APPENDIX H

BIOLOGICAL EVALUATION OF SENSITIVE SPECIES

ARAPAHO AND ROOSEVELT NATIONAL FOREST AND PAWNEE NATIONAL GRASSLAND

I. INTRODUCTION

Biological evaluations (BEs) are Forest Service required evaluations of all Forest Service programs and activities planned, funded, executed or permitted for possible effects on proposed, endangered, threatened and sensitive species. The process and resulting document are similar to a biological assessment (BA) The BA presented in Appendix M addresses the federally listed or proposed species that could potentially be affected by implementation of the Land and Resource Management Plan (LRMP) This BE estimates the effects of implementing the Plan on Forest Service identified sensitive species

II. PROPOSED ACTION

The proposed action is implementation of the Plan. Included are those activities and projects described in the Environmental Impact Statement (EIS) and LRMP for the Arapaho and Roosevelt National Forests and Pawnee National Grassland

III. STATUS AND BIOLOGY OF LISTED SPECIES

The species currently documented as occurring on NFS lands, suspected to occur on NFS lands but unconfirmed, or may not occur on NFS land but may be impacted by FS management actions (Appendix J) are assessed.

Species Currently Documented to Occur on NFS Lands

Birds

common loon *Gavia immer*

Occurrence: ARNF and PNG

Habitat: Loons breed on large (greater than 9 acres), clear lakes at elevations of 5000-9000 ft Lakes need to be ice free for a minimum of 4 months with at least partially forested shorelines Lakes need to be large enough to provide runways for flight, deep enough to sustain fish populations and clear enough for loons to see prey. Breeding territories need secluded shoreline that will protect nest from wave action and an area of shallow water with emergent vegetation within a protected cove or bay for chick rearing Loons frequently nest on islands During winter and migration, loons forage alone during the day, but gather at night into flocks of up to 100 individuals During migration, loons

forage at staging lakes along migration paths Loons winter in coastal areas (Spahr 1991)
Threats: Loons avoid lakes with high levels of human activity, fluctuating water levels, turbid water, and no protected coves Cattle grazing along shorelines (nesting habitat) could also be a threat. Loons primarily eat fish, but also eat amphibians, crayfish, leeches, aquatic insects and some vegetation. Disturbances to food sources could also be a threat to loon populations.

northern goshawk *Accipiter gentilis*

Occurrence ARNF

Habitat In Colorado, northern goshawks occur in mature stands of aspen, lodgepole pine, and spruce-fir forests at elevations of 7500 - 11000 feet. Goshawks prey on birds and small mammals. Goshawks can be summer visitors or year round residents on various districts, utilizing aspen and coniferous forests, and to a lesser degree marshes, mountain meadows, and riparian areas for foraging Breeding records exist in aspen, lodgepole pine, and mixed coniferous forests (USDA Forest Service 1995).

Threats: Goshawks are impacted by fragmentation of forested habitat and by habitat alterations that affect their prey base Grazing has the potential of reducing prey cover/habitat. Goshawks also are sensitive to human disturbances during nesting periods More of a concern is logging of mature to old growth stands, reducing suitable nesting and foraging habitat.

ferruginous hawk *Buteo regalis*

Occurrence ARNF and PNG

Habitat. Ferruginous hawks are found over the western half of North America wherever the combination of nesting sites in deciduous and coniferous trees, rock ledges and an abundant rodent supply are found They are only summer residents in Canada. They are year round residents in Colorado. They prefer habitats of deciduous trees, riparian zones at lower elevations in the foothills and on the plains. They are highly territorial and require approximately 10 square miles per nesting pair Ferruginous hawks prey primarily on lagomorphs (60-90%) and rodents with a few birds and reptiles taken (USDA Forest Service 1981)

Threats Ferruginous hawks are very sensitive to human disturbance, especially during nesting/fledging periods Road closures and other protective measures are recommended to keep birds from being disturbed Loss or scarcity of nest trees could also negatively effect populations, as well as a decrease in prey bases

osprey *Pandion haliaetus*

Occurrence ARNF and PNG

Habitat This large fish eating raptor utilizes forested wetlands along larger rivers, lakes and reservoirs Ospreys food source is primarily fish, hunting from snags or large trees next to water bodies Ospreys require large diameter snags or live trees to build their nests with an unrestricted view Nests are constructed near large bodies of water Ospreys migrate to the southern U.S , Mexico and central america in winter (USDA Forest Service 1981)

Threats: Ospreys continue to recover from pesticide/toxins that decimated populations in 1970's-80's. Development around suitable water bodies could negatively effect populations through loss of suitable perches, nesting disturbance, and prey source depletions. Impacts which negatively effect prey populations could also affect Osprey (e.g., whirling disease, loss of water quality).

merlin Falco *columbarius*

Occurrence: ARNF and PNG

Habitat: This small falcon is a resident of boreal forests of Canada and Alaska. It is widely distributed in North America but it is not common. They nest south to northern Utah, southern Wyoming and parts of Colorado, and in winter move south to Gulf States and northern South America. Merlins prefer open areas to hunt and primarily coniferous forests in which to nest The few nests which have been documented in Region 2, however, have been mostly in deciduous woodlands along rivers east of the mountains In winter they frequent open parkland and prairies with a few scattered trees. Merlins use old nests of magpies and crows in deciduous or coniferous trees, especially along a watercourse. Merlins are aggressive defenders of their territories, however, little specific information is available. Merlin prey upon small to mid-sized birds, and most birds are captured on the wing Merlins periodically eat mice, insects, reptiles and amphibians (USDA Forest Service 1981).

Threats: Because little is known about this bird, it is difficult to asses all possible threats As prey source is largely migratory, any negative effects on migratory passerines could be detrimental to Merlin populations. Suitable habitat loss could also have a negative effect on populations It in unknown how human disturbance to Merlins affects nesting or fitness

American bittern *Botaurus lentiginosus*

Occurrence: ARNF

Habitat: Bitterns are widespread throughout North America inhabiting swamps, marshes, reedy lakes, slow moving rivers, moist meadows and dense riparian thickets Nests are in wet areas with dense cover. Bitterns prey upon fish, tadpoles and frogs with some lizards, salamanders, leeches, insects and mice. They are entirely carnivorous (USDA Forest Service 1981).

Threats Bitterns are very shy, reclusive, and sensitive to human disturbances. Bittern nesting success could be negatively influenced by human disturbances As bitterns are strictly wetland/riparian birds, any degradation or negative affects on riparian systems could affect bitterns Negative affects upon prey sources will also have a detrimental affect on bittern populations (e.g., amphibian populations declines).

white-faced ibis *Plegadis chihi*

Occurrence: ARNF and PNG

Habitat: White-faced ibis are primarily a western species inhabiting marshlands and riparian habitats. These birds winter in the southern U.S. and Mexico Habitat is almost exclusively ponds, marshes, muddy pools, stream margins and river banks for breeding, feeding and resting Nesting platforms are made from dense tules, reeds and cattails.

Nest is sometimes a floating structure attached to surrounding vegetation Birds are very colonial often nesting in rookeries of hundreds of birds in suitable habitat. This wading bird feeds by probing in the mud along streams and shallow ponds on the prairie Food is largely invertebrates including earthworms, insects, leeches, small mollusks and small fish and frogs (USDA Forest Service 1981)
Threats: Draining of wetlands can be detrimental to large numbers of this species due to their nesting habits. Nesting disturbances, reductions in prey sources or degradation of habitat are likely to reduce population numbers. Concerns over migration corridoors and wintering habitats should also be reviewed.

mountain plover *Charadrius montanus*

Occurrence: PNG
Habitat: Found on the high plains and arid regions of western valleys and hills, usually found far from water. Generally avoids mountainous areas and prefers areas dominated by blue grama grass and buffalo grass In winter, congregates in flocks of 15 to several hundred on alkali flats, plowed ground, razed pastures, or other open arid habitats Consumes mostly, if not entirely insects caught on the dry plains and prairies, primarily grasshoppers, crickets, beetles and flies Fairly tolerant of disturbance except during nesting and brooding periods. Population declining (USDA Forest Service 1991).
Threats Plover require short grass habitat for nesting, and as native (or stocked) ungulate grazing decreases on nesting grounds, so does useable habitat Loss of wintering habitat in California's Central Valley is also a concern (USDA Forest Service 1994)

upland sandpiper *Bartramia loicauda*

Occurrence: PNG
Habitat. Inhabits grassy open areas, ranging from sandy, sparsely vegetated flats to open, grassy bogs and muskeg. Mot often found in rich pastureland, hayfields, and alfalfa fields. During the breeding season alights on fenceposts, telephone poles, and other elevated sites. During migration, frequents alfalfa fields, pastures, prairie dog towns, and rarely shores and mudflats Requires open grasslands. Prefers to forage where the grasses are low and open enough to provide good visibility, and where grasshoppers and crickets are most abundant Also eats weevils, ants, berries, waste grain, and seeds of grasses and weeds (USDA Forest Service 1991)
Threats Once abundant, now uncommon Past hunting reduced populations and agricultural practices reducing prey sources also inhibit population expansion

western yellow-billed cuckoo *Coccyzus americanus*

Occurrence PNG
Habitat Found in moderately dense thickets along riparian zones, as well as dense second growth woods, overgrown lots and shrubby areas. Avoids higher altitudinal areas and extremely dense woods Feeds in foliage consuming insects, mostly caterpillars and fall webworms, but also consumes spiders, some small fruits, frogs an possibly small lizards (USDA Forest Service 1991)

Threats: Loss of riparian and shrubby habitats. Habitat fragmentation, loss of prey sources.

Baird's sparrow *Ammodramus bairdii*

Occurrence: PNG

Habitat Favors large areas of prairie grassland with tangles of old and new grasses and patches of shrubs such as snowberry, wolfberry, rose, and willow. Also inhabits ungrazed or lightly grazed mixed-grass prairies, moist meadows, tall-grass prairies associated with wetland, drier rangelands, fallow and stubble fields, and hayfields. May abandon an area after plowing, burning, mowing, or raking Requires relatively undisturbed or reclaimed grassy prairie with scattered shrubs. Forages on the ground for a variety of seeds throughout the year, but consumes many insects in summer. Considered a migrant in our area (USDA Forest Service 1991).

Threats Uncommon on range and breeding population has been reduced. Increasing farmlands or plowing of shrubby fields and meadows could reduce habitat. Grazing of habitat could also reduce populations

greater sandhill crane *Grus canadensis*

Occurrence: ARNF

Habitat These birds are distributed throughout western North America Nesting habitat consists primarily of large marshes and willow-lined drainages of mountain meadows up to 9,500 feet Marshy areas are preferred for nesting An open area with shallow water, dense vegetation, such as willows, sedges, grasses, or rushes is optimum Cranes are strongly territorial with territories ranging from one half mile to one mile for breeding pairs. Feeds extensively on vegetal food, eating roots, bulbs, grains and berries as will as insects, frogs, lizards, snakes and mice (USDA Forest Service 1981)

Threats Cranes cannot tolerate disturbance during the incubation and chick rearing periods Degradation of wetlands could also be detrimental to populations Greater concerns are with maintenance of migrational corridoors.

long-billed curlew *Numenius americanus*

Occurrence: ARNF and PNG

Habitat Curlews are primarily a plains species. They prefer to nest on open bufflao-grama grass flats from Texas to Montana, but occasionally nest in wheat stubble or open fields. Most birds are migrants not nesting, however some do stay to nest Nests on open prairies with nest on bare ground sometimes near a cactus clump Nesting material limited to a few small sticks and other dead organic material Curlews are often quite gregarious in nesting However, they are also very defensive of nest site from other bird species After chicks are large enough, they are moved from nest site to areas with small shrubs and forbs to feed and for cover. Birds begin to congregate as migration time approaches. Diet consists of grasshoppers, beetles, caterpillers, other insects, spiders and worms. Feeding in summer occurs mainly in the forb-midgrass areas (USDA Forest Service 1981).

Threats: Grazing in nesting areas could have a negative effect on nest success Overgrazing of feeding and fledging areas (forb-midgrass) could reduce cover and food

for adult and fledglings. Any manipulation on shortgrass flats should be carefully reviewed.

black tern *Chlidonias niger*

Occurrence: ARNF and PNG

Habitat Mostly a migrant in Colorado, but has been know to nest here Inhabits freshwater marshes, wet meadows, marshy lakes in summer, and sandy coasts in winter and during migration Nests in either a cup-shaped nest of dead grass or in a hollow on floating march vegetation (sometimes atop a muskrat lodge) Feeds upon grasshoppers, locusts, dragonflies, and on fish, crayfish, frogs and tadpoles in shallow water. Black terns are colonial (USDA Forest Service 1981)

Threats: Grazing or human disturbance in nesting areas could reduce nesting success Loss of ponds or riparian food sources could also have a detrimental effect Negative affects on prey base could also decrease tern fitness

western burrowing owl *Athene cunicularia*

Occurrence ARNF and PNG

Habitat Common throughout west where vacant prairie dog holes are available in prairie regions Also use rabbit or badger holes. In winter they migrate to southern U.S. and most of Mexico Owls are territorial requiring 1 ac to 1.8 ac. per nesting pair. Main diet consists of grasshoppers, some beetles and moths Also takes small birds, mice and some crustaceans (USDA Forest Service 1981)

Threats Owls themselves are fairly tolerant of human disturbances, but are dependent upon prairie dogs to provide suitable nesting and resting sites. At time of writing, prairie dogs have been petitioned for protection because of severe range reductions Owls fitness is directly tied with prairie dog population status.

boreal owl *Aegolius funereus*

Occurrence: ARNF

Habitat Boreal owls occupy boreal forests throughout the northern hemisphere. In North America, they are found in the northern forests of Canada and the U.S., with the southern Rocky Mountain populations being the southernmost extent of their range In Colorado, boreal owls inhabit late successional stands of subalpine fir and Engelmann spruce Lodgepole pine, aspen and mixed conifer stands may also be used. The boreal owl is a secondary cavity nester, usually occupying a cavity excavated by a pileated woodpecker or flicker Nest cavities are typically in snags with diameters greater than 10 inches Foraging activity occurs throughout mature stands, but may be concentrated around small, dispersed patches of high quality foraging habitat Voles and forest mice make up the bulk of the diet, but shrews, chipmunks, squirrels, birds and insects may also be taken (Hayward and Verner 1994) Average home ranges are described (Hayward and Verner 1994) as approximately 2470 acres, with some estimates as high as 8373 acres

Threats Logging practices in boreal forests could reduce nesting and roosting habitats as well as reduce prey populations Habitat fragmentation may pose barriers to gene flow between boreal forests, which may be critical depending upon the boreal owls ability to disperse.

flammulated owl *Otus flammeolus*

Occurrence: ARNF

Habitat: The flammulated owl is a small insectivorous neotropical migrant of ponderosa pine forests. They are secondary cavity nesters selecting cavities in the largest and oldest snags and live trees available Foraging of insects is often concentrated in 1-4 acre open patches of mature ponderosa pine on mid-slopes or ridge tops with southerly aspect Daytime roosting occurs in dense thickets or large wolfy trees with a sprawling form. Mistletoe may enhance the usefulness of roost trees (Hayward and Verner 1994) Owls have also been observed using dense second growth stands for calling and resting areas Flammulated owls are territorial, and the most common species found during owl surveys (Hughes and Petterson 1994) This species is documented as breeding on the Arapaho/Roosevelt National Forests (Hayward and Verner 1994).

Threats: Loss of old growth ponderosa stands to logging, crown fires and development pose the greatest threat to the flammulated owl on the ARNF. Loss of wintering habitat and pesticide use in southern Mexico is also a concern.

black swift *Cypseloides niger*

Occurrence ARNF

Habitat· In Colorado this species is most common in the southwest counties of Gunnison, Montrose and Delta as well as the northeastern counties of Boulder and El Paso (Anderson and Righter 1992) Nesting occurs on steep cliffs near or behind waterfalls. Foraging for insects occurs in open areas, presumably often near wetlands or meadows with high insect populations.

Threats: Loss in foraging areas (riparian zones) due to draining or development could negativly effect populations Loss in nesting habitat could also deccrease populations. Wintering habitat concerns should also be considered.

Lewis' woodpecker *Melanerpes lewis*

Occurrence ARNF

Habitat Open cottonwood drainages and parklike ponderosa forests are the major breeding habitats Other forest types similar to the open structure of mature ponderosa pine are utilized Both dead and live trees are used as nest sites and as foraging perches. Scattered snags or live trees and brushy undergrowth must be available for stable populations Lewis' woodpeckers feed on insects, including flies, beetle larvae, caterpillars, and ants. In winter, acorns are important for food (USDA Forest Service 1981).

Threats: Loss of breeding habitats (old growth ponderosa parks) could decrease population numbers. Loss of snags could also hurt populations Any negative affects on prey populations would also have a negative affect on woodpecker populations

three-toed woodpecker *Picoides tridactylus*

Occurrence ARNF

Habitat The three-toed woodpecker is distributed throughout the forested regions of Colorado Primary habitat is spruce-fir forests, but the species may also inhabit ponderosa pine, lodgepole pine and mixed conifer stands (Hoover and Wills 1984) This

species may react favorably to insect infestations or wildfire (Andrews and Righter 1992) The basic habitat requirement for three-toed woodpeckers are mature and old growth forests with abundant snags for foraging and nesting Snags used for nest cavities are usually at least 12 inches in diameter and 15 feet in height. Home range size has been estimated to be approximately 100 acres of good quality old growth habitat (Hoover and Wills 1984).

Threats· Loss of habitat through continued fire suppression could reduce favorable foraging and breeding conditions. Recreational development in habitat could reduce distribution Silvicultural practices designed to reduce insect (beetle) infestations could hurt populations

olive-sided flycatcher *Contopus borealis*

Occurrence. ARNF and PNG

Habitat: This neotropical migrant breeds in mature spruce-fir and Douglas fir forests (Andrews and Righter 1992). It's preference for using the largest snags for perching may be a factor contributing to abundance (Finch 1992). It has also been associated with steep slopes (Andrews and Righter 1992) and with bogs or meadows (Finch 1992). Flycatchers feed entirely on flying insects. Bees are the major food item, and beetles, bugs, moths and grasshoppers are also taken Hawking is done from a high exposed tree branch.

Threats: The olive-sided flycatcher does not normally occur near areas of heavy human activity. It is also strongly dependant on riparian systems. Loss of large snags or uneven aged stands could hurt populations.

pygmy nuthatch *Sitta pygmaea*

Occurrence ARNF

Habitat: The pygmy nuthatch is most often associated with mature ponderosa pine stands, but Hoover and Wills (1984) also cite habitat use in subalpine forests, lodgepole pine and aspen In all forested ecosystems, this species nests in natural or woodpecker created cavities when available. It may also excavate its own cavities when other cavities are not present Home range size is described by Hoover and Wills (1984) as being approximately 3 acres per breeding pair It altitudinally migrates during the winter months They are very gregarious outside of breeding season. Food is mainly insects which is gleaned from bark. Remainder of food is conifer seeds. During poor pine cone crop years it switches from pine to spruce fir seeds.

Threats: Mature and old growth stands are important for this species, loss of habitat could be detrimental to populations Negative impacts on food sources could also hurt populations

golden-crowned kinglet *Regulus satrapa*

Occurrence ARNF and PNG

Habitat Utilizes conifers, Douglas fir, spruce-fir, lodgepole and aspen for feeding and nesting Feeds upon insects and their eggs, also eats fruit and seeds Food is gleaned from foliage, small twigs, limbs and bark of trees and shrubs They may also hover to clean food from vegetation. Fairly uncommon summer resident on ARNF (USDA Forest Service 1995)

Threats Tolerant of ecological change in winter and during migration, but has little tolerance to changes on nesting grounds. Negative affects upon prey sources could also hurt populations.

loggerhead shrike *Lanius ludovicianus*

Occurrence: ARNF and PNG

Habitat This species prefers relatively open country with available lookout perches Roadsides, savannahs, chapparral and deserts are common habitats. Definatly prefers areas with low density crown cover. Shrub and lookout perches adjacent to feeding areas are important to this species Territories are maintained year-round and usually have a radius from 400-600m Territory and home range are synonomous for this species. Shrikes feed almost exclusively on animal life. Large insects such as grasshoppers, beetles, caterpillars and wasps dominate the diet. Small rodents and birds area also taken Prey is impaled upon barbed wire or thorns prior to consumption (USDA Forest Service 1981).

Threats· Loss of prey sources are the main threat to this species. Loss of roost sites could also hurt populations

fox sparrow *Passerella iliaca*

Occurrence: ARNF and PNG

Habitat Inhabits edges and thickets of deciduous (aspen, willow) and coniferous (spruce, ponderosa pine, lodgepole pine) forests Prefers willow streams and beaver ponds. Species is territorial Feeds on insects by scratching in fallen litter and eats seeds Feeds in shade of shrubs and bushes (USDA Forest Service 1995)

Threats Not tolerant of disturbance or ecological change on breeding grounds Water level fluctuations could flood nest sites close to water. Destruction of shrubby habitat along riparian cooridors could hurt populations Negative impacts on prey sources could also harm population levels.

purple martin *Progne subis*

Occurrence ARNF and PNG

Habitat: Population breeds from southern Canada to northern Mexico, but populations within this range are small and scattered. Birds nest in natural or woodpecker created cavities in tree trunks. Large aspens adjacent to parks, lakes, wetlands or meadows are preferred. Winters in South America. Feeds over open grassy areas or over water Colonial, but strongly defensive of individual nest sites. Insectivorous, catches prey while flying (USDA Forest Service 1995)

Threats Loss of snags/nest trees could negatively affect populations. Degradations of feeding habitats (meadows, riparian) could also reduce populations Impacts on prey species also important

Mammals

dwarf shrew *Sorex nanus*

Occurrence: ARNF and PNG

Habitat: Primarily alpine and subalpine areas with rock slides and talus. Low elevation sage flats and pinyon-juniper are also potential habitat Also occurs in various coniferous stands. Tolerant to grazing and logging Less restricted to moist areas than other shrews Feeds on vertebrate carrion as well as insects and spiders (Fitzgerald, 1994).
Threats: Heavy development of habitat is main concern for harming populations Loss of prey source could also have negative impacts on populations

pygmy shrew *Microsorex hoyi montanus*

Occurrence ARNF
Habitat: Inhabits a variety of habitats, subalpine forests, clear-cut and selectively cut stands, forest-meadow edges, boggy meadows, willow thickets, aspen-fir forests, and subalpine parklands Active both night and day, it preys upon carrion and small invertebrates (Fitzgerald, 1994).
Threats Populations may be discontinuous islands from glacial times Development of habitat may be detrimental to populations. Negative impacts on prey sources may harm populations Needs up to twice body weight in food per day.

Townsend's big-eared bat *Plecotus townsendii*

Occurrence ARNF
Habitat Occupies semidesert shrublands, pinon-juniper woodlands, and open montane forests Associated with caves and abandoned mines for day roosts and hibernacula, but will use crevices on cliffs for refuge Relatively sedentary, and do not move long distances from hibernacula to summer roosts, nor do they forage far from day roosts. These bats are late flyers, emerging well after dark Caddisflies appear to be staple of diet, which also includes moths, flies and other insects They are gleaners, picking insects from leaves Much foraging occurs over water, along margins of vegetation, and over sagebrush. Avoid mist nets, and are difficult to detect unless roost sites are found (Fitzgerald, 1994).
Threats Very sensitive to disturbance, and will leave caves or mines where human harassment occurs even though such disturbance is unintentional Also very sensitive to humidity and temperature of roosts and hibernacula, this seems to be a limiting factor in distribution Winter mortality is also a high factor in populations Caves and mines should be closed or access strictly limited to protect the species

Preble's meadow jumping mouse *Zapus hudsonius preblei*

Occurrence ARNF
Habitat Occurs in riparian meadows where tall grass/shrubs are common Has been known to move in order to find suitable moist habitats in hot, dry weather. Occupies similar habitats as voles, but does not use or build runways, instead "crawls" through vegetation. Feeds on animal matter in spring when in comes out of hibernation, and feeds on seeds and vegetable matter rest of season (Fitzgerald, 1994).
Threats Populations in Colorado are thought to be disjunct relic populations from ice age when more tall grass prairie inhabited region Distribution of species is strictly limited to a few island populations Very sensitive to conversion of wetland meadows to irrigation reservoirs, or any other loss of wet meadows Preyed upon by a number of

larger species, and has very high winter mortality.

ringtail *Bassariscus astutus*

Occurrence: ARNF

Habitat. Ringtail inhabits arid and semiarid habitats throughout the Southwest. Associated with rocky canyon country and foothills areas of pinon-juniper woodlands, montane shrublands, or mixed conifer-oakbrush. Ringtails are omnivorous and their diet varies with food availability Feeds on various small mammals including deer mice, ground squirrels, woodrats, lagomorphs, and bats. Mammals, fruits, and arthropods compose over 80% of diet. Mostly noctural and shy, and seldom observed even in areas where they are relatively common. Den in rock crevices, under large boulders, in hollow logs and trees, or in old buildings. They are considered to be more numerous in Colorado than believed (Fitzgerald, 1994).

Threats Automobile mortality and natural predation by great-horned owls, domestic cats and dogs are significant mortality factors. They are considered a fur-bearing species in Colorado. Because of their shy behavior, increased human disturbance in their habitats could unknowingly have a negative effect on populations

marten *Martes americana*

Occurrence ARNF

Habitat Pine marten are most often associated with old growth lodgepole pine and spruce-fir forest associations Talus slopes and rock slides may also be utilized for foraging Small mammals, especially red squirrels, voles and snowshoe hare comprise the bulk of the pine marten's diet but birds, eggs, amphibians, reptiles, insects and fruits are also consumed (Hoover and Wills 1984) Martens occur in very low densities for a species of its size, and does not cross open areas for dispersal (Ruggiero, 1994).

Threats Because of it's avoidance of large open areas, most populations in Colorado are effectively isolated with many barriers to gene flow Large clearcuts, or destructive fires can cause temporary dispersal barriers Low fecundity and low densities also increase population risks Reductions in prey sources could have further effects on marten populations

swift fox *Vulpes velox*

Occurrence PNG

Habitat A common grassland species, populations have appeared to be stable over the last few years. Fox has been extirpated over much of its former range. Although it will utilize mid-grass areas, its habitat preference is heavily grazed grassland, sparsely vegetated habitats on sloping plains, hill tops, and other well-drained situations. Feeds on various rodents, prairie dogs, birds, eggs and insects (Fitzgerald, 1994).

Threats If Mountain Plover populations decrease too much, then swift fox control measures might have to be implemented Fox is vulnerable to other predators and prefers these open habitats with few other carnivorous species and long sight distances for predator detection (USDA Forest Service 1994)

Amphibians

At time of writing, cause of widespread reduction in amphibian populations, especially frogs and toads, has not been determined

tiger salamander *Ambystoma tigrinum*

Occurrence ARNF and PNG

Habitat: The tiger salamander is the only salamander found within Colorado. It may inhabit virtually any habitat type up to 12000 feet provided that there is a non-flowing body of water nearby for breeding The breeding ponds may be as small as 10 feet across but must be at least 18 inches deep and perennial so that larval salamanders can complete development into the terrestrial form. Water quality does not seem to be a limiting factor, since successful breeding has occurred in ponds cited as being badly polluted with cow manure (Hammerson 1986)

Threats: The tiger salamander does not respond well to introduction of fish (trout) species, as young salamanders are predated. Accidental and intentional fish stocking in ponds inhabited by salamanders could destroy populations. Draining of ponds will also have a negative effect on salamander populations.

boreal western toad *Bufo boreas boreas*

Occurrence: ARNF

Habitat. Prefers mountain meadows and riparian deciduous vegetation at lower elevations Requires open water of some type for breeding Buries itself in loose soil or seeks shelter in burrows of gophers, ground squirrels, and other animals. Waits for prey (moving insects) on surface of ground or in shallow burrows (USDA Forest Service 1981)

Threats· Loss of riparian habitat could have negative effects on toad populations.

northern leopard frog *Rana pipiens*

Occurrence· ARNF and PNG

Habitat The northern leopard frog inhabits riparian areas, ponds, marshes, lakes and wet meadows Wet areas with rooted aquatic vegetation are especially favored. Breeding takes place in shallow non-flowing bodies of water at elevations up to 10500 feet (Hammerson 1986). During summer, adults prefer grassy areas, wet meadows and swampy areas surrounding pools and marshes Areas with 100% vegetative cover are preferred Frogs can cover large distances (3 miles) in dispersal and feeding forays. Feeds mostly on arthropods beetles, crickets, grasshoppers, aphids, ants, spiders, flies, caddisflies, etc Also eats worms, snails and slugs. Tadpoles are herbivorous and scavengers Prime feeding grounds for larger frogs are insects in forested, drier parts of habitat (USDA Forest Service 1981)

Threats Cattle grazing in marshy meadows and riparian habitats may remove vegetative cover Draining or flooding of marshes will also have a negative effect.

wood frog *Rana sylvatica*

Occurrence: ARNF

Habitat: Found in montane plant communities of northcentral Colorado It is adapted (and restricted) to cold, protected ponds at elevations between 8000 and 9700 feet. It utilizes tree-lined ponds with tall trees close to waters edge Breeds and lays eggs in ponds, then disperses into trees surrounding pond. Feeds chiefly on insects and to a lesser extent on snails, slugs, and earthworms. Newly transformed froglets may take aquatic forms of invertebrates (USDA Forest Service 1981)

Threats: Loss of vegetation causes a reduction in breeding habitat, which can be caused by grazing or recreational development Introduction of predatory fishes can also cause dramatic population declines in frogs.

Reptiles

lined snake *Tropidoclonion lineatum*

Occurrence ARNF

Habitat: Flat plains grasslands, canyon bottom grasslands and grassy vacant lot and gullies in cities, below 6000 feet elevation (Hammerson 1982).

Threats: Any habitat elimination, modification or disturbance is of concern

yellow mud turtle *Kinosternon flavescens flavescens*

Occurrence: PNG

Habitat: Ranges throughout south-central U.S and northern Mexico, and occurs in extreme eastern Colorado at elevations below 4500 feet (Hammerson 1982) Found in riparian, open woodland and semi-arid grassland, cottonwoods and willows Requires ponds, rivers, marshes, permanent or semi-permanent lakes or streams. Prefers muddy water but is on land during rainy season Consumes small mollusks, aquatic plants, and insects (USDA Forest Service 1981).

Threats: Riparian degredation from grazing and tree/shrub removal could hurt habitat requirements Irrigation projects or similar water diversion activities could decrease habitat Negative impacts on prey sources could also decrease populations

Fish

Colorado River cutthroat trout *Oncorhyncus clarki pleuriticus*

Occurrence ARNF

Habitat: Found in cool, clear water with well vegetated streambanks for cover and bank stability Instream cover in the form of rocks, pools, and downed trees is also important Occurs in Colorado River drainages. Needs clean gravel bars for breeding and egg laying (USDA Forest Service 1981).

Threats Hybridization with non native species has compromised genetic purity of species Habitat alteration from mining, grazing, logging and water diversions have also negatively impacted populations Degradation of stream and riparian habitat, specifically loss of habitat components and increased water temperature, also can create suboptimal conditions for greenback cutthroat trout.

flathead chub *Hybopsis gracilus*

Occurrence ARNF

Habitat· Inhabits clear streams and rivers with sand or gravel bottoms. Chub is able to withstand turbid and silty conditions, and high water temperatures. Chub is omnivorous, feeding on a variety of vegetation, crustaceans, and insects Occurs in larger streams and rivers on plains and possibly foothills of Eastern Slope (USDA Forest Service 1981).

Threats. Varying water levels from irrigation or water holding projects could negatively affect populations through habitat destruction (low water levels) and prey source depletions. Introductions of exotic species (carp) could reduce useable habitat and out compete chub

plains topminnow *Fundulus sciadicus*

Occurrence ARNF and PNG

Habitat: Inhabits clear, sand or gravel bottomed streams with considerable vegetation. Eggs are deposited randomly over a gravel substrate Requires abundant filimentous algal growth and still, clear water Insects are occasionally eaten (USDA Forest Service 1981)

Threats Exotic fish species as well as habitat degradation can reduce populations Effluent from feedlots and farmlands can also hurt populations Sedimentation can have a severe effect on populations by covering spawning gravels and increasing turbidity.

Invertebrates

Rocky Mountain capshell snail *Acroloxus coloradensis*

Occurrence. ARNF

Habitat. Inhabits oligotrophic and mesotrophic lakes or ponds with rock or boulder substrate Inhabited lakes range in elevation from 8,800 to 9,800 feet This small, hermaphroditic snail is thought to be remnants from wider dispersal during previous ice ages. The snail moves very slowly, half as slow as similar species found in Canada. Seasonal migration has been observed which correlates with water temperature, moving into deeper waters in the fall and winter. The snail has been observed to over winter, but the ecology of this process is not known Similar species burrow into mud and over winter in the frozen substrate, but it is speculated that the capshell may remain on a rock substrate throughout the year and prevent freezing by maintaining a thawed bubble of water around itself over winter (Pioneer, 1993). Most gastropods utilize waters with high alkaline content and bound carbonate concentrations for shell production. Similar snail species eat small algaes and plant forms At Peterson Lake, Boulder County, the capshell was observed to over winter above the water line when water was drained from the lake Preventative measures are being considered to prevent this from happening again without further research of effects on snail.

Threats Dissolved oxygen can be an important limiting agent for the capshell, especially during winter periods Populations of the capshell are very low (approx 100 individuals or less per lake), thus it is difficult to estimate the viability of such populations for extended periods of time. Increased recreational traffic near capshell ponds could produce undesierable effects on the snails habitat from higher siltation rates and increased

toxins. Fluctuating water levels due to natural events and human caused events could further reduce snail populations. The capshell has only been located in 5 Colorado lakes.

lost ethmiid moth *Ethmia monachella*

Occurrence ARNF

Habitat: This species has been reported in Boulder County, no habitat data is available (USDA Forest Service 1994).

Threats. No data is available.

Steven's tortricid moth *Decodes stevensi*

Occurrence ARNF

Habitat. No data is available

Threats· No data is available

Plants

Colorado aletes *Aletes humilis*

Occurrence ARNF

Habitat It occurs in cracks and crevices on Precambrian Silver Plume granite cliffs and outcrops It is also found on granite shaded by ponderosa pine and Douglas-fir (Schwab 1992) Plants are usually found on slopes facing north, but some are on slopes with northwesterly or northeasterly aspects and on flat rock outcrops where there is some protection forming a rampart or overhang (Jennings 1991) Elevation 6,000-7,800 feet

Threats: There are few or no direct threats to this species Grazing is not a direct threat because most populations occur in inaccessible areas such as rock outcrops and cliff faces (Schwab 1992)

sea pink *Armeria maritima*

Occurrence ARNF

Habitat· It grows on wet solifluction lobes or even on relatively dry tundra (Weber 1990) Elevation above 12,000 feet

Threats: Any habitat elimination, modification or disturbance is of concern

clustered lady's-slipper *Cypripedium fasciculatum*

Occurrence: ARNF

Habitat· Typically found on shaded slopes in montane and subalpine forests The plants are often found growing on duff or bare ground. This species is usually in dry lodgepole pine forests and occasionally spruce-fir forests. Sites are usually devoid of other vegetation (Jennings 1991) Elevation 8,000-11,00 feet.

Threats· Any habitat elimination, modification or disturbance is of concern

alpine feverfew *Parthenium alpinum*

Occurrence. ARNF and PNG

Habitat· Cushion plant communities on open, stoney slopes and ridges, often on calcareous substrates (Wyoming Rare Plant Guide 1994) Elevation 4,400-6,400.

Threats: Any habitat elimination, modification or disturbance is of concern

Front Range cinquefoil *Potentilla effusa var rupincola*

Occurrence ARNF

Habitat: Granite outcroppings, granite and gravelly soil (CHNP 1994).

Threats: Any habitat elimination, modification or disturbance is of concern

prairie moonwort *Botyrychium campestre*

Occurrence ARNF

Habitat: Prairies, dunes, and fields over limestone (Wyoming Rare Plant Guide 1994) This species appears to prefer dry, gravelly, north-facing prairie hillsides. Since the species does not need direct sunlight, it can compete well in dense prairie vegetation with thick grass litter. It is most easily found among sparse vegetation between clumps of Schizachariurn scoparium. Other associated species include Astragalus crassicarpus and Amorpha canescens (CHNP 1995). The only recorded site of this species on Forest is near Echo Lake at an elevation of 10,800 feet.

Threats: Road construction, reclamation activities near mine dumps, trampling by hikers, over collection, and changes in local soil moisture regimes and forest canopy cover appear to be the most serious threats for several species of moonworts (Schwab 1992) However since Euro-American settlement, light to moderate disturbance of soils may have actually increased the extent or suitability of some habitats.

reflected moonwort *Botrychium echo*

Occurrence ARNF

Habitat Found in the subalpine and alpine on gravelly soils, grassy slopes, along the edges of lakes, and areas which have been disturbed. Elevation 10,000-11,000 feet Moonworts can be found growing along the edge of pavements, and originally all moonwort species grew in coarse-grained granitic colluvium (grus), moist mineral soils, and duff which have collected in depressions in exposed bedrock (Schwab 1992). Recent surveys in southwest Colorado indicate that reflected moonworts may not be as rare as once thought, their apparent rarity may be a result of a lack of surveys

Threats Road construction, reclamation activities near mine dumps, trampling by hikers, over collection, and changes in local soil moisture regimes and forest canopy cover appear to be the most serious threats (Schwab 1992) However since Euro-American settlement, light to moderate disturbance of soils may have actually increased the extent or suitability of some habitats.

pale moonwort *Botrychium pallidum*

Occurrence ARNF

Habitat This species ranges from shady dunes to open meadows and fields, to sandy roadbanks and grassy ditches to shrubby second-growth fields to mixed hardwoods (Wagner and Wagner 1990) The known populations of pale moonwort in Colorado are at elevations of 10,440 to 11,080.

Threats Road construction, reclamation activities near mine dumps, trampling by hikers, over collection, and changes in local soil moisture regimes and forest canopy cover

appear to be the most serious threats (Schwab 1992). However since Euro-American settlement, light to moderate disturbance of soils may have actually increased the extent or suitability of some habitats

livid sedge *Carex livida*

Occurrence: ARNF

Habitat Grows in wet or marshy areas such as, floating mats, bogs, and fens. Elevation 9,000-10,000 feet. This species is known from Labrador to Alaska, south to Connecticut, New Jersey, New York, Michigan, and California. In Colorado, the species is known from two populations in South Park, and a population recently discovered in Larimer County on the Redfeather Ranger District (Schwab 1992 and Wyoming Rare Plant Guide 1994)

Threats: This species is potentially threatened by road building, logging and associated activities, and other activities that may modify the habitat of this species, (CNHP 1995) The effects of grazing on this species are not known. However, most Carex species are highly palatable and preferred by livestock. Extremely wet areas such as bogs and floating mats tend to be avoided by livestock. Impacts could occur if grazing practices resulted in drying out of these sites, or if livestock congregated in these areas during drought years

Hall's fescue *Festuca hallii*

Occurrence: ARNF

Habitat Occurs in alpine meadows, slopes, and open woods Generally in close association with Kobresia myosuriodes (Schwab 1992) In Colorado, Halls fescue grows in alpine tundra and subalpine grasslands (O'Kane 1988) Elevation range is from 7,400 to 10,000 feet. Festuca hallii occurs in Montana, North Dakota, Colorado, Washington, and the Yukon Territory Currently, there are only two extant Colorado populations, Cameron Pass and in western Huerfano County (Schwab 1992).

Threats: The very small number of known occurrences seems to be the critical factor in the status of this species in Colorado (Schwab 1992) The palatability and preference for this species to livestock is not known, but most Festuca species tend to be highly palatable and often preferred.

northern blackberry *Rubus arcticus*

Occurrence ARNF

Habitat. Infrequent in meadows, mossy willow thickets, along mountain streams, and in forests Colorado occurrences are located near roadways, which may indicate that the species favors disturbed sites, much like other raspberry species (Schwab 1992). Elevation 7,000-9,000 feet. There is one known population of Rubus arcticus spp acaulis and it is on the Sulphur Ranger District of the Arapaho-Roosevelt National Forest

Threats Although grazing may impact this species, this population is located in a grazing allotment where it has persisted Any habitat elimination, modification or disturbance is of concern

Species or Habitat Suspected to Occur on NFS Lands, but Unconfirmed

Birds

American bittern *Botaurus lentiginosus*

Suspected Occurrence PNG

Habitat. Bitterns are widespread throughout North America, inhabiting swamps, marshes, reedy lakes, slowmoving rivers, moist meadows and dense riparian thickets Nests are in wet areas with dense cover for the nest structure Bitterns prey upon fish, tadpoles and frogs with some lizards, salamanders, leeches, insects and mice They are entirely carnivorous (USDA Forest Service 1991).

Threats: Bitterns are very shy and reclusive and sensitive to human disturbances. Bittern nesting success could be negatively influenced by human disturbances. As bitterns are strictly wetland/riparian birds, any degradation or negative effects on riparian systems could effect bitterns. Negative effects upon prey sources will also have a detrimental effect on bittern populations (i e amphibian populations declines)

Lewis' woodpecker *Melanerpes lewis*

Suspected Occurrence PNG

Habitat: Open cottonwood drainages and parklike ponderosa forests are the major breeding habitats. Other forest types similar to the open structure of mature ponderosa pine are utilized. Both dead and live trees are used as nest sites and as foraging perches Scattered snags or live trees and brushy undergrowth must be available for stable populations. Lewis' woodpeckers feed on insects, including flies, beetle larvae, caterpillars, and ants In winter, acorns are important for food (USDA Forest Service 1981)

Threats: Loss of breeding habitats could decrease population numbers. Loss of snags and roosts could also hurt populations. Any negative effects on prey populations would also have a negative effect on populations.

Mammals

North American wolverine *Gulo gulo luscus*

Suspected occurrence ARNF

Habitat Wolverines are low density species throughout their range and maintain a solitary existence They mostly utilize subalpine coniferous forests and deciduous stands, with hunting forays taking them into various meadow and shrub communities They are considered mostly a boreal species The wolverine is an inhabitant of remote wilderness areas where development is unlikely to occur, and although it is considered that they follow their prey to lower winter elevations, their large home range and diversity in diet allow them to avoid conflicts with humans Wolverines are believed to eat mostly carrion, and are opportunistic hunters (Ruggiero 1994) They do not hibernate Only one individual has been positively identified in Colorado in the last 20-30 years and was near the Utah border .

Threats: Wolverines have a natural low reproductive success rate due to high juvenile

mortality and poor breeding success (USDA Forest Service 1991). Greatest threats to wolverine populations are incedental trappings Wolverine pelts are not highly valued, therefore specific trapping seldom occurs Increased recreational use of habitat could have a negative impact on populations, although Colorado populations are considered remnant and disjunct at this time Wolverines are very sensitive to human disturbance

North American lynx *Felis lynx canadensis*

Suspected occurrence: ARNF

Habitat· Found in dense boreal forests of Alaska and Canada, and rarely occur south of the Canadian border. Lynx are limited to mountainous zones in the western U.S., where boreal conditions persist Lynx in Colorado are considered the southern most extensions of the population, and are genetically separated from northern populations Lynx's main food source in Colorado are snowshoe hare, squirrel, birds, and rodents Colorado lynx do not have large population cycles similar to northern populations (Ruggiero, 1994)

Threats. Human caused disturbance (recreational development) to it's habitat and hunting/trapping mortality are the main causes of lynx endangerment. Small to mid sized logging cuts have not adversely affected Lynx populations as these disturbances usually increase prey (snowshoe hare) populations. Although harvests in old growth spruce-fir forests have shown to reduce hare populations, reducing lynx prey base. At this time there is a viable genetic population in Colorado

fringed-tailed myotis *Myotis thysanodes pahasapensis*

Suspected occurrence. PNG

Habitat: This bat occurs in ponderosa pine woodlands, oakbrush, and salt and greasewood shrublands Utilize abandoned caves, mines and structures for day and night roosts. Localized migrations thought to occur, but firm data is unavailable. Hibernaculums include caves and buildings. Bats glean a broad range of insects from vegetations, eating moths, beetles, caddis flies, ants, bees, wasps, and other insects (Fitzgerald, 1994).

Threats· Little data is available for this species, and relatively few documentations of this bat occur in our area Disturbance or loss of roost sites and reductions in prey sources could further reduce range of population

Fish

banded killifish *Fundulus diaphanus*

Suspected occurrence. ARNF

Habitat· Inhabits plains streams and rivers, utilizing both gravel/sandy substrates as well as muddy substrates Feeds primarily on insects on the surface and substrate of streams Fairly widespread in perennial streams (USDA Forest Service 1981).

Threats: Disturbances to habitat such as fluctuating water levels through irrigation projects could have negative impacts on populations Non native species introductions and toxins could further harm populations.

Invertebrates

regal fritillary butterfly *Speyeria idalia*

Suspected occurrence PNG

Habitat: Found in wet meadows and virgin prairies near marshes. Reported locally abundant in tall-grass prairie sites. There are no known reports of this species on PNG (USDA Forest Service 1994)

Threats: Decreased riparian meadows and marshes could reduce potential habitat for this species

Albarufan dagger moth *Acronicta albarufa*

Suspected occurrence PNG

Habitat This moth has not been reported in Colorado since 1963. No habitat data is available at writing (USDA Forest Service 1994).

Threats Unknown

lost ethmiid moth *Ethmia monachella*

Suspected occurrence PNG

Habitat Unknown

Threats Unknown

Plants

dwarf milkweed *Asclepias uncialis*

Suspected occurrence: ARNF and PNG

Habitat: Dry plains and hills (Harrington 1964)

Threats Any habitat elimination, modification or disturbance is of concern.

slender moonwart *Botrychium lineare*

Suspected occurrence ARNF

Habitat Grassy slopes, among medium-height grasses, along edges of streamside forests Elevation range is from 7,900 to 9,500 feet (Spackman et. Al 1997)

Threats Road construction, reclamation activities near mine dumps, trampling by hikers, over collection, and changes in local soil moisture regimes and forest canopy cover appear to be the most serious threats for several species of moonwarts (Schwab 1992) However since Euro-Americaln settlement, light to moderate disturbance of soils may have actually increased the extent of suitability of some habitats

Colorado butterfly weed *Guara neomexicana coloradoensis*

Suspected occurrence PNG

Habitat Sub-irrigated, alluvial soils of drainage bottom surrounded by mixed grass prairie (Wyoming Rare Plant Guide) Elevation 5,800-6,400 feet

Threats: Any habitat elimination, modification or disturbance is of concern.

Weber's scarlet-gilia *Ipomopsis aggregata weberi*

Suspected occurrence: ARNF

Habitat: Openings in coniferous forests and scrub oak woodlands (Wyoming Rare Plant Guide 1994) Elevation 8,500-9,600 feet

Threats: Any habitat elimination, modification or disturbance is of concern.

Adder's-mouth *Malaxis brachypoda*

Suspected occurrence: ARNF

Habitat: Grows along small streams in the lower mountains, and is usually found rooted in mosses kept perpetually wet by stream spray (Rare Plants of Colorado 1989) Its elevation range is from 7,200 to 8,080 feet The range of this species is from New Foundland to Alaska, mostly in Canada It occurs in the Great Lakes states and New England In the contiguous western states, it is only known in Colorado and California (Jennings 1989). Only two Colorado locations for this orchid have been known in recent years (Jennings 1989).

Threats: The timing of grazing is critical for this species. As long as grazing occurs after seed set, it is not likely to impact this species

Weber's monkey-flower *Mimulus gemmiparus*

Suspected occurrence: ARNF

Habitat: These plants grow in the moist soil of forest seeps or springs protected by granite overhangs It often grows in association with other monkey flowers, Mimulus rubellus and Mimulus guttatus (CNPS 1989) Elevation range is from 8,500 to 10,500 feet All known populations of Mimulus gemmiparus are in Grand, Jefferson and Larimer Counties

Threats: Any habitat elimination, modification or disturbance is of concern.

autumn willow *Salix serissima*

Suspected occurrence: ARNF

Habitat: Marshes of fens with other *Salix* and *Carex* species Elevation range is from 7,800 to 9,300 feet (Spackman et al 1997)

Threats. Any habitat elimination, modification or disturbance is of concern

V. Effects to SENSITIVE Species

Considering the numerous, varied activities and projects allowed and/or anticipated, the wide range of habitats affected; the intent and design of the LRMP which includes goals, standards and guidelines for resource protection, desired conditions and management area emphases, and the estimated effects in the EIS, it is further estimated that implementation of the Forest Plan may adversely impact individuals, but not likely to result in a loss of viability on the Planning area, nor cause a trend to federal listing or a loss of species viability rangewide with each sensitive species.

To further assure that potential adverse effects are avoided, determination of effects will be done prior to implementation of projects and activities.

VI. PREPARED AND REVIEWED BY:

DENNIS G. LOWRY
Forest Wildlife Biologist
October 23, 1997

PAULA GUENTHER-GLOSS
Forest Fisheries Biologist
October 23, 1997