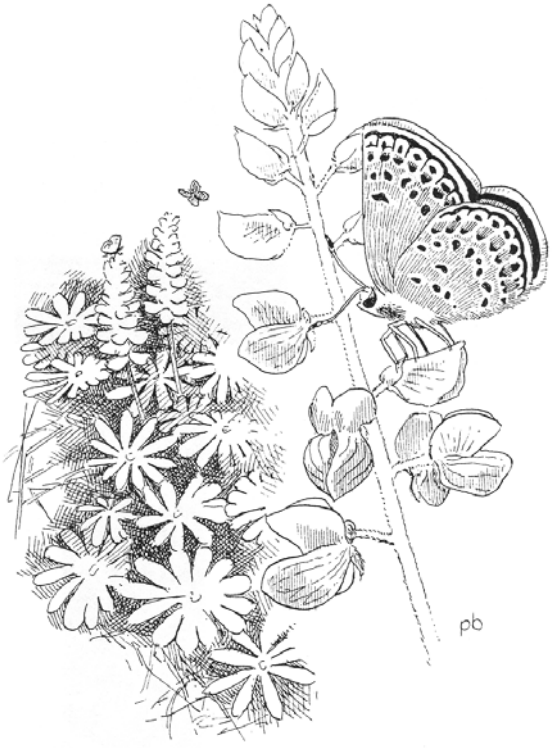
COSEWIC
Assessment and Update Status Report

on the

Karner Blue
Lycaeides melissa samuelis

in Canada



EXTIRPATED
2000

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

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COSEWIC
Assessment Summary

Assessment summary – November 2000

Common name
Karner Blue

Scientific name
Lycaeides melissa samuelis

Status
Extirpated

Reason for designation
This species and its habitat originally occurred in a restricted range. The butterfly's population decline and the degradation of its habitat are well documented. The species has not been seen since at least 1992.

Occurrence
Ontario

Status history
Has not been observed since 1991. Designated Extirpated in April 1997. Status re-examined and confirmed in May 2000. Last assessment based on an existing status report.

COSEWIC
Executive Summary

Karner Blue
Lycaeides melissa samuelis

The Karner Blue (*Lycaeides melissa samuelis* Nabokov) butterfly has historically been found in oak savannahs scattered within the Deciduous Forest Region of southern Ontario. The larva of this butterfly feeds solely on Wild Lupine (*Lupinus perennis* Linnaeus), which is quite restricted in its distribution in Ontario. Land-use changes over the years have reduced the number of sites available for the Karner Blue and degraded the sites that remain. These pressures during the late 1980s and early 1990s resulted in the demise of the Karner Blue in Ontario. The situation is quite similar in the United States, which makes up the rest of the butterfly's historic range. This subspecies is extirpated or endangered in all but one state where its status has not been determined. Because of the loss of much of the suitable habitat in Ontario, declining Karner Blue populations in Ontario and throughout its range, and the absence of any sightings in Ontario in the last four years, it is likely that the butterfly no longer exists in Canada. It is recommended that the Karner Blue (*Lycaeides melissa samuelis* Nabokov) be designated as Extirpated in Canada.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.

** Formerly described as “Not In Any Category”, or “No Designation Required.”

*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list.

Environment Canada | Environnement Canada
Canadian Wildlife Service | Service canadien de la faune

Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

Update
COSEWIC Status Report

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2000

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DISTRIBUTION

America

The Karner Blue (*Lycaeides melissa samuelis* Nabokov) is one of five subspecies of the more widespread Melissa Blue (*Lycaeides melissa* Edwards). The Karner Blue occurs from New Hampshire and New York west across southern Ontario, northern Indiana and Michigan to southern Wisconsin (Opler and Krizek 1984) (Fig.1). Klots (1951) cites it as a subspecies of the Great Lakes and Northeast United States. Its distribution is referred to as patchy or local (Schweitzer 1984, Shapiro 1973). The type locality of *L. m. samuelis* is Karner, New York (Nabokov 1949). (Apparently Karner was formerly known as Center.)

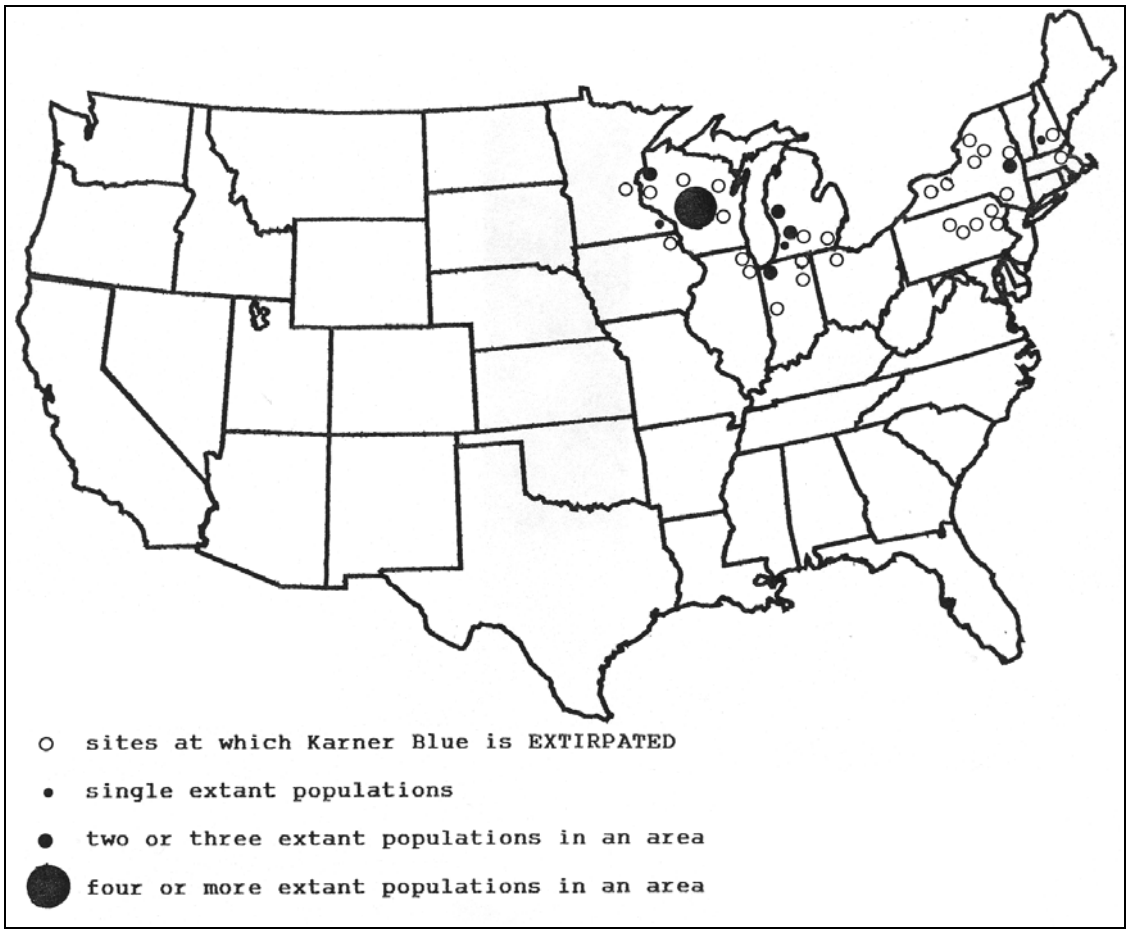

Figure 1. Range of the Karner Blue (*Lycaeides melissa samuelis*) butterfly in the USA (after Seal 1992)

Canada

In Canada, there has been a great deal of confusion regarding the extent of the Karner Blue's range. Previous unconfirmed reports and misidentified specimens suggested a range extending from Nova Scotia to Manitoba (Konecny 1986). Konecny sorted through the relevant documents, talked to the respective experts and had specimens examined. Through this process, she eliminated all but the southern Ontario sites (Konecny 1986) (Fig. 2). The most recent colonies of the Karner Blue were in southern Ontario at Port Franks and St. Williams (Packer 1990), but evidence indicates that formerly it was more widespread with records from Toronto, London and Sarnia (Konecny 1986).

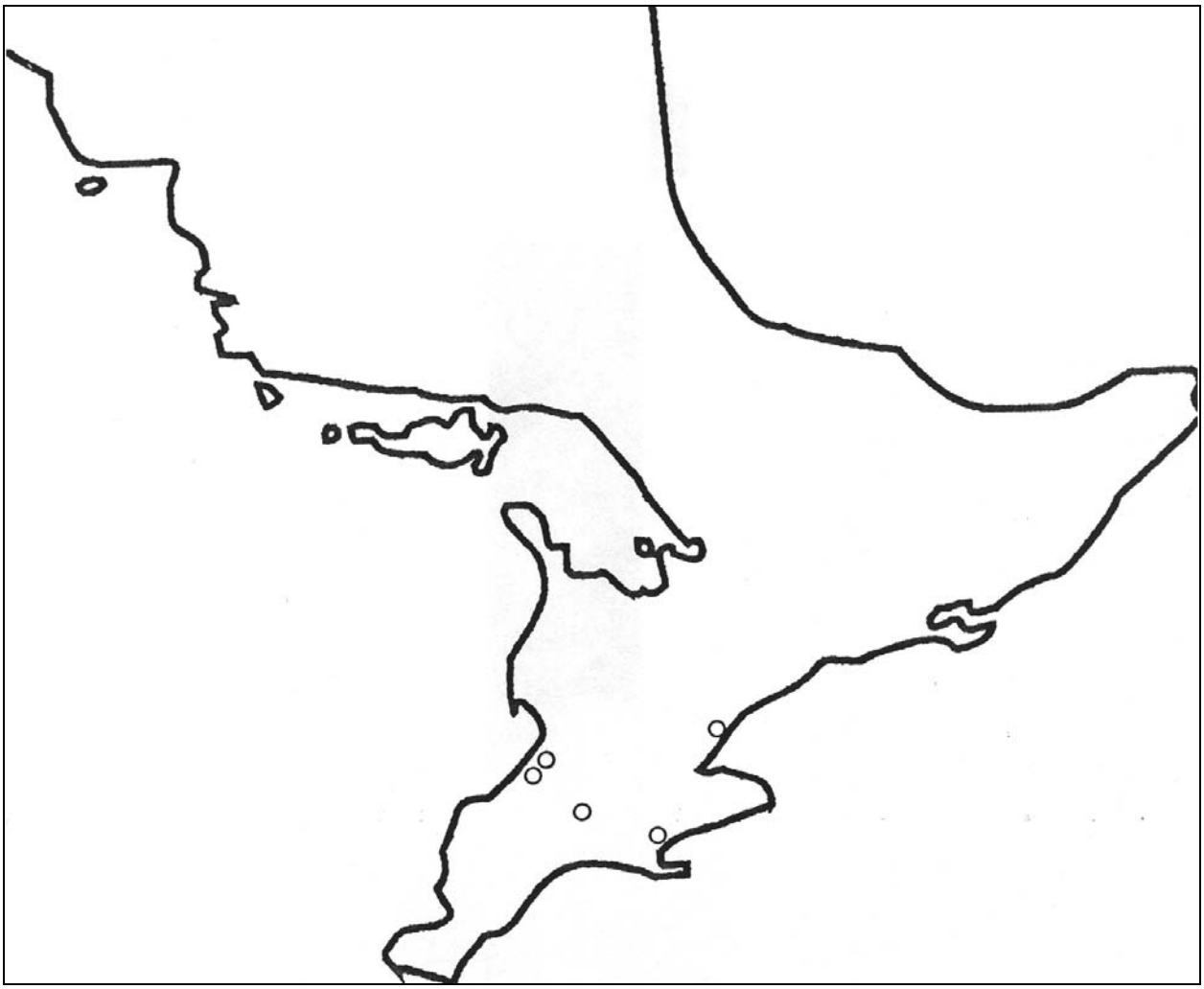

Figure 2. Historic locations for the Karner Blue (*Lycaeides Melissa samuelis*) in Ontario (after Seal 1992)

PROTECTION AND STATUS

United States

The following status information was provided by The Nature Conservancy.

In the United States, the Karner Blue was listed in 1992 as Endangered under the US *Endangered Species Act*. The Nature Conservancy lists it as a G5T2 element, which denotes that the species is common and widespread (G5) but the subspecies is very rare (T2) (usually between 5 and 20 occurrences in the overall range or with many individuals in fewer occurrences; or because of some factor(s) making it vulnerable to extinction). (See Appendix B for a complete listing of The Nature Conservancy's rankings.) On the state level, *L. m. samuelis* is listed as Extirpated in Ohio, Pennsylvania and Massachusetts; S2 (very rare; usually between 5 and 20 occurrences in the state or with many individuals in fewer occurrences often susceptible to extirpation) in Minnesota and Michigan; and S1 (extremely rare; usually 5 or fewer occurrences in the state or very few remaining individuals; often especially vulnerable to extirpation) in Illinois, Indiana, New Hampshire and New York. Wisconsin is the only state with a GU rank (uncertain, insufficient information available to assign a more accurate rank).

Canada

In Canada, the Karner Blue butterfly does not have any federal status and was listed as NX (extirpated in Canada) by The Nature Conservancy in 1993. In Ontario, it was listed in 1989 as Endangered under the Ontario *Endangered Species Act*, and the Ontario Ministry of Natural Resources also lists it as Endangered. In 1990, The Nature Conservancy listed it as S1SX in Ontario.

POPULATION SIZE AND TREND

The Karner Blue is threatened across its range. It has likely declined as much as 90% in the last 10-15 years (Seal 1992). In the USA, The Nature Conservancy considers it extirpated in Ohio, Pennsylvania and Massachusetts and declining in Minnesota, Wisconsin, Illinois, Indiana, Michigan, New York and New Hampshire. Existing populations vary from hundreds to dozens erratically distributed over at most 150 sites (Seal 1992).

By the early 1980s, the Karner Blue in Ontario was reduced to two sites from the original six (Packer 1990). The Port Franks site, with a population of over 1,000 in 1984, was considered secure and possibly even increasing, while the St. Williams site was very small (seven individuals seen in the second brood in 1984) and was expected to die out in the next few years (Packer 1990). This prediction proved true not only for the St. Williams population but the Port Franks one as well. The weather conditions in the summers of 1988-89 were so dry that the lupine plants desiccated before the second brood laid its eggs. There have not been any confirmed reports of the Karner Blue at either of these sites since that time.

HABITAT

The Karner Blue butterfly is restricted to areas of sandy soil, sandy pine barrens and beach dunes (Opler and Krizek 1984). Scott (1986) refers to the sites as sandy soil prairies. This soil type occurs in the pine barrens at the butterfly's type locality at "Karner" in New York (Cryan and Dirig 1978). In Ontario, sandy soils are the foundation of the dry oak savannah at the St. Williams site (Sutherland 1987), and the sandy beach dune complex provides the required habitat at the Port Franks site (Konecny 1986). Sutherland and Bakowsky (1995) used the "Ecological Land Classification Catalogue of Community Types for the Ontario Ministry of Natural Resources, Southern Region" (Lee and Bakowsky, in prep) to classify both the Manestar and Port Franks sites where the Karner Blue was last found in Ontario as Dry Oak-Pine Woodland. Woodlands are characterized by well spaced, open grown trees with a well developed ground cover and 35% to 60% canopy cover. They are a transition zone between forest and savannah or prairie and can have very little or very dense understorey vegetation. These dry, sandy, oak savannahs or woodlands are representative of a vegetation type that once covered at least 11,000,000 hectares of North America (Packer 1990). Fire is necessary to keep vegetation from completely closing the openings between the oaks. Konecny (1986) calls these areas subclimax successional habitat and suggests that fire suppression has been responsible for the loss of a great deal of this habitat. The clearing of land for agriculture and housing as well as tree planting programs on these so-called waste lands have also greatly reduced the extent and quality of this habitat (Konecny 1986).

The sole food plant of the larvae of the Karner Blue is Wild Lupine *(Lupinus perennis* L. Fabaceae) which grows on these xeric sites. The plant ranges from Maine to southern Ontario and Minnesota south to Florida and Louisiana (Gleason and CroNquist 1963) (Fig. 3). In Ontario, Wild Lupine is considered rare (Argus *et al* 1983 and 1987) (Fig. 4), but has a much wider distribution than the Karner Blue, and even in Ontario there are areas with the plant that have never been known to have been occupied by the butterfly. It is possible that the Karner Blue may need large, interconnected areas of suitable habitat and cannot survive in small patches of its host plant. An area such as the Port Franks–Pinery area originally encompassed many thousands of hectares of suitable habitat, as did the St. Williams–Manestar–Turkey Point area. It is quite likely that both these areas were large enough that the fire regime resulted in a mosaic of burned and unburned sections of different ages and frequencies that provided a variety of successionally suitable

habitat for the butterfly. Such a regime would allow for the extirpation of one population or deme of the butterfly but not the whole metapopulation. After a number of years, the burned area would again provide suitable habitat and butterflies from a healthy near-by deme would immigrate to re-establish a population of the subspecies in the area. A continual cycle of local extirpation and reinvasion would maintain the subspecies at a given location.

The historic distribution of the Karner Blue in Ontario was within the Carolinian Zone or the Deciduous Forest Region. Prior to the arrival of Europeans, the majority of the landscape was forested, but on sand plains within these extensive forests were areas with prairie and oak woodlands (Sutherland & Bakowsky 1995). The Karner Blue was found in some of the larger of these areas, such as High Park on the western edge of Toronto, Pinery Provincial Park on the shore of Lake Huron, and the St. Williams–Turkey Point area on the north shore of Lake Erie. Other sites where suitable vegetation communities once occurred near Sarnia and southwest of London have completely disappeared.

BIOLOGY

Description of the adult

The Karner Blue butterfly is small with a wingspread of 22-32 mm (Shull 1987, Klots 1951, Konecny 1986). The dorsal side of the male is iridescent light blue edged with a thin black line. This black line parallels a white fringe on the outer margin of the forewing and the hind and outer margins of the hindwing. On the female, the dorsal side is a purple blue and the leading and outer areas of the forewing and the leading edge of the hindwing have a purple-brown tone. Within the purple-brown area of the forewing and in the hind margin of the hindwing is a chain of black spots. Embracing these spots is an inner parallel row of orange crescents. These black spots with orange crescents are much less distinct on the forewing than on the hindwing.

The ventral side of both the male and female is a light silver-grey overall, with a number of black spots edged with white in the inner areas of both wings. The outer marginal fringe is not as distinct as on the dorsal side of the wing, and the black parallel line has a scalloped appearance. On the female, set within each of the scallops is a silver spot trimmed with black and embraced by an orange crescent which is also capped by a lesser black crescent. This string of silver, orange and black is found on both the fore and hind wings of the female but is reduced on the hindwing and missing on the forewing of the male.

Figure 3. Distribution of the Wild Lupine (*Lupinus perennis* L.) in North America

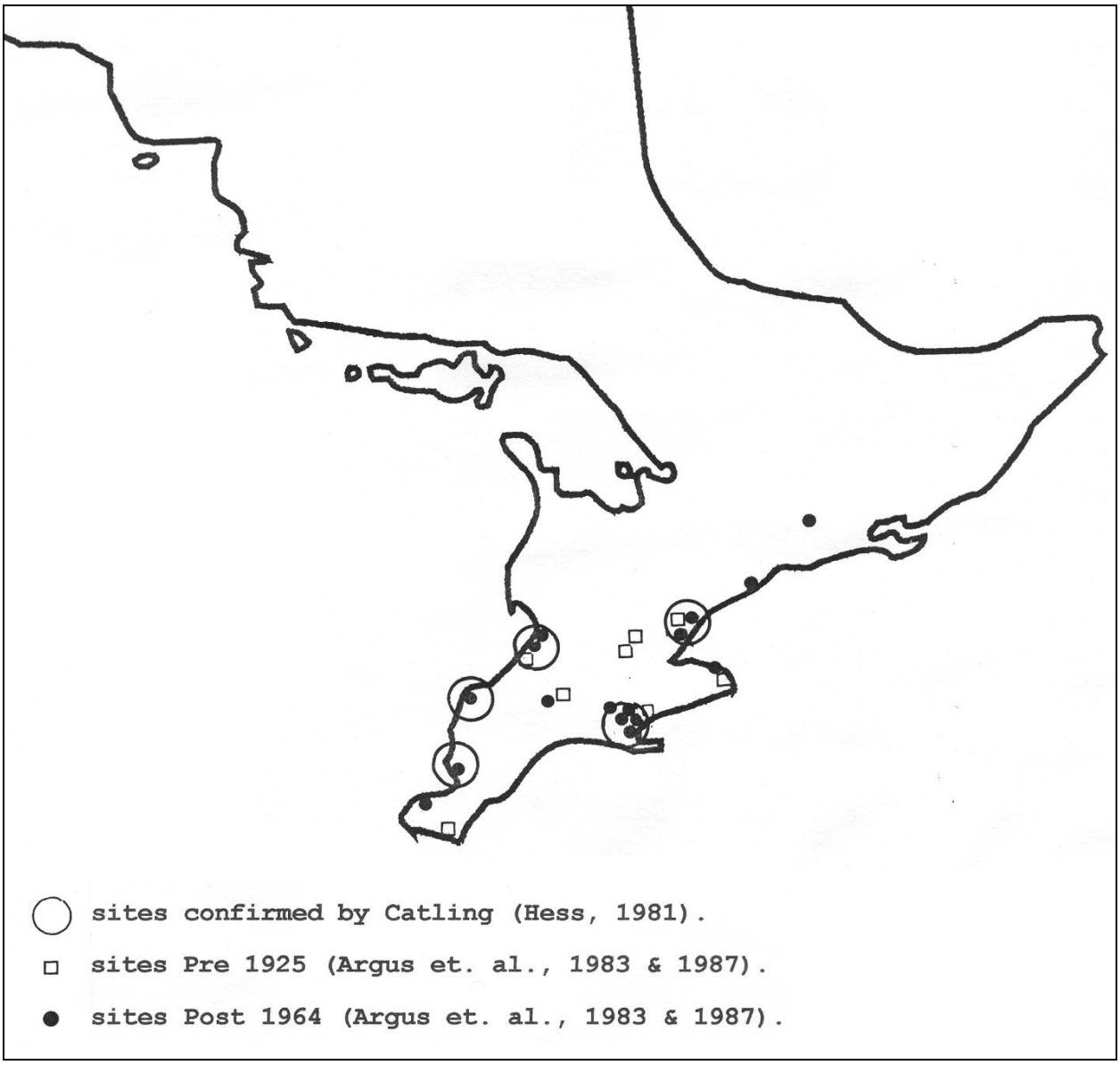

Figure 4. Distribution of the Wild Lupine (*Lupinus perennis* L.) in Ontario

Adult biology

The adult Karner Blue has two flight periods. In Ontario, the first generation has been recorded from May 25 to June 30 and the second from July 12 to August 18 (Hess 1981, 1982, 1983, 1984, 1985a, 1986, 1988, 1989 and 1990). The extreme dates reflect differences in weather over the years. The average flight seasons are from May 25 to June 24 and July 20 to August 18 (Konecny 1986). The average life span of an adult in the wild is five days (Cuthrell 1990, Lawrence and Cook 1989). There are fewer individuals in the first generation than in the second. Schweitzer (1991) suggests that the three-to-four-times-larger second brood can be attributed to the greater availability of its food plant at that time of the year. The sex ratio is close to 1:1 (Packer 1987).

The Karner Blue is capable of rapid population growth if favourable conditions prevail, and in some areas, large healthy populations have been maintained by vegetation management (Packer 1987).

Karner Blue adults are sedentary with movements of a kilometre or more being the exception (Lawrence and Cook 1989). In an Ontario population, Schweitzer found movement of a few hundred metres (Givnish *et al*. 1988). The weakly territorial males disperse to some degree within a few days of hatching. The butterflies are active all day (8 am to 7 pm) if the temperature is warm. Clouds and breezes do not deter them, very hot days reduce activity, and rain stops activity (Lawrence and Cook 1989).

Nectaring of adult

Karner Blue butterflies nectar on the large number of blossoms that are available during each of the two flight periods (see Appendix A for a partial list of nectar sources). Seven plant species were listed as being used by the Port Franks deme during the first generation and an additional five plants were used by the second generation (Packer 1990). Schweitzer (1984) lists eight nectar sources of the second generation, including Butterfly Weed (*Asclepias tuberose*) and New Jersey Tea (*Ceanothus americana*) as two very important nectar sources at the Port Franks site. Lawrence and Cook (1989) concur with Schweitzer in the importance of Butterfly Weed for nectaring by the second generation. Packer (1987) suggests that one of the limiting factors affecting the dispersal of Karner Blue colonies in the St. Williams area is the lack of appropriate nectaring plants in suitable habitat, and Lawrence and Cook (1989) think the same factors may affect Karner Blue abundance. Lawrence and Cook (1989) also mention the visitation of damp earth by young males.

The egg

The Karner Blue overwinters as eggs (Cryan and Dirig 1978) laid in the late summer by the second-generation females. Packer (1990) inspected lupine plants for eggs which he found “low down on the plants, usually lower than, or around, the position of the first leaf petiole. Some eggs were found attached to grass stems close to lupines.” Gregory (in Hess 1983) states that the eggs are deposited on the leaves, drop to the ground with the leaves and overwinter there. Females from the spring or first generation oviposit on leaves and leaf petioles of their lupine food plant, and the eggs hatch after approximately seven days (Cryan and Dirig 1978). Shull (1987) describes the egg as pale green with whitish ridges, and Packer (1990) reports that they are flattened and round with surface sculpture characteristics.

Description of larva

Cryan and Dirig (1978) describe the larva of the Karner Blue as being pubescent green and dorsally flattened. Packer (1987) refers to the larva as having a pill bug shape and being well camouflaged on plants. Shapiro (1973) states that the larvae feed only on Wild Lupine and consume mainly the leaves and rarely the buds, flowers or fruit. Packer (1987) concurs with Cryan and Dirig's (1978) suggestion that the first-instar larvae mine, or feed within, the leaves. After the early instars, the larva feed on the underside cuticle and inner flesh of the leaves (Cryan and Dirig 1978). Recently, Schweitzer (1989) has suggested that the foregoing feeding locational information is erroneous and that the larvae actually feed on the upper surfaces of leaves. There are five larval instar stages (Opler and Krizek 1984) and the complete life cycle takes between 18 to 21 days (Cryan and Dirig, 1978). The survival rate of the second generation of this bivoltine species is three or four times greater than that of the first, which has been attributed to the greater number of leaves and plants available for the larva to eat during the later part of the growing season (Schweitzer 1989).

Food source of larva

The monophagous larva of the Karner Blue cannot occur without the Wild Lupine, its only food plant (Konecny 1986, Howe 1975, Cryan and Dirig 1978). The range of *Lupinus perennis* L. is quite large, extending from Maine west through southern Ontario to Minnesota and south to Florida and Louisiana (Gleason and Cronquist 1963), but the lupine is becoming uncommon to rare in much of its American range (Scheitzer 1985, pers comm in Konecny 1986). In Ontario (Sutherland 1987) it is considered widespread but local, has not been collected recently in many of the old sites, and is now considered rare (Argus *et al*. 1983 and 1987). Konecny (1986) attributes the general decline of this plant species to the loss of its quite specific habitat to farming and urban growth, the control of wild fires, and the planting of traditional sites with coniferous plantations which quite quickly choke out the lupine plants. Ideal conditions for the lupine appear to occur in small clearings with direct sunlight for part of the day. Too much sun causes plant desiccation (particularly in late summer) but neither do the plants do well in a closed situation (Lawrence and Cook 1989).

The role of ants

As is common in many of the "Blues", the Karner Blue has a myrmecophilous larva (thriving in association with ants) (Shapiro 1973). Opler and Krizek (1984) write 'Many blue caterpillars have secretory glands on the dorsal surface of the tenth segment and are tended by ants in exchange for the sugary secretion they produce. It is thought that the ants reduce the chances that small parasitic wasps or flies will lay their eggs on the caterpillars.' Cryan and Dirig (1978) report that it is not known if the ants protect the larvae, but there are no reports of parasites on this butterfly. In his observations of Ontario populations, Packer (1987) found a very high incidence of ant attendance. Further to this, in some manipulative studies that he did, larval mortality was much greater when larvae where deprived of ant protection, even for a short time.

He suggested (with some reservation because of a small sample size) that some of the large species of ants are more proficient in this task. This ant-Karner Blue relationship needs to be explored further, especially as Schweitzer has suggested that it may be less important in healthy butterfly populations than in marginal ones (Packer 1987).

Pupa

At the conclusion of its fifth instar, the larva of the Karner Blue enters an eight-day chrysalis stage (Cryan and Dirig 1978). Gregory (in Hess1985b) reported that the second-brood pupae he raised were 1 cm long, shiny green when new, then changed to chocolate brown, deep brown and finally blackish brown at pupation. These pupae hung on the plant stem close to the end of a leaf petiole. Cryan and Dirig (1978) also state that the pupae hang, but Packer (1990) doubts this as his work suggests that the pupae are in the leaf litter under the plant. This aspect needs more investigation.

LIMITING FACTORS

The Karner Blue's distribution and population density appear to have been limited in Ontario by the extent and health of its food plant. Wild Lupine is restricted to open, dry, sandy areas (Argus *et al*. 1987). The open aspect of these areas of savannah or oak woodland was likely maintained by wild fires. Fire suppression and extensive planting of pine trees on these "waste lands" hastened the shading out of the early successional plant community of which lupine is part (Konecny 1986).

The Karner Blue is not resistant to fire in any of its stages, and colonies are vulnerable to local extirpation by burning. The butterfly is, however, capable of rapidly recolonizing suitable sites if there is a colony close enough to provide pioneers. It is likely that fire reduces insect predators and aids rapid colonization of the Karner Blue at recently burned sites. A site could be suitable for recolonization the year of a burn if the fire occurs early enough in the season so that the lupine plants do not suffer a setback. Lupines respond well to fire because it reduces woody vegetation which competes with lupine plants for light and converts this vegetation into usable nutrients.

For the Karner Blue and lupine to continue to survive at a particular site, the site must have successional variety (leaning to an early successional stage), a good diversity of flowering plants for nectaring adults, and microhabitats different enough to ensure that even in particularly dry years there are enough moist areas to support a healthy lupine population until the second generation of the butterfly can lay its eggs.

For a metapopulation of the Karner Blue to be maintained at a site, the area must be large enough to allow parts of it to be at different stages of succession. Staggered successional stages guarantee areas that are open enough to support good lupine growth and close enough to other Karner Blue colonies to allow reinvasion in case of Karner Blue extirpation at any of the colonies or demes.

SPECIAL SIGNIFICANCE OF THE SPECIES

Any organism is significant in itself as it represents the present point in an ongoing evolutionary process and contains a vast assemblage of accumulated genetic information. The loss of a species has been compared to the burning of an encyclopaedia.

The Karner Blue likely evolved from the same parentage as the Melissa Blue, a prairie species. Over many thousands of years, the Karner Blue was likely isolated (because of climatic or geographic changes) and evolved into its present form.

The Karner Blue has evolved along with the community of which it is a part. It is likely associated with a suite of parasites and predators, such that the loss of the butterfly could result in the loss of other species that rely on or are associated with it, or even the ultimate loss of the entire community. We do not have a good understanding of the long-term effects of even small changes in communities.

The Karner Blue has become a “Political Bug” and has a great public profile. This small blue insect has become the “flagship species” of savannahs and, to a lesser degree, of prairies throughout most of its historic range. The butterfly has been featured in popular magazine articles (e.g., Nature Canada, Autumn 1995), in recent science writings (The Diversity of Life - Edward O. Wilson, in the section dealing with The Human Impact), and has been the subject of several symposia and workshops (The Karner Blue Butterfly Symposium - April 92; the Karner Blue Butterfly Population and Habitat Viability Assessment (PHVA) Workshop at The Wilds - Zanesville, Ohio 22 -24 April 1992, presented by the Captive Breeding Specialist Group, Species Survival Commission IUCN - The World Conservation Union; and a Workshop at the Pinery Provincial Park in Ontario on August 1993 “to bring together dedicated people from private conservation organizations and those from government agencies, in particular the Ontario Ministry of Natural Resources, to discuss and agree on a coordinated plan of action for recovery of the Karner Blue and its habitat in Ontario.” As a result of the aforementioned workshop, a working group composed of representatives from the Metropolitan Toronto Zoo, the Ontario Ministry of Natural Resources, Lambton Wildlife Incorporated, individuals from York University, the Toronto Entomologists Association, the Norfolk Field Naturalists, The Pinery Provincial Park and the St. Williams Forestry Station formed a Provincial Recovery Team for the Karner Blue and Oak Savannah in Ontario. This group developed and is implementing an Ontario Recovery Plan for the Karner Blue).

EVALUATION AND PROPOSED STATUS

In the summer of 1988, the populations of Karner Blue at both the St. Williams and Port Franks sites plummeted. The extended hot dry season desiccated the lupine plants before the second-brood eggs could be laid. Between 1988 and 1991, reports of the Karner Blue have been infrequent and unconfirmed. Since 1991, there have been no sightings of the Karner Blue butterfly in Ontario. The two most recent breeding sites have been searched carefully each year. Adjacent and historic sites have also been searched to no avail. Wild Lupine (*Lupinus perennis*), the sole food plant of the Karner Blue, is rare in Canada (Pryer and Argus 1987) and its locations are known. It is very unlikely that there are any potential undocumented breeding sites in Ontario. It is even less likely that there are any populations of Karner Blue that have been overlooked.

The well documented decline in habitat quality and butterfly population numbers at the most recently active sites and the lack of any sightings despite a great deal of search effort suggests that the Karner Blue butterfly has been lost from Ontario.

A status of Extirpated should be assigned to the Karner Blue (*Lycaeides melissa samuelis*) butterfly in Canada.

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APPENDIX A

Common Nectaring Plants of the Karner Blue Butterfly in Ontario.

First Generation

Wild Lupine, *Lupinus perennis*
Blackberry, *Rubus allegheniensis*
Strawberry, *Fragaria virginiana*
Yellow hawkweed, *Hieracium pilosella*
Dewberry, *Rubus flagellaris*
Thyme-Leaved Sandwort, *Arenaria serpyllifolia*
Lyre-Leaved Rock Cress, *Arabis lyrata*
Juneberry, *Amelanchier* sp.
Wild Geranium, *Geranium maculatum*
Puccoon, *Lithospermum caroliniense*

Second Generation

Knapweed, *Centaurea maculosa*
New Jersey Tea, *Ceanothus americanus*
Butterfly Weed, *Asclepias tuberosa*
Flowering Spurge, *Euphorbia corollata*
Dwarf Blazing-star, *Liatris cylindracea*
Wild Bergamot, *Monarda fistulosa*
Black-Eyed Susan, *Rudbeckia hirta*

APPENDIX B

Outline of Rankings Used by The Nature Conservancy (Oldham 1994.).

Global ranks

Global ranks are assigned by a consensus of the network of natural heritage programs (conservation data centres), scientific experts, and The Nature Conservancy to designate a rarity based on the range-wide status of a species, subspecies or variety. The two most important factors considered in assigning global (and subnational) ranks are the total number of known extant sites world-wide and the degree to which they are potentially or actively threatened with destruction. Other criteria include the number of known populations considered to be securely protected, the size of the various populations, and the ability of the taxon to persist at its known sites. The taxonomic distinctness of each taxon has also been considered. Hybrids, introduced species, and taxonomically dubious species, subspecies and varieties have not been included. Global ranks for this list were provided by The Nature Conservancy, Arlington, Virginia in December 1995.

G1 **Extremely rare:** usually 5 or fewer occurrences in the overall range or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.

G2 **Very rare:** usually between 5 and 20 occurrences in the overall range or with many individuals in fewer occurrences; or because of some factor(s) making it vulnerable to extinction.

G3 **Rare to uncommon:** usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.

G4 **Common:** usually more than 100 occurrences; usually not susceptible to immediate threats.

G5 **Very common:** demonstrably secure under present conditions.

GU Status **uncertain,** often because of low search effort or cryptic nature of the species; more data needed.

G? **Unranked**, or if following a ranking, rank tentatively assigned (e.g. G3?).

Q Denotes that the taxonomic status of the species, subspecies, or variety is **questionable**.

T Denotes that the rank applies to a subspecies or variety.

Subnational ranks

Subnational ranks are used by The Nature Conservancy and provincial and state conservation data centres to set protection priorities for rare species and natural communities within a province or state. These ranks are not legal designations. Ontario's Natural Heritage Information Centre (NHIC) ranks are assigned in a manner similar to that described for global ranks but consider only factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation need can be ascertained. Provincial ranks have been assigned using the best available scientific information. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually. The NHIC welcomes information which will assist in assigning accurate provincial ranks.

S1 **Extremely rare:** usually 5 or fewer occurrences in the province/state or very few remaining individuals; often especially vulnerable to extirpation.

S2 **Very rare:** usually between 5 and 20 occurrences in the province/state or with many individuals in fewer occurrences; often susceptible to extirpation.

S3 **Rare to uncommon:** usually between 20 and 100 occurrences in the province/state; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.

S4 **Common and apparently secure:** usually with more than 100 occurrences in the province/state.

S5 **Very common and demonstrably secure** in the province/state.

SX **Apparently extirpated** from a province/state, with little likelihood of rediscovery. Typically not seen in the province/state for many decades, despite searches at known historic sites.