United States Department of the Interior

FISH AND WILDLIFE SERVICE
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SUMMARY
FINAL CONFERENCE OPINION ON THE EFFECTS TO THE SACRAMENTO MOUNTAINS CHECKERSPOT BUTTERFLY FROM THE PROPOSED CAPITAL IMPROVEMENT PROJECT FOR PINES CAMPGROUND, SACRAMENTO RANGER DISTRICT, OTERO COUNTY, NEW MEXICO

Cons. #2-22-03-F-0061

Date of the final opinion: July 16, 2002

Action agency: Sacramento Ranger District, Lincoln National Forest

Project: The project concerns the Lincoln National Forest's proposal to reconstruct Pines Campground to improve or replace existing facilities. These actions include: 1) replace four vault toilets with three accessible toilets; 2) replace all picnic tables; 3) replace all fire rings; 4) revise and replace signs where needed; 5) designate parking spaces for vehicles and RVs; 6) repair eroding parking spaces; 7) remove and replace cable and I-beam barriers; 8) replace water hydrant; 9) grade the existing road within the current width, and surface with gravel; 10) construct a shelter, improve parking and living spaces, install water line, water hookup, and septic system for the host site; 11) install a site boundary fence; 12) construct a bypass trail to route trail users out of the campground; 13) replace or repair entrance gate; 14) replace fee station; 15) convert two camp units to meet accessibility standards; and 16) install short rail fence in loop road to provide an area for the protection and interpretation of the proposed endangered Sacramento Mountains checkerspot butterfly (*Euphydryas anicia cloudcrofti*) and its proposed critical habitat. The proposed action may slightly change the general layout of campsites.

Species affected: Sacramento Mountains checkerspot butterfly and its proposed critical habitat

Conference opinion: The proposed action is not likely to jeopardize the proposed Sacramento Mountains checkerspot butterfly and there will be no adverse modification of proposed critical habitat of the Sacramento Mountains checkerspot butterfly

Incidental take statement: We also anticipate that less than 10.5 acres of occupied checkerspot butterfly habitat will be taken within the footprint of the proposed action. We have provided reasonable and prudent measures and terms and conditions for the checkerspot butterfly.

Conservation recommendations: Implementation of conservation recommendations is discretionary. Four conservation recommendations are provided.

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July 16, 2003

Cons. #2-22-03-F-0061

Jose M. Martinez, Forest Supervisor
Lincoln National Forest
Federal Building
1101 New York Avenue
Alamogordo, New Mexico 88310-6992

Dear Mr. Martinez:

This responds to your March 3, 2003, letter requesting review of the biological assessment (BA) for the Pines Campground Capital Improvements Project, on the Sacramento Ranger District, Lincoln National Forest, USDA Forest Service (USDA Forest Service 2003) and initiation of formal conferencing for the proposed endangered Sacramento Mountains checkerspot butterfly (*Euphydryas anicia cloudcrofti*) (checkerspot butterfly) and its proposed critical habitat. The BA evaluates the potential impacts of this project on the checkerspot butterfly and Mexican spotted owl (*Strix occidentalis lucida*) (MSO). You have determined that the proposed action "may affect, is likely to adversely affect" the checkerspot butterfly and its proposed critical habitat, and "may affect, is not likely to adversely affect" the MSO.

This document represents our conference opinion on the proposed checkerspot butterfly and its proposed critical habitat in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

Mexican spotted owl

There is approximately 10.5 acres of mixed conifer forest within the project area. You determined in the BA that the project area is in restricted MSO habitat and occurs over one mile from the Little Apache protected activity center (PAC) and the Aspen PAC. This project proposes to remove several trees over 24 inch diameter at breast height to construct parking spaces and campsites. The project area was surveyed in 2001 and no MSOs were detected. Nesting/roosting is likely precluded in Pines Campground because of the seasonal disturbance from campsite visitors during the MSO breeding season.

You also requested that the 10.5 acres within the campground be removed from restricted habitat status. The intent of restricted habitat guidelines identified in the MSO Recovery Plan (USDI 1995) is to manage the landscape to maintain and develop potential nesting and roosting habitat.

We believe that pines Campground is unlikely to ever support a reproducing pair of MSOs because of high disturbance. Therefore, we agree that these acres can be removed from restricted habitat status. For these reasons, we believe that the effects to the MSO are discountable and insignificant. Consequently, the U.S. Fish and Wildlife Service (Service) concurs with your determination that the proposed action "may affect, is not likely to adversely affect" the MSO.

Consultation History

This conference opinion is based on information provided in the March 3, 2003, BA; the January 27, 2003, environmental assessment (EA) for the project, email and telephone conversations between our staffs; site visits and field notes; data presented in the proposed rule to list the checkerspot butterfly as endangered with critical habitat (USDI Fish and Wildlife Service 2001a; 66 FR 46575); data in our files; Forest Service checkerspot butterfly data from survey reports; and a literature review. References cited in this conference opinion are not a complete bibliography of all literature available on the checkerspot butterfly, the proposed action, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office. We received all the information necessary to begin formal consultation on March 5, 2003, when you submitted the BA and requested formal conferencing.

DESCRIPTION OF THE PROPOSED ACTION

The project proposes to reconstruct Pines Campground to improve or replace existing facilities. Capacity of the campground will decrease from the current level of 240 persons at one time to approximately 140 persons at one time, dispersed across 28 campsites. These actions include: 1) replace four vault toilets with three accessible toilets; 2) replace all picnic tables; 3) replace all fire rings; 4) revise and replace signs where needed; 5) designate parking spaces for vehicles and RVs; 6) repair eroding parking spaces; 7) remove and replace cable and I-beam barriers; 8) replace water hydrant; 9) grade the existing road generally within the current width (some minor widening of portions of the road will occur) and surface with gravel or pave with asphalt; 10) construct two shelters: one for the host site with improved parking and living spaces, install water line, water hookup, and septic system, and a second 20 by 14 foot shelter for the group tent spots at the west end of the campground; 11) install a site boundary fence; 12) construct a bypass trail to route trail users out of the campground; 13) replace or repair entrance gate; 14) replace fee station; 15) convert two camp units to meet accessibility standards; and 16) install short rail fence within the center of the campground loop road to provide an area for the protection and interpretation of the proposed endangered checkerspot butterfly and its proposed critical habitat. The proposed action may slightly change the general layout of campsites.

The construction of new toilets, road re-alignment and surfacing, and the construction and surfacing of parking spaces at camp sites will occur within known occupied checkerspot butterfly habitat and proposed critical habitat. Pines Campground encompasses approximately 10.5 acres, the majority of this area is occupied by the checkerspot butterfly and is considered proposed critical habitat because it contains the proposed primary constituent elements. Because the BA did not estimate the total amount of habitat proposed to be disturbed by this project, we assume that the impacts will be 10.5 acres or less

The BA indicates that, as part of the proposed action, the following conservation measures for the checkerspot butterfly will be implemented:

1. Construct and relocate a site boundary fence that will separate additional occupied habitat from campground disturbances (i.e., a boundary fence will enclose the occupied habitat between the fire access road and the existing checkerspot butterfly exclosure on the southwestern side of Chipmunk Loop);

2. Build a barrier across the meadow habitat within the campground loop road;

3. Build and install an informational kiosk highlighting checkerspot butterflies to inform and deter visitors from tramping checkerspot butterfly habitat;

4. Install signs to identify areas where camping is not allowed including the fire access road, and the onsite campground host will enforce the camping restrictions; and

5. Construct retaining walls at campsites which will assist with soil retention, reduce erosion, and focus recreational impacts within each campsite (e.g., the amount of recreational trampling is expected to be reduced).

STATUS OF THE SPECIES (range-wide)

The checkerspot butterfly is a member of the brush-footed butterfly family (Nymphalidae). The adults have a wingspan of approximately 2 inches and are checkered with dark brown, red, orange, white, and black spots and lines. The taxon was described in 1980 based on 162 adult specimens (Ferris and Holland 1980).

The checkerspot butterfly inhabits meadows within the mixed-conifer forest (Lower Canadian Zone) at an elevation between 8,000 and 9,000 ft in the vicinity of the Village of Cloudcroft, Otero County, New Mexico. The adult checkerspot butterfly is often found in association with the larval food plants New Mexico penstemon and valerian, and adult nectar sources such as sneezeweed. New Mexico penstemon is a narrow endemic species (Sivinski and Knight 1996), restricted to the Sacramento Mountains of south-central New Mexico. Other plants that have been documented in checkerspot butterfly habitat include: arrowleaf groundsel (*Senecia riangularis*), curly-cup gumplant (*Grindelia squarrosa*), figworts (*Scrophularia* sp.), penstemon (*Penstemon* sp.), skyrocket (*Ipomopsis aggregata*), milkweed (*Asclepias* sp.), Arizona rose (*Rosa woodsii*), and Wheeler's wallflower (*Erysimum capitatum*) (USDA Forest Service 1999d).

Adult checkerspot butterflies apparently lay their eggs on New Mexico penstemon and perhaps valerian, the known larval host plants. After hatching, larvae feed on host plants and, during the 4th or 5th instar (the period between molts in the larval stage of the checkerspot butterfly), enter an obligatory and extended diapause (maintaining a state of extended inactivity), generally as the food plants die back in the fall from freezing. Some larvae may remain in diapause for more than one year, depending on environmental conditions. During diapause, larvae probably remain in leaf or grass litter near the base of shrubs, under the bark of conifers, or in the loose soils associated with pocket gopher (*Thomomys bottae*) mounds (Moore 1989, T. Narahashi, Lincoln

National Forest, pers. comm. 1999). Once larvae break diapause, they feed and grow through three or four more instars before pupating (entering the inactive stage within a chrysalis) and emerging as adults. Diapause is generally broken in late spring (March-April) and adults emerge in mid-summer (June-July).

The extent of the historical range of the checkerspot butterfly is not known due to limited information collected on this subspecies prior to its description (Ferris and Holland 1980). However, based upon the location of its meadow habitat, the general trend of commercial and private development in suitable habitat, and the encroachment of conifers into suitable habitat due to fire suppression on public and private lands, it is likely that the species once occupied a more extensive, but still limited area.

Based on data gathered by the Forest Service, the subspecies has been documented at 15 general localities (i.e., the geographic extent of occupied areas were not delimited and discrete populations were not identified) (USDA Forest Service 1999a, 1999b, 1999c, 2000a, 2000b, 2002, 2002a; Blue Earth Ecological Consultants 2003). The known range of the checkerspot butterfly is within an 33 mi^2 area, within which the distribution of the checkerspot butterfly is patchy and disjunct. The known range of the checkerspot butterfly is delimited on the north by the Mescalero Apache Nation lands, on the west by Bailey Canyon at the mouth of Mexican Canyon, on the east by Spud Patch Canyon, and on the south by Cox Canyon (USDA Forest Service 2000a, 2000b). The potential range of the checkerspot butterfly to the east and west is likely restricted because the non-forested areas are below 8,000 ft in elevation and the majority of checkerspot butterflies have been consistently documented at higher elevations (USDA Forest Service 1999a 1999b, 1999c, 2000a, 2000b, 2002, 2002a).

Checkerspot butterflies have a patchy distribution throughout the Sacramento Ranger District. Approximately 50 percent of all lands that might support the checkerspot butterfly are in non-Federal (i.e., private) ownership, subject to ongoing and future development activities. The Forest Service has estimated there are about 5,198 ac of potential habitat, composed of 2,553 and 2,645 ac on private and Forest Service lands, respectively (USDA Forest Service 1999b).

Based on available information on topography, soils, and vegetation, it is likely that the distribution of the checkerspot butterfly was more extensive and continuous prior to the increase in commercial and private development, construction of roads, overgrazed range conditions, and the encroachment of conifers and subsequent decrease in the amount of non-forested lands. The isolated localities and limited geographic range of the checkerspot butterfly indicate that the species is particularly vulnerable to large-scale perturbations (disturbances that impact the habitat and host plants associated with the species), which could lead to extinction (Ehrlich *et al.* 1972; Thomas *et al.* 1996).

The threats that have been identified for the checkerspot butterfly are commercial and private development, Forest Service activities, fire suppression and wildfire, highway and forest road reconstruction, recreational impacts, domestic livestock grazing, nonnative vegetation, and insect control (USDI Fish and Wildlife Service 2001a; 66 FR 46575).

Commercial and private development is a significant threat to the checkerspot butterfly. Habitat conversion activities from commercial and private development have likely reduced many historic checkerspot butterfly localities. Approximately 50 percent of all lands that might support the checkerspot butterfly are in private ownership, and may be subject to ongoing and future development activities. Much of these private lands are currently being developed for residential or commercial uses (USDA Forest Service 1986; Forest Service 1997; Holland 2001). Within the known range of the checkerspot butterfly, there are two golf courses, at least 12 private developments, the Village of Cloudcroft, schools, several recreational parks, a ski area, and a network of paved, gravel, or dirt roadways.

The construction of homes, businesses, and associated infrastructure in the habitat of the checkerspot butterfly could directly affect the species through mortality or result in indirect effects, such as the introduction of nonnative plants and animals or loss of movement corridors (Holland 2001). Ground disturbance and vegetation clearing for commercial or private development can disturb soils, remove or eliminate diapause sites (i.e., leaf litter and grasses) and larval or adult food plants, and kill or injure individuals (Wilcox and Murphy 1985; Murphy and Weiss 1988).

We are aware of Forest Service projects proposed within the known range of the checkerspot butterfly that have the potential to affected the species. Recent or future projects include: (1) a capital improvement project for three campgrounds; (2) a new power line, service road, and corridor; (3) livestock grazing activities in several allotments; (4) a land transfer to the Village of Cloudcroft (USDA Forest Service 1999a, 1999b, 1999d, 2000a; Service 1999, 2001a); (5) Otero Electrical Cooperative 10-year Powerline Maintenance activities; and (6) Sacramento Ranger District Road Maintenance Activities.

The Forest Service has eliminated some proposed projects (e.g., the construction of new administrative building) in habitat used by the checkerspot butterfly. They have also taken some actions to protect and manage the checkerspot butterfly, including instituting a checkerspot butterfly closure order, fencing a portion of one checkerspot butterfly locality, conducting checkerspot butterfly surveys to determine range and occupancy (USDA Forest Service 1999a, 1999b, 1999e, 2000a, 2000b, 2002, 2002a), and funding checkerspot butterfly studies (USDA Forest Service 2002b; Blue Earth Ecological Consultants 2003). These actions have been beneficial, especially for increasing our knowledge of this species. However, other multiple use priorities on Forest Service lands, such as range management, powerline and road maintenance, or capital improvement projects, have the potential to impact this species.

The results of 100 years of fire suppression in the Sacramento Ranger District currently threatens the checkerspot butterfly. Fire exclusion and suppression have reduced the size of grasslands and meadows by allowing the encroachment of conifers, and these trends are projected to continue (USDA Forest Service 1995, 1999e). The natural fire regime historically maintained non-forested openings and meadows. Prior to 1900, the mean natural fire interval for forests in the Sacramento Mountains was about 4 to 5 years (Kaufmann *et al.* 1998). These frequent, low-intensity, surface fires historically maintained a forest that was more open (i.e., more non-forested patches of different size, more large, older trees, and fewer dense thickets of evergreen saplings) than it is currently (Kaufmann *et al.* 1998). Such low-intensity fires are now a rare

event. In the next few years, the Sacramento Ranger District may have a catastrophic burn that eliminates some or all of the remaining checkerspot butterfly habitat. This risk of catastrophic wildfire is one of the most significant threats facing this species and projects resulting from increased fire risk funding will need to be implemented before significant risk reduction for the checkerspot butterfly is achieved (USDI Fish and Wildlife Service 2001a; 66 FR 46575).

The reconstruction of forest roads is a threat to the checkerspot butterfly, causing elimination of larval food and adult host plants, crushing of butterflies, and increasing the amount of soil erosion or dust. Because roads are usually sited in open non-forested areas, larval food and adult nectar plants are frequently found in large concentrations along roadways. These areas can similarly contain aggregations of pre- and post-diapause larvae, because bare soils provide sites for thermoregulation (maintenance of a constant internal body temperature regardless of environmental temperature) (Porter 1982). Therefore, activities that disturb suitable habitat adjacent to roadways can impact very high quality sites, important for the development of various life history stages (e.g., pre-diapause instar development). Construction of roadways has historically eliminated or reduced the quality or quantity of checkerspot butterfly habitat (Pittenger 1999; USDI Fish and Wildlife Service 2001a; 66 FR 46575).

The New Mexico State Highway and Transportation Department (NMSHTD) recently improved portions of an approximately 2 mi long stretch of State Highway 130 between the Village of Cloudcroft and the intersection of SH 130 and Sunspot Road (Metric Corporation 1996; Steve Reed, NMSHTD, pers. comm. 1999). The project cleared all vegetation by scraping and widening the road and shoulders, constructing retaining walls, adding drainage ditches and culverts, and reconstructing a curve. In 1998 and 1999, checkerspot butterflies were located within the construction footprint (USDA Forest Service 1999a, 1999b; 1999c); however, none were observed during surveys in 2000 and 2001 (E. Hein, U.S. Fish and Wildlife Service pers. obs.). Some topsoil and larval food plants were stockpiled and used in the revegetation when the project was completed. This revegetation effort was not successful, and no butterflies have been observed within the footprint since 1999 (John Pittenger, Blue Earth Ecological Consultants, pers. comm., 2003).

PROPOSED CRITICAL HABITAT

The primary constituent elements of critical habitat for the checkerspot butterfly include those habitat components providing for breeding, ovipositing (egg laying), diapausing, roosting or resting, or foraging areas and are described below. The proposed critical habitat designation includes the area found within an approximate 54 mi^2 polygon centered around the Village of Cloudcroft, Otero County, New Mexico. The primary constituent elements are: 1) elevation between 8,000 and 9,000 ft within the mixed-conifer forest (Lower Canadian Zone) and within an approximate 54 mi^2 polygon centered around the Village of Cloudcroft, Otero County, New Mexico, south of the Mescalero Apache Nation boundary; 2) drainages, meadows, or grasslands; 3) supporting the known food plants New Mexico penstemon, sneezeweed, or valerian; 4) less than 5 percent canopy cover; and 5) composed of plants such as arrowleaf groundsel, curly-cup gumplant, figworts, penstemon, skyrocket, milkweed, Arizona rose, or Wheeler's wallflower. Areas adjacent to or linking areas that have some or all of the above elements and are sufficient to provide for dispersal between areas of checkerspot butterfly habitat are necessary for the

conservation of the species and thus are proposed as critical habitat. Habitat that provides for dispersal may not support all of the other primary constituent elements.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the Act, when considering the effects of the action on federally listed species, we are required to take into consideration the environmental baseline. Regulations implementing the Act (50 FR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation. We have defined the action area to encompass the 10.5 acres within Pines Campground, the adjacent occupied habitat, and the proposed critical habitat within and adjacent to Pines Campground.

To date, four projects have undergone formal conferencing for the proposed checkerspot butterfly. The projects with anticipated take include: 1) Cloudcroft Water Wells (2-22-02-F-012; 3.7 acres of occupied habitat); 2) Genetics Study (2-22-02-F-667; 100 pre-diapause larvae harmed); 3) Mark-release movements study (2-22-02-F-470; 15 adult butterflies harmed, unlimited number harassed); and 4) Rio Peñasco II vegetation management project (2-22-02-F-397; 36.4 acres of occupied habitat).

STATUS OF THE SPECIES (within the Action Area)

The action area is occupied by the checkerspot butterfly and contains proposed critical habitat. Surveys for the checkerspot butterfly within and adjacent to the proposed project area date from 1980 to present. The Forest Service estimates that the area occupied by the checkerspot butterfly in the proposed project area is approximately 10.5 acres. These surveys documented the presence and successful reproduction of the checkerspot butterfly within the proposed project area (Holland and Ferris 1980; USDA Forest Service 1999a 1999c, 2000a, 2000b, 2002, 2002a; Blue Earth Ecological Consultants 2003).

EFFECTS OF THE ACTION

Our primary tasks in developing a conference opinion are to determine whether the proposed action is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR 402.10). The jeopardy/non-jeopardy determination is based on an evaluation of: 1) a species' status in the project area and range wide (see above sections); 2) the effects of the proposed action on the survival and recovery of a listed species (including effects of interdependent and interrelated actions); 3) the aggregate effects of other Federal actions on a listed species (e.g., amount of take occurring as a result of Federal actions subject to previous consultations); and 4) the cumulative effects on a listed species (i.e., future non-Federal actions that are reasonably certain to occur in the action area).

Checkerspot butterflies have been repeatedly observed throughout Pines Campground and the checkerspot butterfly exclosure during surveys conducted from 1980 to 2003 (Ferris and Holland 1980; USDA Forest Service 1999a 1999c, 2000a, 2000b, 2002; Blue Earth Ecological Consultants 2003; E. Hein, U.S. Fish and Wildlife Service pers. obs., 2003). Hostplants are also known throughout the action area. We expect that the impacts to the species from this proposed action will be related to the permanent elimination of habitat by the construction of new facilities (e.g., toilets, parking spur roads, road realignment and surfacing), recreational trampling, and crushing of individuals from heavy equipment or personnel. These actions will result in the loss of less than 10.5 acres occupied habitat, the elimination of some larval food and adult host plants, and the crushing of various life history stages of the checkerspot butterfly. For example, these areas may contain pre- and post-diapause larvae, because checkerspot butterfly larvae thermoregulate (maintenance of a constant internal body temperature regardless of environmental temperature) on patches of open soils (Porter 1982). Consequently, the proposed action related to permanent habitat altering activities will likely result in the take of an unknown number of checkerspot butterflies.

The construction of the some facilities will also result in temporary habitat alternation (e.g., blading roads, installing water lines, etc). Through these activities it is expected that an unknown number of checkerspot butterflies (i.e., eggs, larvae, adults) will be taken by grading of roads, trenching, or other activities that result in crushing of individuals. Nevertheless, we expect that the checkerspot butterfly's host plants will naturally recolonize these areas in the years following the project.

Because the checkerspot butterfly has a life history pattern similar to other butterflies in the genus *Euphydryas* that exist as metapopulations, it is likely that this checkerspot butterfly has a metapopulation structure (Murphy and Weiss 1988; Harrison 1989; Hanski and Gilpin 1991; Blue Earth Ecological Consultants 2003). A metapopulation is a set of local populations within an area, where typically migration from one local population to other areas containing suitable habitat is possible, but not routine. Movement between areas containing suitable habitat (i.e., dispersal) is restricted due to inhospitable conditions around and between areas of suitable habitat. A metapopulation's persistence depends on the combined dynamics of these local extinctions and the subsequent recolonization of these areas by dispersal (Hanski 1999, Hanski and Gilpin 1991).

Habitat altering activities have likely eliminated or interrupted dispersal of butterflies between suitable habitat patches and thus affected the metapopulation dynamics of the checkerspot butterfly. Although impacts of habitat-altering projects may have the potential to fragment the population between occupied areas, we do not believe that this proposed action will result in the severe disruption of the metapopulation dynamics or the local checkerspot butterfly population. We believe this is a reasonable conclusion given that the action area contains a population with one of the highest known densities (Blue Earth Ecological Consultants 2003), which will remain intact, Furthermore, the areas proposed to be impacted are less than 1 percent of the suitable checkerspot butterfly habitat on Forest Service lands (66 FR 46575).

The implementation of this project, along with the conservation measures, will likely result in short-term adverse impacts to the checkerspot butterfly and its habitat, but will ultimately reduce

the long-term recreational impacts to the species and its habitat in this locality. For example, the capacity of the campground will be significantly reduced, indicating that recreational impacts will decrease. We also expect that the construction of retaining walls, fencing, and signs, the enforcement of areas not open to camping, and the installation of a barrier across the checkerspot butterfly habitat will result in long-term benefits for the species. For these reasons, we believe that the proposed action will not result in disrupt the overall metapopulation dynamics of the checkerspot butterfly.

We also must consider indirect effects and the effects of interdependent and interrelated actions of this project to the checkerspot butterfly. Indirect effects are those that are caused by, or result from, the proposed action, and are later in time, but are reasonably certain to occur. Interrelated actions are actions that are part of a larger action, and are dependent on the larger action for their justification. Interdependent actions are actions that have no independent utility apart from the action under consideration. The use of existing campground roads and trails, operating construction equipment and vehicles, operation of the campground, maintenance of facilities, and water, septic, or other emergency repairs are considered interrelated and interdependent with the implementation of the current project. Affects of the project from indirect impacts and interdependent and interrelated actions should not be any greater than those described above, since the construction will occur within Pines Campground and vehicles, equipment, and future camping activities will likely stay within or directly adjacent to the 28 developed camp sites. For example, we believe that the rail fence barrier across the center of the campground loop road will reduce or eliminate campground visitors trampling checkerspot butterflies and/or their host plants. Moreover, operations and maintenance on the facilities will likely involve habitat-altering activities less than 0.5 acres in size, but will likely be located in areas that were previously disturbed by construction activities.

Proposed Critical Habitat

This project contains all of the primary constituent elements of proposed critical habitat for the checkerspot butterfly. The construction of the project will temporarily destroy some of the checkerspot butterfly habitat components that provide for breeding, ovipositing (egg laying), diapausing, roosting or resting, and foraging. For example, one of the primary constituent elements that is composed of food plants for the checkerspot butterfly (i.e., New Mexico penstemon and sneezeweed) will be adversely affected by the project. Some of the proposed facilities are situated within open meadows that contain this and other primary constituent elements. These areas contain larval food and adult nectar plants in large concentrations. Additionally, other plants that compose a primary constituent element occur or likely occur within the action area and will also be affected include arrowleaf groundsel, curly-cup gumplant, figworts, penstemon, skyrocket, milkweed, Arizona rose, or Wheeler's wallflower.

The proposed construction of the new facilities (e.g., toilets, parking spur roads, road realignment and surfacing), temporary impacts to the habitat (e.g., blading roads, installing water lines, etc), and ongoing recreational trampling will result in both permanent and temporary impacts to less than10.5 acres of proposed critical habitat that is occupied by the checkerspot butterfly. Based information described above, we estimate that less than 1 percent (i.e., 10.5 ÷ 5,198 acres) of the proposed critical habitat will be impacted from the proposed action. These impacts, when added

to the environmental baseline, will not appreciably diminish the capability of the proposed critical habitat to satisfy the essential requirements of the checkerspot butterfly. To ensure that the majority of impacts to proposed critical habitat are short-term, the Forest Service has included conservation measures that will result in long-term benefits to proposed critical habitat. Additionally, the proposed critical habitat within the adjacent checkerspot butterfly exclosure will remain intact.

We have also considered the indirect effects and the effects of interdependent and interrelated actions of this project on the proposed critical habitat of the checkerspot butterfly. The use of existing campground roads and trails, operating construction equipment and vehicles, operation of the campground, maintenance of facilities, and water, septic, or other emergency repairs are considered interrelated and interdependent with the implementation of the current project. Affects of the project from indirect impacts and interdependent and interrelated actions should not be any greater than those described above, since the construction will occur within Pines Campground and vehicles, equipment, and future camping activities will likely stay within or adjacent to the 28 developed camp sites. Operations and maintenance on the facilities will likely involve habitat-altering activities less than 0.5 acres in size, but will likely be located in areas that were previously disturbed by construction activities. Thus, we conclude that these impacts, when added to the environmental baseline, will not appreciably diminish the capability of the proposed critical habitat to satisfy the essential requirements of the checkerspot butterfly.

As part of the proposed action, five conservation measures will be implemented for the checkerspot butterfly and its proposed critical habitat. Because these conservation measures are part of the proposed action, we expect the actions will all be implemented. These conservation measures represent actions proposed by the Forest Service that were evaluated as part of the jeopardy and the incidental take analysis. They are intended to minimize or avoid adverse impacts to the checkerspot butterfly. Moreover, the actions will promote management of occupied habitat and will assist in reducing recreational impacts over the long-term. We conclude that these measures will directly lessen the impacts from habitat altering activities on host plants and disturbance related impacts on the checkerspot butterfly.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions on endangered or threatened species or critical habitat that are reasonably certain to occur in the foreseeable future in the action area considered in this biological and conference opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Cumulative effects analysis as stated here applies to section 7 of the Act and should not be confused with the broader use of this term in the National Environmental Policy Act or other environmental laws.

The action area is located near the Village of Cloudcroft, New Mexico. It is surrounded by mostly National Forest land and private inholdings (e.g., subdivisions), existing infrastructure (e.g., powerlines), private campgrounds, subdivisions, and small communities and surrounding areas, where activities occur either seasonally or year-round. Many roads and public highways that are adjacent to and located within the action area and are used throughout the year, but

especially during the checkerspot butterfly's active season. Consequently, the checkerspot butterfly population in this area is subjected to a variety of other impacts including trampling, road maintenance, and vegetation management (e.g., mowing). These activities have the potential to reduce the quality and quantity of occupied, unoccupied, and proposed critical habitat of the checkerspot butterfly, cause adverse affects to checkerspot butterflies, and contribute as cumulative effects to the proposed action.

There has been a recent increase in commercial or private development projects on non-Federal lands. In addition, future actions on non-Federal lands adjacent to the Forest Service lands that are reasonably expected to occur include grazing, road construction, vegetation management (e.g., mowing or herbicide treatments), fuels management, fire suppression activities, and other associated actions. The major concern in assessing cumulative impacts is the further loss of currently occupied and unoccupied habitat or proposed critical habitat that contributes to a functioning metapopulation, including those areas necessary to provide connectivity between populations. We believe that the continuing rate of habitat loss has the potential in the future, to disrupt the metapopulation dynamics of this species.

CONCLUSION

After reviewing the current status of the checkerspot butterfly, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's conference opinion that the action, as proposed, is not likely to jeopardize the continued existence of the proposed checkerspot butterfly and is not likely to destroy or adversely modify proposed critical habitat.

We reached this conclusion for the following reasons: 1) the minor effects to the checkerspot butterfly and its proposed critical habitat from the proposed action (i.e., disturbance of less than 1 percent of occupied habitat and proposed checkerspot butterfly critical habitat); 2) the proposed action is not expected to result in the disruption of the metapopulation dynamics of the species; 3) the proposed action should result in long-term benefits to the species and its habitat; and 4) the implementation of the conservation measures will further minimize impacts and avoid take.

INCIDENTAL TAKE

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting to engage in any such conduct. Harass is further defined by us as intentional or negligent actions that creates the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Harm is further defined by us to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of the agency action is not considered a prohibited taking under the Act

provided that such taking is in compliance with the terms and conditions of this incidental take statement. The measures described below for the MSO are non-discretionary and must be implemented by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The prohibitions against taking the species found in section 9 of the Act do not apply until the species is listed. However, the Service advises the Forest Service to consider implementing the following reasonable and prudent measures. If this conference opinion is adopted as a biological opinion following a listing or designation of critical habitat, these measures, with their implementing terms and conditions, will be non-discretionary.

The Forest Service has a discretion to regulate the activity that is covered by this incidental take statement. If the species is listed and the Forest Service: 1) fails to require that permittee adheres to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, grant, or contract document, and/or 2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, we recommend that the Forest Service report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

Amount or extent of take

Based on the best available information concerning the checkerspot butterfly, the habitat needs of this species, the proposed project description, and information furnished by the Forest Service, take for the checkerspot butterfly is anticipated. Nevertheless, because of the cryptic nature of the various life history stages of the checkerspot butterfly (e.g., eggs, larvae, chrysalis) and the variation in population sizes from year to year, it is difficult to estimate the number of individuals that will be taken with implementation of this proposed action. Based upon the proposed project, it is estimated that less than 10.5 acres of occupied habitat will be taken. Using the information provided in the BA and our knowledge of the checkerspot butterfly and this site, we anticipate that some individual checkerspot butterflies within the 10.5 acres will be taken in the form of harm and harassment.

Effect of the take

In the accompanying conference opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the proposed Sacramento Mountains checkerspot butterfly or destruction or adverse modification of proposed critical habitat.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take. The prohibitions against taking the checkerspot butterfly found in section 9 of the Act do not apply until the species is Federally-listed. However, the Service advises the Forest Service to consider implementing the following reasonable and prudent measures for the checkerspot butterfly. If this conference opinion is adopted as a biological

opinion following a listing or designation of critical habitat, these measures, with their implementing terms and conditions, will be non-discretionary.

1) Minimize disturbance to the Sacramento Mountains checkerspot butterfly during project implementation, operation of the campground, maintenance of facilities, and emergency repairs.

2) Conduct all construction activities, operation of the campground, maintenance of facilities, and emergency repairs in a manner that will minimize modification and loss of Sacramento Mountains checkerspot butterfly habitat.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service and their employees, contractors, or subcontractors must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following Terms and Conditions are established to implement Reasonable and Prudent Measure 1:

1.1 If the project is conducted during the active season of the checkerspot butterfly (i.e., March through October), surveys shall be conducted prior to any impacts within suitable checkerspot butterfly habitat. These surveys should focus on locating any life stages of the checkerspot butterfly. If any life stages of the checkerspot butterfly are located, they should be relocated onto appropriate food plants (e.g., relocate pre-diapause larvae to New Mexico penstemon) within adjacent sites.

1.2 The Forest Service shall ensure that their employees, contractors, or subcontractors shall designate a Contract Officer's Representative (COR) who shall be responsible for overseeing compliance with the protective measures outlined in these Terms and Conditions. The COR shall have the authority to halt all associated project activities that may be in violation of the terms and conditions of the conference opinion;

1.3 The Forest Service shall monitor the project to ensure compliance with any applicable requirements for contractors and shall otherwise ensure that proposed project is implemented in a manner consistent with the term and condition and the conservation measures described above;

1.4 Prior the annual opening of Pines Campground, the Forest Service shall inform the campground host of the checkerspot butterfly closure order, the areas where camping is not allowed, and other relevant information (e.g, the adjacent checkerspot butterfly exclosure); and

1.5 The Forest Service shall provide a report documenting how the project is in compliance with the reasonable and prudent measures and the terms and conditions of this conference

opinion and implementation of the conservation measures described above. This compliance shall be included within the annual checkerspot butterfly report that is submitted to the New Mexico Ecological Services Field Office each calendar year.

The following Terms and Conditions are established to implement Reasonable and Prudent Measure 2:

2.1. If the project is conducted during the active season of the checkerspot butterfly (i.e., March through October), to the maximum extent practicable, any staging areas (i.e., areas where vehicles or equipment will be located during the construction of the project) should be situated within areas that do not contain New Mexico penstemon, valerian, or orange sneezeweed, or any life stages of the checkerspot butterfly. The staging areas should be clearly delineated (e.g., with surveys stakes or flagging) and the COR will ensure that the contractor is informed of and adheres to these requirements;

2.2. When maintenance of facilities or emergency repairs may affect the checkerspot butterfly within the action area, the Forest Service shall attempt to coordinate (i.e., email or phone call) those activities with the Service prior to implementation.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility for these species. In order for us to be kept informed of actions that either minimize or avoid adverse effects or that benefit listed species and their habitats, we request notification of the implementation of the conservation recommendations. We recommend the following conservation recommendations be implemented:

1. The Forest Service should work cooperatively with the Service and other entities to develop and implement a regional conservation strategy for the checkerspot butterfly.

2. The Forest Service should routinely monitor and report campground use in a manner consistent with these terms and conditions;

3. The Forest Service should review their checkerspot butterfly distribution maps to determine which grazing allotments overlap with the species. Within these allotments, the Forest Service determine whether the ongoing grazing is affecting the checkerspot butterfly and initiate informal or formal conferencing based upon their determinations.

4. The Forest Service should provide an annual report to the New Mexico Ecological Services Field Office to update and review the checkerspot butterfly monitoring data and meet with the Service to share the updated information. This report should also document whether

reasonable and prudent measures and terms and conditions provided by all previous conference opinions were implemented. Using these data, the Service will annually reassess the environmental baseline for the checkerspot butterfly.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

DISPOSITION OF DEAD OR INJURED LISTED ANIMALS

Upon finding a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the nearest Service Law Enforcement Office. In New Mexico, contact (505/346-7828) or the New Mexico Ecological Services Field Office (505/346-2525). Written notification must be made within five calender days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animals shall be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, we should be contacted regarding the final disposition of the animal.

REINITIATION - CLOSING STATEMENT

This concludes formal conference opinion on the proposal to construct the Pines Campground Capital Improvements Project, Sacramento Ranger District, Lincoln National Forest, New Mexico. You may ask the Service to confirm the conference opinion as a biological opinion issued through formal consultation if the Sacramento Mountains checkerspot butterfly is listed or critical habitat is designated. The request must be in writing. If the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary.

After listing of the Sacramento Mountains checkerspot butterfly as endangered/threatened and/or designation of critical habitat for the Sacramento Mountains checkerspot butterfly and any subsequent adoption of this conference opinion, the Federal agency shall request reinitiation of consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this conference opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this conference opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the Sacramento Mountains checkerspot butterfly or its habitat has occurred. Modification of the opinion and incidental take statement may be appropriate to reflect that take. No take of the Sacramento Mountains checkerspot butterfly or its habitat may occur between the listing of the Sacramento Mountains checkerspot butterfly and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

We look forward to working with you on the conservation of the checkerspot butterfly and other sensitive species. We are pleased with the amount and quality of coordination that has been occurring to date. Thank you for your concern for endangered species and New Mexico's wildlife habitats. If you have any questions, please contact Eric Hein of my staff at the letterhead address or at (505) 761-4735.

Sincerely,

Joy E. Nicholopoulos

Joy E. Nicholopoulos
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Forest Biologist, Lincoln National Forest, Alamogordo, New Mexico
District Ranger, Sacramento Ranger District, Lincoln National Forest, Cloudcroft, New Mexico

LITERATURE CITED

Blue Earth Ecological Consultants. 2003. Abundance, population structure, and habitat of the Sacramento Mountain checkerspot butterfly (Euphydryas anicia cloudcrofti), with notes on life history and ecology; project completion report. Santa Fe, New Mexico, 55 pp.

Ehrlich, P. R., D. E. Breedlove, P. F. Brussard, and M. A. Sharp. 1972. Weather and "regulation" of subalpine populations. Ecology 53:243-247.

Ferris, C. D., and R. W. Holland. 1980. Two new subspecies of *Occidryas anicia* (Doubleday) from New Mexico. Bulletin of the Allyn Museum 57:1-9.

Hanski, I., and M. Gilpin. 1991. Metapopulation dynamics: brief history and conceptual domain. Biological Journal of the Linnean Society 42:3-16.

Hanski, I. 1999. Metapopulation ecology. Oxford Series in Ecology and Evolution, Oxford Press Inc., New York.

Harrison, S. 1989. Long-distance dispersal and colonization in the bay checkerspot butterfly, *Euphydryas editha bayensis*. Ecology 70:1236-1243.

Holland, R. May 5, 2001. Email to Eric Hein concerning the Sacramento Mountains checkerspot butterfly.

Kaufmann, M. R., L. S. Huckaby, C. M. Regan, and J. Popp. 1998. Forest reference conditions for ecosystem management in the Sacramento Mountains, New Mexico. General Technical Report, RMRS-GTR-19, U.S. Forest Service, Rocky Mountain Forest and Range Experimental Station, Fort Collins, Colorado.

Metric Corporation, Inc., 1996. Environmental assessment NMSHTD project No. TPM-0130(1)00 [ST-SM-0130(200)], CN 3169, NM 130 3.22 km from US 82 East, Cloudcroft, New Mexico. Prepared for New Mexico State Highway and Transportation Department and Federal Highway Administration, New Mexico Division, Albuquerque.

Moore, S. D. 1989. Patterns of juvenile mortality within an oligophagous insect population. Ecology 70:1726-1737.

Murphy, D. D., and S. B. Weiss. 1988. Ecological studies and the conservation of the bay checkerspot butterfly, *Euphydryas editha bayensis*. Biological Conservation 46:183-200.

Pittenger, J. 1999. Mitigation alternatives for impacts to the Sacramento Mountains checkerspot butterfly from the N.M. Highway 130 rehabilitation project. Blue Earth Ecological Consultants, Sante Fe.

Porter, K. 1982. Basking behaviour in larvae of the butterfly *Euphydryas aurinia*. Oikos 38:308-312.

Sivinski, R. C., and P. J. Knight. August 1996. Narrow endemism in the New Mexico flora. pp. 286-296 in Southwestern rare and endangered plants: proceedings of the second conference. General Technical Report, GTR-283, U.S. Forest Service, Rocky Mountain Forest and Range Experimental Station, Fort Collins, Colorado.

Thomas, C. D., M. C. Singer, and D. A. Boughton. 1996. Catastrophic extinction of population sources in a butterfly metapopulation. Th12e American Naturalist 148:957-975.

USDA Forest Service. 1986. Environmental impact statement for the Lincoln National Forest Plan. Alamagordo, New Mexico, 406pp.

USDA Forest Service. 1995. Final environmental impact statement–amendment of forest plans–Forest Service, Southwestern Region–Arizona and New Mexico. October 1995. Southwestern Region, Albuquerque, New Mexico. 262 pp.

USDA Forest Service. 1997. Fish and wildlife rare plants report addressing the Townsite Act application by the Village of Cloudcroft (9/10/96). Sacramento Ranger District, Lincoln National Forest, New Mexico.

USDA Forest Service. 1999a. Cloudcroft checkerspot butterfly (handouts given at February 24, 1999). Sacramento Ranger District Office, Lincoln National Forest, New Mexico.

USDA Forest Service. 1999b. Additional information on topics discussed on February 24, 1999, meeting regarding the Cloudcroft checkerspot butterfly. Sacramento Ranger District, Lincoln National Forest, New Mexico.

USDA Forest Service. 1999c. Cloudcroft checkerspot butterfly 1998 survey summary. Sacramento Ranger District, Lincoln National Forest New Mexico.

USDA Forest Service. 1999e. Decision notice and finding of no significant impact for Rio Peñasco Wildland/Urban interface project, Otero County, New Mexico. Lincoln National Forest, Otero County, New Mexico. Sacramento Ranger District, New Mexico.

USDA Forest Service. 1999f. Updated project schedule of proposed activities on the Lincoln National Forest, Otero County, New Mexico. Lincoln National Forest.

U.S. Forest Service. 1999h. Decision notice and finding of no significant impact for Rio Penasco Wildland/Urban interface project, Otero County, New Mexico. Lincoln National Forest, Otero County, New Mexico. Sacramento Ranger District, New Mexico.

USDA Forest Service 2000a. Survey summary from 1999, information, and comments regarding the status review for the Sacramento Mountains checkerspot butterfly. Lincoln National Forest.

USDA Forest Service. 2000b. Cloudcroft checkerspot butterfly 2000 survey summary. Sacramento Ranger District, Lincoln National Forest, New Mexico.

USDA Forest Service. 2002. Sacramento Mountains checkerspot butterfly 2001 survey summary. Sacramento Ranger District, Lincoln National Forest, New Mexico.

USDA Forest Service. 2002a. Sacramento Mountains checkerspot butterfly 2002 survey summary. Sacramento Ranger District, Lincoln National Forest, New Mexico.

USDA Forest Service. 2002b. Biological Assessment and evaluation for genetic study of the Sacramento Mountains checkerspot butterflies within the Sacramento Ranger District, Lincoln National Forest, Otero County New Mexico. Lincoln National Forest, Alamogordo, New Mexico.

USDI Fish and Wildlife Service. 1995. Recovery plan for the Mexican spotted owl *(Strix occidentalis lucida)*. Albuquerque, New Mexico. 85pp.

USDI Fish and Wildlife Service. 1999. Acknowledgment of initiation of formal consultation for the issuance of a 10-year special use permit to Otero County Electric Cooperative to construct a new powerline from a substation south of Cloudcroft to James Canyon at highway 82 and its effects on the Mexican spotted owl (*Strix occidentalis lucida*) in accordance with section 7 of the Endangered Species Act of 1973, as amended. Albuquerque, New Mexico.

USDI Fish and Wildlife Service. 2001a. The influence of range management on the abundance of the Sacramento Mountains checkerspot butterfly (*Euphydryas anicia cloudcrofti*) and its host plants. Draft experimental design for the Sacramento Ranger District, Lincoln National Forest, New Mexico.

USDI Fish and Wildlife Service. 2001b. Response to an environmental assessment concerning the proposed Cloudcroft Townsite Land Application on the Sacramento Ranger District, Lincoln National Forest; Consultation number 2-22-01-I-379.

USDI Fish and Wildlife Service. 2001c. Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for the Sacramento Mountains Checkerspot Butterfly and Proposed Designation of Critical Habitat. Federal Register 66:46575-46595.

Wilcox, B. A., and D. D. Murphy. 1985. Conservation strategy: the effects of fragmentation on extinction. The American Naturalist 125:879-887.