February 4, 2005

Mr. Dale B. Engquist
Superintendent
Indiana Dunes National Lakeshore
1100 North Mineral Springs Road
Porter, Indiana 46304

Dear Mr. Engquist:

This document transmits the U.S. Fish and Wildlife Service's (Service) Final Biological Opinion for the Formal Consultation between the National Park Service/Indiana Dunes National Lakeshore and the Service, pursuant to section 7 of the Endangered Species Act of 1973, as amended, for the 2004 Fire Management Plan at Indiana Dunes National Lakeshore.

The National Park Service/Indiana Dunes National Lakeshore is responsible for implementing all requirements of the Biological Opinion and Incidental Take Statement, including work by contractors and consultants. This Biological Opinion authorizes the Indiana Dunes National Lakeshore to take Karner blue butterflies within the prescribed limits. A complete administrative record of this consultation is on file at the Service's Northern Indiana Suboffice, Porter.

For further discussion, please contact Elizabeth McCloskey at the Northern Indiana Suboffice [(219) 983-9753 or elizabeth_mccloskey@fws.gov].

Sincerely yours,

/s/
Scott E. Pruitt
Supervisor

cc: Regional Director, USFWS, Twin Cities, MN (ES-TE Attn: Jennifer Szymanski)
Regional Director, National Park Service, Omaha, NE

Director, Indiana Division of Nature Preserves, Indianapolis, IN
Regional Ecologist, Indiana Division of Nature Preserves, Medaryville, IN
Christie Kiefer, Environmental Coordinator, Division of Water, Indianapolis, IN

bc: NISO, Porter, IN

ES: EMcCloskey/02-04-05/INDU KBB FMP Bio Opinion

Endangered Species Act
Section 7 Consultation - Biological Opinion

Action Agency:
Indiana Dunes National Lakeshore, National Park Service

Action Considered During Consultation:
2004 Fire Management Plan Implementation to Address Wildfire Suppression and Prescribed Fire Use at the Indiana Dunes National Lakeshore

Consultation By:
Region 3, U.S. Fish and Wildlife Service

Date of Issuance: February 4, 2005

Consultation History

Since 1992, The Indiana Dunes National Lakeshore (INDU) has been operating its fire program under a Fire Management Plan (FMP) approved in that year. The Karner blue butterfly was listed as an endangered species on December 14, 1992, thus necessitating consultation under section 7 of the Endangered Species Act of 1973, as amended, to address impacts of the 1992 FMP on this species. This consultation was completed on June 1, 1993 with the issuance of a Biological Opinion and an Incidental Take Statement. Several amendments to the BO were made in subsequent years to address changes in the fire program, the addition of new land units to the prescribed fire plan, and other modifications.

In 1998, National Park Service Director's Order 18 (DO-18) established new required provisions, operational policies, and procedures for wildland fire programs within NPS. A new fire management plan is therefore necessary for INDU to meet the requirements established in DO-18. Rather than amend the 1993 BO, INDU determined that new consultation under section 7 was warranted.

On April 18, 2002, INDU held a public scoping open house to solicit comments on the new FMP and an environmental assessment that would accompany it. Subsequent to this open house, as the new FMP was being drafted, staff of INDU informally discussed with FWS staff which species would need to be addressed in a Biological Assessment to be prepared for the FMP.

On May 6, 2003, INDU wrote to the FWS's Bloomington, Indiana, Field Office to request a list of Federally endangered, threatened, and candidate species and critical habitats found at INDU. FWS responded by letter of June 9, 2003, listing the Karner blue butterfly, bald eagle, Pitcher's thistle, and eastern massasauga rattlesnake, plus critical habitat for the piping plover, as being present at INDU, and the Indiana bat as likely being present. Bat mist net surveys at the Heron Rookery Unit of INDU in summer 2003 confirmed the presence of the Indiana bat at INDU.

Informal drafts of the BA were reviewed and commented on by FWS staff between February and July 2004. The final BA was submitted to the FWS on October 1, 2004, along with a request to initiate formal consultation. The FWS responded on November 4, 2004 and indicated that the Biological Opinion would be provided no later than February 18, 2005.

Species Considered in This Biological Opinion

The Indiana Dunes National Lakeshore contains habitat for the Federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*) and Indiana bat (*Myotis sodalis*) and the threatened bald eagle (*Haliaeetus leucocephalus*) and Pitcher's thistle (*Cirsium pitcheri*). It also contains 4.9 miles of designated critical habitat for the Federally endangered piping plover (*Charadrius melodus*) along the shoreline of Lake Michigan, including 3.1 miles within Indiana Dunes State Park, which is included within the authorized boundary of INDU but is owned by the State of Indiana and is managed as a separate entity from the Federally-owned lands. The Candidate species eastern massasauga rattlesnake (*Sistrurus catenatus catenatus*) is also found at INDU.

The September 2004 Biological Assessment prepared by INDU for their FMP considered the affects of the FMP on these 6 species (INDU 2004c). It was determined that the activities of the FMP would not adversely affect the Indiana bat, bald eagle, Pitcher's thistle, or eastern massasauga or the critical habitat of the piping plover. However, the FMP would adversely affect the Karner blue butterfly. The FWS agrees with this determination. Therefore, the only species considered in the Biological Opinion is the Karner blue butterfly.

Status of the Species

The Karner blue butterfly was listed as an endangered species on December 14, 1992 (57 FR 59236-59243). The species was listed because of habitat loss and modification throughout its entire range (USFWS 1992). Among the major causes of decline of this species leading to its listing as endangered are habitat fragmentation (which reduces and isolates habitat), fire suppression (which results in overgrowth of woody species), pesticides to control undesired insects, herbicide use on areas supporting plant species required by the butterfly, and excessive soil or vegetation disturbance. No critical habitat has been designated for this species.

Historically, the Karner blue occurred in a narrow geographic area that extended from eastern Minnesota, across portions of Iowa, Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania, New York, New Hampshire, Massachusetts, Maine, and the province of Ontario, Canada (USFWS 2003). Over the past 100 years, Karner blue populations have declined significantly throughout the species' range. It is now believed extirpated from Maine, Massachusetts, Pennsylvania, Iowa, Illinois and Ontario, Canada. Currently, populations of the Karner blue occur in 7 states: Minnesota, Wisconsin, Indiana, Michigan, Ohio, New York, and New Hampshire. In 1998 it was reintroduced to Ohio as part of a 5-year reintroduction program, and in 2000 it was reintroduced in New Hampshire, the same year the native population was lost in the wild. Wisconsin and Michigan have the largest numbers of local populations with the greatest numbers of individuals.

A recovery plan for the Karner blue butterfly was published in September 2003 (USFWS 2003).

In general, the recovery strategy for this species is to perpetuate viable metapopulations of the Karner blue in the major ecological regions throughout its geographic range. Thirteen ecological regions are identified (called "recovery units" [RUs]), based on known variations in physiography, climate, and vegetation, and potential geographic genetic variation in Karner blue populations. There is one RU in Indiana, designated the Indiana Dunes RU. It includes the Indiana Dunes National Lakeshore and various nature preserves and other lands in western Gary and eastern Hammond, Lake County.

Species Description

The Karner blue butterfly is a small, silvery member of the family Lycaenidae, the gossamer wing butterflies. The wingspan is about 1 inch. There are color and pattern differences between males and females of the species (Nabokov 1944). The dorsal side of the male fore wing is violet-silvery blue with a black margin and a white-fringed edge. The female dorsal fore wings range from dull violet to bright purplish-blue near the body and central portion of the wings, while the remainder of the wing ranges from light to dark gray-brown. Female hind wings have marginal orange crescents (lunules), which males lack. Ventral surfaces of the wings of both sexes are grayish-fawn to pearly-gray, with several rows of black spots on the inner portions and a line of orange crescents and metallic spots near the margins. There are no tails on the hind wings of either males or females.

The eggs of Karner blues are very small, radially symmetrical, somewhat flattened, and pale greenish-white in color (Dirig 1994). Larvae are a pea-green color, pubescent, and dorsally flattened, with a brown-black to black head capsule (USFWS 2003). Older larvae have pale green to white lateral stripes and a dorsal dark green longitudinal stripe. In pre-pupal larvae the lateral stripes become less distinct and the color becomes a duller green. Pupae are bright green and smooth, changing to a light tan with hints of purple shortly before emergence.

Life History

The Karner blue butterfly is bivoltine, completing 2 generations per year. First (spring) brood larvae hatch from overwintered eggs in mid- to late April, depending on latitude and local weather conditions, and begin feeding on wild lupine (*Lupinus perennis*). Wild lupine is the only known larval food source for the Karner blue butterfly. The larvae pass through 4 instars (Savignano 1990), feeding for approximately 3 to 4 weeks before pupation in late May to early June. Feeding by first and second instar larvae results in tiny circular holes in Lupine leaves, while older larvae eat all but the upper and lower epidermis, creating a characteristic window-pane appearance (Swengel 1995). Karner blues are known to pupate in leaf letter, on stems and twigs, and occasionally on lupine leaves (Dirig 1976, Cyan and Dirig 1978).

Pupation generally lasts 7 to 11 days, with adults emerging in late May through mid-June (Dirig 1976). The first-flight females lay their eggs primarily on lupine plants, often singly on leaves, petioles, stems, or occasionally on other plants or leaf litter close to lupine plants (USFWS 2003).

Second brood eggs hatch in 5 to 10 days, and larvae can be found feeding on wild lupine from

early June through late July. Typically, a larva can survive on the leaves of a single large lupine stem, moving from leaf to leaf, often returning to leaves fed on during earlier instars, but it may move to other lupine stems as well (Lane 1999).

Second (summer) brood adults begin to appear in early to mid-July and can be present until mid-August, although individual life span is approximately 5 days (Bidwell 1995, Knutson *et al.* 1999). However, adults can live as long as 2 to 3 weeks (USFWS 2003). Flight dates can be affected by weather, such as temperature and moisture (*e.g.* cool wet spring, hot dry summer) (Knutson *et al.* 1999, USFWS 2003). Generally, there are many more adults in the second brood compared to the first brood, but the opposite can also occur (Schweitzer 1994, Knutson *et al.* 1999). The smaller first (spring) brood may be attributed to high overwinter mortality of eggs, the inability of larvae to find lupine in the spring, or greater oviposition success of the first flight females because of senescence of lupine by the time of the second brood (USFWS 2003).

Another aspect of the life history of Karner blues is attendance of the larvae by ants; pupae are also frequently tended by ants (USFWS 2003). Larvae tended by ants have a higher survival rate than those not tended by ants (Savignano 1990, 1994, Grundel *et al*. 1998a, Lane 1999), presumably because the ants provide some protection from the natural enemies of larvae. Grundel *et al*.'s (1998a) larval feeding study demonstrated that larvae tended by ants grow relatively rapidly and gain weight more rapidly per amount of food eaten. Ants benefit from this relationship by using as food a liquid secreted from specialized glands on the larvae that contains carbohydrates and possibly amino acids (Savignano 1990). Tending levels for late instar larvae are close to 100 percent. During pupal survival studies, Lane (1999) observed 8 ant species associated with Karner blue pupae. Some species of ants appear to provide greater protection than other species.

Habitat Use and Requirements

Throughout it range the Karner blue butterfly was historically associated with landscapes composed of sandy soils which supported oak or oak-pine barrens and savanna ecosystems. It is now associated with remnant barrens and savannas, highway and powerline rights-of-way, gaps within forest stands, young forest stands, forest roads and trails, airports, and military camps that occur on the landscapes previously occupied by native barrens and savanna (USFWS 2003). Almost all of these contemporary habitats are described as having a broken or scattered tree canopy that varies within habitats from zero to between 50 and 80 percent cover, with grasses and forbs common in the openings. The habitats have lupine for larval feeding, nectar plants for adult feeding, critical microhabitats, and attendant ants. The stature and spacing of trees in native savanna is somewhat variable, reflecting differences in soils, topography, and climate (Nuzzo 1986), and the distribution of trees in contemporary habitats is similarly diverse. Soils are typically well-drained sandy types, which influences both plant growth and disturbance frequency. These conditions are generally wet enough to grow trees but dry enough to sustain periodic fires (Breining 1993). Topography is diverse and includes flat glacial lake beds, dune and swale, and steep, dissected hills (USFWS 2003).

Adults and larvae use a variety of subhabitats created by variation in tree canopy and shrub cover, topography, and soil moisture (Wiklund 1977). These behavior-specific habitats can be

spatially separate and structurally different. It is important for butterflies to be able to move easily between subhabitat types, as optimal subhabitat types differ for adults and larvae. A highly variable microtopography creates a highly variable thermal environment, plant community, and canopy structure.

Adult Karner blues are commonly found in open-canopied areas. In western Wisconsin, Maxwell and Givnish (1994) collected data on the physical structure of habitat and cover estimates of selected vegetation, and found a positive correlation between adult Karner blue abundance and grass cover. Because the grass was used as adult roosting sites, they suggested that this indicated the importance of roosting sites for healthy populations of the species. Grundel *et al.* (1998b) showed that Karner blues exhibited behavioral separation of habitat use in relation to canopy cover. Males consistently used openings, especially large openings, implying that these areas served as primary mating and nectaring habitat. Males were more likely than females to spend time flying across these large openings, although the males spent most of their time resting on vegetation, not patrolling their habitat (Bidwell 1994, Scott 1975, 1982, Grundel *et al.* 1998b). Female Karner blues spread their time more evenly across canopy cover types, concentrating oviposition in moderately shaded areas, especially in the second brood (Lane 1993, 1994, 1999, Grundel *et al.* 1998b, Maxwell 1998).

Karner blue butterfly larvae feed exclusively on wild lupine. Lupine is an early successional species adapted to survive on dry, relatively infertile soils. Even the seedlings have long taproots that allow the plant to reach soil moisture. It grows well in full sun or partial shade but has limited survival under total shade (Grigore and Tramer 1996). Available evidence suggests that lupine thrives on nitrogen-poor soils in partial- to open-canopied area and is suppressed by shade; it may not be competitive with other plants on nitrogen-rich soils and phosphorus-poor soils (USFWS 2003). Several species of pines, oaks, and shrubby vegetation are adapted to the same soils and habitat as lupine (Nuzzo 1986, Haney and Apfelbaum 1990), and without disturbance these species will close the canopy, shading and suppressing lupine. Consequently, disturbances that reduce tree and shrub canopy cover are necessary for lupine to persist. Several disturbances are beneficial for renewing lupine habitat, including prescribed fire, mowing, and mechanical tree removal (USFWS 2003). Studies by Grigore and Tramer (1996) showed that burned lupine had more total plant biomass than unburned plants and more biomass in stems and leaves. Burned populations produced significantly more seed pods and set more seed than unburned populations, and also had taller and more numerous flowering stems, more leaves, and higher percent cover.

Larval feeding experiments at INDU indicated that growing conditions of wild lupine affect the growth rate of Karner blue larvae (Grundel *et al.* 1998a). Leaves from various aged plants, plants that were in flower or in seed, and plants grown in the sun or in shade were used to feed larvae from the time of hatching. It was found that larvae eating leaves of shade-grown lupines that had just gone to seed grew significantly faster than larvae feeding on similar sun-grown lupines. Lupines in seed are common during most of the second larval brood (Dirig 1994). However, in-the-field microclimate differences could modify these results (Grundel *et al.* 1998a). For example, cooler temperatures in the shade might cause slower larval growth.

A second important finding by Grundel *et al.* (1998a) is that phenological age/condition of the

lupine is a factor in larval growth and survival. In their study, larvae feeding on first-year plants (new seedlings) and senescent plants (lupine that had released all their seeds and exhibited significant deterioration of leaf tissue) grew slowly and had poorer survivorship. Oviposition on lupine in areas of intermediate canopy cover, where plants do not senesce as rapidly as in bright sunshine and drier conditions, therefore can be advantageous for Karner blues (Grundel *et al.* 1998b).

Adult Karner blues need adequate nectar resources and will utilize a wide variety of native and introduced flowering plants (Rabe 2001). Throughout their range, Karner blues have been observed to feed on flowers of 39 species of herbaceous plants and 9 species of woody plants during the spring brood and on flowers of 70 species of herbaceous plants and 2 species of woody plants during the summer brood (USFWS 2003). It is believed that availability of nectar plants may be a key factor in determining habitat suitability for Karner blues (Fried 1987). For example, Packer (1994) implicated the dearth of nectar sources as one of the causes of the extirpation of Karner blues from Ontario. However, other researches have not found a correlation between Karner blue populations and nectar sources (Herms 1996). Studies by Grundel *et al.* (2000) at INDU suggest that the Karner blue is opportunistic in selecting nectar plants, choosing species with the greatest total number of flowers or flowering heads. However, these studies also showed a preference for certain select nectar species, such as butterfly weed and horsemint, and nectar plants with yellow or white flowers, particularly sand coreopsis, sand cress, dewberry, and white sweet clover.

Literature on the historic distribution of the Karner blue butterfly suggests that this species occurred as shifting clusters of populations distributed across a vast fire-swept landscape covering thousands of acres (Schweitzer 1989). While fires resulted in localized extirpations, vegetative succession following these fires maintained suitable habitat patches and allowed rapid population expansion or repopulation. Therefore, populations of the Karner blue butterfly exist as dynamic collections of sub-populations that are interconnected by dispersal corridors, collectively making up a metapopulation (USFWS 2003). Metapopulations continually shift in distribution across the landscape as habitat patches change from suitable to unsuitable. Persistence of metapopulations is governed by the balance between extirpation of sub-populations and recolonization of unoccupied suitable habitat sites.

Description of the Proposed Action

A Fire Management Plan is a detailed program of action to implement fire management policy and objectives. The FMP at INDU outlines how wildland fires will be safely suppressed in an efficient, cost-effective manner; how public and private property will be protected from the impacts of wildland fire; and the role fire management will play in the protection and management of natural and cultural resources (INDU 2004a).

The Resources Management Plan for INDU was revised in 1999 (NPS 1999) and identifies 4 major goals:

- Natural resources, processes, and conditions are identified, inventoried, monitored, and protected for future generations to enjoy. Impairments or extirpation of these resources, processes, or conditions are

reversed by restoration, rehabilitation, mitigation or reintroduction as appropriate to the national lakeshore's mission.

 Cultural resources, processes, and conditions are identified, inventoried, monitored, and protected for future generations to enjoy.

 Research in the natural sciences continues in the tradition of Dr. Henry Cowles such that the management needs of the national lakeshore and nearby NPS areas are addressed and natural resources management and research are advanced on a nationally significant scale.

 Restoration of expired reservation of use tracts [former home sites] will require...restoration of as near a natural plant regime as possible.

The purposes of the FMP are as follows (INDU 2004a):

 To ensure firefighter safety;

 To ensure the safety of local residents and the visiting public and the protection of natural and cultural resources and public and private property;

 To perpetuate, restore, replace, or replicate natural and historical fire disturbance processes to the greatest extent practicable; and

 To allow the use of fire to accomplish resource management objectives, including hazard fuel reduction and maintaining or restoring fire-adapted communities.

At INDU, all wildfires, regardless of the source of ignition, will be suppressed. Resource benefits will not be considered when selecting the suppression response. This is because of the wide variety of safety and property concerns present at INDU. This Biological Opinion does not address the wildfires and their affects on Karner blue butterflies because they cannot be predicted and are not at the discretion of INDU.

INDU will utilize prescribed fire to achieve several objectives (INDU 2004a):

 Prescribed fires will be used to accomplish resource management objectives, such as restoring and maintaining oak savannas or creating wildlife habitat, and for achieving fuel hazard reduction objectives, such as reducing fuel ladders and downed woody debris. To the maximum extent possible, this program will try to simulate the effects of the historical fire regime on the plant and animal communities within fire unit boundaries. The goals of this program are to reduce the risk from unwanted wildland fire to values such as structures and private property, and to simulate the severity and intensity of historical fires, at times and places when safety and control can be assured.

 Prescribed fire will be used according to a pre-determined set of parameters. Prescribed fires can be ignited in designated prescribed fire units under specific prescriptions. The required prescriptions are described in the burn unit's prescribed fire plan. Prescribed fires may be carried out at any time of the year when conditions are within prescription and operations will not conflict with wildland fire suppression activities.

 Priorities for use of prescribed fires will be determined by the length of time since previous burns,

vegetative conditions, topographic advantages, current fuel loading, and personnel and logistical requirements.

Specific objectives related to Karner blue butterfly habitat include (INDU 2004a):

- Inventory stands of black oak savanna, black oak woodland, and black oak forest as part of the vegetation mapping project;

- Within 5 years, initiate a monitoring protocol for assessing the mosaic of the savanna/woodland/forest complex;

- Use prescribed fire, in combination with other treatment methods as applicable, to maintain and restore fire-adapted species and communities; and

- Monitor Karner blue butterfly populations, using established methods, as an indicator of the quality and health of the savanna/woodland/forest complex mosaic.

Management considerations related to the Karner blue butterfly to be utilized during prescribed burns include the following (INDU 2004a):

- Prescribed burn operations will be conducted in accordance with the established guidelines for the management of the Karner blue butterfly.

- No off-road heavy equipment or vehicle use will be permitted unless human life or private or public property are threatened in order to avoid unreasonable damage to native habitats.

The established guidelines pertaining to Karner blue butterflies are discussed below as Conservation Measures.

The Indiana Dunes National Lakeshore contains 15,063 acres of oak savanna, prairie, oak forests and wetlands habitats along the southern portion of Lake Michigan (INDU 2004b). Currently, INDU has an active prescribed fire program and burns approximately 300 acres each year, averaging 5 prescribed fires annually. The preferred alternative of the new FMP is to ignite an average of 6 prescribed fires each year and burn approximately 700 acres. This new program would include 4 expanded burn units and 19 new burn units. Two of these new units are recently acquired properties purchased and donated to INDU by United States Steel Corporation as part of a Natural Resources Damage Consent Decree, Miller Woods Subunit 5 (51 acres) (called Enterprise Zone or City of Gary Site in USS documents) and Woodlake Dune Savanna (81 acres). Both of these properties are being restored by contractors employed by US Steel and both support the Karner blue butterfly. Two other USS-purchased parcels of about 8 acres each are adjacent to these two properties but are not yet owned by INDU: however, they will be included in the burn program once they are deeded to INDU (Daniel Sparks, USFWS, personal communication). Other new burn units, such as Calumet Prairie, Cowles Bog, and Hobart Prairie Grove, do not support the Karner blue. Burn units that are known to have or could potentially have Karner blue butterflies are Burns Ditch (125 acres), Miller Woods (approximately 950 acres), Woodlake Dune Savanna (81 acres), Grand Boulevard (53 acres), Inland Marsh (446 acres), Marquette Trail (39 acres), Tolleston Dunes (179 acres), and West Beach (156 acres). These burn units are all within the large West Unit of INDU, meaning they are west of Burns Waterway, which is the division between the West Unit and East Unit. Two

East Unit burn units potentially could have Karner blue butterflies reintroduced at some time in the future, Howes Prairie (84 acres) and Lupine Lane (74 acres).

Different burn prescriptions are proposed for the previously-listed burn units (INDU 2004b). Burns Ditch, Woodlake Dune Savanna, Marquette Trail, and Miller Woods (which is divided into 7 subunits containing oak savanna and buttonbush and cattail wetlands) are proposed to be burned every 3 to 10 years when resources and favorable burning conditions are available. Inland Marsh, Tolleston Dunes, and West Beach have been regularly burned since 1992 under the 1992 FMP and 1993 Biological Opinion. The Inland Marsh prescribed fire unit consists of 5 subunits, which include oak savanna and cattail marshes with aspen transitional areas. Four of the subunits are contiguous south of US 12, and subunit 5 is separated by US 12 and railroads to the north and is along the south side of Long Lake. The Tolleston Dunes prescribed fire unit consists of 4 subunits supporting oak savanna, aspen and willow thickets, cattail marsh, prairie, and bare sand. The West Beach prescribed fire unit is a complex of 10 subunits around the West Beach recreation area and the north side of Long Lake. It consists of oak forest and savanna, disturbed sand mined areas, and wet shrublands. These 3 units have been and will continue to be burned according to the established guidelines concerning Karner blue butterfly management.

Karner blue butterfly habitat is fire-dependent. Therefore, the positive effects of fire on Karner blue habitat must be weighed against any negative impacts to the butterfly (USFWS 2003). Fire is known to be an important component in maintaining savanna/barrens habitat by reducing accumulated plant litter, setting back the growth of native and non-native woody species that would convert the savanna to closed woodlands, increasing light under the tree canopy, and providing higher spring soil temperatures due to the blacking of the vegetation (Grigore and Tramer 1996). However, fire can also have negative effects on the Karner blue, and other invertebrates, through direct mortality of eggs or larvae and/or reduction of food/nectar plants. As discussed previously, lupine has been shown to respond favorably to burning by producing more seed ponds and setting more seeds than unburned plants, as well as having more total plant biomass and taller and more numerous flowering stems, more leaves, and higher percent cover (Grigore and Tramer 1996). These same researchers found that fire causes considerable seedling mortality, however, but post-fire-emergent seedlings and unburned seedlings did not have significant differences in mortality, although seedling survival in general was found to be poor.

Site history and characteristics are primary factors dictating whether prescribed fire is the best management tool for the site, and at what frequency/intensity/season fire should be used. Fire is a natural component of the oak savanna habitat found at INDU and is one of the forces under which vegetation and its associated wildlife at the national lakeshore evolved. As described by Bowles *et al*. (1990), "Fire suppression is one of the most significant postsettlement causes of natural community deterioration and species decline at the Indiana Dunes National Lakeshore, primarily through woody canopy closure and succession to shade-tolerant species." These authors' recommendation for a fire management program at INDU was one that would simulate, to the extent possible, the known presettlement burning regime in order to reduce fuel loads, restore or maintain fire-dependent vegetation types, and maintain high plant species diversity. Since the Karner blue butterfly is dependent upon these native fire-dependent habitats, it likely would be lost from INDU without the prescribed burning necessary to restore and maintain its habitat. However, care must be taken to burn at appropriate intervals, burn only portions of the

occupied Karner blue habitat at a time, conduct patchy burns, and create refugia prior to prescribed fires. At INDU, prescribed burning will occur in the spring and fall, except possibly for small research plots.

Conservation Measures to Minimize Take of Karner Blue Butterflies

The following procedures have been established at INDU to minimize adverse impacts to the Karner blue butterfly population under the FMP (INDU 2004c). They will apply to all national lakeshore prescribed fires; however, if the burn unit does not contain Karner blues, normal National Park Service burn procedures will be followed:

- Proposed prescribed fire burn units will be surveyed for lupine and Karner blues before the burn plan is written. If Karner blues are found, the below procedures will be followed. In addition, a walk-through survey will be conducted prior to the burn to establish the number of Karner blue butterflies present, as well as their locations. These sub-population surveys will take place before and 3 years after each burn for both first and second broods. If the population drops below 60 percent of the long-term average, based upon the counts at each particular habitat, burning will be suspended until the population recovers or permission to burn is obtained through consultation with the U.S. Fish and Wildlife Service. This stipulation recognizes that burning may not be the cause of population declines, since weather such as cold winters, damp or cool springs or summers, or droughts, can also adversely affect the Karner blue population.

- Each isolated sub-population area, such as Inland Marsh, West Beach, or Tolleston Dunes, will be divided into burn subunits and preserve sites so no more than 40 percent of the occupied habitat is burned in a single year. Unoccupied habitat will be burned as necessary to restore that habitat for Karner blues.

- Before each burn, at least one burn exclusion area (refugia) encompassing prime Karner blue habitat within that unit must be established and attempt to be protected from fire to serve as a reserve to help the repopulation of the burn unit.

- Adjacent burn units with Karner blue butterflies will not be burned in consecutive years. This will allow surviving Karner blues to recover from the fire and repopulate the burned unit.

- The stated objectives for prescribed fires in Karner blue butterfly areas will specify a mosaic burn pattern, with no more than 90 percent of the area burned.

- Each subunit should be burned once every 4-10 years. If the habitat is degraded, then the subunit can be burned more often for restoration. Small research burns (less than 5 acres) which may require burning every year for several years will be permitted, because the small area impacted should not have a significant negative effect on the Karner blue population.

- Off-road vehicle use will be restricted in Karner blue habitat. Motorized vehicles will stay on the fire line. Vehicles may leave the fire line only after consultation with a resource advisor qualified to determine the possible impact to Karner blues on a case by case basis. Approval to leave the fire line will be granted only when the impact to Karner blue habitat will be minimal and the work cannot be accomplished by other means. When using vehicles on the burn, the path driven should be through burned areas and avoid unburned areas to minimize the impact to Karner blue eggs.

- When prescribed burning is not feasible due to decline in Karner blue numbers, burn regulations, or extremely degraded habitat, the habitat will be maintained or restored through mechanical and chemical measures that my include manually cutting and treating unwanted vegetation with herbicide. Only approved compounds that will decompose rapidly will be utilized. Mowing may be implemented in small Karner blue habitat areas and along dispersal corridors. Mowing will be restricted to before April 1 and after August 15, with the blade set at least 8 inches above the ground.

Environmental Baseline

Schweitzer (1992) considered that INDU supports a "globally highly significant Karner blue population," based upon mark-release-recapture studies and walk-through surveys. The largest metapopulation was found at the Inland Marsh complex.

INDU Karner blue butterfly habitat is primarily located in the West Unit, as described previously. The West Unit supports 2 separate Karner blue metapopulations, the Inland Marsh Complex and Miller Woods. Karner blues have been extirpated from the East Unit, although several potential habitats exist for possible translocation in the future. The national lakeshore draft Karner blue management plan focuses on 3 main goals (INDU 2004c):

- Manage and improve habitats in the West Unit supporting the Miller Woods metapopulation and Inland Marsh Complex metapopulation.

- Establish and improve new suitable habitats in the East Unit capable of supporting a Karner blue metapopulation and restore Karners to them.

- Create and improve dispersal corridors within each metapopulation to improve its viability.

These goals are reflective of those established and mandated by the Karner Blue Butterfly Recovery Plan (USFWS 2003). This Plan suggests that INDU should support at least 2 minimum viable metapopulations (VP), each consisting of at least 3000 adult butterflies (summer brood).
Based upon requirements of the June 1, 1993 Biological Opinion, INDU established meandering transects (walk-through surveys) through each Karner blue butterfly habitat. Current surveys cover Inland Marsh, Long Lake, Tolleston Dunes, Marquette Trail, West Beach, Miller Woods, and Burns Ditch (INDU 2004c). Contractors for US Steel have been conducting walk-through surveys at Woodlake Dune Savanna and Miller Woods Subunit 5, and INDU staff will assume responsibility for these surveys when the 5-year restoration period at these properties is completed (USS 1999). Survey results are intended to identify population trends and confirm that populations are not adversely affected by habitat management actions, primarily prescribed burns. Because prescribed fires kill Karner blue butterfly eggs, walk-through surveys are used to confirm recolonization and recovery within fire management areas.

Walk-through surveys are conducted annually during both the spring and summer Karner blue flight periods (INDU 2004c). The intent of the surveys is to compare relative peak abundance over time. Because the date of the population peak varies from year to year, and due to the effect poor weather conditions can have on sample results for a given day, surveys are repeated a minimum of 3 times per brood for each transect if at all possible; however, weather conditions and/or staff issues have occasionally limited the surveys to 2 times for one or both broods. This increases the likelihood of surveying near the population peak and allows the investigator to determine if Karner blue abundance is increasing or decreasing from year to year.

Surveys are conducted by walking a specific route and recording all Karner blue butterflies encountered (INDU 2004c). Butterflies are followed until they land and can be confirmed to be Karners. Butterflies that cannot be confirmed to be Karner blues are not recorded. Confirmed

Karners are recorded as male, female, or unknown if the sex cannot be determined or the butterfly escapes before being sexed. Butterfly locations are recorded on topographic maps. Survey routes are sampled using the same paths as closely as possible to ensure that the same areas are sampled during each survey. Surveys conducted at a given site are done at the same time of day with the same number of surveyors (2 or 3). Also recorded are the date, starting and ending times, names of the surveyors, starting and ending wind speed and direction, starting and ending percent cloud cover, starting and ending temperature, and whether or not there was precipitation and if so what type.

The flight period of each brood usually lasts 1 to 2 weeks. Males appear first (protandry), and at peak flight the sex ratio typically exceeds 50 percent males (USFWS 2003). A 3-year mark-release-recapture (MRR) study combined with walk-through surveys at INDU found that, at peak numbers, an approximately 2:1 male:female sex ratio occurred (Knutson *et al*. 1999). These researchers found that the relationships between butterfly captures (MRR) and estimated population numbers, and between walk-through butterfly counts and estimated population numbers, were very similar. With this information on the male:female sex ratio at the population peak and the reliability of walk-through survey population estimates, INDU staff believe it is possible to determine annual Karner blue numbers for the purposes of evaluating the effectiveness of this Burn Plan in managing habitats at INDU for this endangered species.

Under requirements of the 1993 Biological Opinion, INDU has provided annual reports to the FWS on the results of the Karner blue surveys and their relationship to prescribed burns or wildlfires. Dr. Dale Schweitzer's 1992 second brood Karner population estimate for Inland Marsh was about 4,500 butterflies; the 1993 BO and Incidental Take Statement included the requirement that the goal at Inland Marsh is to maintain at least 60 percent of the total 1992 population size (or a spring brood of 500, whichever is larger) in unburned areas. No similar stipulations were provided for other populations within INDU because detailed surveys for Karner blues were not conducted in these areas prior to the BO.

Since 1994, when the current Karner blue surveys were initiated, the population of Karner blue butterflies at Indiana Marsh have varied considerably, from a 2003 second brood low count of 172 to a 1998 high of 844 actual individuals counted, or estimated populations of approximately 2,100 Karners in 2003 and between 4,175 and 5,650 in 1998 (INDU 2004d). These same types of fluctuations have occurred at the other surveyed areas, with higher populations in 1997 and 1998. These population estimates do not necessarily reflect impacts of burning or no burning, since they were uniformly higher during the 1997-1998 period in both burned and unburned portions of INDU and have been uniformly lower in the years since then. This is also true in Miller Woods, were until now there have only been wildfires and no prescribed burns, except for 3-acre research plots. Therefore, an assumption can be made that the population fluctuations observed at INDU may be attributed to factors other than just the prescribed burn program.

Photo points have been established in each of the burn units at Inland Marsh and Tolleston Dunes to provide visual documentation of changes in Karner blue habitat (INDU 2004c). The photo points have been established in the center of openings in the canopy and brush. Photos are taken from that point in the 4 compass directions to track changes in the vegetation structure and document the progress or lack of progress prescribed fire has made in creating and maintaining a

more open vegetation structure for Karner blue butterflies.

Dispersal corridors for interconnecting Karner blue butterfly metapopulations are essential to maintaining the populations and genetic diversity. Two distinct Karner metapopulations have been identified at INDU which are several miles apart and separated by highways, city streets, railroads, and residential areas. Movement of adult Karner blues is relatively restricted, with Knutson *et al*. (1999) finding in studies at INDU that 75 percent of the movements recorded were less than 100 meters (330 feet). Other researchers have found similar movement ranges (USFWS 2003). Both Bidwell (1995) and King (1998) working in central Wisconsin found maximum movements by a few individuals of greater than 1 kilometer (about 3200 feet), but most were much less.

Knutson *et al*. (1999) postulated that the topography at INDU may explain their observed Karner movement patterns. The undulating dune systems at INDU produce considerable habitat heterogeneity relevant to dispersal by the Karner blue butterfly, and there is a longitudinal gradient across the park, with lower, more open, and more frequently burned dunes in the West Unit, which is where the Karners are currently found. The lowest, most homogeneous and generally most open site, Miller Woods, had butterfly movements greater that 300 meters (about 1000 feet) more than twice as frequently as at the other 2 sites studied. They therefore recommended that the ultimate goal of management of Karner blue butterflies at INDU be to provide a landscape that contains quality habitat patches within 1000 feet of each other to allow gene flow among patches and to allow recolonization following local extinctions.

To this end, INDU management plans include Karner blue butterfly habitat restoration along the Marquette Trail, which follows an abandoned railroad bed for about 3 miles between Miller Woods on the west and West Beach on the east (DeLong *et al*. 1999). The goal of this plan is to restore Karner habitat along the general trail corridor, which includes dunes north of the western portion of Long Lake and its wetlands, approximately 300 feet apart or closer if possible, given the narrowness of the corridor in some areas. There are also plans to provide dispersal corridors within the Inland Marsh complex, where some areas are very overgrown with brushy oak sprouts due to a wildfire in the late 1980s.

Aside from the subject proposal, there is one other federal action which involves the Karner blue butterfly within the action area; this is a Habitat Conservation Plan (HCP) by the Northern Indiana Public Service Company (NIPSCO) and Indiana-American Water Company for management of their rights-of-way adjacent to INDU which support Karner blues. This involves issuance of a section 10(a)(1)(B) Incidental Take Permit and intra-Fish and Wildlife Service section 7 consultation.

Effects of the Proposed Action

Past and present activities affecting the Karner blue butterfly at INDU have been more positive than negative. Significant conservation and recovery actions have been realized through the restoration and management of oak savanna habitat for the Karner blue, including several parcels in the East Unit where the butterfly currently is not extant but could be translocated in the future. Research efforts at INDU focusing on habitat management and Karner blue behavior and

dispersal have assisted in determining management strategies for the butterfly (Grundel *et al*. 1998a and b, Kwilosz and Knutson 1999, Knutson *et al.* 1999).

The effects of the new FMP will be to continue to improve suitable habitat for the Karner blue butterfly as a species although individual animals will be adversely affected by the proposal. The long-term effects of a properly managed prescribed fire program should be to increase and enhance habitat for the Karner blue. The goal of the fire management plan at INDU is not to maximize the number of Karner blue butterflies but to perpetuate their existence by restoring and maintaining habitats capable of supporting Karner populations (Schweitzer 1992, Kwilosz and Knutson 1999).

The take of Karner blues resulting from savanna management activities is considered short-term take because Karner blue butterflies lost due to the management activities (prescribed burning) are replaced by recolonization of the site after the treatment. Lupine responds well to burning and will regrow after this treatment, often more vigorously because of the reduction of canopy cover, competition, and exposure of mineral soil. In addition, not all Karner blues are affected by prescribed burning because of the refugia provided within each burn unit and the patchy nature of the fires, both of which are part of the burn management plans at INDU (INDU 2004b and c). Management of savanna habitat is a crucial component in the recovery of the Karner blue butterfly because the absence of fire in oak savannas increases the canopy and understory density, thus restricting growth of lupine and nectar plants (USFWS 2003).

The FMP will have a short-term adverse effect because fire unavoidably kills butterfly eggs that overwinter in the ground litter. At INDU, prescribed burning will primarily occur either in the fall or the spring when Karner blue butterfly eggs would be present but larvae or adults would not (INDU 2004a and b). The only prescribed burning that might occur when larvae or adults are present would be at small research plots in Miller Woods totaling about 3 acres. These plots are for a research project by the U.S.G.S. Biological Resources Division to study the response of herbaceous vegetation to fire during the 4 different seasons. Adverse impacts to the Karner blue due to burning these research plots is expected to not be significant. However, minor take of Karner blues may occur due to trampling of lupine plants while accessing or working at the plots.

Wildfires and their required suppression may occur at any season at IDNU, where the fire season runs from the beginning of March into early December (INDU 2004a). During drought years, summer burns have occurred, sometimes in high numbers. Records of wildfires at INDU since 1982 indicate that such fires are extremely rare in January (only 2 recorded) and rare in December (15 recorded), but can be common during April through August, the months of Karner blue butterfly activity. In April 1996 there were a record 27 wildfires; in May 1992 there were a record 30 wildfires; in June 1995 there were a record 24 wildfires; in July 1996 there were a record 22 wildfires; and in August 1999 there were a record 15 wildfires. Many of these wildfires occurred in Miller Woods, which until now has not had been included in the prescribed burn program (INDU 2004c). Despite these wildfires, Karner blue butterflies have continued to persist within Miller Woods (INDU 2004d). Although wildfires and their suppression likely are causing take of Karner blue butterflies, not suppressing wildfires would likely increase the take and may eliminate small sub-populations of the butterfly (USFWS 1992, Shuey 1997). This

Biological Opinion does not address the wildfires and their affects on Karner blue butterflies because they cannot be predicted and are not at the discretion of INDU.

Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future Federal actions unrelated to the proposed action are not considered because they will require separate consultation pursuant to section 7 of the Endangered Species Act.

NIPSCO and Indiana-American Water Company are in the process of submitting an HCP and application for a section 10(a)(1)(B) Incidental Take Permit for the management of their rights-of-way adjacent to INDU which support Karner blue butterflies. The management plan for their properties, which total 86 acres and include only 4.24 acres of lupine, is compatible with the INDU's FMP, and INDU may include portions of these rights-of-way within their prescribed burn plans. This HCP and the issuance of a section 10(a)(1)(B) Incidental Take Permit are not expected to significantly adversely affect the Karner blue butterfly within the action area.

Consultants for US Steel are in the process of completing restoration work at the Miller Woods Subunit 5 and Woodlake Dune Savanna, and INDU will assume management of these areas under the FMP. Two parcels of about 8 acres each adjacent to these two larger properties have also been purchased by USS under the Consent Decree but they have not yet been transferred to INDU. Restoration work is also occurring on these parcels and they will eventually be donated to INDU. These four parcels will therefore be subject to the requirements of this Biological Opinion when they are fully transferred to INDU.

Biological Opinion

Based upon our review of the information concerning the proposed action, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, and considering the information available to us on the biology, ecology, distribution, and current status of the Karner blue butterfly, we have made the following conclusions about the effects of the Indiana Dunes National Lakeshore Fire Management Plan on this Federally endangered species.

It is the FWS's Biological Opinion that the proposed action is not likely to jeopardize the continued existence of the Karner blue butterfly. The proposed action will not result in the adverse modification of critical habitat, which has not been designated in the action area. Since the FWS has concluded a no-jeopardy opinion, the identification and implementation of "reasonable and prudent alternatives" to avoid the likelihood of jeopardy are not relevant to this discussion.

The Indiana Dunes National Lakeshore has proposed Conservation Measures to address the Karner blue butterfly within their FMP, as described previously under **Description of the Proposed Action**. These discretionary actions will be implemented by INDU with respect to the proposed action in partial fulfillment of their section 7(a)(1) responsibility. This section of the

Endangered Species Act, as amended, directs Federal agencies to use their authorities to carry out conservation programs that benefit endangered or threatened species. These Conservation Measures are intended to minimize or avoid adverse impacts on listed species beyond the level necessary to avoid the likelihood of jeopardy.

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 following conservation actions are recommended:

1. Assess, document, and quantify the nature and aerial extant of the burns in the KBB occupied savanna areas of the burn units to better understand the nature of the refugia that remain after a fire.

2. Continue to fine-tune prescribed burning to be most beneficial to Karner blue butterfly habitat and least damaging to individuals of the species.

3. Evaluate the buffering capacity of the INDU viable metapopulations to determine the best means of buffering these populations against adverse disturbances and threats to survival, as discussed in the Karner blue butterlfly Final Recovery Plan as Criterion 1 for reclassification to threatened status or possible delisting (USFWS 2003).

4. Assess the interrelationships of long-term weather conditions at INDU on the Karner blue butterfly populations, such as effects of winter temperature and snow cover on over-wintering egg survival and the effects of cool and wet springs and summers versus warm/hot and dry springs and summers on numbers of adults found during each brood.

5. Continue to conduct relevant research on Karner blue butterflies and their habitat requirements at INDU, such as studying the effects of summer wildfires on the butterfly population, any effects/biases of the survey methods being utilized, the effects of deer browse on lupine and Karner blue numbers, the effects of non-native vegetation such as spotted knapweed and other species on lupine abundance and Karner blues, and the viability of seeding or planting lupine and nectaring species in establishing new Karner habitat at degraded sites, such as former home sites in the Inland Manor Subdivision.

6. Continue to improve habitats in the East Unit of INDU and translocate Karner blue butterflies to these sites when suitable habitat is available.

Incidental Take Statement

Section 9 of the Act, and Federal regulations pursuant to section 4(d) of the Act, prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined

as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create 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 or sheltering. Incidental take is defined as take that is incidental to and not the purpose of carrying out an otherwise lawful activity. Under the terms of sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be a prohibited taking under the Act, provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

With respect to the proposed implementation of the FMP at INDU, incidental take addresses the adverse effect of burning on eggs and possibly larvae and adults. An acceptable level of incidental take will be dictated by the amount of habitat burned when compared with the amount of habitat that has been preserved throughout the duration of the burn plan and during each burn event.

The reasonable and prudent measures (RPMs) and terms and conditions described below are non-discretionary and must be undertaken by INDU so that they become binding conditions of this BO issued to INDU for the exemption in section 7(o)(2) to apply. The FWS has a continuing duty to regulate the activity covered by this Incidental Take Statement. If INDU fails to assume and implement the terms and conditions of the BO and Incidental Take Statement, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of the incidental take, INDU must report the progress of the action and its impact on the species to the Bloomington Ecological Services Field Office as specified in the Incidental Take Statement.

Because it is difficult to detect and quantify the number of Karner blue butterfly eggs, larvae, or adults taken as a result of the FMP, take is expressed in acres of lupine habitat disturbed by the habitat management activities at INDU. Disturbance of this habitat is expected to be short-term, that is, lupine and Karner blues are anticipated to re-occupy disturbed sites after management treatments or research actions. Based upon the information available, INDU is authorized to take no more than one-third of the existing occupied Karner blue butterfly habitat in each population area during any one burn.

Reasonable and Prudent Measures

The FWS believes that following reasonable and prudent measures are necessary and appropriated to minimize impact of the incidental take of the Karner blue butterfly at INDU:

1. INDU will provide the information in the BO to all current and new staff members who work in areas supporting the Karner blue butterfly and review with them the Conservation Measures, RPMs, and terms and conditions in the BO for the conservation of the butterfly. INDU will also provide Karner blue butterfly training to appropriate existing and new staff members. Training will include how to identify lupine and the Karner blue as well as information on the butterfly's range and habitat.

2. INDU will survey for Karner blue butterflies annually on all occupied management units following established procedures and routes as described in the Biological Assessment (INDU 2004c) and Kwilosz and Knutson (1999). Any significant changes in survey methods or survey routes will first be discussed with the FWS to determine if amendments to this BO are necessary. The long-term average population will be utilized to determine the viability of each population when considering wether to burn or not burn or to use mowing as the preferred management activity. If the population drops below 60 percent of the long-term average within occupied habitat, INDU will reinitiate consultation with the FWS prior to additional burning in that habitat area.

3. If after 3 years of annual population surveys no adult Karner blue butterflies are observed within a burn subunit or a definable portion of a subunit, that subunit will be considered to be unoccupied habitat for the purposes of the prescribed burn management that will be allowed, *i.e.* the subunit can be managed as a habitat restoration area rather than a habitat maintenance area, and more frequent burns will be allowed.

4. INDU will document and evaluate savanna restoration and management activities accomplished for the Karner blue butterfly and report to the FWS on the acres of incidental take of Karner blues due to burning or mechanical management.

5. The Conservation Measures identified by INDU will be utilized when conducting prescribed burns within occupied Karner blue butterfly habitat.

6. Access routes to burn areas during the growing season will be established that will minimize take by trampling of lupine plants.

7. The Douglas Environmental Education Center/Miller Woods Subunit 7, consisting of 10 acres, may be burned every fall or as is necessary in order to protect this building and adjacent boardwalk from possible wildfires. The Long Lake Burn Unit, also known as Subunit 5 of the Inland Marsh complex, may be burned as a single unit every 3 years, if necessary, to reduce the risk of wildfire near the Town of Ogden Dunes, provided that Karner blue butterfly refugia are established and/or the burn is conducted in such a manner to provide a mosaic of burned and unburned areas.

Terms and Conditions

1. INDU will contact the FWS if needed for assistance in explaining or discussing the Conservation Measures, RPMs, and terms and conditions in this BO for conservation of the Karner blue butterfly.

2. INDU will provide the results of its annual Karner blue butterfly surveys and habitat management accomplishments to the Bloomington Field Office, U.S. Fish and Wildlife Service, 620 South Walker Street, Bloomington, Indiana 47403-2121. Data reported will include the number of Karner blue butterflies per complex name, the total of Karner blues on INDU, and a discussion on the findings relative to the recovery goals, including the

establishment of dispersal corridors between occupied habitats. It will also describe where prescribed burning was accomplished, whether the burns created a mosaic of burned and unburned area as intended, and whether the burns achieved the vegetative response that was desired. The report should provide any recommendations for improving management for the conservation of the Karner blue butterfly at INDU. The report will also indicate whether or not wildfires occurred within occupied Karner blue butterfly habitat, their extent, and their effects on the Karner blue butterfly population.

Reinitiation of Consultation

The NPS/INDU must reinitiate consultation with the FWS if, during the course of the action, the amount or extent of the incidental take allowed by this statement is exceeded. All operations associated with the action must cease until new consultation has been completed, the effects of the action on listed species is reevaluated, and a new incidental take statement can be provided. As part of the information package to reinitiate consultation, INDU should provide an explanation of the causes for the taking.

Opportunities for Further Consultation

This concludes formal consultation on the 2004 Fire Management Plan at the Indiana Dunes National Lakeshore. INDU is required to reinitiate formal consultation with the FWS if:

1. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;

2. The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or

3. A new species is listed or critical habitat designated that may be affected by the action.

February 4, 2005 /s/ Scott E. Pruitt

Date Supervisor
Bloomington Field Office

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