4 (28,686 acres) (Table 3.7-12). The lower range of buffer widths being considered as part of Alternative 1 would provide some level of protection to approximately 31,060 acres of riparian habitat. Estimated changes in the acreage of seral types within RMZs under the alternatives are presented in Appendix J, with a detailed discussion of anticipated LSH development within RMZs provided previously in Sections 3.7.4.3; 3.9.2; and 3.10.2.1, Priority Habitats in the LSH section above.

WETLAND HABITAT

Detailed analysis of the effects of the proposed alternatives on wetland habitat is addressed in Section 3.7.2, Wetlands. The following is a summary of those effects as they pertain to wildlife. Resultant effects of the proposed alternatives on wildlife species associated with wetlands in general are discussed in a separate subsection (Wetland Associates) under Other Priority Species. Species-specific effects on priority species are addressed in the individual subsections that follow.

All 486 acres of wetlands in the Project Area would receive both direct protection throughout the Project Area under FPRs (including RMZs), and incidental protection within reserves or RMZs established under all the alternatives. As described in Section 3.7.2, evaluation of effects on wetlands was based on (1) the acreage of wetlands

protected in RMZs and no-harvest areas (e.g., reserves and MMCAs), and (2) the acreage of wetlands managed only under FPRs. As indicated in Section 3.7.2, Class I and II wetlands are protected by RMZs under FPRs. However, timber management and road construction or maintenance activities allowed in or near these and Class III wetlands may cause changes in water quality (e.g., sediment influx), vegetation, and hydrology of wetlands, which may decrease the value of such habitat for wildlife. For example, partial removal of timber within and adjacent to wetlands is permitted under FPRs, which can alter microclimatic conditions required by some species associated with forested habitats. In addition, timber-management activities (harvesting of trees or building of roads) could degrade non-forest vegetation associated with wetlands, thereby degrading the suitability of wetlands for some wildlife.

As described in Section 3.7.3, through the long term, none of the alternatives would be expected to significantly reduce or degrade Class I or II wetlands, although some wetlands could be removed or degraded due to activities occurring in or near wetlands (see above).

UNIQUE HABITATS

Under FPRs and the proposed HCP, no unique habitats except snags and downed logs (in terms of tree retention) receive specific direct protection on private lands, although some incidental protection of these habitats may occur in areas that are difficult to access for timber harvest, are occupied by listed species (e.g., peregrine falcon cliff aeries), or are within established reserves. The relative protection of unique habitats provided under FPRs and PALCO's proposed HCP is summarized in Appendix Table M-2. Effects on unique habitats are presented using four main groupings based on the expected occurrence, distribution, and protection of these habitats under the alternatives as follows: (1) cliffs and rock outcrops; (2) snags and downed logs, and (3) gravel bars and streambanks. Criteria used to evaluate effects of the alternatives on these habitats are identified below.

Cliff and Rock Outcrop Habitat

In the Project Area, cliff and rock outcrop habitats receive no direct specific protection under FPRs or the alternatives, although incidental protection of these habitats may occur with respect to listed species and in protected areas (e.g., reserves, RMZs, MMCAs/occupied marbled murrelet habitat). Thus, issues that may affect priority wildlife species associated with this habitat relative to the proposed alternatives include the acreage set-aside in no-harvest areas that would be expected to provide incidental protection of these habitats. Resultant effects of the proposed alternatives on wildlife associated with cliffs and rock outcrops in general are discussed in a separate subsection (Unique Habitat Associates) under Other Priority Species. Species-specific effects on associated species (e.g. peregrine falcon) are addressed individually in later subsections under Priority Species.

In general, cliffs and rock outcrop habitats would not be expected to be significantly affected directly or indirectly by any of the alternatives. These habitats would not be directly impacted by any of the alternatives, because timber management does not occur in these habitats since the habitats do not support commercial timber. However, species associated with these habitats could be directly affected by timber management or other human-related activities near or in these habitats, resulting in short-term disturbance or displacement of individuals (e.g., bats). See the Peregrine Falcon subsection for a discussion of protection of cliffs used as peregrine falcon aeries. Based on the largest acreage set-aside in no-harvest areas (including no-harvest riparian areas and reserves) in the entire

Project Area and HCP Planning Area, Alternative 3 would be expected to provide the greatest level of incidental protection of cliff and talus slope habitats among all the alternatives, followed in descending order of protection by Alternatives 1, 4, then 2.

Snag and Downed-Log Habitat

Protection of snags and downed logs has become increasingly important, because past methods of timber harvesting have eliminated snags (standing dead trees, including hollow trees) and downed logs in many areas, particularly at accessible low- and mid-elevations, and current salvage logging practices continue to do so within FPRs or federal restrictions. Snag, downed-log, and leave-tree retentions are required under the alternatives as specified in the FPRs or HCP/SYP. However, minimum retentions are not quantitatively specified under FPRs (except in riparian areas), and thus may not be adequate for supporting populations of priority species associated with these habitats. In general, as described previously, the amount of LSH forest was considered an index to the amount of potential habitat available for species dependent on snags, and downed logs. Thus, issues that may affect priority wildlife species associated with snags and downed logs relative to the proposed alternatives include the following: (1) the overall acreage of LSH (and thus, the estimated number of snags and logs), particularly uncut and residual old-growth forest, expected to be available under each alternative, as described previously for LSH; and (2) specific silvicultural prescriptions and/or requirements for snag (and/or leave [green] tree), and downed-log retention (also see Appendix Table M-2 and Sections 2.6, 3.7.2, and 3.9.2). Species-specific effects are addressed individually in later subsections under Priority Species.

Based on the above criteria, Alternative 1 may substantially decrease the amount of snag and downed-log habitat through the short and long term due to a substantial decrease in LSH with no guaranteed protection of snag or downed-wood retention (Table 3.9-1). Similarly, Alternatives 2, 2a and 4 would substantially decrease the amount of LSH in the Project Area in the short and long term. However, snag retention guidelines proposed under the HCP would be expected to maintain sufficient numbers of snags and downed logs in the landscape and thus minimize effects on associated species. Furthermore, in the extended long term, Alternative 4 would be expected to substantially increase the amount of LSH due to growth of LSH in the 63,000-acre Reserve, thereby substantially increasing the available amount of snag and downed log habitat. In contrast, Alternative 3 would be expected to increase snag and downed-log habitat in the short and long term, because the overall acreage of LSH on PALCO land would increase substantially compared to current conditions (Table 3.9-1).

MITIGATION FOR SNAGS AND DOWNED LOGS

Applicant-Proposed Mitigation

This subsection summarizes the mitigation (other than reserve set-asides) proposed in the HCP/SYP under Alternatives 2, 2a, and 4 for priority species associated with snags and downed logs (see Appendix Table M-2 for further detail). There is no specific mitigation above FPRs relative to snag habitat for Alternative 1 (see Appendix Table M-2 for FPR management relative to snags), although mitigation for snags is often developed on a THP-specific basis. Proposed mitigation measures are as follows:

- The current availability of snags and downed logs per acre on the PALCO ownership would be assessed based on a monitoring program developed in consultation with the agencies.

- The following prescriptions would be met based on review of FWS (1997) and analysis of available information on the number of snags and downed logs needed to meet the life history requirements of species dependent on these features (unless further consultation with the agencies and review of new literature determine otherwise):
  - 1.2 snags/acre greater than or equal to 30 inches dbh greater than or equal to 30 feet tall
  - 2.4 snags/acre greater than or equal to 20 inches dbh greater than or equal to 16 feet tall
  - 1.2 snags/acre greater than or equal to 15 inches dbh greater than or equal to 12 feet tall
  - 2 downed logs/acre greater than 15 inches in diameter at large end and greater than 20 feet long of any decay class measured outside of Class I and Class II RMZs. No requirement to leave downed logs where they do not already exist.
- All safe snags (i.e., snags that do not present hazard to roads or activities) would be left standing in the landscape.
- At the end of the first year of the Plan, PALCO would meet with FWS and CDFG to review the effectiveness of the data collection and monitoring program described above, and modify such procedures as necessary.
- After five years of Plan implementation, the effectiveness of the recruitment measures would be evaluated and modified as necessary.
- Following the initial five-year assessment, the effectiveness of the measures and attainment of the objectives would be evaluated at intervals of 5 to 10 years as necessary.

Level of Significance Remaining After Applicant-Prepared Mitigation

Mitigation proposed in the HCP/SYP (see above) would mitigate the effects of Alternatives 2, 2a, and 4 on snag and downed log habitat to a less than significant level. No significant effects would remain following application of the proposed mitigation.

Gravel Bars and Streambank Habitat

As described in Sections 3.4.2, 3.6, and 3.7.3, river gravel bars and sand/silt streambanks on Class I and II streams potentially used by priority wildlife species (e.g., the foothill yellow-legged frog, western snowy plover, or bank swallow) in the Project Area may be directly or indirectly impacted primarily by gravel mining, timber management, road-related activities, and recreational (e.g., off-road vehicle) activities; streambanks may also be impacted to a lesser extent by livestock grazing. In particular, removal of timber in upslope areas and construction of roads can increase the incidence of mass wasting, resulting in erosion of streambanks and changes in the morphology of gravel bars (see Sections 3.4 and 3.6). Streambanks would receive incidental protection within RMZs under the alternatives. However, neither streambanks nor gravel river bars would receive direct protection under the alternatives, although limitations would be made on mining of river gravel bars as regulated by permits (see Section 3.6).

Because river gravel bars and streambanks occur in aquatic and riparian (streamside) areas, they would be affected as described in Sections 3.4.2, 3.6, and 3.7.3. Issues that may affect gravel bar and streambank habitat for wildlife with respect to the proposed alternatives include the following: (1) the acreage protected within RMZs, (2) specific operational measures relative to gravel mining in the HCP Planning Area, (3) the level of protection of streambank stability relative to that recommended in

the literature, and/or (4) anticipated levels of grazing. Effects of the proposed alternatives on wildlife associated with gravel bar and streambank habitat in general are addressed in a separate subsection (Unique Habitat Associates) under Other Priority Species. Species-specific effects on priority species (e.g., foothill yellow-legged frog, western snowy plover, and bank swallow) are addressed in individual species subsections that follow.

Based on the above, effects of the proposed alternatives on river gravel bars or streambank habitat on Class I or II streams would be expected to be relatively small with respect to priority wildlife habitat, because no substantial loss or degradation of such habitat potentially used by priority wildlife species is anticipated, as described below and in respective species subsections (also see Sections 3.6 and 3.7). Based on the acreage allocated to RMZs, Alternative 1 (assuming widest buffer widths) would provide the greatest level of protection for these habitats followed in descending order by Alternatives 3, 4, 2 and then 2a (Figure 3.7-3). Even the FPR buffer widths proposed under Alternative 1 would be expected to still protect gravel bar and streambank habitat to a level similar to that under other alternatives.

Gravel bars would be mined as permitted at similar levels on PALCO lands under all the alternatives. However, as summarized in Section 3.4.2, effects on gravel bars would be expected to be relatively small on Class I streams because associated impacts would be seasonal and localized. Mining would occur during the summer in permitted areas (currently 10 sites along the Eel River between Scotia and Whitlow) outside the wetted channel and the RMZ, and disturbed areas would be restored to the approximate plan form and shape before winter. In addition, current levels of gravel extraction are within typical bedload transport rates through this section of the Eel River. Thus, no net degradation of the streambed would be expected to occur.

As described in Sections 3.6 and 3.7, streambanks on Class I and II streams would not be expected to be directly affected by roads or timber harvesting under Alternatives 1 through 4. However, a moderate (Alternatives 1, 2 and 2a) to low (Alternatives 3 and 4) increase in peak flows during spring associated with new roads in some watersheds could result in some loss of silt/sand streambanks. Silvicultural prescriptions in RMZs under all the alternatives on Class I and II streams would generally meet (no risk, to moderate risk on some Class II streams) those recommended in the literature to maintain levels of streambank stability within a functional riparian ecosystem (see Section 3.7.4.3 and Figures 3.7-3a and 3.7-3b.) Streambank stability may be directly impacted negatively by livestock grazing in a few localized areas, which can contribute to erosion of streambanks (see Section 3.7), However, these impacts would be localized and relatively small with respect to the availability of habitat in the Project Area potentially supporting such species as the bank swallow.

OPEN HABITAT

None of the open habitats that occur naturally in the Project Area (except wet meadows considered wetlands—see Section 3.7) would receive explicit or direct protection under the alternatives, as regulated by the FPRs or the proposed HCP (Appendix Table M-2). However, any open habitats that exist on the landscape would receive incidental protection under the alternatives in protected areas (e.g., Reserves, MMCAs, and RMZs). Issues that may affect naturally occurring open habitat for wildlife with respect to the proposed alternatives include changes in the acreage and level of protection of naturally occurring open habitats due to grazing and road construction associated with timber-

management activities. Effects of the proposed alternatives on wildlife associated with this habitat in general are addressed in a separate subsection (Open Habitat Associates) in Other Priority Species. Species-specific effects on priority species of wildlife are addressed for individual species in the sections that follow.

None of the alternatives would be expected to change the acreage of naturally occurring open habitats, and direct impacts from anticipated, localized low levels of livestock grazing would be relatively small (see Section 3.4 for a description of the levels of grazing in the Project Area under the alternatives). Under all the alternatives, livestock grazing would likely continue to locally impact grasslands, prairies, and meadows in and near leased grazing areas by reducing vegetation cover and potentially contributing to soil erosion (see Section 3.6). However, current levels of grazing would not be expected to substantially degrade the value of naturally occurring open habitats for wildlife uses such as foraging and reproduction. In addition, roads may be routed through some naturally open habitats to access harvestable timber; however, such effects would not be expected to decrease the overall value of these habitats to wildlife due to their relatively localized impacts on open habitat and/or associated species-specific mitigation (e.g., HCP mitigation for the burrowing owl) (see Section 3.6 for a discussion of effects of roads).

The acreage of human-caused grassland/prairie and forest opening (clearcut) areas in the Project Area would change under the alternatives, but these changes would be considered relatively small because such areas were originally forested, and clearcuts are not considered a priority habitat, as described in Section 3.10.1.2 (Table 3.9-1). The acreage of human-caused grassland/prairie habitat that would be converted back to forestland by planting of conifers varies by alternative. The greatest amount of open clearcut habitat in the Project Area and the HCP Planning Area over the short and long term, as dictated by the acreage of programmed timber harvest, would likely occur under Alternative 2, followed in descending order by Alternatives 1, 4, and 3 (Table 3.9-1). All of the alternatives propose maintaining a minimum of five percent of PALCO lands in each WAA and property wide as forest openings (clearcut early seral stage) at any one time except Alternative 3, which proposes only selective harvest and thus no clearcut.

Habitat Fragmentation and Connectivity

As discussed in Section 3.10.1.2, the amount of interior forest habitat and connectivity of patches of LSH, particularly uncut and residual old growth, is important for a number of wildlife species associated with LSH. The FPRs do not set specific management standards and guidelines for limiting LSH fragmentation and maintaining some degree of LSH connectivity. As described previously for LSH, consultation with CDF by individual THP is required, however, when harvest would "significantly" reduce the acreage and distribution of LSH or their functional value as wildlife habitat in a manner which results in "significantly" adverse environmental impacts (Appendix Table M-2). Such consultation requires that a registered professional forester (RPF) provide information on habitat structure of late-successional forest stands and a statement of objectives over time for such stands. In addition, the THP, SYP, or nonindustrial timber management plan (NTMP) must describe the effects of proposed harvesting on current functional wildlife habitat for species associated primarily with "late-successional forest" (as defined by FPRs; see Section 3.10.1.2 under LSH), vegetation structure, connectivity, and fragmentation. Feasible mitigation measures are to be described and

incorporated into the THP, SYP, or NTMP to mitigate, avoid, or reduce "significant," adverse long-term effects on fish, wildlife, and listed species associated primarily with late-successional forest.

As discussed in Section 3.10.2.1, analysis of effects of proposed activities on habitat fragmentation and connectivity in the HCP Planning Area under the alternatives focused on interior LSH forest. Analyses were based on the following assumptions with respect to the long term and extended long term: (1) areas set-aside in the proposed Headwaters or 63,000-acre Reserve would be protected over the extended long term (several hundred years), allowing development and protection of forest with old-growth characteristics; and (2) uncut and residual old-growth harvested during the life of the SYP would be permanently lost. Thus, discussion of effects on habitat fragmentation and connectivity in the following subsections includes both the long and extended long term where relevant.

Some of the proposed alternatives may improve current levels of habitat fragmentation and connectivity in the Project Area, while others may negatively affect these habitat attributes. Reserves and/or buffers (i.e., no-harvest portions of RMZs, MMCAs, other murrelet buffers, and 600-foot buffers under Alternative 3) proposed under some of the alternatives may improve connectivity and fragmentation in the Project Area in the long term and/or extended long term by (1) allowing development of new LSH, including old-growth characteristics within reserves; (2) buffering existing uncut and residual old-growth patches from edge effects (e.g., predation by generalist species associated with edges, windthrow, microclimate changes); (3) improving interior forest conditions; (4) reducing the amount of edge; and (5) connecting or reducing the distance between nearby patches. However, as described in Section 3.10.1.2, associated benefits of improved connectivity and fragmentation would likely be limited by the continued, anticipated relative isolation of such areas from other large, uncut LSH patches in Humboldt County.

In contrast, the primary activities and features associated with the proposed alternatives that may negatively affect habitat fragmentation and connectivity include continued timber harvest (particularly clearcut practices), agricultural practices, roads, and encroachment of human activities and development in LSH and riparian areas. As discussed in Section 3.10.1.2, associated negative effects of these activities on connectivity and fragmentation of such habitat in the Project Area during the term of the SYP include: (1) loss of interior forest through harvest, primarily due to loss of remaining large- and medium-size uncut and residual old-growth patches; (2) increased amount of edge and associated edge effects; (3) increased isolation of remaining uncut and residual old-growth patches; (4) decreased integrity and/or width of riparian corridors; and (5) loss of remaining key LSH movement corridors. Notably, approximately 396 miles of new roads would be constructed under Alternatives 1 to 3 in the first decade, with potentially fewer roads constructed under Alternative 4 because of the smaller landbase. As a result, current road densities in each HU would increase with the greatest increases anticipated in the Freshwater Creek and Larabee Creek HUs (Figure 3.6-4).

Effects on fragmentation and connectivity of wildlife habitat in the Project Area for each of the proposed alternatives were evaluated based on both quantitative and qualitative criteria, including the following: (1) changes in the acreage of interior LSH forest; (2) changes in the number, size,

quality, and proximity of LSH patches; (3) changes in the quality of riparian corridors (i.e., RMZs) based on RMZ widths and the integrity of the RMZs as dictated by proposed silvicultural prescriptions; and (4) effects on LSH corridors potentially supporting wildlife movement, including the Humboldt-Eel and Eel-Park corridors described in Section 3.10.1.2. These effects are all inter-related to a large extent and are also related to effects discussed previously for LSH. The threshold of significance with respect to these habitat attributes was considered to be substantial loss or degradation of interior LSH (via clearcut, bisection through road construction) contributing to increased fragmentation of such habitat under the proposed alternatives, as measured by (1) a net decrease in the acreage of interior LSH, and (2) an increase in the maximum distance between patches of LSH relative to a given threshold. Species-specific thresholds of significance for priority species affected by LSH fragmentation and connectivity are identified in later subsections.

Potential negative and beneficial effects of the proposed alternatives on habitat fragmentation and connectivity in the Project Area were considered in the relative context of the region and the proposed HCP. As discussed in Section 3.10.1.2, LSH patches in the Project Area are now highly fragmented and isolated relative to one another and other large LSH patches in Humboldt County, primarily due to the predominance of early and mid-seral forests surrounding these patches. Moreover, the Project Area would be expected to continue to be relatively isolated in the foreseeable future because most surrounding lands are also privately owned and zoned for timber production. In addition, Highway 101 will continue to represent a significant dispersal barrier for many organisms, including between the Project Area lands to the north and Humboldt Redwoods State Park to the south, due to wide areas of unsuitable habitat and vehicular traffic (Figure 3.9-1). A natural ridge barrier precluding connectivity of riparian corridors between the Yager and Van Duzen WAAs is also expected to continue to interrupt potential habitat connectivity for some species in the Project Area.

Based on actions occurring primarily in the short term, Alternative 1 would be expected to negatively affect habitat fragmentation and connectivity in the Project Area in the short and long term (Table 3.10-10 and Appendix Table M-3). This would occur largely due to permanent loss of interior LSH, a reduction in patch size and increased distance between patches of LSH, and loss or degradation of key movement corridors (Table 3.10-10 and Appendix Table M-3). In contrast, Alternatives 2, 2a, 3 and 4 would be expected to improve current levels of habitat connectivity and reduce fragmentation in the Project Area through the long term, and likely through the extended long term within the proposed reserves. Reductions in the acreage of interior LSH and increased distance between patches of LSH on PALCO's property outside of proposed reserves and RMZs would be expected to be substantially mitigated and less than significant. This substantial mitigation would occur due to increased acreage of interior LSH forest, increased LSH patch size, and reduced distance between patches of uncut and residual old growth and LSH in and around the proposed reserves, MMCAs, and RMZs. In particular, in the reserves proposed under Alternatives 2, 2a, 3, or 4, fragmentation of LSH would decrease, connectivity would improve, and interior LSH would increase in the long and extended long term. The quality of riparian corridors would likely improve under all the alternatives compared to current conditions through the long term, but the benefits of such corridors would largely be limited by the surrounding

managed landscape. Overall, Alternative 1 would provide the greatest protection of riparian corridors in terms of acreage of no-harvest RMZs and/or selective harvest (assuming the widest buffers), followed in descending order by Alternatives 3, 4, 2 and 2a (Table 3.7-5). The two key wildlife movement corridors (as identified in Section 3.10.1.2) would be degraded under Alternatives 1, 2, 2a, and 4 to various extents, but would likely improve overall under Alternative 3. Effects of the proposed alternatives are described in greater detail in the following subsections, followed by mitigation for significant effects on LSH and habitat fragmentation and connectivity.

ALTERNATIVE 1 (NO ACTION/NO PROJECT)

As noted in Section 2.5.1 and Section 3.10.2, the evaluation of the No Action/No Project differs under CEQA and NEPA. For CEQA, the No Action alternative is not projected into the long-term future. In the short term, the conformance with the FPRs, the federal and California ESAs, and other federal and state laws is determined on a THP- and site-specific basis. Compliance is attained by a wide variety of mitigation measures tailored to local conditions such that significant environmental effects and take of listed species are avoided. Consequently, most environmental effects of individual THPs can be expected to be mitigated through implementation of the No Action/No Project alternative.

As noted in Section 2.5.1 and Section 3.10.2, the NEPA evaluation of the No Action alternative considers the implementation of wide, no-harvest RMZs as well as restrictions on the harvest of old-growth redwood forest to model conditions over the short and long term. Ranges of RMZs are considered qualitatively because adequate buffer widths could vary as a result of varying conditions on PALCO lands.

Alternative 1 would be expected to negatively affect current levels of habitat fragmentation and connectivity in the Project Area and HCP Planning Area through the short and long term. This would occur primarily due to harvest of LSH on PALCO's property in the long term except within occupied murrelet and owl habitat as well as no-harvest RMZs. As a result, (1) the acreage and quality of LSH interior forest would decrease; (2) many large patches of LSH would be eliminated; (3) the distance between LSH patches would increase; (4) the quality of RMZs as wildlife movement corridors would improve in the long term, but benefits would be limited; and (5) the Humboldt-Eel and Eel-Park habitat corridors would be degraded as described in further detail below.

Harvest would reduce the acreage of interior LSH forest in the Project Area by 77 percent from 20,011 acres under current conditions to 4,615 acres under Alternative 1 in the long term (Appendix Table M-3). Notably, the only remaining interior forest would exist in occupied marbled murrelet stands. Only one of these patches (the Headwaters Forest) would be greater than 1,000 acres. Remaining patches would become smaller and more isolated by the short term and would likely remain relatively isolated through the long term. Little LSH would be expected to develop in the Project Area except primarily in RMZs in the long term, as described in Section 3.7. These increases would likely improve the current quality of riparian corridors for wildlife movement/dispersal through the long term. The Humboldt-Eel and Eel-Park habitat corridors would likely be substantially degraded due to timber harvest of most existing LSH in the Humboldt and Eel WAAs in the short term (Table 3.9-3).

ALTERNATIVES 2 (PROPOSED ACTION/PROPOSED PROJECT) AND 2A (NO ELK RIVER PROPERTY)

Alternatives 2 and 2a would be expected to negatively affect current levels of habitat fragmentation and connectivity in the Project Area and the HCP Planning Area through the short and long term. This would occur primarily due to harvest of most remaining uncut and residual old growth outside the proposed Headwaters Reserve, MMCAs, and no-harvest portions of RMZs in the short term. As a result, (1) the acreage and quality of LSH interior forest would decrease; (2) the acreage of LSH in large (greater than 1,000-acre) patches would decrease; (3) the distance between LSH patches would increase; (4) the quality of RMZ corridors as wildlife movement corridors would be least among all the alternatives but would improve over current conditions; and (5) the Humboldt-Eel and Eel-Park habitat corridor would be degraded as described below. However, the effects on LSH connectivity and fragmentation would be substantially mitigated and less than significant due to the permanent establishment of the Headwaters Reserve and the development of interior LSH and connectivity in and around the MMCAs through the long term.

Under Alternative 2, harvest would reduce the acreage of interior LSH forest in the Project Area by 68 percent from 20,011 acres under current conditions to 6,306 acres in the long term (Appendix Table M-3). Also, harvest would remove many large patches of LSH, including the majority of remaining uncut and residual Douglas-fir-dominated old growth in the Bear-Mattole WAA (Figures 3.9-2, 3.10-2, and 3.10-7). However, these effects would be substantially mitigated by the development of a very large, contiguous patch of interior LSH within the permanent Headwaters Reserve, along with the development of approximately 10 stands of interior LSH (greater than or equal to 80 acres in size) in the proposed MMCAs through the long term. Also, the large stand of interior forest that would develop in the Headwaters by the extended long term would consist of high-quality old-growth redwood, making it more valuable than younger, managed stands of interior LSH (consisting of late-seral forest) that may exist elsewhere on PALCO's property.

Alternative 2a would be expected to negatively impact habitat fragmentation and connectivity in the Project Area more than Alternative 2 because of the presumed harvest of most of the remaining LSH on ERTC lands. Under Alternative 2a, harvest would reduce the acreage of interior LSH forest in the Project Area by 73 percent, from 20,011 acres under current conditions to 5,407 acres in the long term (Appendix Table M-3). Similar to Alternative 2, harvest would remove many large patches of LSH, including most of the remaining uncut and residual Douglas-fir-dominated old growth in the Bear-Mattole WAA (Figures 3.9-2, 3.10-2, and 3.10-8). However, these effects would be substantially mitigated by the development of a very large, contiguous patch of interior LSH within the permanent Headwaters Reserve, along with the development of approximately 10 stands of interior LSH (greater than or equal to 80 acres in size) in the proposed MMCAs through the long term. One difference between the development of LSH in the Headwaters Reserve under Alternatives 2 and 2a is that, under Alternative 2a, there would be no protection of that portion of the Reserve that extended along the Elk River through ERTC lands. This likely means that more harvest would occur along this major river (outside RMZs) than under Alternative 2, thus reducing habitat connectivity between the Headwaters and lands west of ERTC ownership.

The potential for wildlife movement across the landscape and between the proposed MMCAs, Headwaters Reserve, and

Humboldt Redwoods State Park would be improved by development of LSH in RMZs on Class I and II streams (harvest would be allowed in RMZs on Class III streams) and vegetative buffers for suitable marbled murrelet nesting habitat adjacent to public preserves (see Table 2.6-2, Figure 3.10-7, and Section 3.10.2.3 under Marbled Murrelet Mitigation), although movement would certainly not be limited to the riparian areas. In the long term, LSH would be expected to develop within these areas. Potential benefits, however, would be limited because selective harvest would be allowed within a portion of Class I and II RMZs, and harvest would be permitted up to the edge of Class III streams. Connectivity of LSH in the Humboldt-Eel and Eel-Park corridors would substantially decrease through the long term due to harvest of LSH predominantly in the short term (Figure 3.10-7).

ALTERNATIVE 3 (PROPERTY-WIDE SELECTIVE HARVEST)

Alternative 3 would likely reduce habitat fragmentation and improve connectivity in the Project Area and HCP Planning Area through the long term. Thus, any degradation of LSH through selective harvest would be more than offset, less than significant, and beneficial due to protection (including no salvage harvest) of remaining uncut and residual old-growth forest and associated 600-foot buffers, establishment of the proposed Headwaters Reserve, and selective harvest on PALCO lands outside no-harvest areas. As a result, predominantly in the long term, (1) the acreage and quality of LSH interior forest would increase; (2) the amount of LSH in large patches (greater than 1,000 acres) would increase; (3) the distance between LSH patches would decrease; (4) the quality of RMZ corridors as wildlife movement corridors would improve over current conditions; and (5) habitat corridors would improve over current conditions, as described in further detail below.

Under Alternative 3, the acreage of interior forest would increase by approximately 56 percent from 20,011 acres under current conditions to 31,153 acres by the long term (Appendix Table M-3). All patches of uncut and residual old-growth forest currently located in the Project Area would be protected from harvest, and 600-foot buffers would be provided around these patches (Figures 3.9-2 and 3.10-9). The mean minimum distance between LSH patches less than or equal to 80 acres in size would decrease from approximately 0.25 mile to 0.22 mile (Table 3.10-10). In particular, the 600-foot buffers around protected uncut and residual old growth would connect many stands of such habitat that are currently isolated as more adjacent late-seral forest develops in the long term.

Habitat connectivity through potential LSH corridors would be expected to improve over current conditions in the Humboldt Project Area and HCP Planning Area, primarily in the long term. The quality of RMZs connecting LSH patches and likely providing movement for wildlife species through the landscape would improve compared to existing conditions, largely in the long term due to development of LSH (see Section 3.7.2; see Priority Habitats in Section 3.10.2.1). The total acreage protected in RMZs under Alternative 3 as no-harvest or selective harvest areas (which retain more connectivity) would be greater than under Alternatives 2, 2a, and 4. However, the integrity of these RMZ corridors under Alternative 3 would be less than under Alternative 1 (assuming wider buffers); selective harvest would be permitted in a portion of the buffers under Alternative 3, compared to no-harvest in RMZs under Alternative 1 (see Table 3.10-10 and Section 3.7). Throughout the landscape of the Project Area, selective harvest in all areas outside no-harvest areas would be expected to improve connectivity of LSH in the long term compared to other harvest prescriptions. In

particular, habitat connectivity would improve in the Humboldt-Eel and Eel-Park corridors, as well as the following areas where connectivity is currently limited (1) between uncut and residual old-growth patches and Humboldt Redwoods State Park; (2) through the Van Duzen WAA; and (3) on both sides of Highway 101. However, selective harvest activities would likely degrade the quality of LSH and limit its value to at least some LSH-associated species, as described in Section 3.10-1. Selective harvest would require multiple entries into a given stand to remove target timber volumes, as compared to commercial clearcuts, which usually require only one entry. These multiple entries, while leaving more LSH, will reduce biodiversity in the stands by negatively impacting understory species, the duff and litter layer, and by increasing the frequency of disturbance. These repeated negative impacts would not be expected to occur under most harvest scenarios under Alternatives 1, 2, 2a, and 4. In addition, potential benefits of improved movement/dispersal corridors would continue to be limited by the surrounding, predominantly managed landscape.

ALTERNATIVE 4 (63,000-ACRE NO-HARVEST PUBLIC RESERVE)

Alternative 4 would be expected to negatively affect current levels of habitat fragmentation and connectivity in the Project Area and HCP Planning Area through the short and long term. This would occur primarily due to harvest of most remaining uncut and residual old growth outside the proposed 63,000-acre Reserve and no-harvest portions of RMZs in the short term. As a result, (1) the acreage and quality of interior LSH would decrease in the short and long term; (2) the acreage of LSH in medium-size (80 - 999 acres) patches would decrease; (3) the distance between LSH patches would increase slightly; (4) the quality of RMZ corridors as wildlife movement corridors would be least among all the alternatives but would improve over current conditions; and (5) the Humboldt-Eel and Eel-Park habitat corridor would be degraded as described below. However, these effects would be substantially mitigated and less significant due to the permanent establishment of the 63,000-acre Reserve.

Under Alternative 4, harvest would reduce the acreage of interior LSH in the Project Area by 8 percent from 20,011 acres under current conditions to 19,347 acres in the long term (Appendix Table M-3). Also, harvest would remove many large patches of LSH, including the majority of remaining uncut and residual Douglas-fir-dominated old growth in the Bear-Mattole WAA (Figures 3.9-2, 3.10-2, and 3.10-10). However, these effects would be substantially mitigated by the development of several very large, contiguous patches of interior LSH within the permanent 63,000-acre Reserve. Further benefits would include consolidation of the approximately 25 patches of uncut and residual old growth located within this proposed reserve into one large patch of LSH in the long term, and eventually into old growth in the extended long term (Figure 3.10-10). This would substantially increase the acreage of interior forest and decrease fragmentation and associated edge effects in a relatively large area compared to current conditions.

The potential improvement for wildlife movement across the landscape and Humboldt Redwoods State Park under Alternative 4 would occur primarily in RMZs on Class I and II streams (harvest would be allowed in RMZs on Class III streams), and in the proposed 63,000-acre Reserve (see Table 2.6-2, Figures 3.9-2 and 3.10-10, and Section 3.10.2.3 under Marbled Murrelet Mitigation). In the long and/or extended long term, LSH would be expected to develop within these areas. Potential benefits would be somewhat limited by the surrounding, predominantly managed landscape, although a managed landscape

does not present a barrier to many species (Table 2.6-2). RMZ widths and prescriptions under Alternative 4 would be the same as under Alternative 2. Thus, the quality of RMZs connecting LSH patches and likely facilitating wildlife movement through the landscape would improve compared to current conditions due to development of LSH, but improvements would be less than under Alternatives 1 and 3 (see Table 3.10-10, Section 3.7.2, and Priority Habitats in Section 3.10.2.1). However, improvements under Alternative 4 may be somewhat greater than Alternative 2 due to the additional incidental protection/buffering of RMZs within the proposed 63,000-acre Reserve (see Section 3.7.2). Connectivity of the Eel-Park corridor and the northern portion of the Humboldt-Eel corridor outside the proposed 63,000-acre Reserve would substantially decrease through the long term due to harvest of LSH predominantly in the short term. Although benefits may be limited and localized, the proposed 63,000-acre Reserve may provide an important refugium and movement corridor for wildlife associated with LSH in the long and extended long term (1) within the Humboldt and Yager WAAs (including the southern portion of the Humboldt-Eel key corridor), and (2) potentially between large LSH patches in Redwood National Park and the Six Rivers National Forest to the north and Humboldt Redwoods State Park to the south as connected by riparian corridors, although benefits would be limited by the ridge between the Yager and Van Duzen WAAs, which is dominated by early seral habitats (see Section 3.10.1.2).

MITIGATION FOR HABITAT FRAGMENTATION AND CONNECTIVITY

APPLICANT-PROPOSED MITIGATION

Applicant-proposed mitigation related to LSH, including effects on priority species associated with LSH fragmentation and connectivity is summarized below and in Appendix Table M-2. Additional, species-specific mitigation affecting LSH is summarized in the respective species subsections that follow (most notably the marbled murrelet and northern spotted owl). Unless otherwise noted, all Applicant-proposed mitigation applies to Alternatives 2, 2a, and 4. Proposed mitigation measures are as follows:

- Establish MMCAs, which include vegetative buffers around uncut and residual old-growth (see Section 3.10.2.3, Marbled Murrelet) (Alternatives 2 and 2a only).
- Establish vegetative buffers for suitable marbled murrelet nesting habitat on public preserves (see Section 3.10.2.3, Marbled Murrelet) (Alternatives 2 and 2a only).
- Exclude salvage logging from old-growth MMCAs (see Section 3.10.2.3, Marbled Murrelet) (Alternatives 2 and 2a only).
- Enhance recruitment of second-growth trees into the residual overstory via thinning or single-tree selection, if requested by the agencies (see Section 3.10.2.3, Marbled Murrelet) (Alternatives 2 and 2a only).
- Do not construct new roads within uncut and residual old-growth portions of MMCAs (see Section 3.10.2.3, Marbled Murrelet) (Alternatives 2 and 2a only).
- Maintain 10 percent of all PALCO lands and 10 percent within each WAA in late-seral forest.
- Conserve old-growth Douglas-fir through set-asides within RMZs, conifer basal area requirements within selective harvest portion of RMZs, and WHR 6 size class distribution requirements in RMZ no-harvest zones.
- Conserve old-growth redwood mainly through conservation of marbled murrelet nesting habitat in MMCAs (Alternatives 2 and 2a only).

- Preserve approximately 1,137 and 1,640 acres (assuming Owl Creek MMCA is cut) of old-growth Douglas-fir and redwood, respectively, inside the proposed RMZs (Alternatives 2 and 2a only).
- Approximately 197 and 7,913 acres of old-growth Douglas-fir and redwood, respectively, would be conserved inside the MMCAs and Headwaters Reserve (including some acreage inside RMZs) under the proposed HCP in Alternatives 2 and 2a.

Level of Significance Remaining After Applicant-proposed Mitigation

Measures proposed in the HCP/SYP (see above) would mitigate the effects of Alternatives 2, 2a, and 4 on habitat fragmentation and connectivity to a less than significant level. No significant effects would remain following application of the proposed mitigation.

Priority Species

This section describes the anticipated effects of the alternatives on priority species of wildlife identified in Section 3.10.1.3 and Tables 3.10-1, 3.10-2, 3.10-3, and 3.10-4. As mentioned previously, for the purposes of analysis, species were assumed to occur in priority habitat unless surveys have confirmed non-occurrence/non-occupancy. Evaluation of effects was based on anticipated protection of known or potential sites/individuals and impacts on the quantity, quality, and distribution of species' priority habitats as described above and in the respective species subsections. Effects on priority species were analyzed relative to potential impacts on individuals and populations in the vicinity of the Project Area (unless otherwise indicated). The thresholds of significance and anticipated effects of the alternatives on priority species of wildlife in the context of proposed mitigation are summarized in Table 3.10-9. Under each of the alternatives, it was assumed that wildlife species and their associated habitats would be managed according to current or proposed management requirements for the respective land ownerships on which these species are known or suspected to occur, as summarized in Appendix Table M-2.

Effects of the alternatives on priority species are discussed in the following subsections: (1) invertebrates, (2) amphibians and reptiles, (3) birds, (4) mammals, and (5) other priority species (young forest associates, mid-seral forest associates, wetland associates, riparian associates, LSH associates, unique habitat associates, and open habitat associates). As in Section 3.10.1.3, species-specific discussions of effects in the text are limited to those species that are federal- or state-listed as endangered or threatened, state-listed as fully protected, or identified on List A of PALCO's HCP. General thresholds of significance for priority species of wildlife were defined at the beginning of Section 3.10.2. Parameters used to measure species-specific thresholds of significance and anticipated effects of the alternatives for all priority species are identified in the following subsections and/or Table 3.10-9. Analysis of effects on individual species are grouped in cases where, due to similarities in habitat use, the effects of the alternatives are expected to be similar.

Invertebrates

As described in Section 3.10.1.3, three priority species of invertebrates are suspected to occur in the Project Area: the ground beetle, Humboldt ground beetle, and Klamath shoulderband. Relatively little is known about the specific habitat requirements or occurrence of these species in the Project Area. Therefore, for the purposes of this analysis, it is assumed that these species occur in all potentially suitable priority habitat in the Project Area. The priority habitat type with which these

species are known or likely to be associated and which is considered to be limited in availability in the Project Area is LSH, particularly in riparian and wetland areas (see Table 3.10-1). In the absence of species-specific information on the habitat requirements of these species, their association with LSH is based on (1) that invertebrates in general require moist, cool microclimatic conditions that are typically associated with LSH (both upland and riparian); and (2) because these species have extremely low mobility, are patchily distributed in the landscape and are, thus, extremely slow to respond to disturbance, they are more prevalent in undisturbed habitat, such as the old growth portion of LSH (Powell and Hogue, 1979; Frest and Johannes, 1993; Weber and Cavanaugh, 1992). As described in Section 3.10.1, invertebrates associated with LSH may be adversely impacted by loss, degradation (including ground-disturbing activities such as salvage harvest), and fragmentation of LSH, the latter of which may isolate populations and limit dispersal capabilities. Thus, impacts on priority species of invertebrates were evaluated primarily based on changes in the quantity and distribution of LSH, particularly in riparian and wetlands areas, as described in Section 3.7 and Section 3.10.2.1 under LSH Associates and Habitat Fragmentation and Connectivity. The threshold of significance for priority species of invertebrates was substantial loss or degradation of LSH that is not substantially lessened by proposed mitigation. Such effects would be expected to potentially result in a substantial decline in population numbers, reduced range of local species populations, and potential extirpation of endemic, localized populations (Table 3.10-9).

Based on the above, Alternative 1 may negatively affect the three priority species of invertebrates that may occur in the Project Area vicinity due to loss and degradation (e.g., fragmentation) of LSH, and thus, presumably, a potential decline in species' populations (as described previously for LSH in Sections 3.10.2.1 and 3.10.2.2). However, effects on these species due to harvest of LSH under Alternatives 2, 2a, and 4 would be minimized, mitigated, and less than significant due to the protection of uncut and residual old growth and development of LSH in proposed reserves, MMCAs (Alternatives 2 and 2a), and RMZ no-harvest zones. Potential effects of the alternatives on priority species of invertebrates are summarized in Table 3.10-9.

Mitigation for Invertebrates

APPLICANT-PROPOSED MITIGATION

See Section 3.10.2.2 under Mitigation and Appendix Table M-2 for Applicant-proposed mitigation for LSH and, thus, LSH-associated priority invertebrates, as identified in the HCP/SYP. For LSH-associate priority invertebrates, the proposed HCP/SYP would substantially mitigates for harvest of priority habitat by providing large areas of protected priority habitat.

LEVEL OF SIGNIFICANCE REMAINING AFTER APPLICANT-PROPOSED MITIGATION

Effects of Alternatives 2, 2a, and 4 are anticipated to be minimized, mitigated, and less than significant due to implementation of the HCP mitigation directed at LSH. Thus, no additional agency-proposed mitigation would be required.

AMPHIBIANS AND REPTILES

Effects of the proposed alternatives on the six priority species or subspecies of amphibians and reptiles that may or are known to occur in the vicinity of the Project Area are summarized in Table 3.10-9. All of these species are designated as federal species of concern and state species of special concern. Four species are identified on PALCO's HCP A list. For reproduction, five species are associated primarily with

riparian and/or wetland habitats (in some cases, specifically LSH riparian habitat) and one species is associated with talus or surface rock (see Table 3.10-2). Forest connectivity is also important for dispersal of herptiles associated with forested habitats to avoid isolation of populations. Thus, evaluation of potential effects of the alternatives on all six species was generally based on one or more of the following: (1) removal or degradation of rock outcrop or riparian or wetland vegetation; (2) degradation of aquatic habitat (e.g., changes in water temperature, sediment influx, peak flows); (3) availability of LWD and downed wood in the aquatic and nearby terrestrial environments; (4) disturbance or harm of individuals (e.g., trampling by livestock, human-related activities); and (5) fragmentation of LSH. Effects on aquatic and riparian habitats were described in detail in Sections 3.4, 3.6, and 3.7 and are briefly summarized as applicable in the following subsections. Discussion is focused on effects on Class I and II streams, because based on FPR definition Class III streams do not support aquatic life (see Table 3.7-10). Notably, the acreage of small seeps and springs in the Project Area, which provide important habitat for several of these species, is unknown, but these habitats certainly contribute to the sustainability of their populations.

Evaluation of the effects of the alternatives on four of the five species or subspecies of herptiles on PALCO's HCP A list are described in detail below. Anticipated effects on the two remaining priority species of herptiles are described in general under Unique Habitat Associates, Riparian Associates, and Wetland Associates. The threshold of significance for priority species of herptiles (as identified in Section 3.10.2 under Thresholds of Significance and in Table 3.10-9) consisted of substantial loss or degradation of priority habitat, presumed to result in a substantial decline in species populations. Parameters used to measure thresholds of significance for these species are summarized by species below and/or in Table 3.10-9. These parameters were based on FWS (1997a) and other review and analysis of available literature and data identifying species-specific habitat requirements (as summarized in Section 3.7, 3.10.1.3, and/or below). To evaluate the impacts of the alternatives on these species, the anticipated outcomes of the Aquatic Conservation Strategy were compared with the best available information on the biological requirements of these species (see Section 3.7.3 and Table 3.7-10). Mitigation for amphibian and reptile species is summarized at the end of this subsection and in Appendix Table M-2.

Southern Torrent Salamander and Tailed Frog

As described in Section 3.10.1.3, both the southern torrent salamander and the tailed frog are primarily stream-dwelling species that require permanent, cool, rocky streams and/or seeps for reproduction. Although both of these species persist in managed landscapes, these conditions are typically associated with LSH forest along high-gradient portions of Class II streams. Woody debris in the aquatic and terrestrial riparian environments and clean gravel and cobble are also required by these species for reproduction or cover. Consequently, both species may be adversely affected by removal and degradation of riparian LSH and sediment influx, which alter stream/seep temperatures, reduce the availability of LWD, and/or reduce interstitial spaces on the stream bottom. Protection of cool, forested stream habitats used by these species is assumed to be dictated primarily by the width, age, and integrity (e.g., tree canopy closure) of the forest along streams, as described in Section 3.7. In particular, these species generally require canopy closure of about 80 to 85 percent to protect cool stream temperatures. Thus, potential effects of the alternatives on these two species in the Project Area were evaluated based on the

following criteria in and near RMZs of Class II streams: (1) shade conditions (e.g., stream temperature) primarily in the aquatic habitat based on RMZ width and canopy closure (see Section 3.7.4.3); (2) availability of LWD; (3) levels of sediment influx to high-gradient streams; and (4) the potential for human-related activities (e.g., timber-management activities) that could directly harm individuals.

The threshold of significance for the southern torrent salamander and the tailed frog (as identified above and in Table 3.10-9) consisted of substantial loss or degradation of priority habitat (Class II streams in LSH) presumed to result in a substantial decline in population numbers. Habitat parameters for assessing thresholds of significance were evaluated based on FWS (1997) and other review and analysis of literature and data assessing whether the alternatives would meet biological requirements of these species relative to the anticipated outcomes of the Aquatic Conservation Strategy (see Section 3.7.2 and Table 3.7-2).

Overall, based on anticipated effects on required habitat components as described in Sections 3.7.4.3 and 3.10.2.1, the effects of all the alternatives would be expected to be minimized and mitigated and less than significant for the southern torrent salamander and tailed frog (Table 3.10-9). Although individuals may be directly or indirectly harmed incidentally in RMZs on Class II streams during various activities (e.g., timber management, instream habitat- restoration activities, and/or permitted scientific collection) or due to potential effects on habitat, RMZs under all the alternatives and other mitigation (e.g., mitigation/monitoring for amphibians under the HCP—see Mitigation below) would be expected to provide habitat adequate to sustain these species as described below.

RMZs would be expected to provide adequate shade/canopy density required to protect cool water temperatures and LWD required by these species, although the lower buffer widths proposed under Alternative 1 would slightly decrease the potential for LWD recruitment from what is recommended for a properly functioning aquatic ecosystem (see Section 2.7.4.3). However, less-than-significant effects on stream temperature may occur in localized areas where such conditions are not currently met. Significant sediment influxes would not be expected to occur in high-gradient Class II streams providing potential habitat for these species under any of the alternatives, because such high-energy streams do not tend to accumulate fine sediment and because sediment discharge would be reduced due to road armoring and mass-wasting mitigations (see Sections 3.4.2 and 3.7.4.3). Grazing proposed to continue at current, relatively low levels on PALCO lands under all the alternatives may result in localized negative direct or indirect impacts on these species, primarily by degrading water quality, increasing erosion into streams, removing vegetative cover in the understory in relatively small localized areas, and directly crushing individuals (see Sections 3.4, 3.6.1, and 3.7.2 for discussion of effects of grazing, particularly on riparian and wetland habitats). However, effects of grazing would not be expected to be significant based on the species' primary dependence on the aquatic environment, the relatively low levels of grazing anticipated, and associated monitoring of potential effects from grazing (see Sections 3.4, 3.6.1, and 3.7.4 for discussion of effects of grazing on riparian and wetland habitats). Timber harvest or enhancement activities and stream-restoration projects may harm individuals near and/or within the stream channel through use of heavy equipment. However, associated impacts of these activities and of scientific collection of individuals would be

minimal due to the anticipated infrequency, localized impacts, and/or mitigation proposed for such activities (see Section 3.8).

None of the effects anticipated under any of the alternatives would be expected to threaten the continued existence of populations of the southern torrent salamander or tailed frog. Under all alternatives, the acreage and level of protection (in terms of size of no-harvest buffers and/or silvicultural prescriptions) of priority habitat (LSH in Class II RMZs) potentially used by these two species would be expected to increase and improve compared to current conditions, with the greatest protection provided under Alternative 1 (assuming wide buffer widths), followed in descending order by Alternatives 3, 4, then 2 (see Section 3.7, Table 3.7-8, and Table 3.10-9).

Foothill Yellow-Legged Frog

As mentioned in Section 3.10.1.3, the foothill yellow-legged frog requires shallow, slow-moving, small- to moderate-sized Class I or II rocky streams and vegetated areas within approximately 15 feet of streams for reproduction and foraging, particularly near gravel bars. LWD along lentic river margins is also required by this species for providing cover. Consequently, with respect to the alternatives, foothill yellow-legged frogs may be adversely affected primarily by heavy sediment influx in streams, disturbance of riverbanks and gravel bars associated with timber-management activities, grazing, gravel mining, and/or increased peak flows that may scour eggs from rocks in stream channels. Effects of the alternatives on this species were therefore based primarily on the following parameters for Class I and II streams: (1) level of protection of RMZs; (2) anticipated levels of stream sedimentation; (3) potential for increased peak flows during the spring breeding season; (4) availability of LWD; and (5) potential for human-related activities (e.g., timber-management activities, gravel mining) that could directly harm individuals.

The threshold of significance for the foothill yellow-legged frog (as identified in Section 3.10.2 and Table 3.10-9) consisted of substantial loss or degradation of priority habitat (Class I and II streams) presumed to result in a substantial decline in population numbers. Habitat parameters for assessing thresholds of significance were evaluated based on FWS (1997a) and other review and analysis of literature and data assessing whether the alternatives would meet the habitat requirements of this species as provided by a properly functioning riparian ecosystem (see Section 3.7.2 and Table 3.7-2).

Overall, based on anticipated effects on required habitat components as described in Sections 3.7.4.3 and 3.10.2.1, effects of each alternative would be minimized and mitigated and less than significant for the foothill yellow-legged frog (Table 3.10-9). Although individuals may be directly or indirectly harmed incidentally in RMZs on Class I and II streams during various activities (e.g., timber management , instream habitat-restoration activities, gravel mining, and/or permitted scientific collection) or due to potential effects on habitat, RMZs under all the alternatives in combination with mitigation/monitoring for amphibians or other mitigation would be expected to provide habitat adequate to sustain this species, as described below.

With respect to potential effects on habitat, moderate-to-high risk of localized fine sediment delivery to rivers from road sediment under Alternative 1 and low risk of such effects under Alternatives 2, 2a, 3, and 4 may degrade potential breeding habitat, resulting in less-than- significant, indirect effects on yellow-legged frogs. RMZs proposed under all the alternatives, including the lower range of buffer widths under Alternative 1, would likely provide

adequate protection of stream temperatures used by this species in the Project Area, particularly since this species inhabits warmer streams than do the other amphibian priority species. It is possible that the proposed alternatives could locally decrease the suitability of some streams by reducing water temperature below optimal levels for the foothill yellow-legged frog through the development of RMZ habitat. However, this effect would be expected to be less than significant. In addition, grazing proposed to continue to occur at current levels in localized areas on PALCO lands under all the alternatives may result in localized, negative direct or indirect impacts on this species, primarily through destruction of streambank vegetation used for foraging and cover. However, effects of grazing would be expected to be less than significant based on the species' primary dependence on the aquatic environment and the relatively low levels of grazing anticipated (see Sections 3.4, 3.6.1, and 3.7.4 for discussion of effects of grazing on riparian and wetland habitats).

With respect to potential direct impacts to individuals, timber harvest or enhancement activities and stream-restoration projects may harm individuals near and/or within the stream channel through use of heavy equipment. However, associated impacts of these activities and of scientific collection of individuals would be minimal due to the anticipated infrequency, localized impacts, and/or mitigation proposed for such activities (see Section 3.8). Gravel- mining activities proposed to continue on PALCO lands under all the alternatives may also potentially directly or indirectly harm individuals. Potential effects would be substantially lessened by continued exclusion of gravel mining from wetted channels or WLPZs (see Section 3.6).

Based on the above, all anticipated effects under the alternatives would be expected to be minimized and mitigated and less than significant, and they would not be expected to threaten the continued existence of populations of the foothill yellow-legged frog in the Project Area. Mitigation for this species under the HCP/SYP is summarized later in this subsection, in Appendix Table M-2, and in Sections 3.7 and 3.8 (the latter with respect to anticipated increased peak flows, localized fine sediment delivery, and stream restoration). Under all alternatives, the acreage and level of protection (in terms of size of no-harvest buffers and/or silvicultural prescriptions) of priority Class I and II stream habitat potentially used by this species would be expected to increase and improve compared to current conditions, with the greatest protection provided under Alternative 1 (assuming the widest buffers), followed in descending order by Alternatives 3, 4, then 2 (see Section 3.7 and Table 3.7-8).

Northwestern Pond Turtle

As described in Section 3.10.1.3, the northwestern pond turtle requires still and slow-moving water bodies (e.g., ponds, marshes, sloughs, and sluggish creeks and rivers) with suitable basking sites (e.g., submerged logs, rocks, or exposed mud banks) for resting and terrestrial woody debris for cover. Open habitats usually within approximately 600 feet (but up to about 1,600 feet) of water are required for nesting and often estivation. Potential adverse effects on this subspecies with respect to the alternatives include degradation of wetlands and slow-moving streams (e.g., heavy sedimentation, modification of nearshore vegetation); lack of basking sites (e.g., LWD); direct incidental harm to individuals (particularly destruction of nest sites) through trampling by livestock grazing, road construction, and timber management activities in or near open areas near suitable water bodies; and human disturbance. Thus, effects of the alternatives on the northwestern pond turtle were evaluated primarily based on (1) the level of protection of wetlands and

Class I streams; (2) the level of protection of terrestrial habitats within 1,600 feet of waterbodies; (3) the availability of LWD; and (4) the potential for human-related activities (e.g., timber-management activities) that could directly harm individuals.

The threshold of significance for the northwestern pond turtle (as identified in Section 3.10.2 and Table 3.10-9) consisted of substantial loss or degradation of priority habitat (Class I wetlands and streams) presumed to result in a substantial decline in population numbers. Habitat parameters for assessing thresholds of significance were evaluated based on FWS (1997) and other review and analysis of literature and data assessing whether the alternatives would meet the habitat requirements of this species as provided by a properly functioning riparian ecosystem (see Section 3.7.2 and Table 3.7-2).

Overall, based on anticipated effects on required habitat components, as described in Sections 3.7.4.3 and 3.10.2.1, the effects of all the alternatives would be expected to be minimized and mitigated and less than significant for the northwestern pond turtle (Table 3.10-9). Although activities (e.g., timber harvest, instream habitat restoration, scientific collection, gravel mining) within or near RMZs on Class I streams or wetlands may incidentally harm individuals or degrade some terrestrial habitat used by this species, RMZs on Class I streams and wetlands under all the alternatives, in combination with mitigation/monitoring for amphibians/reptiles and other mitigation, would be expected to provide habitat (e.g., water temperatures, LWD) adequate to sustain this species. Moreover, in general, potential impacts of these activities would be minimal due to the anticipated infrequency, localized impacts, and/or mitigation proposed for such activities (see Section 3.8). However, timber-management activities occurring outside of RMZs but within 1,600 feet of wetland and riparian water bodies under all the alternatives could disturb terrestrial habitats potentially used by turtles for nesting or hibernating and incidentally harm individuals, particularly road construction. Grazing livestock may also crush nest burrows or individuals in open habitat, although such effects would be minimal and localized based on the relatively low levels of grazing anticipated in these areas (see Section 3.4). Potential effects from gravel mining would be minimized by continued exclusion of gravel mining from wetted channels or WLPZs (see Section 3.6).

Based on the above, all of the effects anticipated under the alternatives would be expected to be minimized, mitigated and less than significant, and they would not be expected to threaten the continued existence of populations of the northwestern pond turtle. Under all alternatives, the acreage and level of protection of riparian habitats (in terms of size of no-harvest buffers and/or silvicultural prescriptions) potentially used by this species would improve compared to current conditions, with the greatest level of protection provided under Alternative 1, followed in descending order by Alternatives 3, 4, then 2 (see Section 3.7).

Mitigation for Amphibians and Reptiles

APPLICANT-PROPOSED MITIGATION

The above analysis of effects of the alternatives on the southern torrent salamander, tailed frog, foothill yellow-legged frog, and northwestern pond turtle were considered in the context of Applicant-proposed mitigation under Alternatives 2, 2a, and 4, which incorporate the proposed HCP/SYP. Mitigation proposed in the HCP Alternatives is summarized below, in Appendix Table M-2, and/or in Sections 3.6, 3.7, and 3.8. Proposed mitigation measures are as follows:

- Implement the HCP Aquatic Strategy measures. Specifically with respect to reptiles and amphibians, develop and implement a monitoring program with FWS and CDFG to determine if Class II protection is adequate to protect amphibians. Information from this monitoring may warrant different (increased or decreased) protection of Class II streams on a localized scale (e.g., WAAs).
- Mitigate to minimize and control fine sediment delivery to Class I and II streams (see Section 3.6 for specific mitigation measures). This mitigation would be expected to minimize associated potential effects on the foothill yellow-legged frog, southern torrent salamander, and tailed frog.
- Implement mitigation for gravel mining (see Section 3.4).
- Monitor effects of grazing and implement mitigation as needed (see Section 3.4).

LEVEL OF SIGNIFICANCE REMAINING AFTER APPLICANT-PROPOSED MITIGATION

As summarized above, implementation of Applicant-proposed mitigation would be expected to minimize and mitigate effects of Alternatives 2, 2a, and 4 on the southern torrent salamander, tailed frog, foothill yellow-legged frog, and northwestern pond turtle to a level that is less than significant. Thus, no additional mitigation is required for these species for either the proposed HCP (Alternative 2 or 2a) or the other alternatives.

BIRDS

Marbled Murrelet

As described in Section 3.10.1.3, the marbled murrelet requires suitable nesting platforms for reproduction, and with respect to actions associated with the alternatives, is threatened primarily by removal and fragmentation (and associated edge effects) of suitable nesting habitat. Consequently, two primary criteria were used to evaluate the significance of potential effects of the alternatives on the marbled murrelet: (1) the occurrence of marbled murrelets in the Project Area; and (2) changes in the quantity, quality, and distribution of suitable nesting habitat (uncut and residual old-growth redwood) and DCH. Effects were evaluated at the local (Project Area) and regional (the bioregion, Zone 4, and "three-state" [California, Oregon, and Washington]) population levels, and were considered in the context of Applicant-proposed mitigation summarized at the end of this subsection and/or Appendix Table M-2.

The threshold of significance used to identify significant effects on the marbled murrelet was whether or not an alternative would cause a substantial loss or degradation of suitable or possibly suitable habitat (uncut and residual old-growth redwood) that would be expected to result in a substantial decline in population or restricted species range.

Overall, Alternative 1 would be expected to result in negative direct and indirect effects on marbled murrelets. Although harvest and fragmentation of currently unoccupied uncut and residual old-growth habitat may preclude potential nesting in the future, no take of murrelets is likely under this alternative (Table 3.10-9). Alternatives 2 and 4 would be expected to result in short-term direct and indirect effects on murrelets; however, in the long term, these effects would be minimized and mitigated. Short-term effects under Alternatives 2, 2a, and 4 may occur due to permitted incidental take through harvest and fragmentation of some lower-quality, old-growth, and residual habitat. The result would be a loss of habitat and presumably, a loss in population numbers. The level of such take is anticipated to be greater under Alternatives 2 and 2a than Alternative 4,

because Alternative 4 has a larger percentage of suitable and possibly suitable habitat permanently protected inside reserves. In contrast, Alternative 3 would have no effect on or may benefit murrelets because all uncut and residual old growth (including all suitable and possibly suitable habitat) would be protected, property-wide selective harvest would buffer these stands, and no take of murrelets would occur.

Although most of the habitat within the boundary of DCH in the Project Area is currently unsuitable for marbled murrelet nesting (see Section 3.10.1.3, Marbled Murrelet), some suitable or possibly suitable habitat known to be or possibly occupied by murrelets would be harvested under the alternatives (Table 3.10-6). With respect to DCH, between approximately 1,888 and 2,442 acres of uncut and residual old-growth redwood inside the boundaries of the CHU would be harvested under Alternative 2, depending on whether Owl Creek or Grizzly Creek MMCAs are harvested, respectively (Appendix N, Part 1). No DCH would be harvested under Alternative 4. No harvest of uncut or residual old-growth redwood would be expected under Alternative 3. As described in Section 3.10.1.3, DCH is considered essential by the FWS (1997b) to current and future recovery of marbled murrelet populations, and loss of such habitat could limit the recovery of these populations. Such habitat is considered critical because it encompasses a significant, relatively isolated portion of the species' nesting habitat, and federal or other protected (e.g., parks) lands in the southern portion of Zone 4 alone are probably inadequate to guarantee long-term survival of murrelets in this Zone (FWS, 1996, 1997b) (also see Section 3.10.3, Cumulative Effects—Marbled Murrelet). However, the MMRT also recognized that implementation of adequately designed HCPs will be very important in the conservation of murrelets, particularly in areas with little federal ownership such as the project vicinity within Zone 4. Notably, FWS has determined that lands covered by approved HCPs would not require additional protection (e.g., designation as critical habitat). Thus, under Alternative 2, following issuance of the ITP, all DCH on PALCO lands would will be excluded from critical habitat while the permit is active (FWS, 1997).

Evaluation of anticipated effects of each alternative on the marbled murrelet was based primarily on projected changes in the acreage and distribution of habitat and the associated level of anticipated take, as described in further detail in the following subsections. Effects on all LSH in the Project Area were discussed under Priority Habitats. Notably, as stated above, no new old-growth forest would be expected to develop under any of the alternatives by the end of the ITP (i.e., the long term); however, old-growth forest characteristics that contribute to suitable habitat for the marbled murrelet (e.g., large platforms, moss pads, trees taller than 150 feet) would likely develop in the extended long term in the proposed Headwaters or 63,000-acre Reserve (see Section 3.9.2; see Priority Habitats in Section 3.10.2.1).

ALTERNATIVE 1 (NO PROJECT/NO ACTION)

Overall, Alternative 1 would be expected to result in some negative direct and indirect effects on the marbled murrelet. These effects would be expected to be minimized, and effects would be mitigated by take avoidance guidelines. Under Alternative 1, all suitable marbled murrelet habitat on private lands must be surveyed prior to any timber-management activities. Any suitable habitat that is occupied is fully protected by both state and federal laws. However, habitat that has been determined to be unoccupied may be harvested even where it has been designated as critical habitat. Such habitat removal would affect both the high-quality redwood old-growth

habitat and redwood residual habitat. Removal of currently unoccupied habitat would eliminate the potential use of this habitat by nesting murrelets and would also eliminate opportunities for aggregation of habitat into larger patches in the future. In combination, these actions would be expected to further degrade the potential of Zone 4 to support the recovery of this species in the long term.

Notably, while "no take" management under Alternative 1 provides some protection for marbled murrelet occupied habitat, the MMRT (FWS, 1997) indicated that such protection may not be adequate to protect and would not enhance habitat on non-federal lands in the long term. This is because the anticipated continued decline in populations over at least the next 50 years would eventually be expected to result in unoccupied habitat that might thus be subject to legal harvest without being considered take (FWS, 1997). Of a total of approximately 17,500 acres of uncut and residual old-growth redwood on PALCO lands, 55 percent has been surveyed and presumed occupied. Some portion of the remaining 45 percent (7,800 acres) has not been surveyed to protocol (Appendix N). If unoccupied, such habitat may be subject to legal harvest without being considered take. In addition, although currently known occupied murrelet habitat is considered occupied for an undetermined length of time, it is possible that a protocol may be developed by the agencies in the future that allows harvest (without take) of such habitat if it is determined to be unoccupied. Thus, although no take of murrelets is permitted under Alternative 1, the fate of what is currently considered suitable or possibly suitable habitat for this analysis cannot be determined with certainty for the short and long term under Alternative 1, and this habitat is at risk of timber harvest.

Alternatives 2 (Proposed Action/Proposed Project) and 2a (No Elk River Property)

Under Alternatives 2 and 2a, short-term effects on the marbled murrelet may be significant; however, in the long term these effects would be minimized and mitigated and less than significant. Short-term effects may occur due to the incidental take and loss of some lower-quality suitable nesting habitat, which may result in reduction of reproductive success. However, by the end of the HCP planning period, the anticipated increases in murrelet nesting associated with the improvement of habitat due to the mitigation provided by the proposed HCP (see the end of this subsection and/or Appendix Table M-2), particularly the establishment of the MMCAs and buffers around the parks, would be expected to offset any short-term net decline in population numbers. In addition, creation of the MMCAs ensures opportunities for other management options in these areas in the future. In contrast to Alternative 1, where lack of MMCAs allows a continual encroachment on, and degradation of, the existing unoccupied nesting habitat, the quality of the nesting habitat within the MMCAs proposed under this alternative would be expected to substantially improve over time due to the continued development and recruitment of interstitial second-growth forest within the MMCAs.

Although establishment of the Headwaters Reserve would be permanent, the fate of the MMCAs and park buffers would be uncertain after the ITP expires in 50 years. However, the amount of projected habitat recovery on federal lands in the period of 50 to 100 years is anticipated to be sufficient to possibly support a viable population of marbled murrelets for most zones in the three-state area after expiration of the ITP (FWS, 1997). Thus, in conjunction with the permanent establishment of the Headwaters Reserve, the need for the MMCAs and park buffers on PALCO

property to support a viable population of murrelets in Zone 4 may decrease by the end of the HCP planning period.

Under Alternatives 2 and 2a, in order to minimize and mitigate for incidental take of murrelets for the 50-year life of the ITP, the HCP delineates a series of MMCAs (totaling 8,511 acres) where PALCO has the option of cutting either the Grizzly Creek or Owl Creek MMCA. In addition, the HCP establishes 300-foot late-seral forest buffers on PALCO lands adjacent to suitable nesting habitat in public preserves which cover 447 acres (Appendix N, Part 1), and the HCP establishes limited take measures elsewhere on PALCO land. (See Mitigation for the Marbled Murrelet and Appendix Table M-2 for further description of mitigation measures.) Thus, most (at least 4,322 acres or 84 percent with the Grizzly Creek MMCA option preserved) of the uncut old-growth redwood comprising suitable habitat in the Project Area would be protected from harvest within the MMCAs and Headwaters Reserve (Appendix N, Part 1). As described in Section 2, the general strategy for the MMCAs is to focus on conservation of the larger uncut or relatively contiguous uncut/residual, redwood-dominated old-growth stands of known, occupied marbled murrelet habitat (see Table 3.9-2 for a description of the seral and tree species composition by acreage of MMCAs). In addition, uncut and residual old-growth habitat is buffered by second-growth forest within MMCAs to improve and/or increase connectivity and interior forest conditions through development of surrounding younger forest. As discussed in Section 2, the HCP has the option of protecting one of two suitable occupied stands (the Owl Creek or Grizzly Creek stands) from harvest within a MMCA. The Owl Creek stand totals 925 acres, including 317 acres of uncut old-growth redwood and 239 acres of residual redwood old growth (Table 3.10-5 and Figure 3.9-2). In comparison, the Grizzly Creek stand totals 1,057 acres, including 117 acres of uncut old-growth redwood and 530 acres of residual old growth (Table 3.10-5). The proposed Grizzly Creek MMCA surrounds approximately 387 acres of uncut and residual old-growth redwood currently protected inside Grizzly Creek State Park (Thomas Reid Associates, 1998). The Grizzly Creek stand is relatively isolated from proposed MMCAs compared to the Owl Creek stand, but the Grizzly Creek stand is closer to murrelet habitat in parks, and may be important as a linkage between MMCAs and murrelet habitat in Humboldt Redwood State Park and other parks (Figures 3.9-2 and 3.10-5) (also see Section 3.10.1.2, Habitat Fragmentation and Connectivity).

With respect to suitable and possibly suitable habitat, under Alternatives 2 and 2a, between 7,822 acres (preserve Owl Creek MMCA) and 8,469 acres (preserve both Owl Creek and Grizzly Creek MMCAs) of such habitat in the Project Area would be protected from harvest through the 50-year HCP/ITP period within MMCAs and no-harvest buffers adjacent to public preserves, or through the extended long term within the proposed Headwaters Reserve, as described above (Table 3.10-5 and Figure 3.9-2). However, incidental take of murrelets would be permitted primarily in the short term through harvest of the remaining 9,765 acres (retain Owl Creek option) or 9,674 acres (retain Grizzly Creek option) of possibly suitable habitat generally considered to be of lower quality than the protected habitat (Appendix N). Approximately six percent (619 acres) of the suitable or possibly suitable murrelet habitat that would be subject to take when retaining the Owl Creek MMCA consists of uncut old-growth redwood, and the remaining 94 percent (9,146 acres) consists of lower-quality residual old-growth redwood stands. These stands are believed to be of lower quality for nesting by

murrelets than the suitable habitat proposed for MMCAs or the Headwaters Reserve because they (1) are relatively small in patch size (usually less than 80 acres), and thus contain relatively little interior forest; (2) are relatively isolated, generally located on the periphery of the presumably higher-quality stands proposed for MMCAs; (3) consist primarily of residual (94 percent, most of which is low density or younger forest), with little or no (total of 619 acres) uncut old-growth forest; and/or (4) are generally located farther from marine waters (Table 3.10-5 and Figures 3.9-2 and 3.10-5).

As a result of harvest described above, fragmentation of uncut and residual old growth (including suitable and possibly suitable murrelet habitat) negatively affecting marbled murrelets would increase under Alternative 2 compared to existing conditions, and would be greater under this alternative than under Alternatives 1, 3, and 4. Under Alternative 2, approximately 10,183 acres (56 percent) of all uncut and residual old growth in patches greater than or equal to 80 acres in area and less than one mile apart (Table 3.10-10) is projected to be lost in the long term. However, in the long term, contiguity of forest surrounding suitable marbled murrelet stands within MMCAs, within buffers around public preserves, and within the proposed Headwaters Reserve would be expected to improve due to the protection and development of late-seral forest in and around these preserves in exchange for elimination of lower-quality, outlying stands (Figure 3.10-5 and Table 3.10-10). In particular, in the extended long term, the entire Headwaters Reserve (7,500 acres under Alternative 2, and approximately 5,700 acres under Alternative 2a) would potentially consist of old-growth habitat that may be suitable for murrelet nesting (Figure 3.9-2).

Take described above for Alternative 2 may be significant in the short term because it would result in a loss of suitable habitat and presumably a loss of individuals. However, these short-term effects would be minimized, mitigated, and less than significant within the HCP planning period due to development of late-seral, second-growth forest within MMCAs and buffers. This would significantly improve current nesting conditions, particularly in the understory of lower-quality residual habitat. Notably, the certainty of protection of these MMCAs plus the improvement in the amount and quality of their habitat contrasts with the uncertainty associated with Alternative 1. As discussed under Alternative 1, harvest of unoccupied habitat, reduction of habitat quality by harvest in areas surrounding quality habitat, and the possibility that a protocol would be established to allow harvest of previously occupied but abandoned habitat, all indicate a continued reduction in the amount and quality of marbled murrelet habitat, even under no-take scenarios.

It is estimated that from 17 to 23 percent of the occupied habitat in the bioregion would be lost under the proposed HCP, although most of this occupied habitat appears to be of lower value for nesting murrelets than that occurring within the MMCAs and proposed Headwaters Reserve, based on survey results (Ralph and Miller, 1997; Appendix N, Part 2). Assuming a one-to-one relationship between habitat loss and the at-sea population estimate of murrelets for the Bioregion (1,479 birds; see Section 3.10.1.3, Marbled Murrelet), this impact would result in a loss of breeding habitat for 251 to 340 murrelets (17 to 23 percent of the bioregion population). This impact translates to a loss of 3.1 to 6.1 percent of the Zone 4 population, and 0.8 to 2.0 percent of the population in the three-state region. See Appendix N, Part 2 for a more detailed background discussion of habitat

loss, take, and impacts to murrelets under Alternative 2.

Consistency with the Murrelet Recovery Plan

The proposed HCP and other mitigation proposed under Alternative 2 (see Mitigation below) generally appear consistent with the goals of the final recovery plan for the marbled murrelet (FWS, 1997b), particularly with respect to Zone 4, and provide greater assurance of protection of the species than the No Action Alternative (Alternative 1). Murrelet recovery plan goals include preventing the loss of occupied nesting habitat, minimizing the loss of unoccupied but suitable habitat, decreasing the time for development of new suitable habitat, maintaining large blocks of suitable habitat, maintaining and enhancing buffer habitat, and minimizing disturbance and reducing predation at nest sites. In comparison, the overall anticipated effects on the marbled murrelet of implementation of the PALCO HCP and establishment of the Headwaters Reserve include (1) protection in perpetuity of the largest contiguous stand of suitable murrelet habitat on the PALCO ownership (the proposed Headwaters Reserve), (2) aggregation and protection of the majority of "high-quality" habitat on the PALCO ownership (e.g., suitable and possibly suitable uncut old growth) and residual habitat contiguous with that old growth, (3) recruitment of improved habitat within suitable residual redwood stands associated with old-growth stands, (4) minimization of disturbance of nesting birds, and thus (5) enhancement of the probability of survival of the murrelet for the next 50 years. The next 50 to 100 years is currently considered by the MMRT (FWS, 1997b) to be the most critical period with respect to potential recovery of murrelets, as most development of additional potentially suitable nesting habitat on federal lands is not expected to occur until after the next 50 years.

The MMRT (FWS, 1997b) emphasized the importance of developing HCPs and land exchanges in areas where protection of federal lands alone may be inadequate to conserve the murrelet, such as in the project vicinity. The MMRT recognized that HCPs probably offer the best method for conserving murrelets on non-federal lands as long as appropriate measures are implemented to minimize and mitigate incidental take in the short term while maintaining or creating habitat for the long term. Compared to the No Action Alternative (Alternative 1), the HCP would be expected to provide greater assurance of protection and development of large aggregated stands of suitable marbled murrelet habitat at least over the life of the HCP and particularly through the long term within the Headwaters Reserve. Under Alternative 1, there is considerable uncertainty regarding the level of protection that currently suitable murrelet habitat would receive. In particular, there is no guarantee against degrading suitable habitat or of protecting suitable murrelet habitat if such habitat is determined to be unoccupied in the future, as opposed to the longer-term protection provided in the MMCAs, buffers, and proposed Headwaters Reserve under Alternatives 2 and 2a.

ALTERNATIVE 3 (PROPERTY-WIDE SELECTIVE HARVEST)

Alternative 3 would be expected to result in no direct or indirect effects, and a beneficial effect, on marbled murrelet populations in the short and long term through the following: (1) the complete protection of all uncut and residual old growth (including suitable and possibly suitable nesting habitat), (2) the establishment of no-harvest buffers around suitable nesting habitat, (3) the avoidance of incidental take of marbled murrelets, (4) property-wide selective harvest that would improve LSH connectivity on PALCO lands, and (5) increased nesting habitat over the extended

long term through the permanent establishment of the Headwaters Reserve.

Under Alternative 3, all 17,618 acres of suitable and possibly suitable murrelet habitat would be protected from harvest; thus, no take of murrelets would occur (Table 3.9-1). Marbled murrelets would be expected to indirectly benefit from the 600-foot buffers provided around all uncut and residual old growth (including suitable habitat) under this alternative (Figure 3.9-2). These buffers and property-wide selective harvest in other areas would be expected to benefit murrelets through the long term by further insulating murrelet nest sites in these stands from potential predation, connecting many of the suitable patches, and increasing the longevity of the stands by decreasing potential impacts of windthrow. In addition, in the extended long term, old-growth characteristics would develop within the proposed Headwaters Reserve, resulting in an increase in habitat that may be suitable for future nesting by murrelets. However, selectively harvested areas would not be likely to provide potential nesting habitat for murrelets.

Alternative 4 (63,000-acre No-harvest Public Reserve)

Similar to Alternative 2, under Alternative 4 short-term effects may be significant; however, in the long term these effects would be minimized, mitigated, and less than significant. However, the short-term effects would be less than under Alternative 2 due to the immediate protection of additional suitable and possibly suitable nesting habitat through the establishment of a larger reserve area (63,673 acres) than the proposed Headwaters Reserve. As in Alternative 2, these short-term effects would be expected to be fully mitigated to a less-than-significant level by the long term. The short-term direct and indirect effects would occur due to the incidental take and loss of some lower-quality suitable nesting habitat (i.e., residual old-growth redwood forest), which is expected to result in a decline in population numbers. However, by the long term, anticipated increases in murrelet nesting associated with the development of habitat due to the mitigation presented in the HCP (see the end of this subsection and Appendix Table M-2), including the establishment of the permanent 63,000-acre Reserve, would be expected to at least partially offset any short-term decline in population numbers. Additionally, the amount of projected habitat recovery on federal lands is anticipated to eventually provide enough habitat in the next 50 to 100 years to possibly support a viable population of marbled murrelets for most zones in the three-state area (FWS, 1997b), regardless of the mitigation proposed in the SYP/HCP. Short-term effects would be less under Alternative 4 (6,880 acres, or 39 percent, of all suitable and possibly suitable habitat when retaining Owl Creek) than under Alternative 2 (a total of 9,765 acres, or 55 percent, of all suitable and possibly suitable habitat when retaining Owl Creek), because less-suitable habitat would be harvested under Alternative 4 due to protection of some of this habitat in the 63,000-acre Reserve (Appendix N, Part 1 and Figure 3.10-5). Similarly, although most uncut and residual old growth on PALCO lands would be harvested in the short term under Alternative 4, potentially precluding some future nesting opportunities for marbled murrelets, this harvest would be less under Alternative 4 than under Alternative 2 (Tables 3.9-2 and 3.10-6, and Figure 3.10-5).

As a result of the harvest described above, fragmentation of uncut and residual old growth (including suitable and possibly suitable murrelet habitat) negatively affecting marbled murrelets would be greater under Alternative 4 than under Alternatives 1 and 3, but less than under Alternative 2. Under Alternative 4, approximately 7,731 acres (43 percent) of

all uncut and residual old growth in patches greater than or equal to 80 acres in area and less than one mile apart (Table 3.10-10) are projected to be lost in the long term. However, in the long term, contiguity of forest surrounding suitable marbled murrelet stands within the proposed 63,000-acre Reserve would be expected to improve due to the protection and development of late-seral forest in and around these preserves in exchange for eliminations of lower-quality outlying stands (Figure 3.10-10 and Table 3.10-10). In particular, the 63,000-acre Reserve would encompass and thus buffer approximately 35 medium-to-large patches of suitable or possibly suitable marbled murrelet habitat through the extended long term, thereby benefiting the marbled murrelet and improving connectivity of suitable and possibly suitable murrelet habitat. Furthermore, in the extended long term, the entire 63,000-acre Reserve would potentially consist of old-growth habitat that may be suitable for murrelet nesting.

Take described above for Alternative 4 may be significant in the short term because it would result in a loss of suitable habitat and presumably a loss of individuals. However, these short-term effects would be minimized, mitigated, and less than significant by the long term due to development of late-seral, second-growth forest within the 63,000-acre Reserve, which would significantly improve current nesting conditions, particularly in the understory of lower-quality residual habitat. It is estimated that from 12 to 16 percent of the occupied habitat in the Bioregion would be lost under Alternative 4, although this occupied habitat appears to be of lower value for nesting murrelets than that occurring within the 63,000-acre Reserve (Appendix N, Part 1). Assuming a one-to-one relationship between habitat loss and the at-sea population estimate of murrelets for the bioregion (1,479 birds – see Section 3.10.1.3 – Marbled Murrelet), this impact would result in a loss of breeding habitat for 177 to 237 murrelets (12 to 16 percent of the bioregion population). This impact translates to a loss of 2.2 to 2.9 percent of the Zone 4 population and 0.6 to 0.8 percent of the population of the three-state region. See Appendix N, Part 2, for a more detailed background discussion of methods used to estimate habitat loss, take, and impacts to murrelets.

MITIGATION FOR THE MARBLED MURRELET

Applicant-Proposed Mitigation

The above analysis of effects of Alternatives 2, 2a, and 4 on the marbled murrelet was developed in the context of Applicant-proposed mitigation and minimization measures, as summarized below and presented in further detail in Appendix Table M-2:

- Establish MMCAs and vegetative buffers around the MMCAs and the state parks and associated reserves (Alternatives 2 and 2a)
- Establish no-harvest RMZs
- Other management restrictions, as described in Appendix Table M-2.

Level of Significance After Applicant-proposed Mitigation

As discussed above, short-term effects may be significant but in the long term would be minimized, mitigated, and less than significant. Thus, no agency-proposed mitigation beyond that proposed by the applicant is required.

Northern Spotted Owl

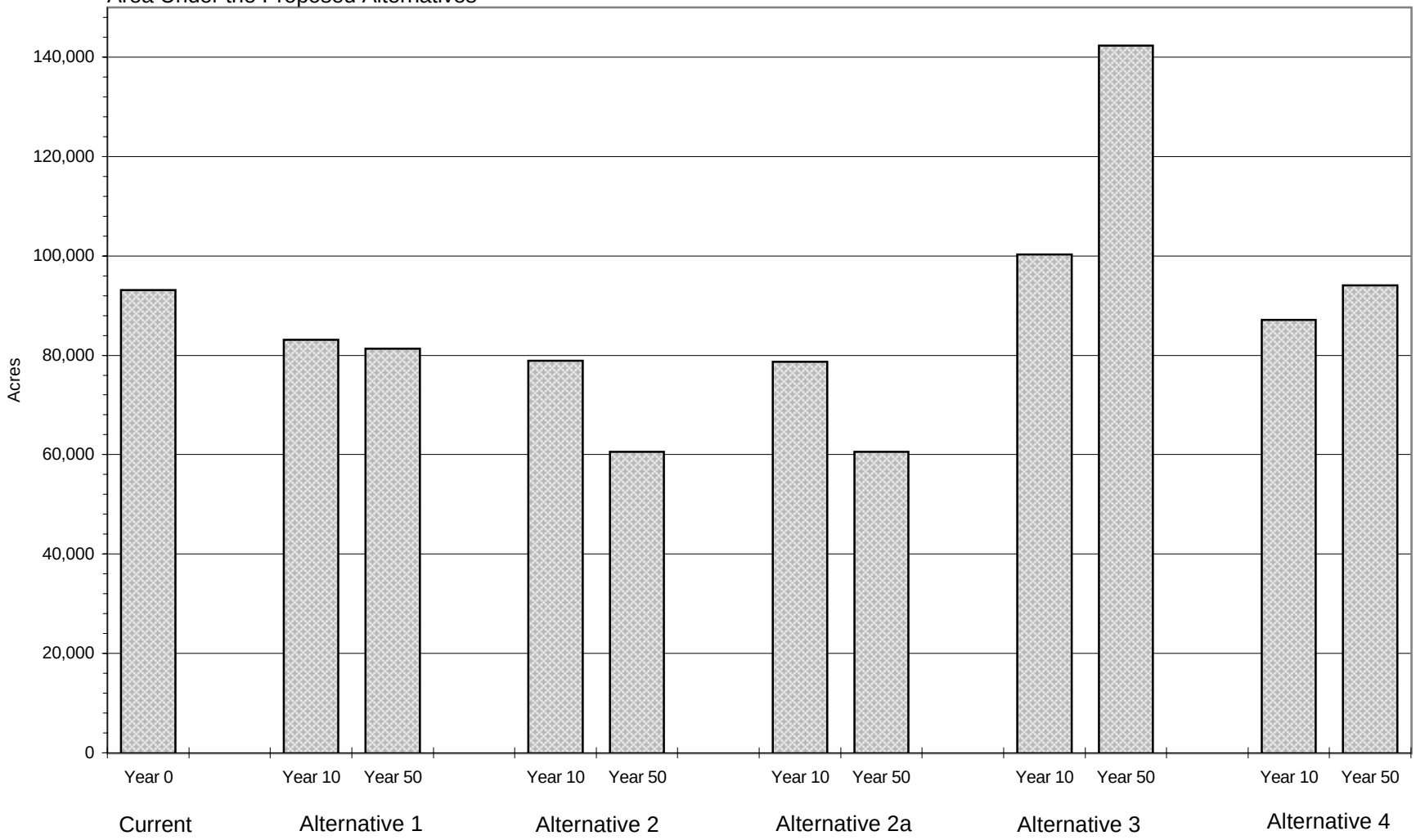
As described in Section 3.10.1.3, in northwestern California the northern spotted owl generally uses old-growth forest for nesting on federal lands. On managed lands, the species uses second-growth forest, often nesting in a residual component where available. Some specific patterns of distribution of forest across the

landscape are also needed for dispersal. Thus, effects of the alternatives on northern spotted owls in the vicinity of the Project Area and HCP Planning Area were evaluated, primarily based on (1) the level of protection of owl sites under proposed management (see Appendix Table M-2); and (2) the amount and distribution of suitable nesting, roosting, foraging, and dispersal habitat in the Project Area over time. The threshold of significance for this species was substantial loss or degradation of occupied suitable habitat within owl circles, assumed to result in a substantial decline in population. In this case, substantial declines were defined as falling below population viability goals set out in the draft recovery plan (USDI, 1992).

Overall, effects of all the proposed alternatives on northern spotted owls would be minimized and mitigated. No direct take of nesting spotted owls would occur under any of the alternatives. No take is authorized under Alternatives 1 and 3. Under Alternatives 2, 2a and 4, no take would occur because PALCO does not propose to take nesting owls under the guidelines of the HCP, which provide measures to avoid such take. However, negative effects would occur under Alternative 1 primarily due to net loss and fragmentation of unoccupied suitable nesting habitat. Less-than-significant effects under Alternative 3 would be associated primarily with potential disturbance of foraging birds, although the net acreage of suitable nesting habitat would increase through the long term under this alternative, potentially benefiting owls. However, under Alternatives 2, 2a, and 4, effects would occur due to harvest of suitable habitat within owl sites, allowing for a potential reduction of 33 percent of the baseline owl population in the Project Area. Impacts of taking under Alternatives 2, 2a, and 4 would be minimized, mitigated, and less than significant due to provision of nesting and foraging habitat for spotted owls throughout the Plan period, protection of all known nest sites for the first five years of the HCP, and reduction in the likelihood that nesting owls would be disturbed during timber harvest and other activities (see Mitigation below and Appendix Table M-2). None of the alternatives would be expected to threaten northern spotted owl populations at a local or regional level. As summarized in Section 3.10.1.3, local and regional populations of northern spotted owls in California are considered relatively stable and uniquely adaptable to managed landscapes.

With respect to future potential nesting opportunities for northern spotted owls, loss of suitable (high- and medium-quality) nesting habitat in the Project Area due to timber management is anticipated through the HCP planning period under Alternatives 2 and 2a, and in the short and mid term under Alternatives 1 and 4, which may preclude some portion of such opportunities (Figure 3.10-6). The greatest net decrease among the alternatives would occur under Alternative 2 in the long term. In contrast, an increase in such habitat anticipated in the short and long term under Alternative 3 and in the long term under Alternative 4, may provide more opportunities for nesting owls than current conditions (Figure 3.10-6). With respect to the availability of all potential habitat (nesting, roosting, foraging, and dispersal habitat), an extensive (greater than 80 percent of the landscape) and adequate amount and distribution of foraging and dispersal habitat would be maintained under all the alternatives. Notably, in the long and extended long term under Alternatives 2 to 4, the proposed Headwaters or 63,000-acre Reserve would provide a relatively large refuge for northern spotted owls in the otherwise managed landscape; in contrast, in the HCP Planning Area, owl sites would continue to be managed on a site-by-site basis, although MMCAs and other murrelet buffers under

Figure 3.10-6. Current and Projected Acreage of Suitable Nesting Habitat for the Northern Spotted Owl in the Project Area Under the Proposed Alternatives



Alternatives 2 and 2a would provide scattered refuges through the 50-year term of the HCP. A detailed description of the estimated quantity of take in terms of individual owl sites and anticipated changes in the acreage and distribution of potentially suitable owl habitat over time relative to impacts on local and regional owl populations is provided below for the proposed alternatives.

Nest Sites

Alternative 1 would not be expected to impact nest sites of the northern spotted owl in the Project Area because of continued implementation of FPRs, which prohibit take of northern spotted owls. Alternative 3 would also not be expected to impact nest sites because FPR guidelines to avoid disturbance of nesting birds would be followed.

In contrast, Alternatives 2, 2a, and 4 would result in permitted incidental take of spotted owls in the short and long term due to harvest of suitable habitat within owl sites outside of the proposed reserves during the non-nesting season, as described in the following paragraph. This habitat removal could result in indirect effects on owls through displacement of individuals and elimination of future nesting opportunities at these sites. However, direct effects to nesting owls would not be expected under these alternatives, because timber activities within 1,000 feet of active owl sites are required by CDFG to follow seasonal operation restrictions during the nesting season (see Appendix Table M-2 and Section 2.6.4 for further description of management and monitoring of owl sites under the HCP, FPRs, and alternatives).

Under Alternatives 2, 2a, and 4, the HCP (and PALCO's associated Northern Spotted Owl Conservation Plan) and various other measures would be implemented to minimize and mitigate impacts of permitted take of spotted owls as follows (also see Mitigation below and Appendix Table M-2). During the first five years of implementation of this Plan, 16 historically occupied (although recently inactive) northern spotted owl sites with low or no history of reproduction would be harvested. Because these sites are currently considered inactive, no direct harm to spotted owls would be expected. However, harvest of these sites would be considered "take" under FPR and FWS policies. In addition, 16 known sites historically or currently occupied by spotted owls would be protected for the life of the 50-year Plan in MMCAs established under Alternatives 2 and 2a. During the first five years of the Plan, intensive surveys would be undertaken to determine the baseline population of spotted owls on PALCO lands. Following determination of baseline population numbers during the first five years of the Plan, nesting pairs representing up to 33 percent of the baseline population of owls in the HCP Planning Area would be allowed to be taken through displacement by timber harvest. As a result, the spotted owl population would be expected to decline and fluctuate in approximate proportion to available habitat (see Habitat subsection below). However, throughout the Plan period, spotted owl population numbers would be tracked by repeated censusing. Should the owl population in the HCP Planning Area fall below 67 percent of the baseline level for three consecutive years, no further take would be permitted to occur until causes of the decline are assessed and the ITP amended.

Notably, it is estimated that approximately 70 additional northern spotted owl activity centers are located within 1 mile of the PALCO ownership (Personal communication, Gould, CDFG, in PALCO, 1998). It is possible that, through modification of spotted owl habitat near PALCO ownership boundaries, some of these activity centers could be "taken"

during the life of PALCO's ITP. However, the same take minimization measures that would be applied to owl sites on PALCO lands would be used to minimize take of those known owl sites adjacent to PALCO property boundaries (PALCO, 1998). Thus, take of such adjacent sites is considered unlikely to occur.

Suitable Habitat

Assessment of overall impacts of the alternatives on the availability of suitable (high-quality and mid-quality) nesting habitat (i.e., LSH) for northern spotted owls was based on projected net changes in the acreage and distribution of suitable nesting habitat in the entire Project Area. Thus, in terms of future nesting opportunities, the northern spotted owl would be expected to be negatively affected through the long term by Alternatives 2 and 2a, and in the short and long term by Alternatives 1 and 4 due to net decreases in the acreage of suitable (high- and mid-quality) nesting habitat (Figure 3.10-6 and Appendix Table M-5). The greatest decrease in high- and mid-quality nesting habitat both in the Project Area and the HCP Planning Area among all the alternatives would occur under Alternative 2 in the long term. As described previously for LSH (see Section 3.10.2.1), decreases in suitable nesting habitat under Alternatives 1, 2, 2a, and 4 would be associated primarily with timber-management activities, despite various mitigation measures proposed under these alternatives, including establishment of reserves (Alternatives 2, 2a, and 4), MMCAs, buffers, and/or no-harvest portions of RMZs, where suitable nesting habitat would be protected and/or expected to develop (see Mitigation below and Appendix Table M-2 for a description of mitigation measures). In contrast, the northern spotted owl may indirectly benefit from an anticipated increase in the acreage of suitable nesting habitat in the Project Area in the short and long term under Alternative 3 (Figure 3.10-6). As described earlier for LSH, these increases would be associated primarily with protection and development of LSH within the Headwaters Reserve, buffers, no-harvest portions of RMZs, and selective harvest targeting late-seral forest conditions.

The level of fragmentation and connectivity of suitable high- and mid-quality nesting habitat would be similar to that described for LSH under Habitat Fragmentation and Connectivity. Thus, in general, under Alternatives 1, 2, 2a, and 4, overall fragmentation of such habitat would increase through the long term, but would decrease under Alternative 3. However, notable increases in connectivity of large patches of LSH would occur in the proposed Headwaters or 63,000-acre Reserve and buffers adjacent to public parks under Alternatives 2, 2a, and 4, as well as the established MMCAs under Alternatives 2 and 2a, in the long and/or extended long term. In the extended long term, old growth and large second-growth would likely develop and consolidate in the reserves, potentially providing a relatively large refuge for owls in the otherwise highly fragmented landscape. In addition, connectivity of suitable nesting habitat would be provided through the network of RMZs provided under all the alternatives. Notably, basal area and large tree retention measures provided in RMZs would meet or exceed those recommended for spotted owls by researchers in the redwood region (Folliard, 1993; Thome, 1997; PALCO, 1998)

With respect to foraging and dispersal habitat, an extensive and adequate amount and distribution of this habitat would be expected to continue to be available in the Project Area under all the alternatives, because at least 80 percent (and up to 95 percent) of the landscape would consist of high-quality, mid-quality, or low-quality nesting habitat, and roosting and foraging/dispersal habitat (compared to

90 percent of the Project Area under current conditions), and RMZs would connect most of this landscape (Appendix Table M-5). Thus, more than 175,000 acres of low-quality nesting, roosting, and foraging/dispersal habitat would continue to be available in the Project Area under all the alternatives.

Potential Impacts on Spotted Owl Populations

None of the alternatives would be expected to threaten local or regional populations of northern spotted owls. As described above, no take of spotted owls would be permitted under Alternatives 1 and 3. Although take of up to 33 percent of the estimated baseline population of owls in the Project Area would be permitted under Alternatives 2, 2a, and 4 prior to implementation of a "no take" strategy, this level of take is a worst-case scenario and is considered unlikely to occur given the proposed HCP and other measures to minimize and fully mitigate for direct take, provide habitat across the landscape, and monitor the population and habitat. Moreover, as described in Section 3.10.1.3, this subspecies appears to have shown unique persistence and adaptability in heavily managed landscapes of northwestern California, and therefore is likely to adapt to anticipated fluctuations in the distribution of habitat in the Project Area over time.

The actual baseline level of spotted owls on PALCO lands is currently unknown, but based on an estimated 1997 baseline of 147 pairs, PALCO's HCP strategy under Alternatives 2, 2a, and 4 should provide for at least 98 sites occupied by pairs at all times. This potential reduction of the baseline population to approximately 98 sites, maintained in a matrix of suitable nesting habitat interconnected with foraging and dispersal habitat, is similar to previous strategies proposed to maintain viable populations of this subspecies (Thomas et al., 1990). Because federal lands in the California Coast Province may be insufficient to support viable owl populations, the Draft Recovery Plan for the northern spotted owl recommended maintaining three clusters of 20 owl pairs each (60 pairs total) in southern Humboldt and Mendocino counties (FWS, 1992). The HCP proposes to maintain habitat for approximately 98 pairs on PALCO lands, which would exceed the Draft Recovery Plan goal for all of southern Humboldt County. Moreover, monitoring of sites as proposed under the HCP is intended to assess associated impacts of proposed management on owls to avoid significant reduction of baseline population levels, and includes consultation with the FWS if the baseline population drops below 75 percent for three consecutive years, as described in further detail under Mitigation below and in Appendix Table M-2.

Mitigation for the Northern Spotted Owl

Applicant-Proposed Mitigation

The above analysis of effects of Alternatives 2, 2a, and 4 on the northern spotted owl were considered in the context of Applicant-proposed mitigation. This mitigation is summarized below and described in detail in Appendix Table M-2 with respect to the HCP/SYP. Notably, under the HCP/SYP, mitigation would consist of implementation of PALCO's Northern Spotted Owl Conservation Plan as well as additional general mitigation (e.g., reserves) and mitigation provided for other species (e.g., marbled murrelet and RMZs) as identified below.

- Implement PALCO's proposed HCP Northern Spotted Owl Conservation Plan. In general, this Plan includes the following measures (see Appendix Table M-2 for a detailed description of these measures as identified in the HCP/SYP, including relative to measures provided under the FPRs):
    1. Provide nesting, foraging, and dispersal habitat for the species

throughout the Plan period. Maintain at least 10 percent of the forested landscape within WAAs as suitable nesting habitat for the species throughout the Plan period.

2. Conduct surveys for spotted owls (including nesting status surveys) to identify active and new sites relative to timber-harvest operations (excluding salvage logging done under a salvage exemption to the FPRs).
3. Protect all known nest sites for the first five years of the Plan.
4. Implement measures to reduce the likelihood that nesting owls will be disturbed during timber harvest and other activities.
5. Survey/census owls each year for the first five years of the Plan using methodology acceptable to the FWS and CDFG to establish a baseline population estimate of owls in the Plan Area. Subsequently, survey a sample area each year and compare results to the baseline.
6. Monitor owl sites to assess the effectiveness of the Plan. If owl population estimates in the Plan Area fall below 75 percent of the baseline population for three consecutive years, convene with FWS and CDFG and evaluate reasons for decline and means for managing the population. If estimates fall below 67 percent of the baseline population for three consecutive years, meet with FWS and CDFG and implement no-take management until the estimate is above 67 percent for three consecutive years.

- Establish MMCAs and associated restrictions and buffers (Alternatives 2 and 2a only) (see Marbled Murrelet—Mitigation and Appendix Table M-2—Marbled Murrelet for a detailed summary of these measures as identified under the HCP/SYP). MMCAs would encompass 16 sites currently occupied by owls.
- Implement aquatic mitigation measures in RMZs (see Section 3.7). These measures would provide nesting habitat as well as foraging and dispersal habitat.
- Implement snag and downed log policy.

Level of Significance Remaining After Applicant-Proposed Mitigation

As summarized above, due to Applicant-proposed mitigation and other minimization measures, effects on the northern spotted owl under Alternatives 2, 2a, and 4, due primarily to take of individual sites, would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

American Peregrine Falcon

As discussed in Section 3.10.1.3, the American peregrine falcon requires cliffs for nesting. No known active aeries are known to occur in the Project Area. Although two historical aeries occur on or near current PALCO lands, one of these sites in the Eel WAA (outside reserves proposed under the alternatives) may currently be uninhabitable due to natural damage during winter 1995, which caused failure of the rock face as described in Section 3.10.1.3. In the Project Area, this species is threatened mainly by disturbance of nesting birds. Therefore, evaluation of potential effects of the alternatives on this species was based primarily on (1) the current and potential use of the Project Area for nesting; and (2) the level of protection of potential nest sites. Because the peregrine falcon is a California Fully Protected species, no take (e.g., harm, loss) of individuals or nest sites is permitted. Thus, the threshold of significance for this species was take of individuals and/or nest sites, or substantial loss or degradation of priority habitat (cliffs) used for nesting by this species.

The American peregrine falcon would not be expected to be significantly directly or indirectly affected by any of the alternatives in the short and long term due to (1) the low probability of potential use of the Project Area by this species, (2) any adverse impacts on birds that may nest there in the future would be unlikely due to implementation of HCP measures for protection of nest sites (Alternatives 2, 2a and 4), as described in Section 3.10.1.3 and Appendix Table M-2, and (3) consultation with CDFG under CESA and FPRs to avoid take. The acreage of potential cliff nesting habitat would not be expected to change or be degraded under any of the alternatives. Transient migrant or foraging peregrine falcons that may occasionally occur in the Project Area could be temporarily disturbed by timber management activities proposed for most of the lands under all the alternatives, particularly in riparian and wetland areas, but such effects would be short term and considered insignificant.

MITIGATION FOR THE PEREGRINE FALCON

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the American peregrine falcon.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, and other impact minimization measures, effects of Alternatives 2, 2a, and 4 on the peregrine falcon would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Aleutian Canada Goose

As described in Section 3.10.1.3, the Aleutian Canada goose is not likely to occur in the Project Area because this species prefers coastal, lowland areas. However, this species could potentially forage in lowland agricultural fields and pastures of the Project Area during winter or migration periods, particularly in the lower Eel River drainage. Population declines have been linked primarily to predation on nesting grounds outside of the Project Area and overhunting. Therefore, evaluation of potential effects of the alternatives on this species was based on the expected occurrence of this species in the Project Area, and effects on lowland, open agricultural habitat potentially used for foraging. The threshold of significance for effects on the Aleutian Canada goose was considered to be substantial loss or degradation of priority habitat that could result in a substantial decline in the population or restricted species' range.

The Aleutian Canada goose would not be expected to be significantly directly or indirectly affected by any of the alternatives through the long term because of the low likelihood of occurrence and because there would be no loss or substantial degradation of foraging habitat in the Project Area. The acreage of lowland agricultural areas providing potential foraging habitat would not be expected to change under any of the alternatives, and levels of human-related activities within these areas would not be expected to change significantly from current conditions (see Table 3.9-1 and Section 3.10.1.3, Priority Habitats). Thus, geese that may forage in these areas would not be expected to be significantly affected.

MITIGATION FOR THE ALEUTIAN CANADA GOOSE

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the Aleutian Canada goose.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, and to other impact minimization measures, effects of Alternatives 2, 2a, and 4 on the Aleutian Canada goose would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Bald Eagle

As discussed in Section 3.10.1.3, priority habitat for the bald eagle in this analysis consists of Class I LSH riparian habitat, since these areas are where nesting and roosting would be expected to be concentrated in the Project Area. Only wintering bald eagles are known to occur in the Project Area, although nesting could occur there in the future based on the availability of potentially suitable habitat and the occurrence of nesting birds in northwestern California. In the Project Area, this species may be adversely affected primarily by human-related disturbance of nesting or wintering birds and loss of potentially suitable nesting and roosting habitat. Therefore, evaluation of effects of the alternatives on bald eagles in the vicinity of the HCP Planning Area was based on (1) the level of protection of nesting and wintering birds; and (2) the amount of potential suitable nesting and roosting habitat available over time. Because the bald eagle is a California Fully Protected species, no take (e.g., harm, loss) of individuals or nest sites is permitted. Thus, the threshold of significance for this species was take of individuals/nest sites or substantial loss or degradation of priority habitat (riparian LSH along Class I streams) used for nesting by this species.

Overall, through the long term, none of the proposed alternatives would be expected to significantly directly or indirectly affect bald eagles. This determination is based on the current lack of nest sites in the Project Area and the level of protection that potential nest sites and wintering birds would receive based on consultation with CDFG under CESA and FPRs, as well as protection provided by the BEPA (Table 3.10-9). However, less than significant direct or indirect effects may occur under Alternatives 1 through 4 due to harvest of some LSH and/or potential disturbance of foraging birds from timber-management activities; however, these effects would be minimized, mitigated, and less than significant due to the proposed mitigation measures under Alternatives 2, 2a, and 4. Primarily in the mid and long term, net increases in riparian LSH on Class I streams under all the alternatives in the Project Area could potentially result in beneficial indirect effects on bald eagles by providing more potential future nesting or wintering habitat than under current conditions (Table 3.9-1). The greatest net increase in such habitat would be anticipated to occur under Alternative 3, followed in descending order by Alternatives 1, 4, and 2. Under Alternatives 2, 2a, and 4, if bald eagle nests are found in the Project Area in the future, active sites would be protected during the breeding season on PALCO lands by 0.25-mile to 0.5-mile buffers. Under Alternative 1, protection of bald eagle nests sites would be provided by the FPRs through application of a minimum 10-acre buffer as well as provisions under the BEPA of 1940 (see Section 3.10.1.3 and Appendix Table M-2 for further description of protection measures).

Significant direct disturbance or displacement of winter foraging bald eagles would not likely occur under any of the alternatives because of the low degree of use and the availability of alternate foraging sites. Additionally, under the HCP (Alternatives 2, 2a, and 4), timber operations would be excluded within 100 feet of known or potential foraging habitat when eagles are present, as summarized in

Appendix Table M-2. The FPRs provide no specific direct protection of winter foraging sites used by bald eagles. Consequently, under Alternatives 2, 2a, and 4, wintering bald eagles on PALCO lands may receive greater specific protection under the proposed HCP than under FPRs under Alternatives 1 and 3 (see Appendix Table M-2). In addition, under Alternatives 2, 2a, and 4, skyline cables over Class I streams in the HCP Planning Area would be marked in consultation with the FWS or CDFG to reduce the probability of collisions (Olendorff et al., 1981).

MITIGATION FOR THE BALD EAGLE

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the bald eagle.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, and other impact minimization measures, effects of Alternatives 2, 2a, and 4 on the bald eagle would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Western Snowy Plover

As described in Section 3.10.1.3, the western snowy plover in northwestern California is known to nest primarily on sandy marine beaches but also on inland river gravel bars. This species has not been detected in the Project Area and the nearest known nesting area is located approximately 6 miles downstream from PALCO lands on the Eel River (see Section 3.10.1.3 and Figure 1.2-1). In the Project Area, the western snowy plover is potentially threatened by modification of inland gravel bars primarily due to gravel mining and human-related disturbance of nesting birds. Therefore, criteria used to evaluate potential effects of the alternatives on this species were (1) known occurrence in the Project Area; (2) the level of protection of inland river gravel bars; and (3) the level of site-specific protection of known or future nesting sites. The threshold of significance with respect to effects on this species was substantial loss or degradation of occupied suitable gravel bar nesting habitat assumed to result in a substantial decline in the population or restricted species' range.

None of the alternatives would be considered likely to have a direct or indirect effect on the western snowy plover through the long term because (1) take of nesting birds is unlikely due to the low likelihood of nesting in the Project Area, (2) measures would be implemented under all the alternatives to detect and protect potential active nest sites, and (3) no net loss of potentially suitable nesting habitat is anticipated (Table 3.10-9). However, less-than- significant direct or indirect effects could occur due to disturbance of birds from recreational activities or grazing. Notably, these effects would be minimized, mitigated, and less than significant by the proposed mitigations under Alternatives 2, 2a, and 4. If nesting were to occur in the Project Area, potential impacts would be expected to be related primarily to gravel-mining operations along the Eel and Van Duzen rivers under all the alternatives. However, under all the alternatives, protection of riparian areas (see Section 3.7) and limitations on gravel mining (see Section 3.4) would likely maintain or potentially increase the area of potential suitable habitat for this species as described in Section 3.10.2.1, Priority Habitats. Furthermore, 1,000-foot seasonal restriction buffers would be applied to active nest sites (PALCO, 1998). Potential low-level use of gravel bars by off-road vehicles and livestock moving along river corridors in

river gravel bar areas may directly damage nests or disturb potentially nesting birds. However, the anticipated relatively low level of the latter two activities in potential suitable nesting habitat, combined with the low likelihood of nesting in the Project Area, would not be considered likely to result in significant effects on populations of this species. In addition, under all the alternatives, periodic monitoring for nesting birds would be expected to continue on PALCO lands in association with management activities that may disturb gravel rivers bars, particularly gravel mining, and any nest sites discovered would be protected in consultation with the FWS.

MITIGATION FOR THE WESTERN SNOWY PLOVER

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the western snowy plover.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, and other impact minimization measures, effects of Alternatives 2, 2a, and 4 on the western snowy plover would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Great Gray Owl

As discussed in Section 3.10.1.2, the great gray owl requires snags in dense coniferous forests near wet montane meadows for reproduction and foraging. The normal range of this species does not include the Project Area; thus, this species is unlikely to occur there. Populations are threatened primarily by loss of suitable snag nesting habitat through timber management activities but also degradation of open foraging habitat through livestock grazing. Therefore, criteria used to assess potential effects of the alternatives on this species were (1) the likelihood of occurrence in the Project Area, (2) changes in the acreage of LSH forest near meadows, and (3) the level of protection of meadows. The threshold of significance for effects on this species was substantial loss or degradation of priority habitat (snag nesting habitat generally in LSH adjacent to open meadows) assumed to result in a substantial decline in populations or restricted species' range. For this species, in California, substantial decline could be interpreted as one pair (only 10 known nest sites in California).

The great gray owl would not be expected to be affected directly or indirectly by any of the alternatives through the long term primarily due to the low likelihood of occurrence in the Project Area (Table 3.10-9). Moreover, no substantial loss or degradation of naturally occurring grassland/prairie habitat potentially providing foraging habitat is anticipated, as described in Section 3.10.2.2, Priority Habitats (Table 3.9-1). In addition, net increases in LSH (a portion of which may provide suitable nesting habitat) under Alternative 3 and mitigation for snags under the HCP under Alternatives 2, 2a, and 4 may increase the availability of potential nesting habitat (see Section 3.10.2.1 Priority Habitats, Table 3.9-1, and Appendix Table M-2). However, negative effects could occur due to potential disturbance or displacement of birds during timber management or other activities proposed under all the alternatives, or due to net loss of LSH under Alternative 1. Effects of Alternatives 2 through 4 would be expected to be minimized, mitigated and less than significant due to the proposed HCP/SYP measures, including a 200-foot, no-cut buffer around active nest trees during nesting season.

MITIGATION FOR THE GREAT GRAY OWL

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the great gray owl.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on the great gray owl would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Little Willow Flycatcher

As indicated in Section 3.10.1.3, the little willow flycatcher requires primarily riparian swamps and thickets and montane meadows, particularly riparian willow thickets, at elevations of 2,000 to 8,000 feet. This species is not known or likely to occur in the Project Area, as this area is outside the current breeding range of the species, and winter migrants are considered rare in northwestern California. There is a low likelihood that the little willow flycatcher may nest in the Project Area in the future based on its historic range and the availability of potentially suitable nesting habitat. Populations are threatened mainly by loss of riparian nesting habitat, particularly due to livestock grazing, and parasitism by cowbirds. Thus, evaluation of potential effects of the alternatives on this species was based on (1) the likelihood of occurrence of nesting birds, (2) the level of protection of riparian areas, (3) anticipated levels of grazing, and (4) changes in the acreage of riparian shrub habitats. The threshold of significance for the little willow flycatcher was substantial loss or degradation of occupied priority habitat (riparian shrub habitat) assumed to result in a net decline in populations or restricted species' range.

Overall, none of the alternatives would be expected to negatively directly or indirectly effect the little willow flycatcher through the long term. Although the net acreage of potentially suitable nesting habitat may decrease under all the alternatives due to development of later seral stages replacing shrub habitat in riparian areas, such effects under Alternatives 2 through 4 would be less than significant due to (1) the low likelihood of this species nesting in the Project Area, and (2) the abundance of such habitat in the predominantly managed landscape surrounding the Project Area (Table 3.9-1). Grazing would likely continue to occur at current, relatively low levels under all the alternatives, and these levels would not be expected to significantly change and thus impact potential little willow flycatcher habitat beyond current conditions (see Sections 3.4 and 3.7).

MITIGATION FOR THE WESTERN LITTLE WILLOW FLYCATCHER

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the little willow flycatcher.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on the little willow flycatcher would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Bank Swallow

As described in Section 3.10.1.3, the bank swallow requires sandy or silty loam in vertical banks and cliffs in riparian areas for nesting. This species is a rare breeder

in northwestern California, and no nesting colonies are known to occur in the Project Area. However, there is a low likelihood of birds nesting there in the future based on the availability of potentially suitable habitat, including sand piles associated with aggregate mining operations. Populations are threatened by destruction or disturbance of such habitat, including channelization, stabilization, and erosion of river banks. Therefore, evaluation of potential effects of the alternatives on this species was based on a combination of the (1) potential for occurrence in the Project Area, (2) level of direct protection of nest sites, and (3) level of protection of streambank stability. The threshold of significance for this species was substantial loss or degradation of occupied priority habitat (sand/silt streambanks used for nesting along Class I and II streams) assumed to result in a substantial decline in populations or restricted species' range (Table 3.10-9).

The bank swallow would not be expected to be negatively directly or indirectly affected by any of the alternatives through the long term due to the low likelihood of nesting in the Project Area, and the level of direct or indirect protection nest sites would receive if they occurred there (Table 3.10-9). Under all the alternatives, RMZs would likely adequately protect streambank stability through the long term, and thus indirectly protect potential suitable breeding habitat (see Section 3.7.4.3 and Table 3.7-12). However, low (Alternatives 3 and 4) to moderate (Alternatives 1 and 2) risk of increased peak flows associated with road building in some watersheds during spring could result in some loss of habitat potentially used by the bank swallow for nesting (see Section 3.6; Section 3.10.2.2, Priority Habitats; and Table 3.10-9). Among the alternatives, the greatest level of site-specific protection would occur under the HCP under Alternatives 2, 2a, and 4 through protection of active nests during the breeding season along watercourses, and surveys and monitoring as described in Appendix Table M-2 (also see PALCO, 1998). In addition, under the HCP in Alternatives 2, 2a, and 4, PALCO would attempt to prevent repeated nesting attempts in unnatural sand piles through use of netting on sand piles or other methods in consultation with the agencies. However, under Alternatives 2, 2a and 4, less-than-significant effects may occur due to potential disturbance of nesting birds from gravel mining activities. Any effects that may occur would be expected to be minimized, mitigated, and less than significant due to the proposed HCP/SYP and other minimization measures.

MITIGATION FOR THE BANK SWALLOW

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the bank swallow.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, and other impact minimization measures, effects of Alternatives 2, 2a, and 4 on the bank swallow would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Golden Eagle

As described in Section 3.10.1.3, the golden eagle requires cliffs or large trees in rugged open areas for nesting. This species is not known to nest in the Project Area, and is considered a rare breeder in northwestern California. However, there is a low likelihood that nesting may occur in the Project Area in the future based on the availability of potentially suitable nesting habitat, and infrequent sightings of birds in

the Project Area. Current threats to this species are related primarily to human disturbance of nesting birds. Therefore, evaluation of potential effects of the alternatives on this species was based primarily on the level of protection of potential nest sites. Because the golden eagle is a California Fully Protected species, no take (e.g., harm, loss) of individuals or nest sites is permitted. Thus, the threshold of significance for this species was take of individuals and/or nest sites, or substantial loss or degradation of priority habitat (cliffs or isolated large trees in open areas) used for nesting by this species (Table 3.10-9). In general, it is assumed that FPR nest site protection measures, in conjunction with BEPA and the California birds-of-prey prohibition (CA Fish and Game Code 3503.5), are likely to avoid take of this species (see Section 3.10.1.3 and Appendix Table M-2 for a description of measures required under FPRs to avoid take of this species).

None of the alternatives would be expected to negatively directly or indirectly affect the golden eagle through the long term due to the low likelihood of potential nesting in the Project Area, and the level of protection any potential future nest sites would receive there (Table 3.10-9). If nest sites are discovered in the future, they would be protected by FPRs under all the alternatives as described in Appendix Table M-2. However, the level of nest site protection would be greater under the HCP in Alternatives 2, 2a, and 4 than by just FPRs under Alternatives 1 and 3 (Appendix Table M-2). Because the golden eagle nests on cliffs, in large trees in rugged open areas, or in dominant trees in mature stands, some potential benefits may be derived from protection of LSH (e.g., large trees) and/or snags to various levels under the alternatives, as discussed in Section 3.10.2.1 under Priority Habitats. However, under all the Alternatives, negative effects may occur through potential temporary disturbance of foraging birds from such activities as timber management or road building. Any effects on this species that may occur under Alternatives 2, 2a and 4 would be expected to be minimized, mitigated, and less than significant due to the proposed HCP/SYP and other minimization measures presented in the proposed alternatives.

MITIGATION FOR THE GOLDEN EAGLE

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the golden eagle.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, and other impact minimization measures, effects of Alternatives 2, 2a, and 4 on the golden eagle would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

MAMMALS

Effects of the alternatives on the 14 priority species or subspecies of mammals that are known or suspected to occur in the vicinity of the Project Area are summarized in Table 3.10-9. Effects on the one threatened species that has potential to occur in the Project Area, the California wolverine, are described below. Effects on the three species of mammals identified on PALCO's HCP A list and thus proposed for coverage under the ITP (the Humboldt marten, Pacific fisher, and California red tree vole) and the remaining 11 priority species of mammals are discussed in the Other Priority Species subsection that follows.

California Wolverine

As described in Section 3.10.1.2, the California wolverine requires suitable den sites generally in relatively contiguous tracts of remote, dense montane forests. The current known range of this species does not overlap the Project Area; thus, it is not likely to occur there. Moreover, current levels of timber-management activities likely limit the potential use of the area for the possible, rare transient individual. Populations are currently threatened mainly by human disturbance and forest fragmentation due to timber-management activities. Therefore, evaluation of potential effects of the alternatives on this species in the Project Area was based primarily on (1) the likelihood of occurrence, (2) anticipated levels of human-related activities, and (3) effects on habitat fragmentation and connectivity. Because the California wolverine is a California Fully Protected species, no take (e.g., harm, loss) of individuals is permitted. Thus, the threshold of significance for this species was take of individuals or substantial loss or degradation of occupied priority denning habitat generally consisting of logs and talus in large tracts of remote, dense montane forest (Table 3.10-9).

None of the alternatives would be expected to negatively affect the California wolverine through the long term due to the low likelihood of occurrence of this species in the Project Area (Table 3.10-9). As described in Section 3.10.2.1 under Habitat Fragmentation and Connectivity, overall Alternatives 1, 2, 2a, and 4 would further decrease connectivity of current patches of LSH in the Project Area. The potential benefits for this species from establishment of the proposed Headwaters Reserve under Alternatives 2, 2a and 3 or the 63,000-acre Reserve under Alternative 4, would be limited by the reserve's relative isolation from other potential refugia, and the relatively high levels of timber-management activities proposed in the area surrounding the Reserve (Figures 3.10-7, 8, 9, and 10). The California wolverine could benefit from Alternative 3 due to anticipated overall increased connectivity and decreased fragmentation of forested and riparian areas compared to existing conditions, as described previously. However, potential benefits would likely be limited by the continued anticipated isolation of the HCP Planning Area relative to other large refugia or wilderness areas other than the Humboldt Redwoods State Park due to the predominance of commercial timberlands surrounding these areas (Figures 1.1-1 and 1.1-2).

Mitigation For the California Wolverine

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the California wolverine.

Level of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, and other impact minimization measures, effects of Alternatives 2, 2a, and 4 on the California wolverine would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Other Priority Species

This section describes the anticipated general effects of the alternatives on other priority species of wildlife identified in Tables 3.10-1, 3.10-2, 3.10-3, and 3.10-4 that are known or suspected to occur in the vicinity of the Project Area but were not addressed previously in Section 3.10.2.1. The main criteria used to evaluate potential effects of the alternatives on these species were anticipated changes in the quantity, distribution, and/or level of protection of known occupied sites and the priority

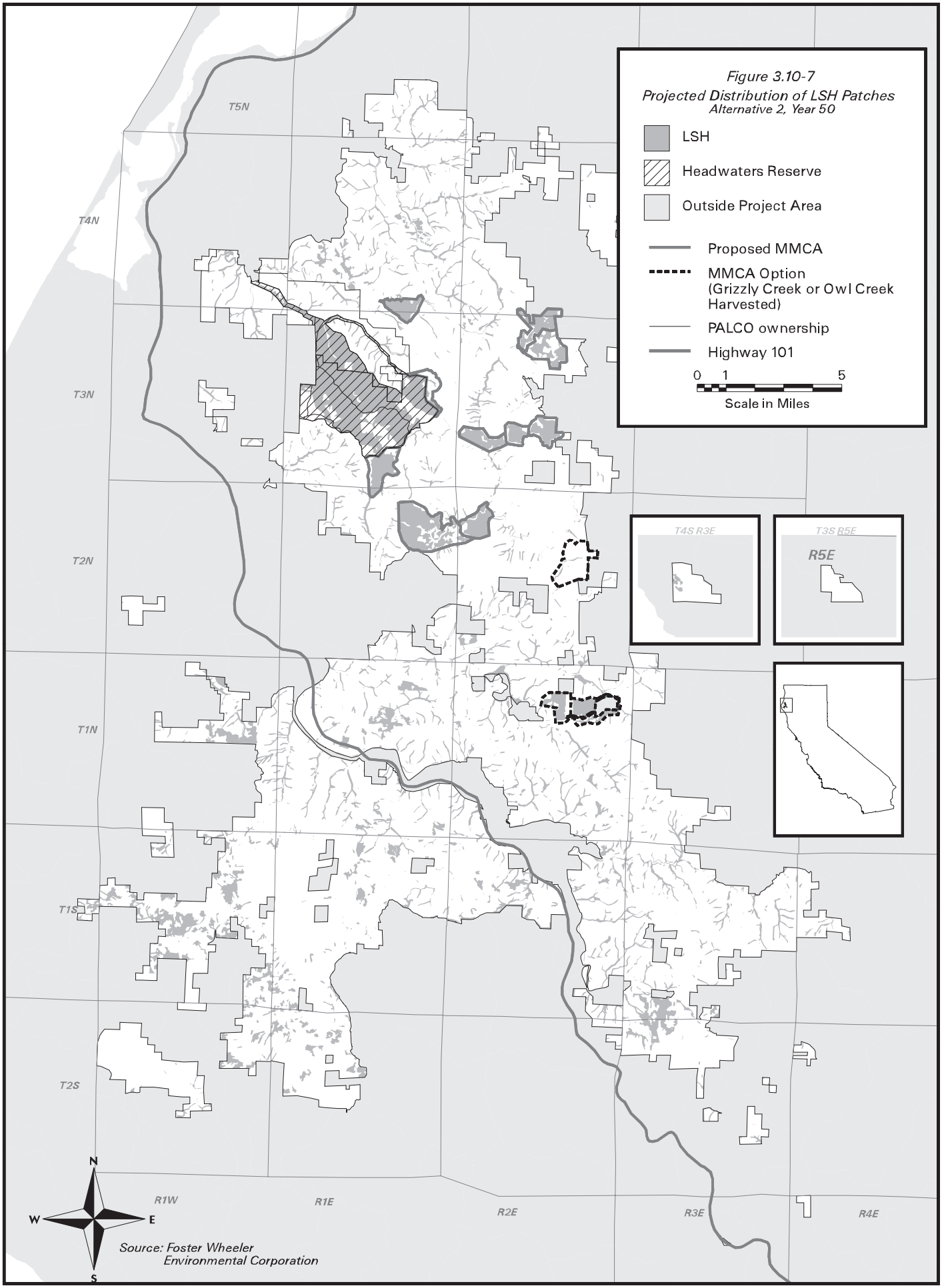


Figure 3.10-7
Projected Distribution of LSH Patches
Alternative 2, Year 50
LSH
Headwaters Reserve
Outside Project Area
Proposed MMCA
MMCA Option
(Grizzly Creek or Owl Creek
Harvested)
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
W
E
S
Source: Foster Wheeler
Environmental Corporation

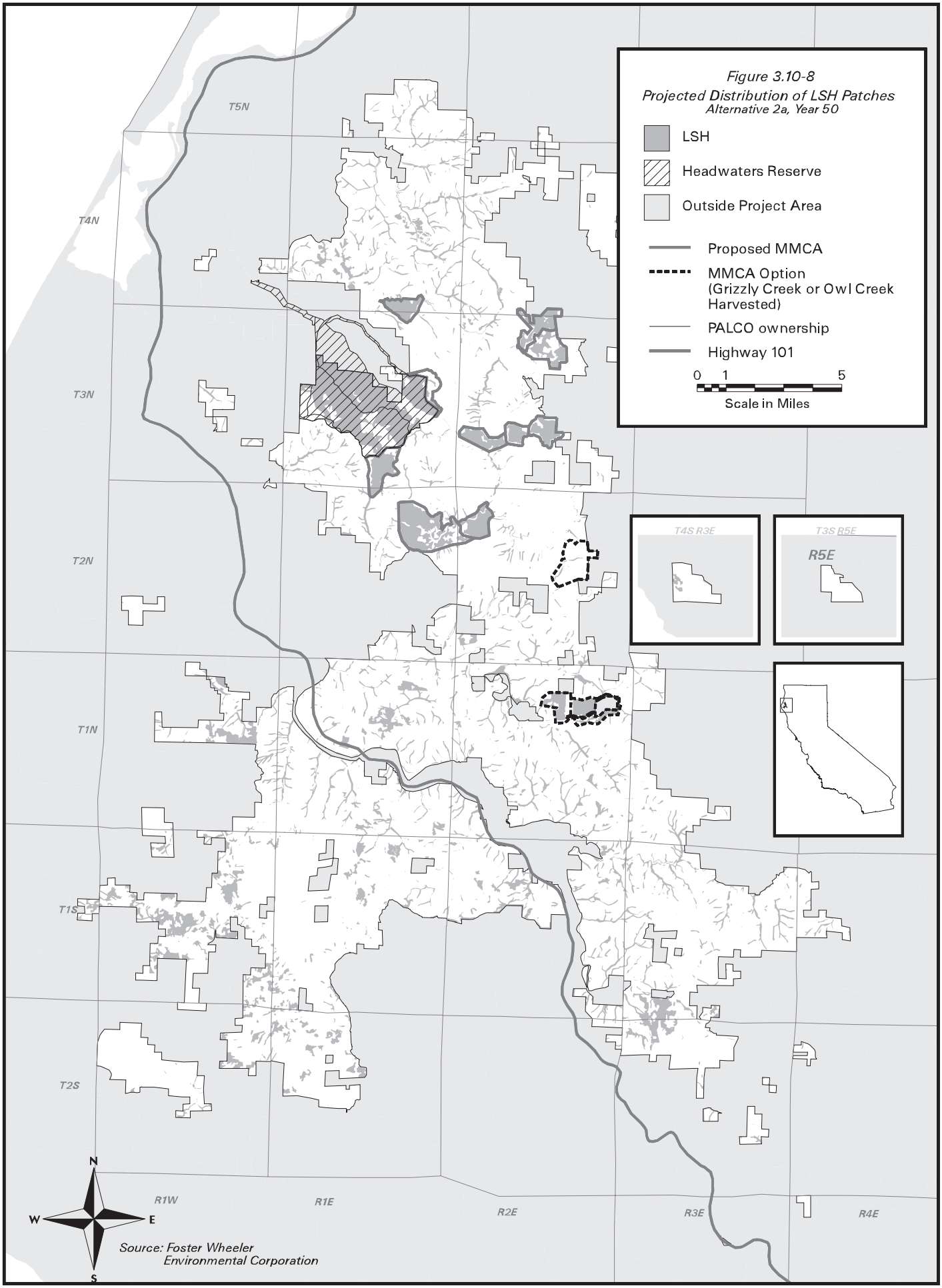


Figure 3.10-8
Projected Distribution of LSH Patches
Alternative 2a, Year 50
LSH
Headwaters Reserve
Outside Project Area
Proposed MMCA
MMCA Option
(Grizzly Creek or Owl Creek
Harvested)
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
W
E
S
Source: Foster Wheeler
Environmental Corporation

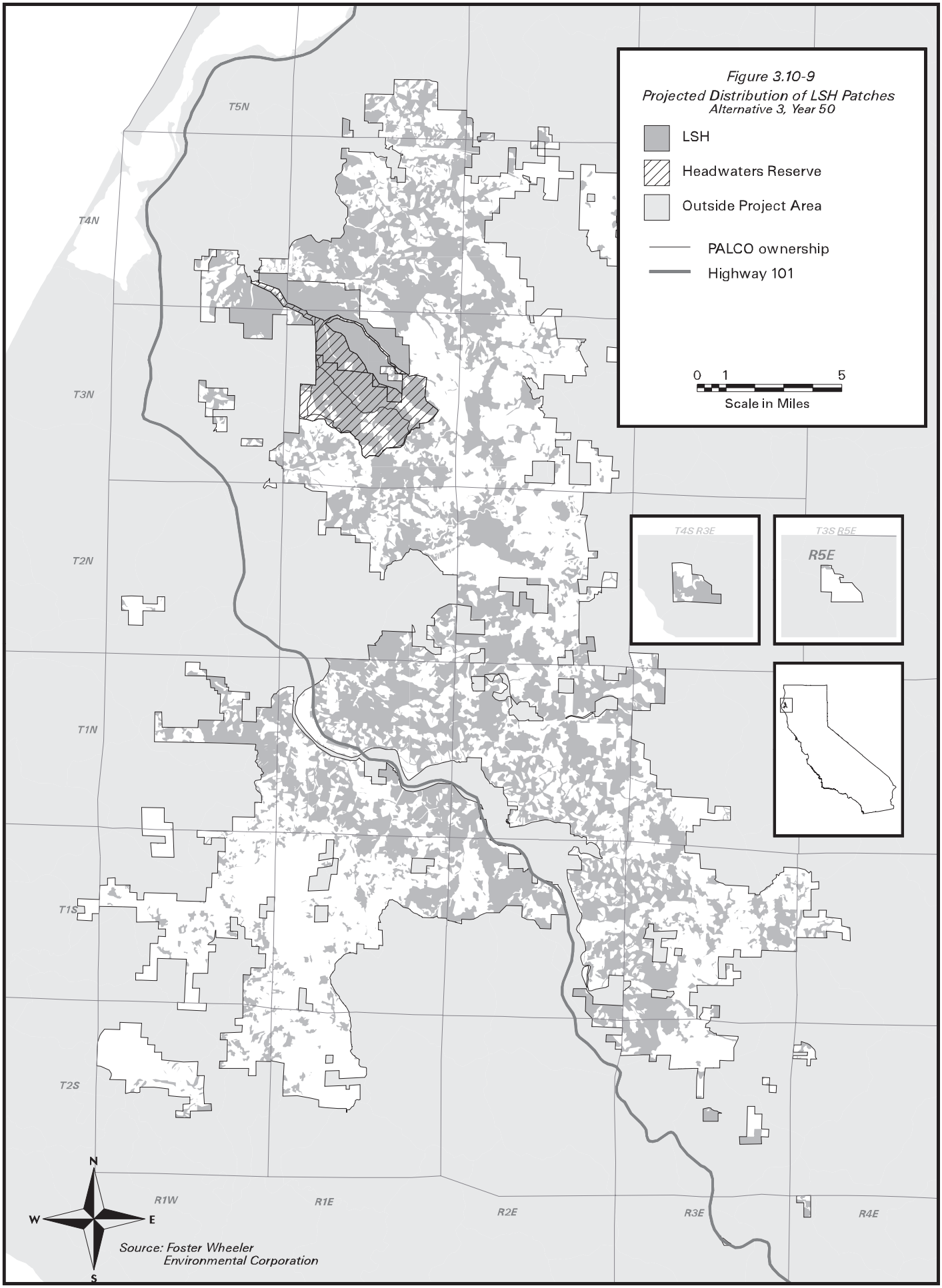


Figure 3.10-9
Projected Distribution of LSH Patches
Alternative 3, Year 50
LSH
Headwaters Reserve
Outside Project Area
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
S
E
W
Source: Foster Wheeler
Environmental Corporation

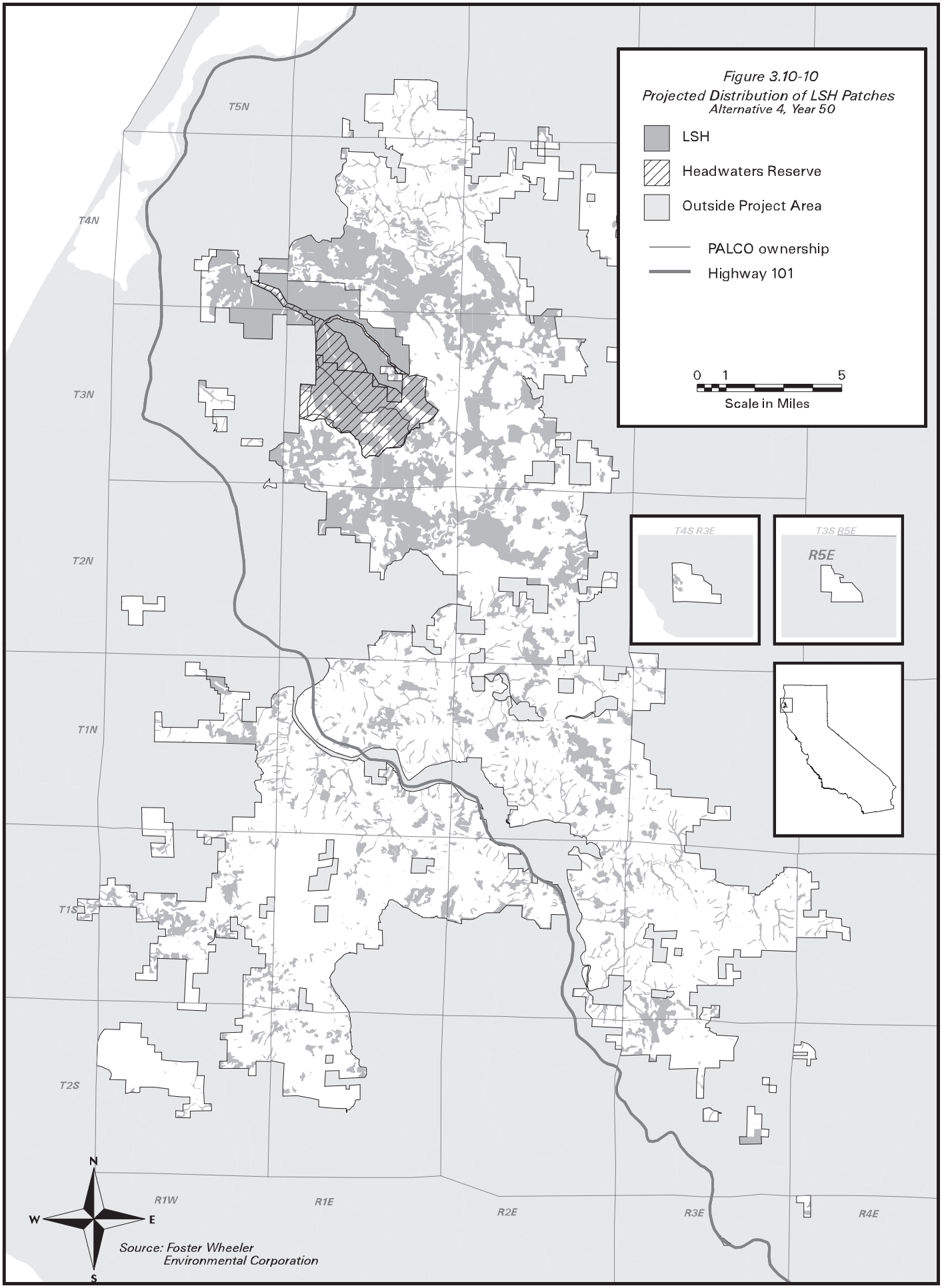


Figure 3.10-10
Projected Distribution of LSH Patches
Alternative 4, Year 50
LSH
Headwaters Reserve
Outside Project Area
PALCO ownership
Highway 101
0 1 5
Scale in Miles
T5N
T4N
T3N
T2N
T1N
T1S
T2S
R1W
R1E
R2E
R3E
R4E
T4S R3E
T3S R5E
R5E
N
S
E
W
Source: Foster Wheeler
Environmental Corporation

habitat with which each species is primarily associated, as summarized in the following subsections: (1) young forest associates, (2) mid-seral forest associates, (3) LSH associates, (4) wetland associates, (5) riparian associates, (6) unique habitat associates, and (7) open habitat associates. The threshold of significance used to assess the level of potential impacts of the alternatives on each of these species was substantial loss or degradation of occupied priority habitat assumed to result in a substantial decline in a priority species' population or restricted range of the species (Table 3.10-9). Notably, a number of priority species of birds identified in Table 3.10-3 are not likely to breed in the Project Area, and/or are associated with a variety of younger-forest seral stages (e.g., open and mid-seral forest) or other priority habitats that are not limited in availability, and thus would not be considered a limiting factor for the species in the vicinity of the Project Area as described in the following subsections and Table 3.10-9. In addition, no priority species are associated exclusively with hardwood forest habitats (e.g., outside of riparian zones), so this habitat is not addressed in a specific subsection below.

Young Forest Associates

As described in Section 3.10.1.1, three priority species are associated primarily with young forest within the Project Area: the mountain quail, ruffed grouse, and sharp-shinned hawk. Effects of the alternatives on these three species are not addressed in other, species-specific subsections. Thus, evaluation of anticipated effects of the alternatives on these species was based on direct and indirect effects on this habitat as described in Section 3.10.2.1, Priority Habitats. The threshold of significance for species associated with young forest was substantial loss or degradation of occupied priority young forest habitat assumed to result in a substantial decline in a priority species population or restricted range of a priority species associated with such habitat (Table 3.10-9).

None of the alternatives would be expected to negatively affect species that use young forest, because there would be no substantial loss or degradation of these habitats under any of the alternatives with respect to the surrounding landscape (Tables 3.9-1 and 3.10-9). Under Alternative 3, most existing young forest habitat in the Project Area would develop into mid- and late-seral forest, eliminating some potential breeding and foraging habitat for these species. However, this impact would likely have a less-than-significant effect because of the prevalence of this habitat type elsewhere in the surrounding landscape, and due to the ability of these species to use a variety of other habitat types, such as montane forest (mountain quail), riparian (ruffed grouse), and mid-successional forest (sharp-shinned hawk). In addition to impacts under Alternative 3, negative effects may occur on these young forest associates under all the alternatives due to potential temporary disturbance or displacement of individuals by noise and activities of nearby timber removal (Table 3.10-9). However, any effects on sharp-shinned hawks would be expected to be minimized, mitigated, and less than significant under Alternatives 2 through 4 due to the prevalence of young forest habitat on the surrounding landscape and the proposed HCP/SYP measures under Alternatives 2, 2a, and 4.

MITIGATION FOR YOUNG FOREST ASSOCIATES

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on mountain quail, ruffed grouse, and sharp-shinned hawk.

Level Of Significance Remaining After Applicant-Proposed Mitigation

Due to applicant proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on mountain quail, ruffed grouse, and sharp-shinned hawk would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Mid-seral Forest Associates

As described in Section 3.10.1.1, one priority species is associated primarily with mid-seral forest within the Project Area, the Cooper's hawk. Effects of the alternatives on the Cooper's hawk are not addressed in other, species-specific subsections. Thus, evaluation of anticipated effects of the alternatives on this species was based on direct and indirect effects on this habitat as described in Section 3.10.2.1, Priority Habitats. The threshold of significance for species associated with mid-seral forest was substantial loss or degradation of occupied priority young forest habitat assumed to result in a net decline in a priority species population or restricted range of a priority species associated with such habitat (Table 3.10-9).

None of the alternatives would be expected to negatively affect species that use mid-seral forest, because there would be no net loss or substantial degradation of these habitats under any of the proposed alternatives (Tables 3.9-1 and 3.10-9). In addition, effects may occur to the Cooper's hawk under all the alternatives due to potential temporary disturbance or displacement of individuals by noise and activities associated with nearby timber removal (Table 3.10-9). However, any effects on Cooper's hawk would be expected to be minimized, mitigated, and less than significant under Alternatives 2 through 4 due to no overall net loss of mid-seral forest and the proposed HCP/SYP measures under Alternatives 2, 2a, and 4.

MITIGATION FOR MID-SERAL ASSOCIATES

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the Cooper's hawk.

Level Of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on the Cooper's hawk would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

LSH Associates

Effects of the alternatives on 8 of the 15 priority species associated with LSH were addressed in previous species-specific subsections. The northern goshawk and California red tree vole are the only priority species that are considered LSH associates and are not addressed in other subsections. Notably, the five species that are associated with snags and downed logs in LSH habitats are addressed under the Unique Habitat Associates subsection that follows.

As described in Section 3.10.2.3, the northern goshawk is considered a rare resident and breeder in northwestern California. Only 36 observations of the northern goshawk have been recorded on PALCO property during species-specific surveys, including one in the Allen Creek MMCA, one in the proposed Headwaters Reserve, and one in the Bear-Mattole WAA (Harris, 1996; PALCO, 1998). As summarized in Section 3.10.1.3, the California red tree vole is primarily associated with LSH and is widespread on PALCO lands, where it has been associated primarily with mesic old-growth forest, particularly Douglas-fir. Thus, effects of the alternatives on the northern goshawk

and red tree vole were assessed based on (1) the potential for species occurrence; (2) changes in the acreage of LSH (particularly Douglas-fir trees for the red tree vole); (3) changes in the level of LSH fragmentation and connectivity; and/or (4) the level of protection of known nest sites. The threshold of significance for these species was substantial loss or degradation of priority LSH assumed to result in a substantial decline in populations or restricted species' range.

The northern goshawk would not be expected to be negatively affected by any of the alternatives, because as indicated above, this species nests at low levels in the Project Area, and take of nesting birds would be unlikely to occur because FPR specifications and/or HCP/SYP measures to avoid take would be followed under all the alternatives (Table 3.10-9 and Appendix Table M-2). Effects on this species may occur under all the alternatives due to potential disturbance of foraging birds from timber-management activities and under Alternatives 1, 2, 2a, and 4 due to net loss and fragmentation of LSH (as described previously in Sections 3.10.2.1 and 3.10.2.2), which may preclude some nesting by this species in the Project Area in the short and long term. However, effects under Alternatives 2 through 4 would be expected to be minimized, mitigated, and less than significant due to 1) protection of existing uncut and residential old growth in proposed reserves and MMCAs (Alternatives 2, 2a and 4), 2) development of LSH in reserves, MMCAs, and riparian no-harvest zones, and 3) HCP snag and downed log mitigation proposed under Alternatives 2, 2a, and 4, which may improve habitat conditions for the northern goshawk in remaining stands of LSH. Net increases in acreage and connectivity of LSH under Alternative 3 may further improve habitat conditions for this species (Table 3.9-1 and Appendix Table M-3).

Similar to the northern goshawk, the California red tree vole would not be negatively affected by Alternatives 1 through 4 in the long term due to substantial protection of LSH (including Douglas-fir), which is anticipated to minimize and mitigate for anticipated loss and modification of priority habitat (Tables 3.9-1 and 3.10-9). While loss and modification of suitable habitat would likely result in direct loss of nest sites, this loss would be offset by the widespread distribution of suitable Douglas-fir nest trees in most seral stages. This species may indirectly benefit from Alternative 3 due to anticipated net increases in LSH and improvements in habitat connectivity, primarily in the long term. See Section 3.10.2.1, Priority Habitats and Section 3.10.2.2, Habitat Fragmentation and Connectivity for a detailed description of the anticipated effects of the alternatives on these habitats and features. Thus, based on the above, potential effects of Alternatives 2 through 4 on the California red tree vole would be expected to be minimized, mitigated, and less than significant due primarily to the management of LSH and protection of LSH in no-harvest portions of RMZs.

MITIGATION FOR LSH ASSOCIATES

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the northern goshawk and California red tree vole.

Level Of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on the northern goshawk and California red tree vole would be minimized, mitigated, and less than significant. Thus, no

additional agency-proposed mitigation would be required.

Wetland Associates

As described in Section 3.10.1.3 and associated tables, 21 priority species are considered streamside riparian and/or wetland associates relative to their potential use of the Project Area (Tables 3.10-2, 3.10-3, and 3.10-4). Fourteen of these species were not addressed in previous, species-specific subsections. Of these 14 species, only the red-legged frog is considered likely to use wetlands for breeding in the Project Area. The remaining 13 species are expected to be associated primarily with riparian habitat for reproduction in the Project Area. These 13 species are addressed in the next subsection.

Wetland associates (such as the red-legged frog) are sensitive to loss or modification of wetland vegetation. Thus, in general, effects on wetland associates were evaluated based on (1) the potential for occurrence in the Project Area, (2) the current or proposed buffer widths and management prescriptions for Class I and II wetland habitats, and/or (3) the anticipated level of protection of forest microclimates in Class I and II wetland habitats. The threshold of significance for wetland associates was substantial loss or degradation of occupied wetland priority habitat, assumed to result in a substantial decline in a species population or restricted range of a priority species associated with such habitat (Table 3.10-9).

Overall, based on the above criteria, none of the proposed alternatives would be expected to result in negative effects on wetland associates. Potential effects on wetland associates due to loss or degradation of wetlands primarily from timber-management activities and gravel mining in or near Class I and II RMZs (including Class I and II wetlands)(Section 3.7.2, Wetlands) would be expected to be minimized, mitigated, and less than significant due primarily to establishment of RMZs under FPRs and/or the proposed HCP. RMZs would be expected to protect or improve the quality of Class I and II wetland habitats compared to current conditions (as described in Sections 3.7 and 3.10.2.1) (Tables 3.7-6 and 3.10-9, Figures 3.7a through 3c, and Appendix Table M-2). Furthermore, any priority wetland associates that may occur but not breed in the Project Area, would not be expected to be limited by the availability of foraging and cover habitat in the Project Area (see Section 3.10.1.3 and PALCO [1998]). Notably, as described in Section 3.10.2.2, Priority Habitats, all of the alternatives would meet or exceed FPRs governing protection of the species' habitat (see Section 3.7, Tables 3.7-6, and Figures 3.7-3a through 3c).

MITIGATION FOR WETLAND ASSOCIATES

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the wetland associates.

Level Of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on the wetland associates would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Riparian Associates

As described in Section 3.10.1.3 and associated tables, 21 priority species are considered streamside riparian and/or wetland associates relative to their potential use of the Project Area (Tables 3.10-2, 3.10-3, and 3.10-4). Fourteen of these species were not addressed in

previous, species-specific subsections. Of these 14 species, 13 are considered to be primarily associated with riparian habitats for reproduction. These riparian associates include 12 species of birds and 1 species of mammal (the white-footed vole).

Riparian associates are sensitive to loss or modification of riparian vegetation. Thus, in general, effects on riparian associates were evaluated based on (1) the potential for occurrence in the Project Area, (2) the current or proposed buffer widths and management prescriptions for Class I and II riparian habitats, and/or (3) the anticipated level of protection of forest microclimates in Class I and II riparian habitats. The threshold of significance for riparian associates was a substantial loss or degradation of occupied riparian priority habitat, assumed to result in a substantial decline in a species population or restricted range of a priority species associated with such habitat (Table 3.10-9).

Overall, based on the above criteria, none of the alternatives would be expected to result in negative effects on riparian associates. Some negative effects on riparian-associate species may occur under all the alternatives due to potential loss or disturbance of individuals or loss or modification of habitat from timber management, gravel mining, or other activities in or near Class I and II RMZs. However, effects under Alternatives 2 through 4 would be expected to be minimized, mitigated, and less than significant due to establishment of RMZs along Class I and II streams under FPRs and/or the proposed HCP. RMZs would be expected to protect or improve the quality of Class I and II riparian habitats compared to current conditions (as described in Sections 3.7 and 3.10.2.1), (Tables 3.7-6 and 3.10-9, Figures 3.7-3a through 3c, and Appendix Table M-2). This conclusion also applies to the lower range of buffer widths being considered as part of Alternative 1. Furthermore, many priority riparian associates (such as the double-crested cormorant and harlequin duck) may forage but are unlikely to breed in the Project Area, but would not be expected to be limited by the availability of foraging habitat in the Project Area (see Section 3.10.1.3 and PALCO [1998]). Notably, as described in Section 3.10.2.2, Priority Habitats, all of the alternatives would meet or exceed FPRs governing protection of the species' habitat (see Section 3.7). For example, all active heron and egret nest sites would receive a seasonal buffer of 300 feet around a nest tree or rookery under Alternatives 2, 2a, and 4 (see Appendix Table M-2). Also, all active osprey nests would be protected by buffers up to 18 acres in size.

MITIGATION FOR RIPARIAN ASSOCIATES

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on the riparian associates.

Level Of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on the riparian associates would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Unique Habitat Associates

As described in Sections 3.10.1.2 and 3.10.1.3 and associated tables, 15 priority species are considered unique habitat associates, one of which (the peregrine falcon) was addressed in previous, species-specific subsections. The 14 priority species associated with unique habitats that were not addressed in previous, species-specific subsections are dependent on cliffs, rock outcrops, or talus slopes (fringed myotis,

long-eared myotis, long-legged myotis, Pacific western big-eared bat, pallid bat, small-footed myotis, spotted bat, Yuma myotis), or snags and downed logs (pileated woodpecker, Vaux's swift, purple martin, Humboldt marten, and Pacific fisher) (Tables 3.10-2, 3.10-3, and 3.10-4). Thus, evaluation of anticipated effects of the alternatives on these species was based on direct and indirect effects on these habitats as described in Section 3.10.2.1, Unique Habitats. The threshold of significance with respect to species associated with cliffs, talus, and rock outcrops was substantial loss or degradation of occupied priority cliff/rock outcrop/talus habitat assumed to result in a substantial decline in a priority species population or restricted range of a priority species associated with such habitat (Table 3.10-9). For species dependent on snags and downed logs, the threshold of significance was not providing the minimum number of snags or downed logs considered necessary to support priority wildlife species dependent on this habitat assumed to result in a net decline in a priority species population or restricted range of a priority species associated with such habitat (Table 3.10-9).

Based on anticipated effects on unique habitat described in Section 3.10.2.1, Priority Habitats, none of the alternatives would be expected to negatively affect species that use cliffs, talus, and rock outcrops, because there would be no substantial loss or degradation of these habitats under any of the alternatives (Tables 3.9-1 and 3.10-9). Some negative effects may occur on some of these species under all the alternatives due to potential temporary disturbance or displacement of individuals by noise and activities and degradation of microclimates through nearby timber removal (Table 3.10-9); however, these effects under Alternatives 2 through 4 would be expected to be minimized, mitigated and less than significant due to management measures described in Appendix Table M-2.

With respect to species associated with snags and downed logs, as described in Section 3.10.2.1, Priority Habitats, Alternative 1 would be expected to adversely affect such species due to a substantial loss of LSH (and thus a presumed net decrease in the availability of snags and downed logs) and lack of adequate snag and leave-tree requirements under FPRs (Tables 3.9-1 and 3.10-9 and Appendix Table M-2). In contrast, less-than-significant effects would be expected on such species under Alternatives 2, 2a, and 4. Under these alternatives, loss or disturbance of individuals may occur due to timber-management activities; however, these effects would be expected to be minimized, mitigated and less than significant due to HCP snag and downed-log mitigation. Other measures would be expected to mitigate such effects to a less than significant level by providing an adequate number of these features to support these species (see Section 3.10.2.1 and Appendix Table M-2). Similarly, under Alternative 3, less-than-significant effects may occur through loss or disturbance of individuals associated with timber-management activities; however, net increases in LSH and thus an anticipated net increase in the availability of snags and down logs through the long term under Alternative 3.

Notably, as described in Section 3.10.1.3, fishers and martens generally require large, relatively undisturbed patches of LSH connected by forested riparian corridors to sustain populations. Thus, these species may also be affected indirectly through the long term by overall decreased habitat connectivity and loss of interior LSH anticipated under Alternative 1 as described in Section 3.10.2.1, Habitat Fragmentation and Connectivity. However, these effects would be expected to be,

mitigated primarily by the establishment of RMZ widths that would be considered adequate for dispersal of such species under all the alternatives and would improve compared to current conditions, as described in Section 3.7. In addition, the proposed Headwaters (Alternatives 2, 2a, and 3) or 63,000-acre (Alternative 4) reserves would likely provide a refuge for martens and fishers in the otherwise largely managed landscape, although such benefits would be limited as described in previous sections.

MITIGATION FOR UNIQUE HABITAT ASSOCIATES

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation measures under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on unique habitat associates.

Level Of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on unique habitat associates would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

Open Habitat Associates

As described in Sections 3.10.1.2 and 3.10.1.3 and associated tables, nine priority species are considered open habitat associates, two of which (the Aleutian Canada goose and the golden eagle) of which were addressed in previous, species-specific subsections. As stated in Section 3.10.1.1, evaluation of effects of the alternatives on open habitats and associated species focused naturally occurring open habitats. As indicated in Table 3.10-4, the American badger is the only priority species not addressed in previous subsections that is likely to depend on the availability of such habitat in the Project Area for reproduction. The other six species (burrowing owl, ferruginous hawk, merlin, northern harrier, prairie falcon, and short-eared owl) may use such habitat for foraging but are unlikely to breed in the Project Area; thus, populations of these species in the Project Area are not expected to be limited by the availability of this habitat (Tables 3.10-3). The threshold of significance for priority species associated with open habitat in the Project Area was substantial loss or degradation of naturally occurring open habitat, assumed to result in a substantial decline in populations or restricted range of priority species associated with such habitat (Table 3.10-9),

None of the alternatives would be expected to result in negative effects on priority species associated with naturally occurring open habitat in the Project Area, because there would be no substantial loss or degradation of such habitat (see Section 3.10.2.1 and Tables 3.9-1 and 3.10-9). Notably, decreases in grassland/prairie habitat acreage under Alternatives 2, 2a, and 4 are due to the presumed planting of human-caused openings that were formerly forested. In particular, continued low levels of livestock grazing (as described in Section 3.4) would not be expected to affect the suitability of naturally occurring open habitat for priority species of wildlife. Some negative effects on such species may occur due to disturbance or displacement of individuals by road construction. However, these effects would be expected to be minimized, mitigated, and less than significant under Alternatives 2 through 4 due to nest-site protection measures under FPRs and/or the HCP and other species-specific mitigation measures for the burrowing owl proposed in the HCP under Alternatives 2, 2a, and 4 (Appendix Table M-2).

MITIGATION FOR OPEN-HABITAT ASSOCIATES

Applicant-Proposed Mitigation

See Appendix Table M-2 for mitigation under FPRs and the HCP that would be implemented under Alternatives 2, 2a, and 4 to avoid significant effects on open-habitat associates.

Level Of Significance Remaining After Applicant-Proposed Mitigation

Due to Applicant-proposed mitigation summarized in Appendix Table M-2 and above, effects of Alternatives 2, 2a, and 4 on open-habitat associates would be minimized, mitigated, and less than significant. Thus, no additional agency-proposed mitigation would be required.

NEOTROPICAL MIGRATORY BIRDS

As described in Section 3.10.1.4 and Table 3.10-8, 22 NTM bird species known or suspected to occur in the Project Area are associated with LSH, including snag habitat, which is considered to be the primary resource limiting their distribution and occurrence. None of the proposed alternatives would be expected to negatively affect NTM birds associated with other habitat types, such as riparian or mid-seral, because these habitat types would not be expected to be limited under any of the alternatives. Some negative effects on NTM species could result from grazing along riparian areas. However, grazing would be expected to continue at levels similar to current conditions under all of the alternatives. Also, the FREIGHTS model projects that most young forest would develop into later seral stages under Alternative 3, which could reduce the amount of suitable habitat for NTM species associated with this habitat. However, this effect would be considered less than significant because it is unlikely that young forest habitat would be limited on the landscape, even if a large percentage of the Project Area is allowed to develop naturally. Natural disturbance, fire, and harvest outside old-growth buffers would be expected to provide enough habitat to maintain populations of the NTM species at current levels. Declines in populations of forest-dwelling NTM bird species are believed to be partially attributable to fragmentation of forest habitat on breeding grounds in North America (Terborgh, 1992). Thus, anticipated effects of the alternatives on NTM birds associated with LSH would be expected to be related to changes in the quantity, quality, and distribution of LSH. As LSH-associates, the threshold of significance for these species would be substantial loss or degradation of LSH habitat, assumed to result in a substantial decline in species populations or restricted species range (Table 3.10-9).

NTM bird species associated with LSH habitat would be expected to be negatively affected directly and indirectly by Alternative 1 through the long term due to net loss and fragmentation of LSH. As noted in Sections 2.5.1 and 3.10.2, the NEPA evaluation of the No Action Alternative considers the implementation of wide, no-harvest RMZs as well as restrictions on the harvest of old-growth redwood forest to model conditions over the short and long term. Alternative 3 may benefit NTM birds due to a net increase in the acreage and connectivity of LSH, as described previously for LSH in Sections 3.10.2.1 and 3.10.2.2 (Tables 3.9-1 and 3.10-9). However, this benefit would be somewhat offset by the disturbance inherent in repeated entries into selectively harvested stands, which would negatively impact understory diversity more than single-entry prescriptions. Proposed HCP mitigation for snags under Alternatives 2, 2a, and 4 would be expected to mitigate effects on neotropical migrants associated with LSH. These snag minimum requirements are described under Snag and Downed Log Habitat. In particular, the increased availability of snags and downed woody debris used by these species for

nesting or foraging would be increased by the acreage and connectivity of LSH within MMCAs and the proposed Headwaters Reserve under Alternatives 2 and 2a and within the 63,000-acre Reserve under Alternative 4 (Appendix Table M-2 and Figures 3.10-7 through 3.10-10).

GAME SPECIES

As described in Section 3.10.1.5, numerous game species are known or suspected to occur in the vicinity of the Project Area. These species are typically diverse in their use of habitat types, and may be associated with any of the seven wildlife habitats described in Section 3.10.1.1. The threshold of significance for game species in this analysis was considered to be substantial loss or degradation of priority habitat used by game species, assumed to result in a substantial decline in species populations or restricted species' range (Table 3.10-9).

The potentially limiting priority habitat type important to some of these game species, including deer and elk, is the availability of LSH (particularly for providing wintering habitat for big game) and riparian travel corridors. Connectivity of LSH, particularly in riparian areas, is important in providing dispersal and movement corridors for big game, including bears, minks, cougars, and bobcats. Thus, effects of the alternatives on many game species would be expected to be similar to effects described for LSH in Section 3.10.2.1 under Priority Habitats and Habitat Fragmentation and Connectivity.

3.10.2.2 Cumulative Effects

Cumulative effects result from the incremental impact of direct and indirect effects when combined with other, related or unrelated past, present, and reasonably foreseeable future management actions. For the purposes of this analysis, cumulative effects are defined as the potential effects of the alternatives combined with effects of other non-federal or federal activities that are likely to occur in the reasonably foreseeable future in the vicinity of the Project Area, in the context of past and current related actions. With respect to terrestrial wildlife resources overall, cumulative effects of the alternatives would be dependent primarily upon the effects of other land-management activities on the habitats or habitat features that are known or suspected to currently limit populations of priority species in the vicinity of the Project Area. The analysis area with respect to potential cumulative effects of the alternatives on wildlife resources in general in the vicinity of the Project Area was considered to be Humboldt County.

Cumulative effects on priority wildlife species and habitats in the vicinity of the Project Area would occur primarily from the direct and indirect impacts of habitat removal, habitat fragmentation, and human disturbance related to intensive timber-management activities (e.g., timber harvest, road building) and urbanization on both non-federal and federal lands. In general, the primary resource issues of concern with respect to wildlife in the vicinity of the Project Area are the loss and fragmentation of LSH and connectivity of riparian areas, particularly old-growth redwood forest, as described in Sections 3.10.1 and 3.10.2.1. Notably, the loss and degradation of these habitats is also of particular concern in areas beyond Humboldt County, including the redwood region and the Pacific Northwest. Thus, evaluation of anticipated cumulative impacts of the alternatives on general wildlife resources in Humboldt County focused on the quantity and distribution of LSH and riparian areas relative to effects on LSH associates and wide-ranging species as described below. Cumulative effects on riparian habitat were described in detail in Section 3.7.3.3. In addition, evaluation of cumulative effects focused on the two currently listed species that would potentially be "taken" under

some of the alternatives: the marbled murrelet and northern spotted owl.

LSH Fragmentation and Connectivity

Cumulative effects on wildlife in Humboldt County with respect to the proposed alternatives would be related primarily to changes in the quantity, quality, and/or connectivity of LSH (particularly uncut and residual old-growth forest) and riparian corridors relative to the past, current, and future availability of such habitat. Approximately 919,460 acres of LSH dominated by mixed conifers or conifer-hardwood currently occurs in Humboldt County based on satellite imagery GIS data summarized by Humboldt State University (Fox, 1998). Approximately nine percent of this LSH is located on PALCO and Elk River Timber Company lands in the Project Area. The majority of the LSH in Humboldt County occurs on state or federal lands, primarily parks and National Forest System lands. Such habitat would generally be expected to continue to be protected on these lands. The largest, relatively contiguous blocks of LSH (including old-growth forest) occur in the Redwood National Park (approximately 30 miles north of PALCO lands), Humboldt Redwoods State Park (adjacent to the PALCO ownership about 11 miles south of the proposed Headwaters Reserve), Six Rivers National Forest (about 29 miles northeast of PALCO lands), and King Range National Conservation Area (approximately 5 miles southwest of PALCO lands). With respect to old-growth redwood forest, of the approximately 100,000 acres remaining in the original range of this species, approximately 10 percent occurs on PALCO lands, including the largest privately owned patch of redwood forest (i.e., the Headwaters Grove); most of the remaining approximately 90 percent occurs in parks (see Section 3.9.1.3). Thus, PALCO owns a substantial proportion of remaining old growth in Humboldt County. Notably, as an example of the ongoing concern for declines in the quality and quantity of LSH in the project region, from 1992 to 1996, old-growth forest declined in the southern Humboldt region by 1.5 percent, while residual old-growth forest declined by almost 40 percent; little decline in such habitat occurred during 1996 to 1997 (SEI Headwaters Project Science Advisory Panel, 1997).

Stands of late-successional Douglas-fir, while doubtless much reduced from historic levels, are still found well-distributed on federal lands in the region surrounding the Project Area. On BLM lands in the Arcata Resource Area, there are approximately 20,000 acres of Douglas-fir-dominated stands with average dbh of greater than 24 inches and canopy closure of greater than 60 percent. All are in reserved allocations under the Northwest Forest Plan. About 4,216 acres of these stands are scattered within various tributary watersheds of the Mattole River (Personal communications; Steve Hawks, BLM Arcata Resource Area, September 9, 1998, Paul Roush, BLM Arcata Resource Area, September 14, 1998).

On the Six Rivers National Forest, in Del Norte, Humboldt, and western Trinity counties, approximately 208,710 acres of late successional timber types containing Douglas-fir occur in late successional reserve or wilderness status under the Northwest Forest Plan (Personal communication, Jeff Mattison, Six Rivers National Forest, September 9, 1998). These stands consist of multi-layered canopy, a total canopy closure greater than or equal to 70 percent with overstory trees greater than or equal to 21 inches dbh which comprised at least 40 percent of the total canopy closure (USDA, 1995). Additional acreage containing this vegetative series occurs in unmapped riparian reserves, occupied marbled murrelet stands, and late successional reserves which would be unavailable for programmed timber

harvest. These data are unavailable at this time.

In the context of Humboldt County, net loss and fragmentation of remaining uncut and residual old growth under Alternative 1 (as described in Section 3.10.2.1) would likely contribute substantially to cumulative negative effects on LSH associates due to: (1) the limited availability and continuing fragmentation (mostly on private lands) of such habitat in the County, and (2) the period of time required for development of significant amounts of new late-seral forest (approximately 50 years) or old-growth forest (greater than 100 to 200 years) on protected state and federal lands (USDI and USDA, 1994; FWS, 1997). In contrast, primarily in the long term, Alternatives 2, 2a, 3, and 4 may contribute to limited cumulative benefits to such species due to anticipated overall increases in the acreage and connectivity of such habitat in the Project Area combined with development of LSH mainly on protected state and federal lands (Table 3.9-1 and Figures 3.10-7 to 3.10-10). Of these alternatives, Alternative 3 would contribute the most cumulative benefit, followed by Alternatives 4, 2, and 2a. Permanent establishment of the Headwaters Reserve or the 63,000-acre Reserve would make significant contributions to reducing fragmentation and improving connectivity on this landscape.

Potential benefits to LSH associates in the vicinity of the Project Area as described above would probably be limited largely to the immediate area of the PALCO ownership. As described in Section 3.10.1.2, remaining LSH (particularly uncut and residual old growth) on PALCO lands is already highly fragmented and would likely continue to be isolated from other large contiguous patches of similar habitat in Humboldt County. LSH development on private lands, including those surrounding the Project Area, would likely be limited largely to potential set-asides under other HCPs (see Spotted Owl section below) and riparian areas surrounded by intensively managed lands. Notably, based on recent listing of the coho salmon in northern California, the level of protection of riparian corridors under all the alternatives and throughout the range of this species is expected to increase over current conditions, as described in Section 3.7.3.3 under Riparian Lands. Thus, connectivity of riparian areas in the Project Area and Humboldt County may improve somewhat in the long and extended long term. However, these potential improvements would still be limited for wildlife use by the predominant, surrounding managed landscape.

Marbled Murrelet

With respect to the alternatives, cumulative effects on marbled murrelet populations in the bioregion would likely be related primarily to further loss and fragmentation of suitable and possibly suitable (redwood-dominated) habitat considered essential to the species by the FWS, but also loss and fragmentation of unoccupied uncut and residual old-growth forest (FWS, 1997). As described in Section 3.10.2.1, only Alternatives 2, 2a, and 4 would be considered likely to significantly impact marbled murrelet populations adversely in the bioregion, and only in the short term, due to net loss of suitable or possibly suitable habitat (Table 3.10-9). As a result of Alternatives 2, 2a, and 4, based on a conservative worst-case analysis, it is estimated that from 17 to 23 percent of the occupied habitat in the bioregion would be lost under the HCP, potentially resulting in a corresponding loss of reproduction success. This loss translates to a loss of 3.1 to 6.1 percent of the Zone 4 habitat and 0.8 to 2.0 percent of the three-state region habitat (see Section 3.10.2.3, Marbled Murrelet, and Appendix N). However, effects under Alternatives 2, 2a, and 4 would be expected to be minimized,

mitigated, and less than significant in the long term due to HCP mitigation and other measures proposed under these alternatives, as well as development of potentially suitable habitat for murrelets on protected federal lands, as described previously in Section 3.10.2.3. As summarized in Section 3.10.2.3, substantial amounts of potentially suitable habitat for murrelets on federal and other protected lands (primarily in LSRs and CHUs) is not expected to develop for at least another 50 years (FWS, 1997). Furthermore, relatively little take of murrelets would be expected to occur at these landscape levels in the reasonably foreseeable future, as described below.

In terms of other non-federal or federal actions potentially affecting marbled murrelets in the bioregion and three-state region, no take of murrelets is allowed except as otherwise permitted under an ITP and HCP. With respect to cumulative impacts, it is assumed that potential take of murrelets under an approved PALCO HCP/ITP and existing and future ITPs and HCPs would be coordinated by federal and state agencies to avoid cumulative significant long-term effects on murrelet populations that could potentially threaten the three-state or zone populations. Currently, several industrial timber companies are engaged in various stages of discussions of potential HCPs with the FWS and NMFS. Not including PALCO, about 1.2 million acres could be covered by HCPs in the future, with about 700,000 acres in Humboldt County, 30,000 acres in Del Norte County, and 470,000 acres in Mendocino County. The acreages of THPs and potential THPs that are either ongoing or recently completed in Humboldt County are described in Section 3.2.

Northern Spotted Owl

Cumulative effects on the northern spotted owl with respect to this analysis would be related to cumulative potential take of owl sites and loss of habitat that could threaten owl populations in the California Coast Province. As described in Section 3.10.2.1, any effects on spotted owls would be expected to be minimized and mitigated to less than significant. Under Alternatives 2, 2a, and 4, none of the alternatives would be expected to threaten northern spotted owl populations in the Project Area or in the California coast province. With respect to other non-federal or federal activities potentially affecting owls in the province, no take of northern spotted owls is allowed except as otherwise permitted by the FWS (e.g., under an ITP and HCP). Regarding cumulative impacts of take of northern spotted owls in the Province, it is assumed that take under an approved PALCO HCP/ITP and other existing or future HCPs/ITPs would be coordinated by federal and state agencies to avoid threats to northern spotted owl populations. Thus, a PALCO HCP potentially approved by the FWS would not be expected to contribute to significant cumulative effects on this subspecies. Notably, two HCPs addressing the northern spotted owl have been completed and accepted by the FWS in Humboldt County (for Simpson Timber Company lands located adjacent to PALCO and Elk River Timber Company lands in the Project Area and one other HCP addressing spotted owls on approximately 1,300 acres in Humboldt County) and other industrial companies are currently developing HCPs addressing the northern spotted owl on lands in Humboldt County (see above).

AB 1986 Conditions

Under the HCP, either the Owl Creek or the Grizzly Creek MMCA would be available for harvest. AB 1986 conditions the expenditure of state funds for acquisition of the Headwaters Forest and other lands on the inclusion of several provisions in the final HCP, the IA, and the ITPs intended to strengthen protections for covered species. Should PALCO include

those provisions in the final HCP, state monies would be appropriated to the state Wildlife Conservation Board to fund the state's share of the cost of acquiring approximately 7,500 acres of private forest lands, including the Headwaters Forest. Under AB 1986, the Owl Creek MMCA would be protected from harvest for the life of the ITPs, and the Grizzly Creek MMCA would be protected for five years from the date of the adoption of the final HCP. AB 1986 also appropriates additional funding for the future opportunity to purchase Owl Creek. Any funds remaining from those appropriated for the purchase of the Owl Creek MMCA could be used to purchase tracts of the Elk River Property and previously unlogged Douglas-fir forest land within the Mattole River watershed.

The state managing agency and management prescriptions are unknown, and these acquisitions are somewhat speculative. Considering the legislative intent behind AB 1986, it is assumed that purchased lands would be managed similarly to the Headwaters Reserve. These anticipated acquisitions would protect old-growth and residual redwood stands and some Douglas-fir stands within these tracts in perpetuity.

The Owl Creek MMCA would protect 925 acres (including 318 acres of old-growth redwood and 247 acres of residual redwood). The Grizzly Creek MMCA would protect 993 acres (including 118 acres of old-growth redwood and 530 acres of residual). In addition, the property-wide RMZ prescriptions could result in more trees remaining in some riparian zones. Less disturbance within the riparian zone could result in more rapid improvement in habitat quality and more quickly achieve fully functioning aquatic conditions which would be beneficial to amphibians and other species that use the riparian zone and stream habitat. The combined effect of land acquisition and additional protections on the landscape would reduce late-seral forest fragmentation, thus enhancing interior forest conditions, reducing edge and enhancing interior forest connectivity. Additional late-seral forest habitat remaining on the landscape would benefit late-seral dependent species such as marbled murrelet and northern spotted owl. It would also benefit snag-dependent species such as woodpeckers and cavity nesting species such as Vaux swift, as well as species which rely heavily on downed wood. Retention of interior forest habitat would also reduce habitat quality for species favoring openings and edge (e.g., deer, elk); however, edge and open space habitats are quite common throughout the PALCO ownership and surrounding landscape.