Chapter 3: Alternatives Selected for Detailed Evaluation

This chapter provides information on the "Proposed Action" alternative, the "No Action" alternative and a comparison of the two. This chapter and Chapter IV, which describes the affected environment, form the foundation of the environmental impact assessment work that was completed in order to identify the environmental consequences outlined in Chapter V.

The descriptions of the Proposed Action and No Action alternatives are presented in slightly different manners due to the distinct nature of each alternative. Several aspects of the Proposed Action alternative are unique to the *Wisconsin Statewide Karner Blue Butterfly HCP* and are not present in the No Action alternative (e.g., the levels of conservation focus and associated conservation strategies, the non-partner participation strategy, the new institutional arrangements, and the application of adaptive management principles and associated monitoring efforts are all absent from the No Action alternative).

The description of the Proposed Action alternative includes discussion of:

- two broad conservation strategies,
- land management activities (with modifications),
- related conservation measures,
- involvement of non-partners,
- proposed institutional arrangements,
- the application of adaptive management principles, and
- incidental take of state listed species.

The description of the No Action alternative includes only a general overview and a description of land management activities as they are currently practiced in the absence of the HCP (i.e. in the absence of the Proposed Action alternative). Presentation in this manner recognizes the differing nature of the two alternatives and helps focus discussion and analyses on appropriate aspects of the Proposed Action alternative (i.e. that which is new). Table 3.3 in Part C of this chapter (pages 240-243) provides a comparison of the most salient features of each alternative.

Chapter 4: Affected Environment

This chapter provides an overview of the physical, biological and socio-economic features of the 21 counties specific to the Karner blue butterfly's documented range. The information presented is similar to that in Part A of Chapter II, but specific to the documented range, rather than statewide. The documented range is made up of parts of Adams, Barron, Burnett, Chippewa, Clark, Dunn, Eau Claire, Green Lake, Jackson, Juneau, Marquette, Menominee, Monroe, Oconto, Outagamie, Polk, Portage, Shawano, Waupaca, Waushara and Wood counties (Figure 2.10, page 56).

Incidental take of Karner blue butterflies will not occur outside the documented range, since Karner blue butterflies occur only within the documented range. Because of this, the description of the affected environment and the associated impact analyses are restricted to the documented range. In addition, activities in the counties that constitute the documented range present the greatest opportunities for Karner blue butterfly habitat conservation and are the areas most subject to activities being conducted as part of the HCP.

The chapter is divided into three parts discussing:

- the affected physical environment,
- the affected biological environment, and
- the affected socio-economic environment.

A. Affected Physical Environment

This section provides information on the principle physical features of the documented range. Information for this section was taken primarily from the *Geology of Wisconsin and Upper Michigan* (Paull and Paull 1977) and the *Physical Geography of Wisconsin* (Martin 1965).

1. Geology and Soils

Because most of these counties lie along the "tension zone," where most plant and animal species reach the limit of their ranges as described in the state overview, there are no uniform characteristics that depict the entire area. Referring to the physical provinces shown in Figure 2.1 (page 16), counties in the documented range fall primarily within and constitute the Central

Plain. Some of the documented range, however, extends up into the Northern Highland province, west into the Western Uplands, and east into the Eastern Ridges and Lowlands as well.

The Central Plain is comprised of all or part of 18 of the 21 counties forming the documented range. As mentioned in Chapter II (pages 15-17), this is the smallest physical province and is entirely within Wisconsin. It is principally developed on Cambrian sandstone, and the sandy soils are generally not well suited for agriculture. Nonetheless, a variety of vegetation is supported; this includes timberland, oak and jack pine barrens, and, in some areas, bogs (Paull and Paull 1977).

After the Central Plain, the most significant province represented in the documented Karner blue butterfly range is the Northern Highland. Portions of 10 of the 21 counties fall within this physical province. As the southern most extension of the Canadian Shield, this upland consists of igneous and metamorphic rocks with a cover of glacial deposits. With the exception of dairying, agriculture in this province is limited by a short growing season, generally poor soils, irregular topography and the amount of water cover (Martin 1965, Paull and Paull 1977).

2. Topography and Drainage

As its name indicates, the topography of the Central Plain is flat or slightly rolling. It reflects differences in Pleistocene history within the area. In the Driftless Area, steep sided sandstone mesas and buttes (castellated mounds) are concentrated in parts of Adams, Jackson, Juneau, Portage and Wood Counties. In contrast to this unglaciated part of the province, the remainder lacks castellated mounds and has a rolling cover of ground moraine, sandy outwash and clay-rich deposits (Paull and Paull 1977).

The Karner blue butterfly documented range primarily overlies all or part of seven of the state's major drainage basins (Fig. 2.2., page 19). These are the St. Croix, Lower Chippewa River, Black River, Lower Wisconsin River, Upper Wisconsin River, Upper Fox River and Wolf River. The Wisconsin River is the largest and most significant drainage feature in the Central Plain. Its route is characterized by a gentle grade and few tributaries. The Wisconsin River has hydroelectric plants along the Juneau and Adams county line that form the large Castle Rock and Petenwell flowages.

Since this area was traversed by multiple lobes from at least two major centers of ice accumulation, the Northern Highland has a complex glacial history. Glacial fingers moved from the north, northwest and northeast out of what are now the Lake Superior and Lake Michigan basins. Early Wisconsin (Altonian) ice advanced as far south as Clark, Wood and northern Marathon counties. This area is better drained and less rugged than regions further north and has the best farmland in the Northern Highland (Paull and Paull 1977).

The Northern Highland is the headwaters region for the major river systems of Wisconsin. From a center near Land O' Lakes, Wisconsin, rivers flow south, southwest, southeast and north. Tributaries of the St Croix, Flambeau-Chippewa and the Wisconsin rivers flow to the Mississippi River. The Escanaba, Menominee, Pehtigo, Oconto and the Fox-Wolf rivers flow to either Green Bay or Lake Michigan, and a series of short streams follow simple routes north to Lake Superior (Martin 1965, Paull and Paull 1977).

3. Water Quality

General information on water quality for each of the seven basins mentioned above was obtained from the respective basin water quality management plans prepared by the DNR (i.e. Koperski 1996; Bougie, *et al.* 1996; Kreitlow, *et al.* 1997; Fix 1994; Malischke, *et al.* 1994; Kreitlow 1992; Sorge 1992; and Fix and Eagan 1990). Water quality is described as generally good within the documented range. Many of the watersheds within the basins, however, lack current or base-level data, making assessment difficult.

Nonpoint source pollution is prevalent throughout the affected environment and is the predominant threat to water quality. In the south and central portions of the documented range, nonpoint pollution results primarily from agricultural practices. Sources of water contamination from agriculture include streambank pasturing, barnyard or exercise runoff, streambank erosion and cropland erosion. Livestock grazing along streams causes erosion, as well as ammonia and phosphorus contributions from livestock waste and elevated water temperatures; this can cause severe impacts to fish and other aquatic life (Turville-Heitz 1994).

In the northern reaches, however, the effects of forestry practices are one of the principal contributors to water quality degradation (Turville-Heitz 1994). Streambank erosion, polluted runoff and elevated water temperatures are among the principal concerns. As with those associated with unmodified agricultural practices, these problems can have injurious effects on the health of streams. Best management practices are helping to reduce concerns.

Another commonly noted problem in preserving water quality is the presence of impoundments. Because of slowed current and nutrient loss from upstream, both natural and anthropogenic impoundments can cause higher nutrient concentrations and rates of sedimentation. Beaver dams were noted as an issue of concern in many watersheds within the basins. Furthermore, many hydroelectric dams operate within the documented range.

4. Climate and Weather

In refining the Karner blue butterfly documented range map, the HCP Biological Team established criteria for habitat based on climate data (see Part B of Chapter II, pages 52-56). Factors that were considered included the average date of the first autumn frost, which ranged between September 21-30; the average date of the last spring frost, which ranged between May 6-25; the average length of the growing season, which ranged from 115-154 days; the average maximum temperature from May 16 to June 15, which ranged from 71-75 degrees; the average maximum temperature from June 16 to July 15, which ranged from 75-81 degrees; and the average maximum temperature from July 16 to August 15, which ranged from 77-81 degrees.

5. Air Quality

Air Quality in the Karner blue butterfly documented range is generally good. All 21 counties included in the documented range are in attainment of the National Ambient Air Quality Standards. These standards require the monitoring of six primary contaminants to air quality: sulfur dioxide, carbon monoxide, nitrogen oxides, lead, particulate matter and volatile organic compounds (VOCs).

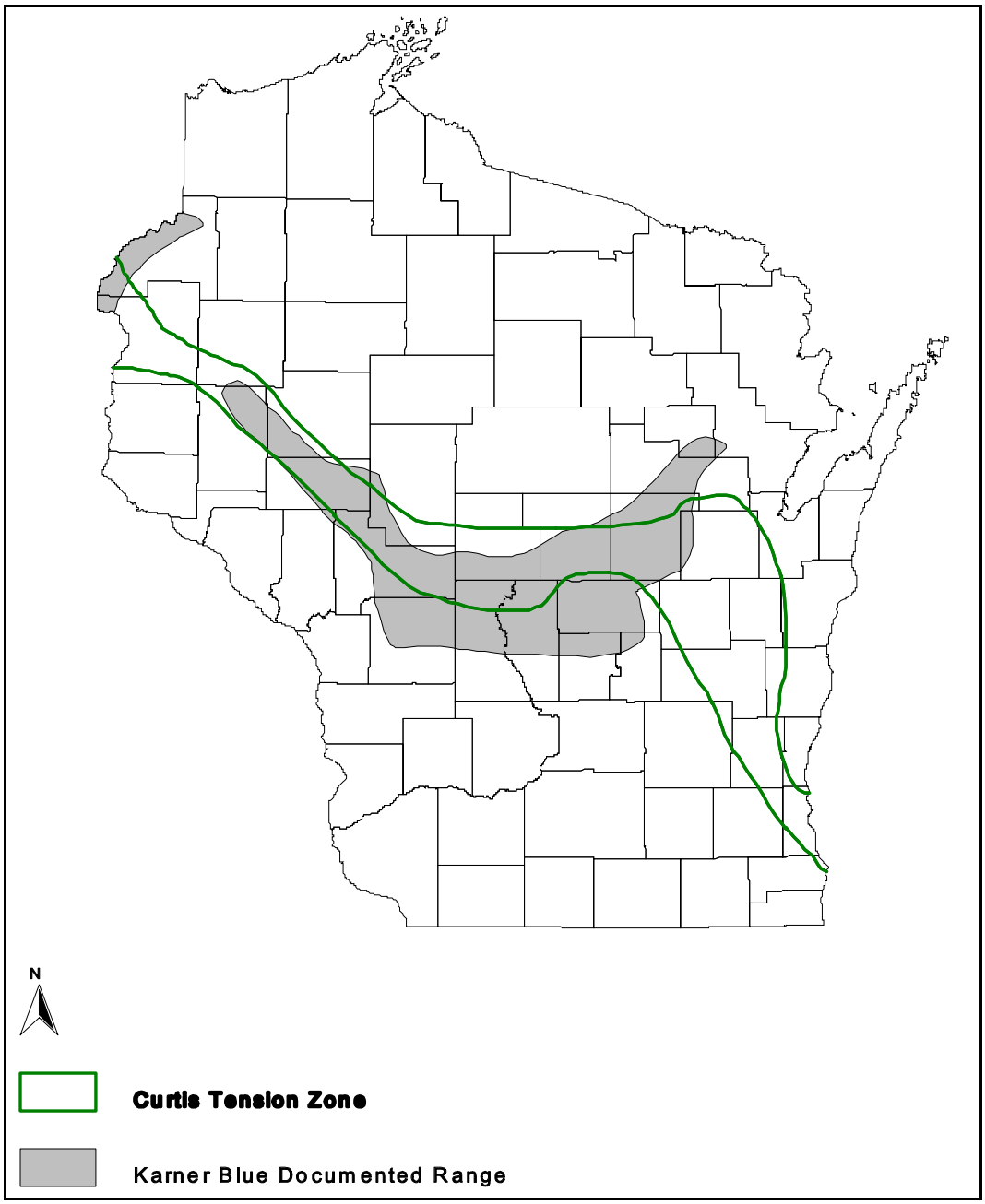
B. Affected Biological Environment

Part A of Chapter II (pages 20-23) and the report *Wisconsin's Biodiversity as a Management Issue* provide an overview of the plant communities found in Wisconsin. This part of Chapter II provides information specific to natural and artificial barrens communities, since the Karner blue butterfly is found in these ecosystems, and several partners have chosen to manage comprehensively for barrens. This part also discusses federally- and state-listed species, as well as species associated with Karner blue butterfly habitats.

1. Plant Communities

Most of the counties included in the documented range lie along the "tension zone" described by Curtis (1959) (Figure 4.1, page 249). Most plant and animal species reach the limits of their ranges in this area. As such, there are no uniform characteristics that depict the entire area. Rather, the area is typified by a mix of both northern and southern species.

Figure 4.1. Location of the Tension Zone (Adapted from Curtis 1959) with the Karner Blue Butterfly Documented Range



2. Natural Barrens Communities

Barrens are plant communities that occur on sandy soils and are dominated by grasses, low shrubs, small trees and scattered large trees. Typically, these areas contain jack pine (*Pinus banksiana*), red pine (*P. resinosa*) , or Hill's oak (*Quercus ellipsoidalis*) as the dominant trees and average less than full canopy closure. These communities have a diverse mix of tree diameters and heights with several successional stages present. Shrub layer and ground layer vegetation includes sweet ferns (*Comptonia peregrina*), hazel (*Corylus* spp.), blueberry (*Vaccinium* spp.), bracken fern (*Pteridium aquilinum*), reindeer lichens (*Cladonia* spp.), Pennsylvania sedge (*Carex pensylvanica*), blue-stem grasses (*Andropogon* spp.) and many other species.

Curtis (1959) described these communities as pine barrens in northern and central Wisconsin and as oak barrens in southern and west-central Wisconsin. Barrens have a dynamic nature and are variable in structural type and species composition. Given this, they are difficult to describe and classify (Eckstein and Moss 1995).

One consistent element of all barrens is the dependence on disturbance and the major role that fire can play in their dynamics. For thousands of years, fires have periodically burned on Wisconsin barrens. Prior to Euro-American settlement, fires were caused by lightning or were set by Native Americans to maintain game habitat, drive game and enhance fruit and berry crops (Eckstein and Moss 1995). The behavior of fire is greatly influenced by topography, weather, vegetation, soil factors, season and time of day. Natural wild fires usually produce a complex mosaic of burned and unburned patches depending on fire intensity, topography, soil moisture and local weather conditions (Niemi and Probst 1990).

Because of the long association with fire, the plants and animals that comprise barrens communities are adapted to periodic disturbance. Vogl (1970) states:

> *The question of whether fire is necessary to maintain northern Wisconsin pine barrens is perhaps not an appropriate question, for all factors including soil type, soil fertility, topography, climate, drought and fire are inseparably linked and operate together in chain reactions and cannot be considered individually. Fire is one of the essential ingredients in pine barrens, but the critical factor in determining the presence of barrens among northern pine-hardwoods forests is not so much fire, but the presence of sandy plains; sites with low fertility that lend themselves to droughts and fires of the proper intensities and frequencies to produce a vegetational structure and composition called barrens.*

Element occurrence data from the Natural Heritage Inventory -- the DNR's integrated system of computer databases, maps and manual files that document the historical and current occurrence of rare plants, animals and natural communities -- indicate that 10,000 acres of pine and oak

barrens remain on 65 sites (Eckstein and Moss 1995). These figures do not include all of the pine and oak barrens remaining in Wisconsin. The most significant omissions are portions of large, managed barrens on county, state and federal lands in northwestern Wisconsin. The Natural Heritage Inventory lists pine barrens as G3 (very rare and local throughout the range or found locally) and oak barrens as G2 (imperiled globally, because of rarity).

Although recently cut pine and oak stands may mimic barrens for a period of time, remaining barrens primarily exist as small, isolated fragments on about a dozen state or federal managed areas. Most of these fragments are too small and isolated to ensure long-term viability of all their characteristic native plant and animal species (Eckstein and Moss 1995). Some larger remnants, however, provide greater opportunities for ecosystem recovery. A few examples are Ft. McCoy in Monroe County, Necedah National Wildlife Refuge in Juneau County, Crex Meadows Wildlife Area in Burnett County and Fish Lake Wildlife Area in Burnett County (Shively and Temple 1994).

For additional information on Wisconsin's barrens communities, readers are referred to Eckstein and Moss (1995), Mossman, *et al.* (1991) and Curtis (1959).

3. Artificial Barrens Communities

Although the Karner blue butterfly is associated with the barrens landscape, it is not necessarily particular to it. For instance, some land management practices serve to temporarily mimic aspects of barrens communities. As natural habitats within the state have been increasingly altered by man, the Karner blue butterfly has been able to acclimate to managed forest lands, road and utility corridors and fallow agricultural fields.

Managed forests often provide early successional habitat that can be readily colonized by lupine, and, ultimately, the Karner blue butterfly. Usually, in the first 10-15 years after being prepped and planted, a site provides the appropriate characteristics to support lupine and other nectaring plants, which may, in turn, support Karner blue butterflies. Furthermore, forest roads originally established to transport timber products may serve as dispersal corridors for the Karner blue butterfly. This allows them to migrate or expand their populations by colonizing new sites.

Managed easements for roads and utilities also provide mimicked early successional habitat well suited to lupine. This is done both in the creation of new corridors and in the maintenance of existing ones. These activities can reduce canopy cover, providing increased light to herbaceous plants; disturb soil, providing germination sites for lupine seeds; and create corridors, providing means of dispersal between isolated Karner blue butterfly populations (Weaver Boos Consultants 1996).

Karner blue butterfly habitat can also be found on many fallow agricultural fields. Although these

sites, usually scattered and smaller, vary widely in habitat quality, wild lupine is often common to abundant. Non-native forage grasses often have completely replaced native warm-season grasses, and the proportion of weedy and non-native flowering plants can also be quite high. Nevertheless, these fields appear to serve as surrogate prairie or barrens. Such sites are especially common in the eastern portion of the Karner blue butterfly documented range. They also exist, however, on openings that were historical homesteads in the western counties, where forest management is now more prevalent. Agriculture was attempted and abandoned across much of the Central Sands Region where Karner blue butterfly habitat now exists.

4. Federally-Listed Species

In addition to the Karner blue butterfly, eight animal and six plant species that are federally-listed as endangered or threatened occur in Wisconsin. In addition, one species proposed for federal listing as threatened, the Canda lynx, occurs in Wisconsin. The status and distribution of each species is briefly discussed below. Several of these species do not occur within the Karner blue butterfly's high potential range (i.e. the "affected environment"), but are included here in an attempt to consider potential impacts on all listed species. Potential impacts to these species are discussed in Chapter V (pages 315-318). *Incidental take of other federally listed species would not be authorized as part of the Karner blue butterfly HCP and ITP.*

Canada Lynx (*Lynx canadensis*)

Proposed Threatened. The Canada lynx was proposed for federal-listing as threatened in the contiguous United States on July 8, 1998 (USFWS 1998b). A resident Canada lynx population has not likely existed in Wisconsin since 1900. The presence of Canada lynx in the states has been associated with the cyclic lynx population fluctuations in Canada (Theil 1987). Very few sitings have been made of Canada lynx in recent years in Wisconsin; with sightings mostly occurring in the northern and northwestern parts of the state. Canada lynx were placed on the state's protected species list in 1957 and classified as state endangered in 1972 (USFWS 1998b). In 1997, Canada lynx was removed from the state's threatened species list, as it has not been a current or recent breeder in the state. In 1998, the Canada lynx was added to the state list of protected wild animals (s. NR 10.02, Wis. Adm. Code).

Timber wolf (*Canis lupus*)

Endangered. About 178-184 wolves in 47 groups exist in Wisconsin (Wydeven and Boles 1998). Average adult mortality is about 20 percent and the population continues to increase (Theil and Wydeven 1996). The Wisconsin wolf range is restricted to Florence, Forest, Lincoln, Oneida, Price, Rusk, Sawyer, Taylor, Iron, Ashland, Bayfield, Douglas, Sawyer, Washburn, Burnett and Polk counties in the north, and Clark, Eau Claire, Jackson, Monroe, Juneau and Wood counties in the central part of the state. As the wolf population increases, this range may expand. Overlap

of the Karner blue butterfly range and that of the timber wolf likely occurs in Burnett, Clark, Jackson and Wood counties.

Peregrine Falcon (*Falco peregrinus*)

Endangered. Historically, Peregrine Falcons nested in Wisconsin on cliffs along the Wisconsin and upper Mississippi rivers and in Door County. Between 1965 and 1985, however, no Peregrine Falcons nested in the state (Gieck 1992). Breeding along the Mississippi River by captive-bred Minnesota birds began in 1986 and has continued since. Nesting in the past also occurred at or near release sites in Madison and Milwaukee and at Devil's Lake State Park. Currently, Peregrine Falcons are only known to nest on buildings and bridges in Wisconsin. During 1998, ten nests successfully fledged young. Nests sites were in Milwaukee, Oak Creek, Kenosha, Sheboygan, Manitowoc and Green Bay (Univ. Minnesota 1998)

Kirtland's Warbler (*Dendroica kirtlandii*)

Endangered. The Kirtland's Warbler is also known as the Jack Pine Warbler due to its highly specific nesting requirement of jack pine barrens. Jack pine (*Pinus banksiana*) must predominate and be young to middle aged. It has been found only a few times in the state, but only as a nonbreeding species. The Kirtland's Warbler has been found in Jackson, Douglas, Washburn, Vilas, Marinette, and possibly Juneau counties. Historic records indicate presence in other counties during migration.

Piping Plover (*Charadius melodus*)

Endangered. Piping plovers are tiny shorebirds that inhabit sandy beaches where vegetation is sparse. In Wisconsin, the only breeding pairs in recent years have occurred along the shores of Lake Superior (Hallowell and Gieck 1987).

Bald Eagle (*Haliaetus leucocephalus*)

Threatened. In Wisconsin, bald eagles nest along the shores of inland lakes and rivers, with the largest breeding concentrations in the northern third of the state (Gieck 1991). Bald Eagles have recovered well in Wisconsin (USFWS 1995). During 1998, 689 occupied territories were documented in the state (Jody Millar, Rock Island Ecol. Serv. Field Office, pers. comm.).

Hine's Emerald Dragonfly (*Somatochlora hineana*)

Endangered. In Wisconsin, the Hine's Emerald Dragonfly is found only in Door County. Its larvae are restricted to very small groundwater fed seeps, which occur over dolomitic bedrock near the surface. Typically, the larvae are found underneath partially decaying vegetation.

Higgins' Eye Pearly Mussel (*Lampsilis higginsi*)

Endangered. The world range of the Higgins' eye pearly mussel is the upper Mississippi River from Prescott, Wisconsin south to Iowa, Illinois and Missouri and larger tributaries, such as the St. Croix and Wisconsin Rivers (Brynildson 1989, Cummings and Mayer 1992).

Winged Mapleleaf Mussel (*Quadrula fragosa*)

Endangered. Historically, the winged mapleleaf mussel was found in the Mississippi, Tennessee, Ohio and Cumberland river drainages in at least eleven different states. Today, the winged mapleleaf mussel is restricted to only a small area in the lower St. Croix River (Cummings and Mayer 1992, Lewellyn 1993).

Northern Monkshood (*Aconitum noveboracense*)

Threatened. Northern monkshood is restricted to cool, moist, rocky slopes in mixed forests of the Driftless Area (Read 1976). It is often found near seepage springs. Occasionally, the monkshood may be found in sunny areas when it can grow in the shade of a tree such as sugar maple (*Acer saccharum*) or yellow birch (*Betula alleghaniensis*). Other plants that favor the conditions of the Northern monkshood include the Canada mayflower (*Maianthemum canadense*) and the Spinulose wood fern (*Dryopteris carthusiana*). Monkshood is known from only seven sites in the state (Kopitzke, n.d.).

Prairie Bush Clover (*Lespedeza leptostachya*)

Threatened. Dry to medium moist prairies with full sun are the preferred habitat of the prairie bush clover. Soils are often gravelly or sandy. Prairie bush clover is thought to require occasional prairie fires to discourage the growth of trees and shrubs that compete with it. Other observations suggest grazing or recent grazing history are more important controls on competition (Ann B. Swengel, pers. comm.). In Wisconsin, prairie bush clover is found in only about six sites in the southern and western parts of the state (Dane, Grant, Pierce, Rock and Sauk counties; Kopitzke, n.d.).

Dune (Pitcher's) Thistle (*Cirsium pitcheri*)

Threatened. Dune thistle occurs on sand dunes along the Lake Michigan shoreline in Door, Manitowoc and Sheboygan counties. It generally occurs in the area between an open sandy beach and a fully vegetated dune (Kopitzke, n.d.), and about 60 percent of the existing plants occur on publicly owned land (Brynildson, n.d.). It is found as appropriate openings appear in a slowly changing dynamic dune system.

Fassett's Locoweed (*Oxytropis campestris* var. *chartacea*)

Threatened. Gravelly or sandy shores of hard water lakes are the favored habitat of Fassett's locoweed. It is known only from the shores of a few shallow lakes in central Wisconsin, from sites exposed to full sunlight and subject to widely fluctuating water levels (Kopitzke, n.d.; Read 1976). Locoweed apparently benefits from the changing water levels that discourage the growth of trees and shrubs that might otherwise shade it out.

Dwarf Lake Iris (*Iris lacustris*)

Threatened. In Wisconsin, the dwarf lake iris is found only in Door and Brown counties in the northeastern part of the state, along the shores of Lake Michigan. It occurs in openings in white cedar and birch forests (Brynildson, n.d.; Kopitzke, n.d.). Dwarf lake iris thrives in cool air from the lakes and the thin, moist, sandy or rocky soil near the shores, a popular area for shoreland development.

Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)

Threatened. Eastern prairie fringed orchids occur in deep, fertile, well-watered soils of wet to medium wet prairies. It is also found in wet meadows and bogs. It grows best in full sun (Brynildson, n.d.). The plant is known from about 11 sites in southeastern Wisconsin (Kopitzke, n.d.). Like many wild orchids, eastern prairie fringed orchid can appear some years in large numbers and other years not show itself at all.

5. State Listed Species

Wisconsin's endangered and threatened species list currently includes 101 animals (two mammals, 26 birds, one amphibian, nine reptiles, 21 fishes, 20 insects and 22 mollusks) and 138 vascular plants. These species occur in a variety of habitats and occupy a variety of ecological niches. Some of these rare species are associated with Karner blue butterflies or their habitat. These species are discussed in the next section. Some rare species have overlapping ranges with the Karner blue butterfly, but are found in distinctly different habitat types. Other species do not share overlapping ranges with the Karner blue butterfly documented range. Species in these latter two categories are not addressed in this document. State listed species are subject to a consultation process under Wisconsin's endangered species law (see pages 318-321 in Chapter V for more information on this process and the potential effects of HCP implementation on these species, respectively).

Most of the rare species known to occur, or likely to occur over the next ten years, on partner lands within the Karner blue butterfly's high potential range (the documented range and an area of potential habitat surrounding it) are not expected to experience any significant impacts, positive or negative, as a result of implementing this HCP. Typically, this is due to the fact that these species' habitat needs are not associated with Karner blue butterfly, pine/oak barrens or dry, sandy soils. Species falling into this category are listed in Table 4.1 (pages 257-258).

Several of the rare species known to occur, or likely to occur, on partner lands within the high potential range are closely associated with the Karner blue butterfly and are expected to experience similar positive benefits through the implementation of the HCP. As with the Karner blue butterfly, species in this category are dependent upon disturbance of their existing occupied habitat which, although resulting in take of individuals or populations, benefits the species over the long-term. Other species in this category are those for which any take would be limited, both in terms of frequency of occurrence as well as the magnitude of the take. That is, although there will likely be no positive benefit to the species, any take will be not be substantial and is not expected to result in any long-term harm to the species distribution or status in the state. Species falling into this second category are listed in Table 5.2 (page 321).

6. Species Associated with Karner Blue Butterflies

Tables 4.2-4.4 list rare species associated with Karner blue butterfly and a variety of habitats in which they occur. Additional information on species highlighted in boldface text is included in Appendix B.

Key to status symbols used in Tables 4.2 - 4.4 (Pages 259-263)

SC = special concern
End = endangered
Thr = threatened
FSC = federal species of concern

Table 4.1. State Listed Species for which HCP Implementation is Expected to Result in Neither Significant Positive or Negative Effects

Plants

American beakgrain
Brook grass
Early anemone
Fassett's locoweed
Reticulated nutrush
Soft-leaf muhly
Spotted pondweed
Tussock bullrush
Bog bluegrass
Drooping sedge
Fairy slipper
Large water-starwort
Long-beaked baldrush
Marsh valerian
Musk-root
Northern wild monkshood
Pale green orchid
Small white lady's-slipper
Snow trillium
Sticky false-asphodel
False hop sedge
Hairy fimbristylis
Heart-leaved foam-flower
Heart-leaved plantain
Lapland azalea
Little goblin moonwort
Smooth phlox
Wolf spikerush
American fever-few
Arrow-leaved sweet-coltsfoot
Beaked spikerush
Buckhorn
Carey's sedge
Cliff cudweed
Forked aster
Round-leaved orchis
Seaside corwfoot
Snowy campion
Squarestem spikerush
Bog bluegrass
Spotted pondweed
Squashberry
Canada gooseberry
Lake-cress
Algae-like pondweed
Dwarf umbrella sedge

Invertebrates

Giant carrion beetle
Northern blue butterfly
Snuffbox
Warpaint emerald
Winged mapleleaf
Pygmy snaketail
Salamander mussel
Slippershell mussel
Flat-headed mayfly
Ebony shell
Higgin's eye pearly mussel
Pacatonica River mayfly
Silphium borer moth
Slough sandshell
Swamp metalmark
Yellow sandshell
Monkeyface
Rock pocketbook
Wartyback
Ellipse
Wing snaggletooth
Spatterdock darner
Extra-striped snaketail

Table continues on next page.

Table 4.1. State Listed Species for which HCP Implementation is Expected to Result in Neither Significant Positive or Negative Effects, Cont.

Fishes

Crystal darter
Goldeye
Blue sucker
Gilt darter
Greater redhorse
Longear sunfish
Ozark minnow
Paddlefish
Pugnose shiner
Redfin shiner
River redhorse
Speckled chub
Bullhead
Pallid shiner
Slender madtom
Starhead topminnow
Striped shiner
Black buffalo
Creek chubsucker
Weed shiner

Amphibians and Reptiles

Blanchard's cricket frog
Queen snake
Blanding's turtle
Northern ribbon snake
Western ribbon snake
Butler's garter snake

Birds

Barn owl
Common tern
Forster's tern
Red-necked grebe
Trumpeter swan
Great egret
Osprey
Yellow rail
Caspian tern
Piping plover
Yellow-crowned night heron

Table 4.2. Rare Vertebrate Species Associated with Karner Blue Butterflies in Wisconsin (Based on 1996 revisions to Natural Heritage Inventory Working List and work of the HCP Biological Team.)

(See key to status categories on page 256)

Scientific Name, Common Name	State Status	Fed. Status
Rare Birds		
Ammodramus henslowii, Henslow's sparrow	SC	FSC
A. savannarum, grasshopper sparrow	SC	none
Bartramia longicauda, upland sandpiper	SC	none
Chondestes grammacus, lark sparrow	SC	none
***Dendroica kirtlandii*, Kirtland's warbler**	**SC**	**End**
Dolichonyx oryzivorus, bobolink	SC	none
Icterus spurius, orchard oriole	SC	none
***Lanius ludovicianus*, loggerhead shrike**	**End**	**FSC**
Oporornis agilis, Conneticut warbler	SC	none
***Pedioecetes phasianellus*, sharp-tailed grouse**	**SC**	**none**
Pooecetes gramineus, vesper sparrow	SC	none
Spiza americana, dickcissel	SC	none
Spizella pusilla, field sparrow	SC	none
Sturnella neglecta, western meadowlark	SC	none
Tympanuchus cupido, greater prairie-chicken	Thr	none
Tyrannus verticalis, western kingbird	SC	none
Tyto alba, barn owl	End	none
Vermivora peregrina, Tennessee warbler	SC	none
Vireo bellii, Bell's vireo	Thr	none
Rare Reptiles & Amphibians		
Crotalus horridus, timber rattlesnake	SC	none
***Ophisaurus attenuatus*, western slender glass lizard**	**End**	**none**
Pituophis melanoleucus, bull snake	SC	none
***Sistrurus catenatus catenatus*, eastern massasauga**	**End**	**FSC**
Terrapene ornata, ornate box turtle	End	none
***Clemmys insculpta* #, wood turtle**	**Thr**	**none**
***Emydoidea blandingii* #, Blanding's turtle**	**Thr**	**FSC**

Bold = Species for which additional information has been included in Appendix B.

Table 4.3. Rare Invertebrate Species Associated with Karner Blue Butterflies in Wisconsin (Based on 1996 revisions to Natural Heritage Inventory Working List and work of the HCP Biological Team.)

(See key to status categories on page 256)

Scientific Name, Common Name	State Status	Fed. Status
Aeropedellus clavatus, club-horned grasshopper	SC	none
***Aflexia rubranura*, red-veined prairie leafhopper**	**SC**	**FSC**
***Atrytonopsis hianna*, dusted skipper**	**SC**	**none**
***Chlosyne gorgone carlota*, Gorgone checker spot**	**SC**	**none**
***Cicindela patruela patruela,* a tiger beetle**	**SC**	**none**
***C. p. huberi*, a tiger beetle**	**SC**	**none**
Cicindela splendida, a tiger beetle	SC	none
Eritettix simplex, velvet-striped grasshopper	SC	none
Everes amyntula, western tailed blue	SC	none
Erynnis baptisiae, wild indigo dusky wing	SC	none
***E. martialis*, mottled dusky wing**	**SC**	**none**
***E. persius persius*, Persius dusky wing**	**SC**	**none**
Euchlaenia milnei, a looper moth	SC	FSC
Gastrocopta procera, wing snaggletooth snail	Thr	none
Grammia phyllira, Phyllira tiger moth	SC	none
G. oithona, Oithona tiger moth	SC	none
Hemileuca nevadensis, buck moth	SC	none
Hesperia comma, Laurentian skipper	SC	none
H. ottoe, ottoe skipper	SC	none
***H. leonardus leonardus*, Leonard's skipper**	**SC**	**none**
H. leonardus/pawnee, Leonard/Pawnee blend	SC	none
***H. metea*, cobweb skipper**	**SC**	**none**
Hesperotettix speciosus, a grasshopper	SC	none
***Incisalia henrici*, Henry's elfin butterfly**	**SC**	**none**
***I. irus*, frosted elfin butterfly**	**Thr**	**none**
Lycaeides idas nabokovi, northern blue butterfly	End	none
L. melissa samuelis, Karner blue butterfly	SC	End
Megacephala virginica, Virginia big-headed tiger beetle	SC	none
Melanoplus flavidus, blue-legged grasshopper	SC	none
M. obovatipennis, obovate-winged grasshopper	SC	none
Oeneis chryxus strigulosa, chryxus arctic butterfly	SC	none
Pardalophora phoenicoptera, orange-winged grasshopper	SC	none
Phoetaliotes nebrascensis, large-headed grasshopper	SC	none
***Phyciodes batesii*, tawny crescent spot**	**SC**	**FSC**

Table continues on next page.

Table 4.3. Rare Invertebrate Species Associated with Karner Blue Butterflies in Wisconsin, Cont.

Scientific Name, Common Name	State Status	Fed. Status
Phytometra ernestinana, Ernestine's moth	SC	none
Polyamia dilata, a prairie leafhopper	SC	none
Psinidia fenestralis, long-horned grasshopper	SC	none
Spharagemon marmorata, northern marbled locust	SC	none
***Schinia indiana*, phlox flower moth**	**End**	**FSC**
Speyeria idalia, regal fritillary	End	FSC
Tachysphex pechumani, a sand-loving wasp	SC	none
Trachyrhachis kiowa, ash-brown grasshopper	SC	none
Trimerotropis maritima, seaside grasshopper	SC	none

Bold = Species for which additional information has been included in Appendix B.

Table 4.4. Rare Vascular Plant Species Associated with Karner Blue Butterflies in Wisconsin (Based on 1996 revisions to Natural Heritage Inventory Working List and work of the HCP Biological Team.)

(See key to status categories on page 256)

Scientific Name, Common Name	State Status	Fed. Status
~~*Agalinis gattingeri*, round-stemmed false foxglove~~	~~Thr~~	~~none~~
A. skinneriana, pale false foxglove	End	FSC
Agastache nepetoides, yellow giant hyssop	Thr	none
Anemone caroliniana, Carolina anemone	End	none
Anemone multifida var hudsoniana, Hudson Bay anemone	End	none
Aristida dichotoma, poverty grass	SC	none
Artemisia dracunculus, dragon sagewort	SC	none
A. frigida, prairie sagewort	SC	none
Asclepias lanuginosa, wooly milkweed	Thr	none
A. ovalifolia, oval milkweed	PThr	
A. purpurascens, purple milkweed	End	none
Astragalus crassicarpus, prairie plum	End	none
Besseya bullii, kitten tails	Thr	none-former c3
Botrychium rugulosum, ternate grape fern	SC	none
Cacalia tuberosa, prairie indian plantain	Thr	none
Calylophus serrulatus, toothed evening primrose	SC	none
Carex richardsonii, Richardson sedge	SC	none
Cirsium flodmanii, Flodman's thistle	SC	none
Cirsium hillii, prairie thistle	Thr	FSC
Dalea villosa, villous prairie clover	SC	none
Diodia teres var teres, buttonweed	SC	none
Eupatorium sessilifolium var. *brittonianum*, upland boneset	SC	none
Gentiana alba, yellowish gentian	Thr	none
Lespedeza leptostachya, prairie bush clover	End	Thr
L. virginica, slender bush clover	Thr	none
Leucophysalis grandiflora, white ground cherry	SC	none
Liatris punctata var. *nebraskana*, dotted blazing star	End	none
L. spicata, marsh blazing star	SC	none
Minuartia dawsonensis, northern rock sandwort	SC	none
Nothocalais cuspidata, prairie dandelion	SC	none
Ophioglossum vulgatum var. *pseudopodum*, adder's tongue	SC	none
Opuntia fragilis, brittle prickly pear	Thr	none
Orobanche ludoviciana, Louisiana broomrape	SC	none
O. uniflora, one-flowered broomrape	SC	none
O. fasciculata, clustered broomrape	Thr	none

Table continues on next page.

Table 4.4. Rare Vascular Plant Species Associated with Karner Blue Butterflies in Wisconsin, Cont.

Scientific Name, Common Name	State Status	Fed. Status
Parthenium integrifolium, wild quinine	Thr	none
Penstemon pallidus, pale beardtongue	SC	none
Phlox bifida, cleft phlox	SC	none
Polygala incarnata, pink milkwort	End	none
Prenanthes aspera, rough white lettuce	End	none
Rhamnus lanceolata var. *glabrata*, lance-leaved buckthorn	SC	none
Rhus aromatica, fragrant sumac	SC	none
Ruellia humilis, wild petunia	End	none
Scutellaria parvula var.*parvula*, small skullcap	End	none
Solidago sciaphila, cliff goldenrod	SC	none
***Talinum rugospermum*, prairie fame-flower**	**SC**	**FSC**
Thaspium barbinode, hairy meadow parsnip	End	none
T. trifoliatum var flavum, meadow parsnip	SC	none
Tomanthera auriculata, eared false foxglove	SC	FSC
Vaccinium caespitosum, dwarf bilberry	End	none
***Viola fimbriatula*, sand violet**	**End**	**none**

Bold = Species for which additional information has been included in Appendix B.

C. Socio-economic Environment

This part of Chapter IV provides an overview of the socio-economic features of the 21 counties included in the Karner blue butterfly documented range.

1. Human Population and Housing

Information for this section was drawn primarily from the U.S. Census of Population and Housing.

Population. As seen in Table 4.5 (page 265), population in the counties that make up the Karner blue butterfly documented range has generally been increasing. With the exception of Clark and Jackson Counties, showing a 1.4 percent and 3.8 percent decrease in population respectively, the counties in the range showed an increase for the period 1980-1990. Adams County grew the fastest relative to its base population during this period, increasing its population by 16.56 percent with 2,225 new persons. Outagamie added the largest total number of people, with 11,780 new residents in the 10 year period.

Urban areas in the documented range were also compared (see Table 4.5, page 265); Plover, in Portage County, had the greatest relative change in population, increasing over 50 percent. Altoona in Eau Claire County had a dramatic percentage increase as well. As one of the largest urban centers in the region, Eau Claire showed the largest gross rise in population, with an increase of 5,328 persons in the ten year period.

Distribution. The counties that form the Karner blue butterfly documented range are predominantly rural. Several counties, such as Adams, Burnett, Marquette and Menominee, have none of their population classified as urban (see Table 4.5, page 265). In contrast, Eau Claire County has over 74 percent of its population residing in urban areas, and Outagamie County has nearly 73 percent. Monroe, Portage and Wood Counties also have significant urban populations of 40 percent or more.

Table 4.5. Population and Housing Units in the Documented Karner Blue Butterfly Range (U.S. Census of Population and Housing)

	Population				Housing Units		
	1980	1990		Change	1980	1990	Change
	Total	Urban	Total	1980-1990	Total	Total	1980
Adams	13,457	0	15,682	16.53%	26,186	28,839	10.13%
Barron	38,730	10,984	40,750	5.21%	17,153	19,363	12.88%
Burnett	12,340	0	13,084	6.02%	10,359	11,743	13.36%
Chippewa	52,127	20,023	52,360	.44%	19,203	21,024	9.48%
Clark	32,910	2,670	31,647	-3.83%	12,384	12,904	4.19%
Dunn	34,314	13,547	35,909	4,64%	11,886	13,252	11.49%
Eau Claire	78,805	63,534	85,183	8.09%	28,973	32,741	13.0%
Green Lake	18,370	5,304	18,651	1.52%	8,319	9,202	10.61%
Jackson	16,831	3,490	16,588	-1.44%	6,975	7,627	9.34%
Juneau	21,037	3,439	21,650	2.91%	9,938	11,422	14.93%
Marquette	11,672	0	12,321	5.56%	7,128	8,035	12.72%
Menominee	3,373	0	3,890	15.32%	1,327	1,742	31.27%
Monroe	35,074	15,358	36,633	4.44%	12,741	14,135	10.94%
Oconto	28,947	7,058	30,266	4.41%	23,157	25,173	8.7%
Outagamie	128,730	102,158	140,510	9.15%	43,930	51,923	18.19%
Polk	32,351	2,657	34,773	7.48%	16,228	18,562	14.38%
Portage	57,420	31,182	61,405	6.94%	19,901	22,910	15.11%
Shawano	35,928	7,598	37,157	3.42%	15,246	16,737	9.77%
Washburn	13,174	0	13,772	4.53%	8,716	9,829	12.76%
Waupaca	42,831	14,629	46,104	7.64%	18,142	20,141	11.01%
Waushara	18,526	81	19,385	4.63%	11,242	12,246	8.93%
Wood	72,799	39,676	73,605	1.1%	26,186	28,839	10.13%

Table 4.6. Population Age and Education in the Documented Karner Blue Butterfly Range (U.S. Census of Population and Housing)

	Age		Education	
Counties	**Median**	**% 50 or Older**	**% High School Diploma**	**% College Degree**
Adams	40.2	38.4	67.0	12.4
Barron	34.5	30.1	73.0	19.4
Burnett	39.2	37.4	72.3	13.7
Chippewa	33.4	27.4	75.0	18.2
Clark	33.9	30.6	67.5	13.9
Dunn	28.5	22.8	77.7	26.3
Eau Claire	30.3	23.5	82.8	29.9
Green Lake	36.8	33.7	74.6	17.3
Jackson	35.5	31.3	68.8	15.3
Juneau	35.5	32.7	70.6	14.4
Marquette	39.1	38.2	69.7	14.0
Menominee	24.5	20.0	62.7	7.3
Monroe	33.7	28.0	75.7	17.4
Oconto	35.0	30.9	69.4	13.4
Outagamie	31.4	23.1	81.5	24.9
Polk	34.6	29.2	78.0	18.6
Portage	29.3	21.2	79.7	24.6
Shawano	35.3	32.4	69.5	14.8
Waupaca	35.0	30.9	72.1	16.6
Waushara	38.6	36.2	70.0	15.1
Wood	33.3	27.3	78.3	21.7
State of Wisconsin	32.9	26.2	78.6	21.7

Age and Education. The age structure for the counties in the Karner blue butterfly documented range varies considerably (see Table 4.6, page 266). With the exception of Menominee County, however, the most rural counties have the highest median age and the highest percentage of elders (persons over 65) in the population. The inverse is not seen with the urban areas. Menominee, the most rural county, has both the lowest median age and the smallest percentage of elders. Of the other counties with a low median age and younger population, only Portage was one of the five top urban counties.

Educational attainment of the population in the documented range more closely follows urban/ rural divides (see Table 4.6, page 266). For the most part, those counties with the highest percentage of high school and college graduates are also the most urban. Eau Claire, Outagamie and Portage counties are in the top five for both percentage of high school and college graduates. Likewise, there is an obvious nexus between the rural counties and lower educational attainment. In both the percentage of high school and college graduates, Menominee and Adams counties rank the lowest and next lowest, respectively.

Housing Units. During that same period, the number of housing units in each of these counties increased significantly more than the population. In some instances, the percent increase in housing units was more than triple the percent change in population. For instance, in Juneau County population increased by 2.9 percent, while the number of housing units increased by nearly 15 percent. Menominee County had the largest relative change in the number of housing units, increasing 31.3 percent; it had, however, by far the lowest base number of units, making small numerical changes appear more significant. Not surprisingly, Outagamie County added the largest total number of housing units, with 7,993 new units in the ten year period. Housing statistics for the Karner blue butterfly documented range are summarized in Table 4.7 (page 268).

2. Socio-Economic Patterns

This section describes current patterns in the socio-economic makeup of the counties within the Karner blue butterfly documented range. Information for this section was primarily drawn from the *1990 Census of the Population and Housing* and the *1993 County Business Patterns*, both from the U.S. Department of Commerce.

The level of socio-economic strength also reflects the disparities among urban and rural counties in the documented range. As seen in Table 4.8 (page 269), urban counties have consistently higher median household and per capita income. Outagamie County had the highest of both, with a median income of $33,770 and a per capita income of $13,893. It was followed by Wood, Portage and Eau Claire counties, respectively. The lowest of both income measures was Menominee County, with a median income of $14,122 and a per capita income of $5,674. Other rural counties followed Menominee with low income standing; these were Burnett, Clark and Jackson counties, respectively.

Table 4.7. Housing in the Documented Karner Blue Butterfly Range (U.S. Census of Population and Housing)

Housing					
Counties	**Household Size**	**% Built Before 1969**	**Owner Occupied**	**Total Units**	**% Owner Occupied**
Adams	2.44	17.2%	4,859	12,418	39%
Barron	2.60	26.1%	11,345	19,363	58%
Burnett	2.45	23.0%	4,232	11,743	36%
Chippewa	2.68	31.7%	14,163	21,024	67%
Clark	2.77	32.1%	8,827	12,904	68%
Dunn	2.69	26.6%	8,234	13,252	62%
Eau Claire	2.58	26.9%	20,162	32,741	62%
Green Lake	2.56	33.9%	5,399	9,202	59%
Jackson	2.59	31.6%	4,547	7,627	60%
Juneau	2.59	26.2%	6,275	11,422	55%
Marquette	2.52	24.5%	3,893	8,035	49%
Menominee	3.57	18.0%	695	1,742	40%
Monroe	2.70	28.1%	9,571	14,135	68%
Oconto	2.65	27.3%	9,204	25,173	37%
Outagamie	2.73	28.3%	36,507	51,923	70%
Polk	2.62	21.8%	10,165	18,562	55%
Portage	2.71	26.9%	14,984	22,910	65%
Shawano	2.64	31.8%	10,614	16,737	63%
Waupaca	2.62	27.5%	12,961	20,141	64%
Waushara	2.52	24.7%	6,116	12,246	50%
Wood	2.65	32.1%	20,127	28,839	70%
State of WI	2.61	29.3%	1,215,324	2,055,774	59%

Table 4.8. Income, Employment and Commuting Patterns in the Documented Karner Blue Range (U.S. Census of Population and Housing)

County	Income		Empl. and Commuting	
	Per Capita	Median	Unempl.	Driving
Adams	10,926	21,548	10.6%	88.2%
Barron	10,377	22,570	6.5%	80.8%
Burnett	9,623	20,153	8.5%	82%
Chippewa	11,170	25,858	6.2%	84.5%
Clark	9,810	22,177	5.2%	70.9%
Dunn	10,364	24,452	6.3%	76.2%
Eau Claire	11,801	25,886	6.3%	85%
Green Lake	11,840	25,708	6.1%	81.7%
Jackson	10,173	21,409	7.7%	80.3%
Juneau	10,304	22,073	6.6%	83.2%
Marquette	10,652	22,234	5.9%	83.9%
Menominee	5,674	14,122	20.7%	88.8%
Monroe	10,744	24,799	4.7%	81.0%
Oconto	10,375	22,927	7.3%	83.2%
Outagamie	13,893	33,770	4.0%	88.9%
Polk	11,291	24,267	6.7%	81.2%
Portage	11,730	28,686	5.0%	84.0%
Shawano	10,586	23,841	6.0%	81.0%
Waupaca	11,455	26,083	5.5%	84.8%
Waushara	10,408	21,888	7.2%	83.9%
Wood	13,130	29,735	6.1%	88.4%
State of Wisconsin	13,276	29,716	5.2%	86.0%

Contrasts between the urban and rural counties are also seen in home ownership patterns. As with unemployment, home ownership tendencies modeled fairly closely those of median household income. Generally, as median income increased, there was a corresponding increase in home ownership. Burnett, Oconto, Adams and Menominee counties showed the lowest rates of home ownership, while Outagamie, Portage and Wood were among the highest. The instance of home ownership in Outagamie County almost doubled that of Burnett County; this illustrates the latitude between the high and low ends of the spectrum.

Predictably, unemployment rates for counties within the Karner blue butterfly documented range were highest in those rural counties with the lowest income (see Table 4.8, page 269). According to the Census of Population and Housing by the U.S. Department of Commerce, Menominee County had the highest unemployment rate at 20.7 percent, contrasting a 4.0 percent rate in Outagamie County. Despite this broad range in unemployment rates, the twenty-one counties that are the Karner blue butterfly documented range, taken in their entirety, have a higher instance of unemployment than the state average. Only three counties, Outagamie, Portage and Clark, have an unemployment rate that is equal to or below the state level of 5.2 percent.

Employment structures. In their industrial sectors, the rural counties tended to be predominantly manufacturing in their employment structure; counties that were more urban were inclined toward services and retail as their major employers. According to the 1993 County Business Patterns report, employment in the most rural counties, Menominee and Marquette, was heavily dominated by the manufacturing sector. Outagamie, Portage and Wood Counties were fairly well balanced in the different employment sectors, but Portage and Wood were still topped by service and retail.

D. Land Use

This section presents possible implications of the population and socio-economic trends and provides information on other land use-related issues. New information in this section is drawn from land record information from the Wisconsin Department of Revenue. As mentioned in Part A of Chapter II (page 44), land use decisions are a function of existing or anticipated demographic, economic, agricultural, social, cultural and natural conditions. The preceding sections provide a basis for discussing implications and trends in land use.

Population, Housing and Employment. The trends outlined for population growth, housing and employment indicate that land development pressures on those counties that are more urban is likely to continue. With lower unemployment rates and higher median incomes in the urban counties, some continued migration would be expected from the rural areas. Furthermore, the significantly higher rate of growth for housing development relative to population is likely to require greater land conversion in those areas with increasing populations.

Land Conversion. When evaluating land use trends, particularly with regard to conservation issues,

the rate of land conversion is highly salient. Land conversion rates in the Karner blue butterfly documented range are presented in Table 4.9 (page 273). Land conversion records from the Department of Revenue were reviewed for the three most urban counties in the Karner blue butterfly range: Eau Claire, Portage and Wood. For the period 1990 through 1995, a total of 37,586 acres in the three counties were converted from rural land uses, such as agriculture, forest and wetlands. With nearly 15,000 acres converted during that period, Wood County showed the highest acreage changing land use. In Portage and Wood Counties, rural land conversion was at its height for this period in 1994, while land conversion in Eau Claire County was significantly higher in 1995 than in other years. From 1991 to 1995, there appeared to be no clear trend of increase or decrease in land conversion, but rather, it varied inconsistently.

For comparison, land conversion rates in the three most rural counties in the range, Burnett, Marquette and Menominee, were also examined. They were, however, not much lower. In fact, Burnett County exceeded Wood County in land conversion with about 15,500 acres of rural land being diverted to other uses (Table 4.9, page 273). In Burnett County, much of the land conversion may be attributed to recreational and second home development for nonresident land owners.

From the data, it is difficult to form a clear understanding of what is happening in land conversion. Although most of the population growth is directed near urban areas, land conversion is occurring at a similar rate in rural areas.

Property Values. Trends in property values vary considerable from county to county, particularly rural to urban. For instance, agricultural land changing use in Burnett County in 1996 averaged $282 per acre; whereas agricultural land being converted in Eau Claire County for the same year had a mean value of $937 per acre. Clearly, there is notably more incentive for a farmer in Eau Claire County to turn over his land to other uses. Nonetheless, the rates of land conversion are not commensurately higher.

There are two key implications that property values might have on development and land use. The first is that, given the high return per acre, agricultural land owners are more likely to sell land in the counties that are more urbanized. With the higher value per acre, the farmer has a strong incentive to sell or develop his land. Second, in order to get lower, more competitive prices, new residential development will be more inclined to be located further on the periphery of urban centers. Thus, this incites residents to commute further for more economical but less efficient use of land.

Transportation (as it relates to land use and planning). The highway system for the central portions of Wisconsin went through rapid growth from the 1950's through the 1970's; now at a stable period, relatively little new acreage will be required in the foreseeable future. Almost all future work needed by state, county and township road systems will occur on existing rights-of-way. If full state and federal funding is received, almost 1,000 acres of the 10.6 million acres in the Karner blue butterfly documented range will be converted for state transportation uses within the next five to seven years. Most of this additional land would be used to convert current two lane roads to four lane

expressways near the existing cities of Elk Mound, Waupaca, Plover and Wisconsin Rapids. Local streets and subdivision roads will also be needed, but the extent of this is unknown. Other forms of transportation, such as railways and airports, are also stable and will require little additional land.

Table 4.9. Average Rural Land Conversion for 1990-1995 in the Documented Karner Blue Range (Based on Wisconsin Department of Revenue Figures)

	Mean Value per Acre		Number of Acres Changing Use		
County	**Converted**	**Retained**	**Agriculture**	**Other Rural Uses**	**Total**
Adams	366.80	338.70	2,921	5,783	8,704
Barron	219.20	182.70	12,769	9,813	22,582
Burnett	164.50	155.70	4,548	11,227	15,775
Chippewa	203.00	170.00	9,206	10,388	19,594
Clark	151.00	175.70	10,358	8,225	18,583
Dunn	206.50	203.80	9,268	7,012	16,280
Eau Claire	309.20	204.80	6,065	5,443	11,508
Green Lake	345.50	371.70	2,462	1,586	4,048
Jackson	259.50	242.30	3,386	13,316	16,702
Juneau	299.80	254.50	5,644	8,937	14,581
Marinette	223.70	216.30	6,207	15,333	21,540
Marquette	250.00	262.50	5,041	3,742	8,783
Menominee	Information not available				
Monroe	365.00	268.50	3,994	8,978	12,972
Oconto	254.30	220.5	6,193	5,710	11,903
Outagamie	1030.50	462.70	7,000	1,902	8,902
Polk	256.30	192.20	13,427	12,524	25,951
Portage	377.50	331.50	6,083	5,055	11,138
St. Croix	589.50	432.30	16,045	4,724	20,769
Sawyer	225.30	148.30	3,052	24,291	27,343
Shawano	280.30	231.20	6,885	6,334	13,219
Washburn	155.00	150.70	4,938	18,130	23,068
Waupaca	346.50	293.80	8,698	6,524	15,222
Waushara	332.50	298.70	7,502	5,855	13,357
Wood	318.70	238.00	8,522	6,418	14,940

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A. Proposed Action Alternative

The proposed federal action is the issuance of a permit for the incidental take of Karner blue butterflies in Wisconsin pursuant to section 10(a)(1)(B) of the ESA. The permit would authorize the take of Karner blue butterflies on *all* non-federal lands in Wisconsin pursuant to a *Statewide Karner Blue Butterfly Habitat Conservation Plan* (Chapters I and II and Appendices A-G of this document), and incidental to otherwise lawful land management activities and development projects. The applicant for the permit is the Wisconsin DNR. Other parties to the permit comprise a partnership of the 27 public and private entities identified in Table 1.1 (page 9).

The proposed state action is the preparation of a *Statewide Karner Blue Butterfly Habitat Conservation Plan* (Chapters I and II and Appendices A-F of this document), species and habitat conservation agreements (conservation agreements) with each HCP partner and an incidental take permit (ITP) application. The proposed state action also includes the implementation of the actions outlined in these documents, as well as those outlined in an Implementing Agreement with the USFWS.

The 27 public and private partners participating in the HCP identified goals in their "Articles of Partnership." These include:

- ☞ developing an ecologically and economically sound solution integrating Karner blue butterfly conservation with economic and other land uses acceptable to the citizens of Wisconsin and the owners and managers of public and private lands;

- ☞ encouraging multiple species and barrens ecosystem management planning for those ownerships where such measures are desirable and feasible and acceptable by the landowners;

- ☞ assuring, on a landscape basis, no-net-loss of Karner blue butterfly habitat attributable to land use that would otherwise be legal; and

- ☞ providing for Karner blue butterfly metapopulation dynamics on landscapes managed to maintain the necessary dynamic processes.

See the Articles of Partnership in Appendix C for a complete list of partnership goals. The Karner blue butterfly HCP (Chapters I and II) represents a shift from the traditional emphasis on protection of individual organisms on fixed tracts of land to a broader, proactive approach to conservation and management.

The HCP partners have estimated their costs for implementation of the HCP at approximately $600,000 annually. The DNR alone is committing a full-time employee to support

implementation and permit administration. Full funding commitments are discussed in Part G of Chapter II (pages 151-157).

1. Broad Conservation Strategies

The strength of this unique HCP is the commitment of conservation measures on large tracts of public and private land (partner lands) throughout the state of Wisconsin (see Figure 1.2, page 10). The 27 HCP partners have agreed to apply broad conservation measures as a framework for addressing Karner blue butterfly conservation. Specific management levels to benefit the Karner blue butterfly and its habitat will vary across partner activities and economic goals. Included in this HCP are two distinct levels of conservation focus:

- ☞ management with consideration for the Karner blue butterfly and its habitat, and
- ☞ management to feature, protect or enhance the Karner blue butterfly and its habitat.

Each of these levels of focus is described in Part C of Chapter II (pages 62-66) and examples of each are provided in Table 2.12 (page 67). Notably, all partners have chosen to engage in management with consideration for Karner blue butterflies. Seven partners have chosen to also manage some acreage to feature, protect or enhance the Karner blue butterfly and its habitat. A total of 264,916 acres are included in the HCP for management under one of these levels of focus. The breakdown of this acreage by partner is provided in Table 2.11 (pages 65-66) and the individual partners' conservation agreements. Figure 3.1 (page 198) depicts the location of all partner lands included in the HCP. These lands are depicted by ownership category in the three figures that follow. Figure 3.2 (page 201) depicts the location of DNR and county forest lands included in the HCP, Figure 3.3 (page 202) depicts the location of private lands included by partners, and Figure 3.4. (page 203) depicts the transportation corridors included in the plan. DNR properties included in the HCP are identified in Table 3.1 (pages 192-197).

Under the Proposed Action alternative, all partner lands in the state would be covered by an ITP, not just the lands identified in Figures 3.1-3.4. However, it is those lands identified in Figures 3.1-3.4 that are being proactively managed for Karner blue butterfly conservation. Lands being managed under each of these broad levels of conservation focus bear a relationship to documented Karner blue butterfly occurrences. One hundred ninety-seven of the 281 Karner blue butterfly element occurrences are located on partner lands included in the management with consideration category. One hundred twenty-six of these occur on public lands and 71 occur on private lands. An additional 34 element occurrence are located on lands that will be managed to protect or enhance Karner blue butterfly habitat; thirty-three occur on public lands and one occurs on private land.

Within each level of focus, four broad conservation strategies were identified as options to be selected by individual HCP partners for conserving the Karner blue butterfly and its habitat:

- management for long-term habitat,
- management for a shifting mosaic of habitat,
- management for dispersal corridors, and
- compensatory mitigation.

Partners have chosen one, several, or all of these strategies to integrate with their specific land management activities on acres identified for inclusion in the HCP. Table 2.13 (pages 78-79) indicates the conservation strategies selected by each partner. This table presents the broad conservation strategies in the context of the two levels of conservation focus discussed above. Figure 3.1 (page 198) depicts the locations of all lands in the state that will be managed under the HCP. The specific application of each of the land management strategies is further defined in each individual partner's legally-binding conservation agreement. Table 3.2 (pages 199-200) summarizes the relationship between the levels of focus, conservation strategies and specific land management activities.

Of the total 264,916 acres included, 227,191 acres will be managed with consideration for the Karner blue butterfly and its habitat. Clark, Eau Claire and Jackson County Forests, Northern States Power Co., The Nature Conservancy, the DOT and the DNR will use long-term habitat as a means of managing with consideration. Nearly all of the partners will manage for a shifting mosaic of habitat. All of the utility company partners, the DOT and the DNR will manage corridors with consideration for Karner blue butterflies. ANR Pipeline, Lakehead Pipe Line Co., Northern States Power Co., Wisconsin Gas Co., Alliant, Wisconsin Public Service Co. and the DOT are also committing to compensatory mitigation, but only if planned activities result in an *unanticipated* permanent take (i.e. if those areas where planned activities are to occur are found to be occupied by Karner blue butterflies). Any plans for mitigation will be approved by the USFWS.

Of the total 264,916 acres included in the HCP, 37,725 acres will be managed to feature, protect or enhance the Karner blue butterfly and its habitat. Seven partners have chosen this level of conservation focus. The Eau Claire, Jackson and Juneau county forests, Northern States Power Company, Wisconsin Gas Company, The Nature Conservancy and the DNR will use long-term habitat as a means to protect or enhance Karner blue butterfly habitat. Jackson County Forest and the DNR will also use a shifting mosaic strategy to protect or enhance habitat, and the DNR will manage a small number acres with a corridor strategy to protect or enhance Karner blue butterfly habitat (see Table 2.13, pages 78-79). Commitments to this management are documented in the individual partner's conservation agreements.

Table 3.1. DNR Lands Included in the Statewide Karner Blue Butterfly Habitat Conservation Plan

Adams County
- Adams ranger station
- Big Roche-a-Cri Fishery Area
- Colburn Wildlife Area
- Dells of the Wisconsin River Natural Area
- Dorro Couche tower site
- Friendship tower site
- unnamed gift lands
- Lake Camelot public access site
- Lawrence Creek Wildlife Area
- Leola Marsh Wildlife Area
- Patrick Lake public access site
- Quincy Bluff and Wetlands Natural Area
- Campbell Creek remnant
- Carter Creek remnant
- Fordam Creek remnant
- Little Roche-a-Cri remnant
- Risk Creek remnant
- Roche-a-Cri State Park
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands
- unnamed statewide non-point easement program lands
- Upper Neenah Fishery Area
- Wisconsin Dells tower site

Barron County
- Arland tower site
- Chetek tower site
- Cumberland area storage facility
- Cumberland Area Headquarters
- Dummy Lake Fishery Area
- Engle Creek Springs Fishery Area
- extensive unnamed wildlife habitat lands
- Little Granite Lake public access site
- Loon Lake Wildlife Area
- Maple Plain Rearing Station
- New Auburn Wildlife Area
- Duck Lake remnant
- Hickey Creek remnant
- Red Cedar River remnant
- Upper Turtle Lake remnant
- scattered unnamed wildlife habitat lands
- Silver Creek Fishery Area
- Sate-owned islands
- unnamed statewide habitat areas lands
- Turtle Creek Fishery Area
- Tuscobia State Trail
- Yellow River Fishery Area

Burnett County
- Amsterdam Sloughs Wildlife Area
- Clam Lake Wildlife Area
- Clam River Fishery Area
- Crex Meadows Wildlife Area
- Culbertson Springs Fishery Area
- Danbury tower site
- Danbury Wildlife Area
- Fish Lake Wildlife Area
- Gandy Dancer State Trail
- unnamed gift lands
- Governor Knowles State Forest
- Grantsburg ranger station
- Kiezer Lake Wildlife Area
- unnamed lup grant lands
- Namekagon Barrens
- Clam Lake remnant
- Clam River remnant
- Devils Lake remnant
- Round Lake remnant
- Sand Lake remnant
- Yellow River remnant
- Sand Creek Fishery Area
- unnamed scattered forest lands
- Siren tower site
- Spring Creek Fishery Area
- St. Croix River public access site
- State-owned islands
- unnamed statewide habitat areas lands
- Timberland tower site
- Trade Lake public access site
- Webster ranger station

Table continues on next page.

Table 3.1. DNR Lands Included in the Statewide Karner Blue Butterfly Habitat Conservation Plan, Cont.

Chippewa County
- Brunet Island State Park
- Chippewa Moraine State Recreation Area
- Cornell ranger station
- Drywood Wildlife Area
- Duncan Creek Fishery Area
- Elk Creek Fishery Area
- Flambeau Ridge tower site
- Hay Creek Fishery Area
- Ice Age Trail
- Lake Wissota State Park
- McCann Creek Fishery Area
- Old Abe State Trail
- Bob Lake remnant
- Elk Creek remnant
- Sand Creek remnant
- Ruby tower site
- Sand Creek Fishery Area
- scattered unnamed wildlife habitat lands
- Stang tower site
- unnamed statewide habitat areas lands
- unnamed statewide stream bank easement program lands
- Tom Lawin Wildlife Area

Clark County
- Black River State Forest
- Bruce Mound tower site
- Black River remnant
- Dickenson Creek remnant
- scattered unnamed wildlife habitat lands
- Twin Mound tower site

Columbia County
- Dells of the Wisconsin River Natural Area
- Lower Wisconsin State Riverway

Crawford County
- Lower Wisconsin State Riverway

Dane County
- Lower Wisconsin State Riverway

Dunn County
- Bolen Creek Fishery Area
- Chippewa River State Trail
- Dunnville Wildlife Area
- Elk Creek Fishery Area
- extensive unnamed wildlife habitat lands
- Hoffman Hills Recreation Area
- Lake Menomin Fishery Area
- Muddy Creek Wildlife Area
- Nine Mile Island State Natural Area
- Otter Creek Fishery Area
- Red Cedar State Trail
- Elk Creek remnant
- Gilbert Creek remnant
- Otter Creek remnant
- Red Cedar River public access site remnant
- South Fork Hay River remnant
- Tainter Lake Spawning Marsh remnant
- Torgerson Creek remnant
- Wilson Creek remnant
- Sand Creek Fishery Area
- scattered unnamed wildlife habitat lands
- unnamed statewide natural areas lands
- unnamed stream bank easement program lands

Eau Claire County
- Augusta Wildlife Area
- Buffalo River State Trail
- Chippewa River State Trail
- Elk Creek Fishery Area
- Fairchild ranger station
- Clear Creek remnant
- Seymour tower site
- unnamed statewide habitat areas lands
- unnamed statewide stream bank easement program lands
- unnamed stream bank protection program lands
- West-Central Regional Headquarters
- Wilson tower site

Grant County
- Lower Wisconsin State Riverway

Table continues on next page.

Table 3.1. DNR Lands Included in the Statewide Karner Blue Butterfly Habitat Conservation Plan, Cont.

Green Lake County
- extensive unnamed wildlife habitat lands
- Grand River Marsh Wildlife Area
- Green Lake Rearing Station
- Heart Lake Rearing Station
- Puckaway Rough Fish Station
- Little Green Lake remnant
- Rogers Memorial Habitat Preserve
- scattered unnamed wildlife habitat lands
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands
- Upper Fox River public access site
- White River Marsh Wildlife Area

Iowa County
- Lower Wisconsin State Riverway

Jackson County
- Albion Rearing Station
- Beaver Creek Rearing Station
- Black River Falls Area Headquarters
- Black River Falls ranger station
- Black River tower site
- Black River State Forest
- Buffalo River Fishery Area
- Buffalo River State Trail
- Half Moon Lake Fishery Area
- Halls (Stockwell) Creek Fishery Area
- Jay Creek State Natural Area
- Knapp Mound tower site
- North Bend Bottoms Wildlife Area
- North Branch Trempealeau River Fishery Area
- Oak Ridge tower site
- Allen Creek remnant
- Black River remnant
- South Branch Trempealeau River remnant
- Washington Coulee remnant
- Saddle Mound tower site
- unnamed scattered wildlife habitat lands
- Smith Pond Fishery Area
- South Beaver Creek Wildlife Area
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands
- unnamed stream bank protection program lands
- Tank Creek Fishery Area
- Trump Coulee Rearing Station

Jefferson County
- Kettle Moraine State Forest - Southern Unit

Juneau County
- Buckhorn State Park
- Buckhorn Wildlife Area
- Cranberry Rock tower site
- Dell Creek Wildlife Area
- Dells of the Wisconsin River Natural Area
- Eagle Nest Flowage public access site
- Elroy Sparta State Trail
- unnamed gift lands
- Hillsboro-Union Center State Trail
- Hulburt Creek Fishery Area
- Meadow Valley Wildlife Area
- Mill Bluff State Park
- Necedah ranger station
- Necedah tower site
- Brewer Creek remnant
- Little Lemonweir River remnant
- Rocky Arbor State Park
- scattered unnamed wildlife habitat lands
- unnamed statewide natural areas lands
- unnamed statewide stream bank easement program lands
- The '400' State Trail

La Crosse County
- Coon Creek Fishery Area
- Coulee Experimental Forest
- Great River State Trail
- La Crosse Area Comprehensive Fishery Area
- La Crosse River State Park
- Mississippi Islands Wildlife Area
- North Bend Bottoms Wildlife Area
- scattered unnamed wildlife habitat lands
- unnamed statewide habitat areas lands
- unnamed stream bank protection program lands
- Van Loon Wildlife Area

Table continues on next page.

Table 3.1. DNR Lands Included in the Statewide Karner Blue Butterfly Habitat Conservation Plan, Cont.

Marinette County
- Beaver tower site
- Green Bay West Shores Wildlife Area
- Lake Noquebay public access site
- Lake Noquebay Wildlife Area
- Little River Rearing Pond
- Menomonie River public access site
- Middle Inlet tower site
- Montana Lake Fishery Area
- North Branch Beaver Creek Fishery Area
- Peshtigo tower site
- Pound ranger station
- Seagull Bar Wildlife Area
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands
- unnamed statewide non-point easement program lands
- Thunder Mountain tower site
- Thunder River Rearing Station

Marquette County
- Andrew Krakow Fishery Area and public access site
- Caves Creek Fishery Area
- French Creek Wildlife Area
- Germania Wildlife Area
- Grand River Marsh Wildlife Area
- John A. Lawton Fishery Area
- Lawrence Creek Wildlife Area
- Mecan River Fishery Area
- Montello ranger station
- Laing Creek remnant
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands
- Upper Fox River public access site
- Westfield Hatchery
- White River Marsh Wildlife Area

Monroe County
- Big Creek Fishery Area
- Cataract Pond public access site
- Cataract tower site
- Coon Creek Fishery Area
- Elroy-Sparta State Trail
- Greenfield tower site
- Kickapoo River Fishery Area
- La Crosse Area Comprehensive Fishery Area
- La Crosse River Fishery Area
- La Crosse River State Recreation Area
- Meadow Valley Wildlife Area
- Mill Bluff State Park
- Mill Creek Fishery Area
- Pinnacle Rock Rearing Station
- Rathbone Creek remnant
- unnamed scattered forest lands
- unnamed statewide stream bank easement program lands
- Tomah ranger station

Oconto County
- Bagley tower site
- Copper Culture Mounds State Park
- unnamed gift lands
- Green Bay West Shores Wildlife Area
- Lakewood Rearing Station
- Mountain-Bay Recreation Trail
- Oconto Falls ranger station
- Peshtigo Brook Wildlife Area
- South Branch Oconto River Fishery Area
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands

Outagamie County
- Deer Creek Wildlife Area
- Mack Wildlife Area
- Maine Wildlife Area
- Outagamie Wildlife Area
- Wolf River-Hortonville Flats remnant
- Wolf River-Spoehrs Marsh remnant
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands
- Wolf River Bottoms Wildlife Area
- Wolf River public access site

Table continues on next page.

Table 3.1. DNR Lands Included in the Statewide Karner Blue Butterfly Habitat Conservation Plan, Cont.

Polk County
- Behning Creek Fishery Area
- East Lake Fishery Area
- Gandy Dancer State Trail
- Governor Knowles State Forest
- InterState Park
- Osceola Hatchery
- Nimon Lake remnant
- St. Croix Falls Hatchery
- State-owned islands
- Sterling tower site
- Twin Lake public access site (Eureka)
- Twin Lake public access site (Laketown)

Portage County
- Buena Vista Wildlife Area
- Dewey Marsh Wildlife Area
- Emmons Creek Fishery Area
- Hartman Creek State Park
- Ice Age Trail
- Little Plover River Fishery Area
- Little Wolf River Fishery Area
- Mead Wildlife Area
- Paul Olson Wildlife Area
- Radley Creek Fishery Area
- Leary Creek remnant
- Mack Creek remnant
- North Fork Radley Creek remnant
- Peterson & Sannes Creeks remnant
- Stedmons Creek remnant
- Ten Mile Creek - North Branch remnant
- Richard A. Hemp Fishery Area
- unnamed statewide natural areas lands
- Whiting ranger station
- Wolf River Fishery Area

Richland County
- Lower Wisconsin State Riverway

Sauk County
- Dells of the Wisconsin River Natural Area
- Lower Wisconsin State Riverway
- Mirror Lake State Park

Sawyer County
- Bean Brook Fishery Area
- Benson Creek Fishery Area
- Beverly Lake Fishery Area
- Connors Lake tower site
- Dead Creek Springs Fishery Area
- Flat Creek Wildlife Area
- Grindstone Creek Fishery Area
- Hayward Nursery
- Hayward ranger station
- Kissick Swamp Wildlife Area
- McDermott Brook Fishery Area
- Meteor tower site
- Namekagon River Fishery Area
- Big Lac Court Oreilles remnant
- Big Sissabagama Lake remnant
- Hauer Creek remnant
- McDermott Creek remnant
- Mosquito Brook remnant
- Sand Lake Rearing Station
- Sand Lake tower site
- State-owned islands
- Totagatic Wildlife Area
- Tuscobia State Trail
- Uhrenholdt Memorial Timber Demonstration Forest

Shawano County
- Kolpack tower site
- Mountain-Bay Recreation Trail
- Navarino Wildlife Area
- Shawano Lake Fishery Area
- unnamed statewide habitat areas lands
- Wiouwash State Trail

St. Croix County
- Lower St. Croix State Riverway
- St. Croix Islands Wildlife Area
- unnamed statewide natural areas lands
- Willow River State Park

Walworth County
- Kettle Moraine State Forest - Southern Unit

Table continues on next page.

Table 3.1. DNR Lands Included in the Statewide Karner Blue Butterfly Habitat Conservation Plan, Cont.

Washburn County
- Bean Brook Fishery Area
- Beaver Brook Wildlife Area
- Chippewa Falls to Ambridge State Trail
- Ernie Swift Youth Camp
- Five Mile tower site
- Flat Creek Wildlife Area
- Gov. Tommy G. Thompson Hatchery
- Lampson tower site
- Mackey Creek Fishery Area
- McKenzie Creek Fishery Area
- McKenzie tower site
- Minong ranger station
- Namekagon River public access site
- Pear Lake public access site
- Potato Lake tower site
- Pear Lake remnant
- Namekagon River remnant
- Spooner Lake remnant
- Sawyer Creek Fishery Area
- Shell Creek Fishery Area
- Shell Lake Rearing Station
- Shelton tower site
- State-owned islands
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands
- Totagatic Wildlife Area
- Totogatic River Fishery Area
- Whalen Creek Fishery Area

Waukesha County
- Kettle Moraine State Forest - Southern Unit

Waupaca County
- Deer Creek Wildlife Area
- Embarrass River Fishery Area
- Emmons Creek Fishery Area
- unnamed gift lands
- Hartman Creek State Park
- Little Wolf River Fishery Area
- Mukwa Wildlife Area
- Myklebust Lake Natural Area
- Navarino Wildlife Area
- Radley Creek Fishery Area
- Doty Creek remnant
- Leer & Griffen Creeks remnant
- Peterson & Sannes Creeks remnant
- South Branch Pigeon River remnant
- South Branch Blake Creek remnant
- Waupaca River remnant
- Whitcomb Creek remnant
- Wolf River-Colic Slough remnant
- Scandanavia tower site and ranger station
- unnamed statewide habitat areas lands
- unnamed statewide natural areas lands
- Trout-Nace Creek Fishery Area
- Waupaca River Fishery Area
- Wolf River Fishery Area

Waushara County
- Big Roche-a-Cri Fishery Area
- extensive unnamed wildlife habitat lands
- Greenwood Wildlife Area
- Mecan River Fishery Area
- Pine River System Fishery Area
- Poygan Marsh Wildlife Area
- Carter Creek remnant
- Little Silver Creek remnant
- Pony Creek remnant
- unnamed statewide natural areas lands
- Wautoma communication tower
- Wautoma ranger station
- White River Fishery Area
- Wild Rose Fish Hatchery
- Willow Creek Fishery Area

Wood County
- Auburndale transmitter site
- Babcock ranger station
- Griffith Nursery
- Mead Wildlife Area
- Paul Olson Wildlife Area
- Sandhill Wildlife Area
- South Bluff tower site
- unnamed stream bank protection program lands
- Wood County Wildlife Area

Figure 3.1. Partner Lands Included in the HCP

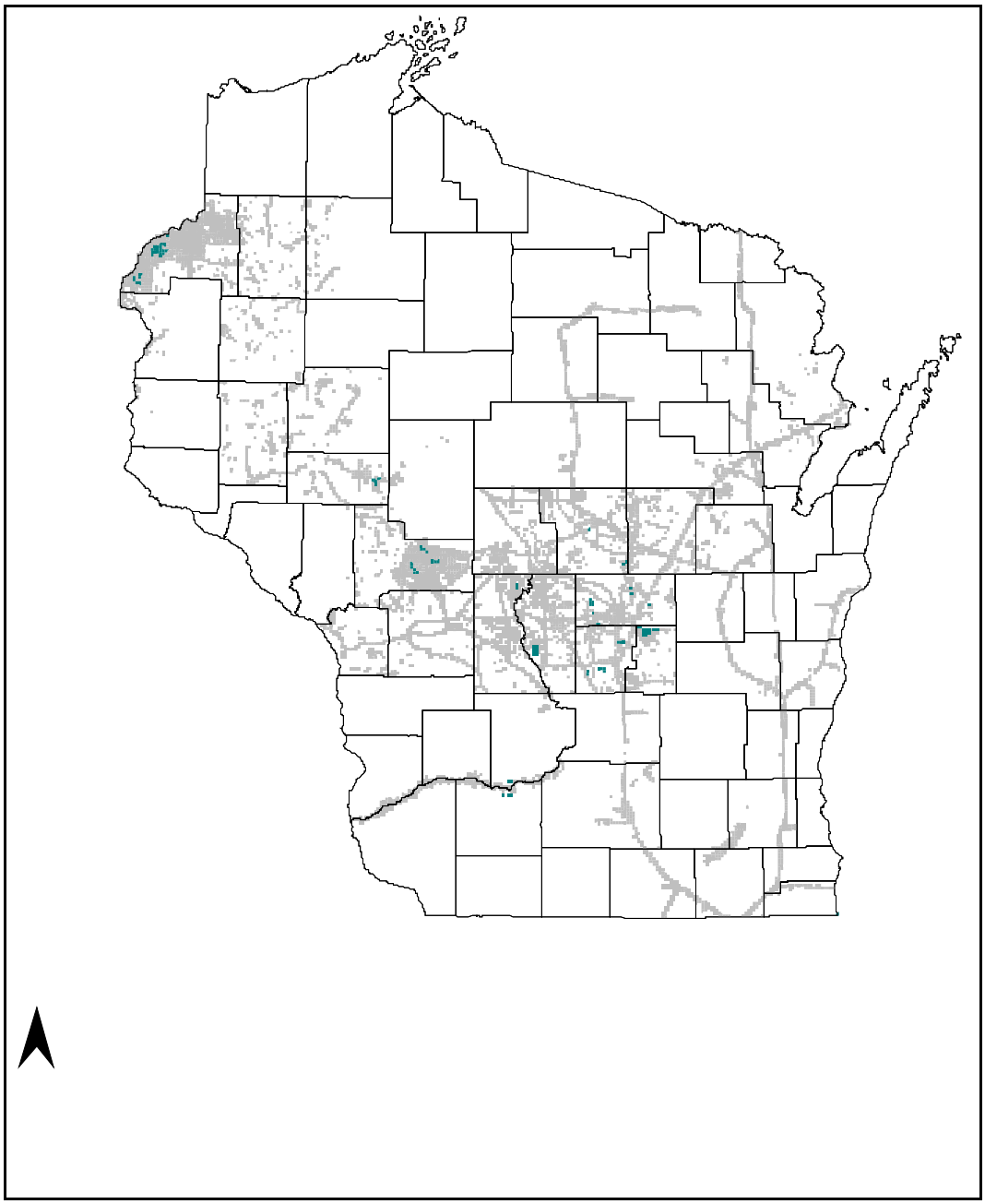


Table 3.2. Overview of Relationship between Levels of Focus, Conservation Strategies and Land Management Activities

Level of Focus: Management with Consideration for the Karner Blue Butterfly and its Habitat (227,191 acres, see Figure 3.1, page 198)

Conservation Strategy: Management for Long-term Habitat (used by seven partners)

Land Management Activities:

Forest Management (timber harvesting, stand improvement, prescribed burning)
Barrens, Prairie and Savanna Management (prescribed fire, mechanical treatment, herbicide treatment, native plant propagation, grazing)
Recreational Management (less intensive construction, maintenance, public use)
Transportation Management (road maintenance, vegetation control)
Utility Right-of-Way Management (maintenance of transmission lines, vegetation control, maintenance of pipelines)
Other Land Management

Conservation Strategy: Management for a Shifting Mosaic of Habitat (used by 21 partners)

Land Management Activities:

Forest Management (timber harvesting, stand improvement, prescribed burning, forest roads, forest regeneration)
Barrens, Prairie and Savanna Management (prescribed fire, mechanical treatment, herbicide treatment, native plant propagation, grazing)
Recreational Management (less intensive construction, maintenance, public use)
Other Land Management

Conservation Strategy: Management for Dispersal Corridors (used by 11 partners)

Land Management Activities:

Forest Management (prescribed burning, forest roads)
Barrens, Prairie and Savanna Management (prescribed fire, mechanical treatment, herbicide treatment, native plant propagation)
Recreational Management (intensive construction, less intensive construction, maintenance, public use)
Transportation Management (road development, road maintenance, vegetation control)
Utility Right-of-Way Management (construction of transmission lines, maintenance of transmission lines, vegetation control, construction of new pipelines and underground transmission lines, maintenance of pipelines)
Other Land Management

Conservation Strategy: Compensatory Mitigation (used by eight partners)

Table continues on next page.

Table 3.2. Overview of Relationship between Levels of Focus, Conservation Strategies and Land Management Activities, Cont.

Level of Focus: Management to Feature, Protect or Enhance the Karner Blue Butterfly and its Habitat (37,725 acres, see Figure 3.1, page 198)

Conservation Strategy: Management for Long-term Habitat (used by seven partners)

Land Management Activities:

Forest Management (timber harvesting, stand improvement, prescribed burning)
Barrens, Prairie and Savanna Management (prescribed fire, mechanical treatment, herbicide treatment, native plant propagation, grazing)
Recreational Management (less intensive construction, maintenance, public use)
Transportation Management (road maintenance, vegetation control)
Utility Right-of-Way Management (maintenance of transmission lines, vegetation control, maintenance of pipelines)
Other Land Management

Conservation Strategy: Management for a Shifting Mosaic of Habitat (used by two partners)

Land Management Activities:

Forest Management (timber harvesting, stand improvement, prescribed burning, forest roads, forest regeneration)
Barrens, Prairie and Savanna Management (prescribed fire, mechanical treatment, herbicide treatment, native plant propagation, grazing)
Recreational Management (less intensive construction, maintenance, public use)
Other Land Management

Conservation Strategy: Management for Dispersal Corridors (used only by the DNR)

Land Management Activities:

Forest Management (prescribed burning, forest roads)
Barrens, Prairie and Savanna Management (prescribed fire, mechanical treatment, herbicide treatment, native plant propagation)
Recreational Management (intensive construction, less intensive construction, maintenance, public use)
Transportation Management (road development, road maintenance, vegetation control)
Utility Right-of-Way Management (construction of transmission lines, maintenance of transmission lines, vegetation control, construction of new pipelines and underground transmission lines, maintenance of pipelines)
Other Land Management

Figure 3.2. DNR and County Forest Lands Included in the HCP

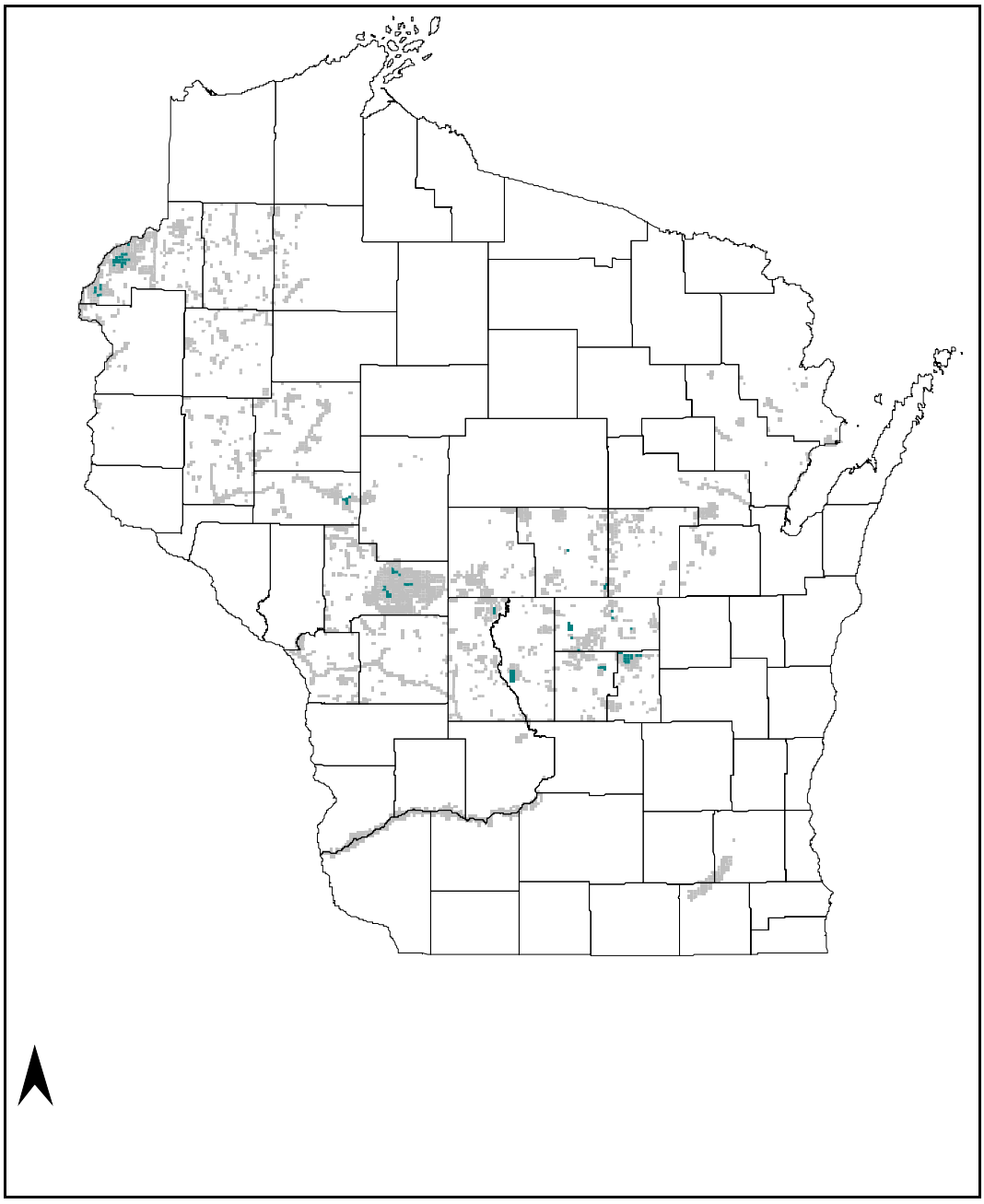


Figure 3.3. Private Lands Included in the HCP

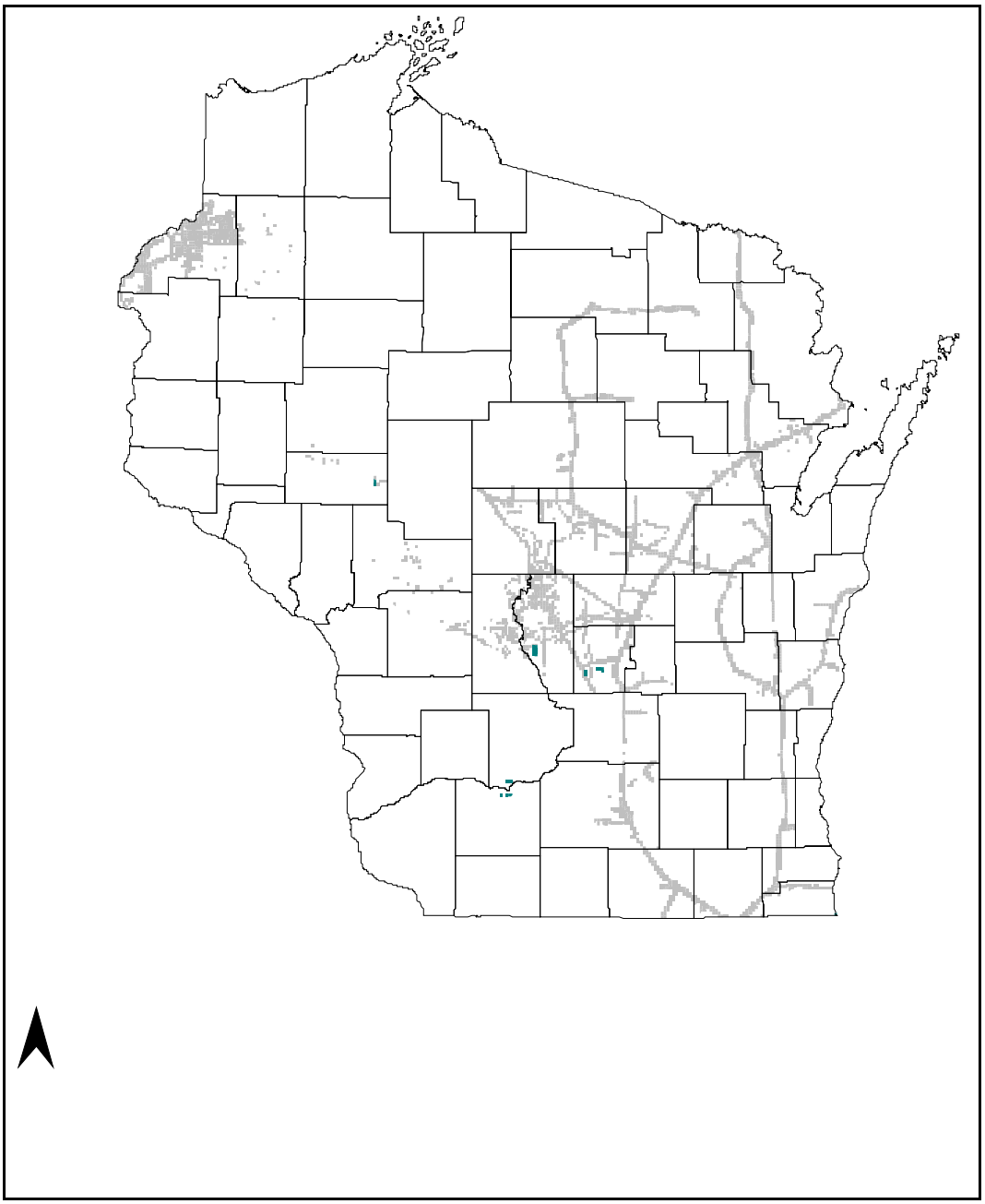
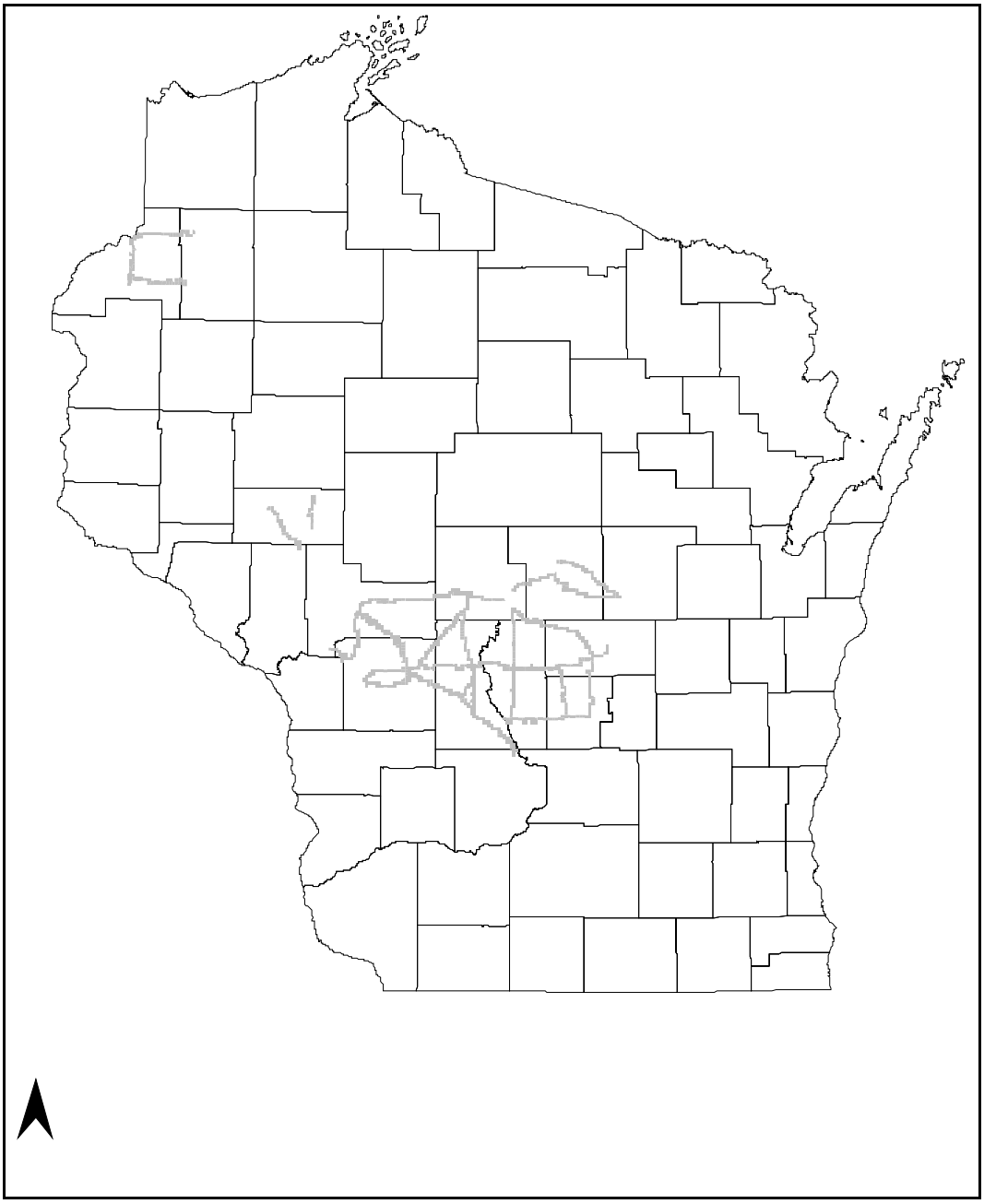


Figure 3.4. Transportation Corridors Included in the HCP



Conservation Premise. The most effective approach to terrestrial invertebrate conservation is that based on conservation of habitat (New 1984, Coy 1995). Disturbance is an integral part of ecosystem process (Sprugel 1991, Rogers 1996). The conservation of disturbance can be thought of as equally important as the conservation of species. The restoration of ecological processes, including disturbance, is an important tenet of conservation biology (Pickett and White 1985, White 1987, Rogers 1996). Key (1978) points out that even small areas of indigenous flora subject to periodic disturbance can be a valuable refuge for insects that have been completely eliminated from adjacent sites. On-going disturbance maintains an early successional community. The Karner blue butterfly and its host plant wild lupine are typically found in these types of communities. As such, an important premise of the HCP is that the maintenance of suitable habitat relies on ecological disturbance; the maintenance of habitat through disturbance is the basis for each of the conservation strategies included in the HCP.

Management for Long-Term Habitat. This strategy is discussed on page 72 in Chapter II. The most common long-term habitat strategy will be barrens community restoration and management (as on several DNR properties). On-going disturbance is most often accomplished through periodic mowing or prescribed fire with rotation intervals of three to ten years. In addition, some areas not considered barrens communities proper, such as roadside rights-of-way, may also be managed on a long-term basis through periodic mowing.

Some partners have identified long-term habitat as part of their strategy, but do not yet have specific plans for accomplishing this strategy. However, their individual conservation agreements and the HCP require such a plan, including a timeline for implementation, to be submitted with their first annual report. So, such a plan must be developed.

Management for a Shifting Mosaic. Management for disturbances and the resulting patch dynamics across large landscapes has been suggested as a flexible institutional approach to resource management that incorporates planned and unplanned disturbances into long-term management goals for ecosystem integrity and resource extraction (Everett and Baumgartner 1997). Several of the HCP partners have embraced this concept and plan to implement it through the shifting mosaic strategy outlined in Part C of Chapter II (pages 73-76).

Forest systems are in a constant state of change (Botkin and Sobel 1975). The current mosaic includes forest stands with different species, age classes, stocking levels, height diversity, access corridors and acreage that have been deliberately manipulated by the partners. The HCP partners want to use this strategy to maintain Karner blue butterfly habitat in a diverse patchwork of forested stands in a slowly changing distribution over time across the landscape. Unless other intentions are described in the individual conservation agreements, the "shifting mosaic" is a land management strategy whereby suitable habitat patches are created by routine land management practices conducted by the partners across their landscape. This patchwork

of Karner blue butterfly habitats allows the opportunity for colonization of newly created habitat

from nearby maturing patches with declining Karner blue butterfly habitat due to succession.

Under this strategy, allowing land management activities with consideration for Karner blue butterflies to continue will maintain the disturbance pattern that has historically provided the rich mosaic of habitats where Karner blue butterflies exist today.

The methods used to plan these disturbance patterns, or a shifting mosaic across the landscape, already exist in the form of a land and vegetation inventory system operated by each partner. The planning and implementation of the shifting mosaic strategy will rely heavily on this same system. In other words, this conservation strategy builds on existing planned management activities.

Most, if not all, partners now rely on computer technology to store, manipulate and retrieve attribute data for each land unit. Some partners operate geographic information system (GIS) technology which links digital maps to inventory data for each land unit. These systems provide the information base for decision-making.

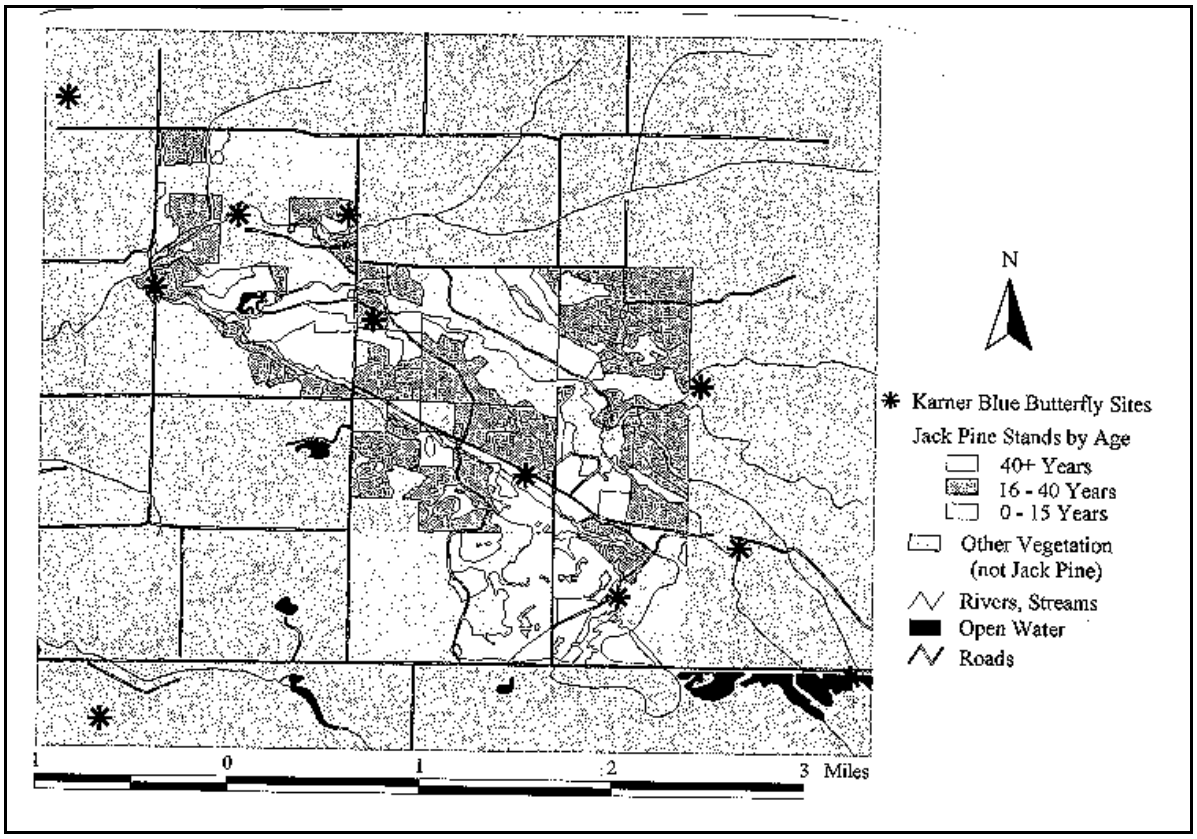
As discussed in Chapter II (pages 73-76), Figure 3.5 displays this type of forest inventory information linked with actual Karner blue butterfly element occurrences on the Black River State Forest. These Karner blue butterfly occurrences indicate that the butterfly is recently present and using known habitat. These individual butterfly sites have been historically disturbed. The present vegetation composition and structure is changing with growth and aging. If left to natural succession, wild lupine and other disturbance-dependent species will eventually be replaced. The shifting mosaic strategy recognizes this natural process and allows for timely, planned disturbance of the forest stands.

Figure 3.5 depicts the age class distribution of jack pine stands. As explained in Chapter II (page 75), the location of the various stands (age classes) in proximity to each other provides substantial opportunities to shift habitat across the landscape in a moving mosaic fashion.

Management for Dispersal Corridors. The management of dispersal corridors is discussed on page 76 in Chapter II and commitments to the strategy are included in individual partners' conservation agreements. Under this strategy, some lands will be managed to provide dispersal corridors or linear stretches of habitat. Generally, these areas are along road or utility ROWs. However, some management for dispersal corridors will occur on forest lands.

Compensatory Mitigation. Compensatory mitigation will be used only to mitigate negative land management activities (i.e. where an unanticipated permanent take occurs). As indicated on page 77 in Chapter II and elsewhere in the HCP, *all* permanent take must be mitigated and any mitigation plans *must* be approved by the DNR and the USFWS.

Figure 3.5. Shifting Mosaic Strategy Applied to Black River State Forest



2. Land Management Activities (with Modifications)

Pages 223-239 in Part B of this chapter describe current land management activities typically engaged in by the HCP partners as they are currently practiced. The HCP partnership developed a number of modifications to these current land management practices to ensure consideration for Karner blue butterflies and their habitat. Modifications to management practices are outlined in individual partners' conservation agreements, Part C of Chapter II (pages 80-96) and Appendix F. Some partners have outlined specific conservation measures in their conservation agreements. Other partners have agreed to follow the guidelines included in the HCP and Appendix F. Others will do a mix of what is in the HCP (and Appendix) and their own approach. All commitments, however, are stated in the partners' conservation agreements, especially if they are to be different than what is included in the HCP. These modifications are based on the best available scientific and applied knowledge and include changes in how management is carried out, as well as timing considerations that correspond with the Karner blue butterfly and wild lupine life cycles. Guidelines for use of pesticides (herbicides, in particular) with consideration of Karner blue butterflies will be developed during the first year of HCP implementation.

Land management activities are grouped into five categories:

- forest management,
- barrens, prairie and savanna management,
- recreational management,
- transportation management, and
- utility ROW management.

HCP partners intend to use these categories of management to implement the broader statewide conservation strategies discussed above. Not all of the management activities can be used to accomplish all four of the broad conservation strategies. Land management activities to accomplish specific strategies are identified in Table 2.15 (pages 95-96). Partner commitments to specific land management activities are outlined in Table 2.14 (pages 93-94) and are specifically identified in each partner's conservation agreement.

Descriptions of typical land management activities without modifications for Karner blue butterfly conservation are discussed in the No Action alternative in Part B of this chapter (pages 221-239). Forest industry partners, county forests, some utilities and the DNR will use modifications of forest management practices to manage for long-term habitat, a shifting mosaic and/or dispersal corridors (see Tables 2.14 and 2.15, pages 93-96). County forests, the Nature Conservancy, some utilities, the DOT and the DNR will use modifications to barrens, prairie and savanna management practices to apply long-term habitat, shifting mosaic and/or dispersal corridors conservation strategies. Similarly, forest industry partners, county forests, the Nature Conservancy and the DNR will modify recreational management activities in order to apply these same three conservation strategies. Utility partners and the DOT will be involved in modifying transportation management and ROW management practices primarily for application of the

long-term habitat and dispersal corridors strategies, but also as part of a shifting mosaic strategy in some situations.

3. Related Conservation Measures

The HCP partners have agreed to conduct HCP-related research as part of implementation. Recent and current research activities are outlined in Part D of Chapter II (pages 114-124). The results of this research will be used by HCP partners, through the adaptive management process described below, as they evaluate the effectiveness of plan implementation and the use of specific land management activities. Part D of Chapter II also outlines proposed research pending (pages 119-120) and objectives of future research (pages 121-123). In addition, the HCP partners will look to research conducted as part of the federal recovery planning efforts for results which may be applicable to HCP implementation.

The DNR, in cooperation with other HCP partners and participants, will coordinate a lupine and nectaring plant seed gathering program for use in the conservation effort. The DNR is willing to provide training in seed harvesting and cleaning as part of its other assistance programs. The DNR will also provide or work with others to make seed available for land conservation efforts. The DNR will coordinate efforts to help assure seed is available for others who choose to use seeding as part of their enhancement efforts. The USFWS has contributed $25,000 to help with lupine and nectar plant seed collection and processing.

In addition to the management proposed as part of the HCP, a number of partners are participating in the federal recovery planning efforts lead by the USFWS. These efforts are discussed in Part F of Chapter II (pages 147-151). HCP partner acreage commitments being made to the recovery process are identified in Table 2.20 (page 150). DNR properties being committed to recovery efforts are identified in Table 2.21 (page 151). In total, HCP partners are committing more than 23,000 acres to the federal recovery efforts.

Finally, a few partners (e.g., the DNR, the Nature Conservancy) have chosen to manage for other species associated with the Karner blue butterfly and its habitat. Management for associated species takes a broader habitat or ecosystem approach to conservation.

4. Involvement of Non-Partners

In addition to the partners identified in Table 1.1 (page 9), it is proposed that other private landowners be brought under the coverage of the ITP through participation in the HCP process identified in Part F of Chapter II (pages 127-140) and Appendix D. Figure 3.6 (pages 212-213) outlines the participation process in flowchart form.

As part of this strategy, the partners have identified "significant population areas" and "areas of conservation emphasis" as a means of focusing their education and outreach efforts. Significant population areas roughly correspond to the viable populations and large viable populations identified in the Karner Blue Butterfly Working Draft Recovery Plan (USFWS 1997), and generally have concentrations of Karner blue butterfly element occurrences. The larger areas of conservation emphasis encompass element occurrences, potential habitats and potentially unidentified populations outside the significant population areas. Eight areas of conservation emphasis and 13 significant population areas were identified.

During the development of the HCP inclusion strategy, the DNR provided the USFWS field office detailed maps of significant population areas and areas of conservation emphasis. Figure 2.11 (page 131) was derived from these more detailed maps and presents a generalized depiction of the locations of significant population areas and areas of conservation emphasis. Due to constraints of the map scale, some of the areas have been combined in Figure 2.11. A more detailed county-by-county description of these areas follows.

Adams County. One area of conservation emphasis with a single significant population area was identified in west central Adams County. The area of conservation emphasis extends into east central Juneau County, but the entire significant population area is located in Adams County. Approximately 60 percent of the land included in the significant population area is owned by HCP partners. The 4,500 acre Quincy Bluff State Natural Area, involving both DNR and Nature Conservancy ownership, is a prominent partner holding.

Karner blue butterflies do not currently occupy the Quincy Bluff area, but it is anticipated that translocation or colonization will be used to ensure population viability in this area.

Burnett County. Two significant population areas are included in the single area of conservation emphasis identified in western Burnett County. The area of conservation emphasis includes a small portion (approximately two townships) of northwestern Polk County. One significant population area includes the Crex Meadows State Wildlife Area, and the other includes the Fish Lake State Wildlife Area and the Governor Knowles State Forest. Approximately 95 percent of the land included in these two significant population areas is in public ownership.

Clark County. A single area of conservation emphasis was identified in western Clark County.

This area extends into eastern and central Eau Claire County and includes one significant population area consisting mostly of county forest lands. More than 90 percent of the land in the area is owned by HCP partners.

Eau Claire County. A single area of conservation emphasis was identified in eastern and central Eau Claire County. This area extends into western Clark County and includes one significant population area. More than 90 percent of the land in the area is owned by HCP partners, primarily county forests.

Green Lake County. One area of conservation emphasis with a single significant population area was identified in northern Green Lake County. The White River Marsh State Wildlife Area occupies nearly 77 percent of this area. The area is targeted for a minimum viable population in the federal Karner Blue Butterfly Working Draft Recovery Plan (USFWS 1997)

Jackson County. Three significant population areas were identified in Jackson County. Two of these areas are located in a single area of conservation emphasis in the central and eastern part of the county. The other area of conservation emphasis is situated immediately south of the first and extends into northern and central Monroe County. This area of conservation emphasis includes the third significant population area, which also extends into northern Monroe County. Approximately 95 percent of the acreage in the significant population areas is owned by HCP partners.

Juneau County. Two areas of conservation emphasis were identified in Juneau County. One of these areas, located in the east central part of the county, extends into west central Adams County. The only significant population area included in this area of conservation emphasis is located entirely within Adams County. Approximately 50 percent of the land in this area of conservation emphasis is owned by HCP partners. The second area of conservation emphasis is located in the northern part of the county and extends into southern Wood County. This area of conservation emphasis includes two significant population areas, one in Juneau County and one in Wood County. The Juneau County significant population area includes the Meadow Valley Wildlife Area and the Necedah National Wildlife Refuge. About 80 percent of the land included in this area of conservation emphasis is either in HCP partner or federal ownership.

Monroe County. Two significant population areas were identified in Monroe County. Both are located within a single area of conservation emphasis which extends into south central Jackson County. One of the significant population areas is centered on Fort McCoy and the other extends into southern Jackson County. All of the land in the significant population area is either a part of Fort McCoy or is owned by an HCP partner.

Polk County. There are no significant population areas in Polk County. Approximately two townships are included in an area of conservation emphasis that extends into western Burnett

County.

Portage County. A small area of conservation emphasis was identified in southeastern Portage County. The area, and its single significant population area, extends across the border into southwestern Waupaca County. The Emmons Creek State Fishery Area comprises about 80 percent of the landownership in the area.

Waupaca County. A small area of conservation emphasis was identified in southwestern Waupaca County. The area, and its single significant population area, extends across the border into southeastern Portage County. The Emmons Creek State Fishery Area is located in the area. Only about 10 percent of the acreage in the significant population area is owned by HCP partners. There is a fair amount of non-partner land with potential Karner blue butterfly habitat located within the area of conservation emphasis.

Waushara County. The only significant population area identified in Waushara County is centered on the Greenwood State Wildlife Area in the east central part of the county. This area is situated within an area of conservation emphasis that occupies approximately two townships. Approximately 20 percent of the acreage in the significant population area is owned by HCP partners.

Wood County. One area of conservation emphasis was identified in Wood County. This area is located in the southern part of the county and extends into northern Juneau County. The area includes two significant population areas, one in Wood County and one in Juneau County. The Wood County significant population area includes the Sandhill State Wildlife Area. About 90 percent of the land in the area is owned by HCP partners.

Figure 3.6 Flow Chart for Determining Options for ITP Coverage

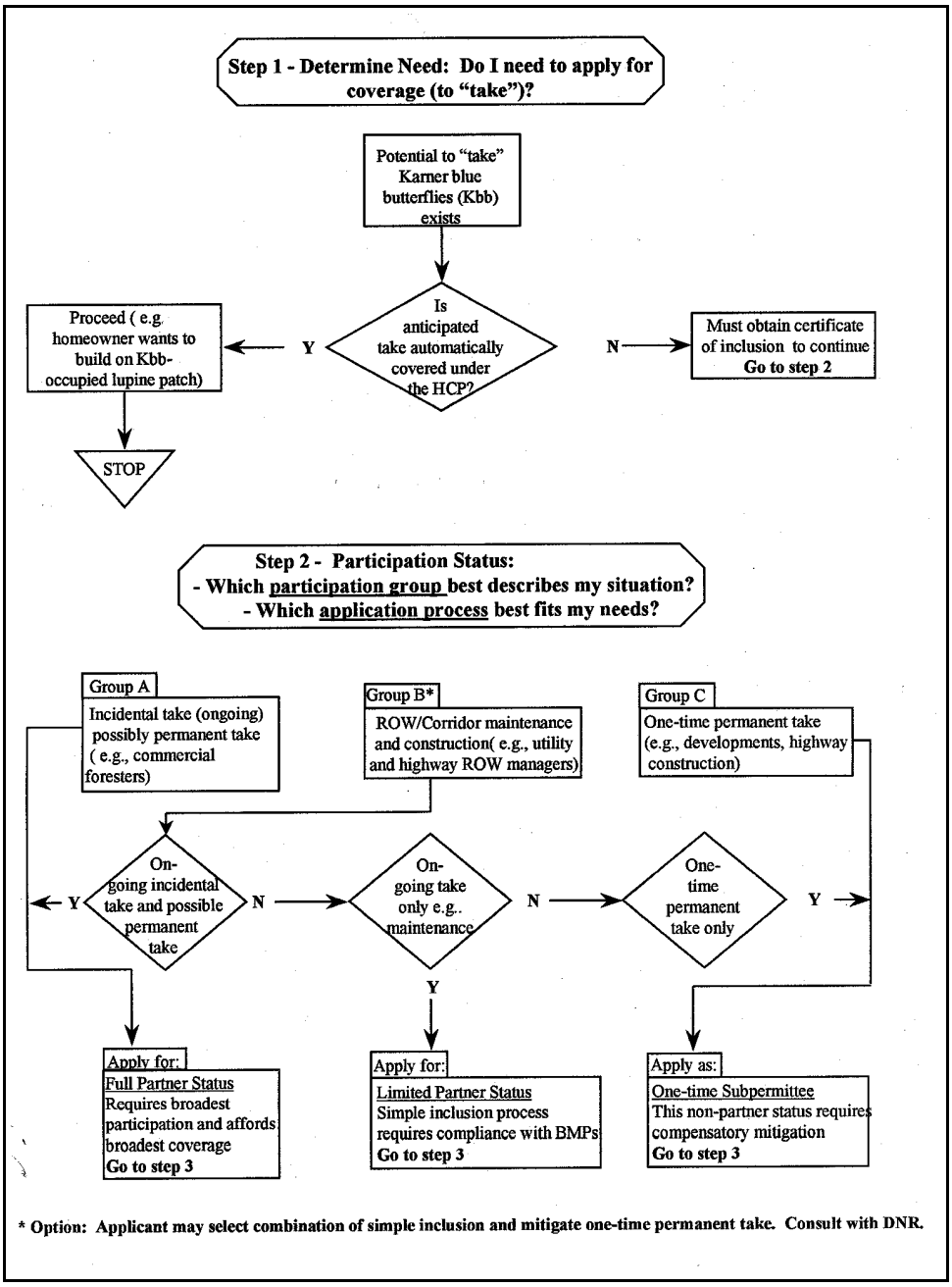
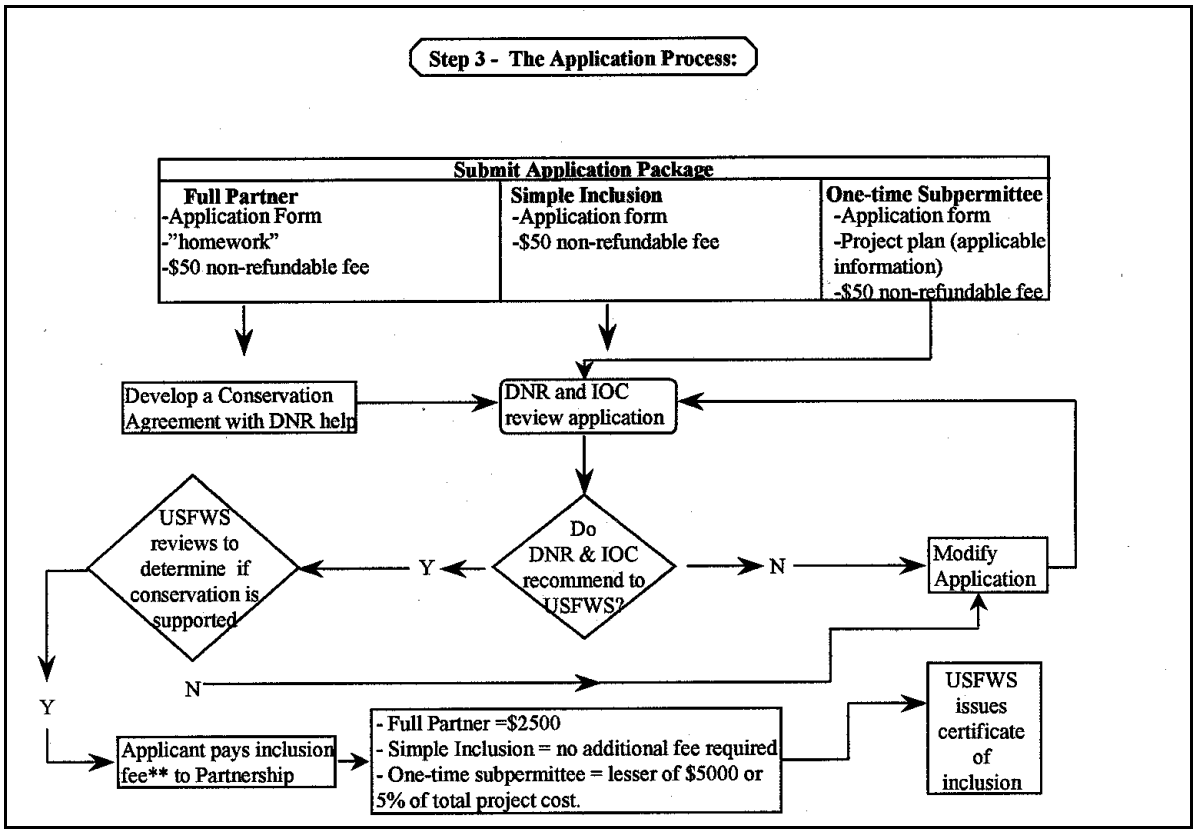


Figure continues on next page.

Figure 3.6 Flow Chart for Determining Options for ITP Coverage, Cont.



** Note: Fees may be waived for governmental units.

5. Institutional Arrangements

A brief history of and a copy of the Articles of Partnership for the Wisconsin Karner Blue Butterfly HCP effort are included in Appendix C. In addition, Part H of Chapter II (pages 159-179) outlines the institutional arrangements that will be used to implement this HCP.

The DNR is the lead applicant for the ITP. Under the ESA, if the USFWS issues an ITP to the DNR, the two agencies will enter into a legally-binding Implementing Agreement. This agreement will outline all of the responsibilities associated with the permit and HCP implementation. It will also establish the reporting relationship between the applicant (the DNR) and the USFWS.

The DNR will serve as the permit administrator. DNR commitments to this role are outlined on pages 159-163. In this capacity, the DNR will have final authority and responsibility for decisions related to the ITP. However, the agency will routinely work with and seek the advice of the other HCP partners through formal and informal communication channels, including the Implementation Oversight Committee (IOC) described on pages 166-172. This team will be representative of the partnership and will operate within the Articles of Partnership (see Appendix C). The IOC will act as an advisor to the DNR on permit issues, however, the DNR will be responsible for final decisions to assure the ITP is not jeopardized.

Legally-binding Species and Habitat Conservation Agreements (conservation agreements) between the individual HCP partners and the DNR will establish permit coverage for the partners. These conservation agreements form the basis of the DNR's application for a statewide ITP. Each conservation agreement is consistent with and tailored to the resources, capabilities and commitments of individual partners. An example of a conservation agreement is included in Appendix D. The contractual nature of the conservation agreements and their administration is discussed in Part H of Chapter II (pages 163-166).

The non-partner participation plan (discussed below) will be subject to a review component to assure its effectiveness and adaptability. The review component of the plan is outlined on pages 145-147 in Part F of Chapter II. It is a qualitative approach which will rely on the recommendations of the partnership and the USFWS.

In addition to the arrangements discussed above, Part H of Chapter II also includes information on future applications for partner status or participation, the permit period, permit amendments, permit renewal and the USFWS's "no surprises" rule (pages 175-179). Part I of Chapter II (page 181) establishes procedures for amendments resulting from future species listings.

6. Application of Adaptive Management Principles

Adaptive management is a structured approach for addressing uncertainty in natural resource management by providing for the improvement of methods as new information becomes available. Such an approach recognizes that the information necessary for management decisions is not always known or available. By definition, adaptive management also includes a commitment to change management approaches when it is deemed appropriate. The diagram in Figure 3.7 (page 217) summarizes the adaptive management process.

The adaptive management process begins immediately following completion of the original HCP and issuance of the ITP. The process consists of eight distinct components. The first is to implement the recommendations and protocols identified in the HCP and associated appendices. This would include not only recommendations and protocols for land management practices of the HCP partners, but also for outreach and education to the general public. Land management in this context includes activities such as site preparation, regeneration, or harvesting methods for timber stands; propagation, burning, or mechanical and chemical management for barrens or prairies; and development and maintenance practices for recreation, utility, or transportation management; as well as others. Outreach and education would include an initial awareness campaign, and then focussed efforts in the significant population areas, the areas of conservation emphasis, the high potential area, and finally, the remainder of the state. This HCP implementation represents the *action* component of the adaptive management process.

The next three steps represent the *monitoring* component of the management process. The first of the three, implementing the surveying and monitoring procedures, includes self-monitoring, effectiveness monitoring and compliance audits. Self-monitoring will help partners determine their success at meeting their individual conservation agreement goals, while effectiveness monitoring will be used for assessing the effectiveness of the HCP for meeting its statewide conservation goals. Also included in this step are the compliance audits, which will be individual evaluations of the partners' fulfillment of their conservation agreements. The next step is the development of monitoring reports. In the final monitoring step, data collected during implementation and presented in the monitoring reports is processed and analyzed.

The next two steps include internal and external influences or catalysts. These changes may contribute to the need to amend management practices. External catalysts include changed circumstances, legal or policy changes, or partnership changes. Changed circumstances are events such as anticipated natural occurrences, listing of a new species, loss of Karner blue butterflies from a site, modification of permitted activities, or modification of the monitoring program. Legal or policy changes include events such as changes in the structure or interpretation of the ESA. Changes in partnership may include simply the addition or

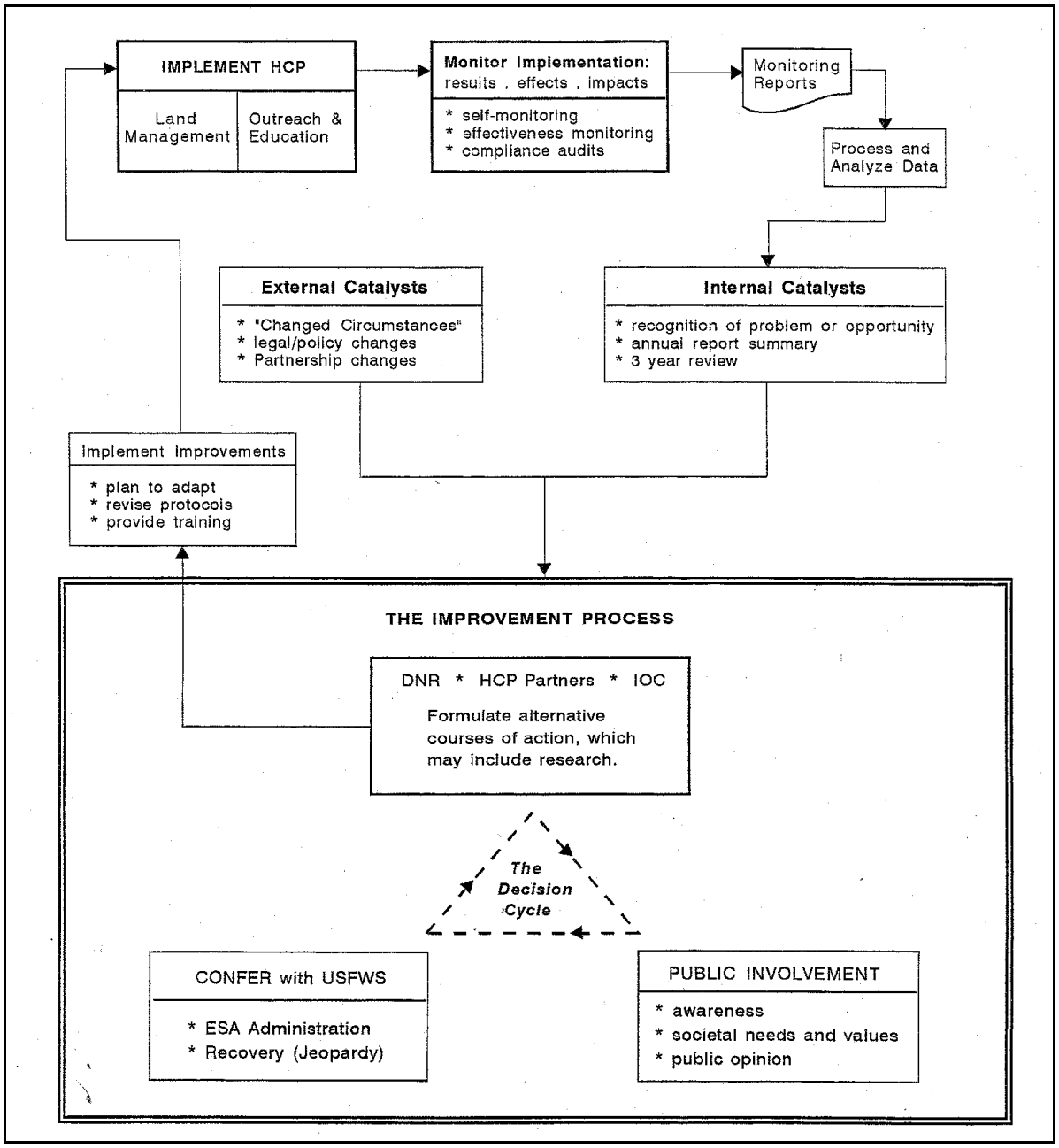
subtraction of a partner. Internal catalysts to change consist of those influences that are within the control of the partnership. These may include the three-year review, the annual report summary,

or, more informally, the identification of a problem or an opportunity by a partner.

The next step, the improvement process, includes the three groups that are involved in the decision cycle: the DNR, IOC and HCP partners; the public; and the USFWS. This is the *evaluation* component of the adaptive management process. The DNR, IOC and the HCP partners develop alternative responses to new information and/or changes brought about by internal or external catalysts. Such responses may range from performing research to amending management practices. Choices made in this regard are influenced both by the need to meet the requirements of the ESA as interpreted by the USFWS and by the need to involve and satisfy public opinion. If a reaction is deemed necessary, then the DNR, IOC and HCP partners determine the appropriate modifications to research or management practices in this step.

The *adaptation* component of the process is the final step. At this point, improvements can be implemented by standardizing the decisions made in the improvement process. This will be accomplished through careful planning, protocol revisions and personnel training. Following this step, the adaptive management process returns to the beginning of the process, with the implementation of new practices.

Figure 3.7 The HCP Adaptive Management Process



7. Incidental Take of State Listed Species

Wisconsin's endangered species laws prohibit the take of any animal listed as endangered or threatened by the state, regardless of where the animal occurs (see s. 29.604, *Wis. Stats.*). The take of plants listed as endangered or threatened by the state is prohibited only on public property. However, on publicly owned lands, the take of listed plants is not prohibited if it occurs in the course of forestry or agriculture practices or in the construction, operation or maintenance of utility facilities. Wisconsin law instructs other state agencies to notify the DNR of the location, nature and extent of activities that it conducts, funds or approves that may affect an endangered or threatened species.

The DNR may authorize the take of state listed species that would otherwise be prohibited under state law through either scientific take permits or through an incidental take authorization. Scientific take permits may be granted for take that is for zoological, educational or scientific purposes. Incidental take authorization may be granted for take that is not the purpose of, but will be incidental to, the carrying out of an otherwise lawful activity. State agencies may receive authorization to conduct, fund or approve activities that incidentally take species protected under the state endangered species law through a process, known as consultation, with the DNR.

In order to authorize incidental take, the DNR must conclude:

- the take is not likely to jeopardize the continued existence and recovery of the listed species, or the whole plant-animal community of which it is a part, within the state;
- the take is not likely to result in the destruction or adverse modification of habitat determined by the DNR to be critical to the species' continued existence within the state;
- the benefit to public health, safety or welfare justifies the taking activity; and
- to the maximum extent possible, adverse impacts are minimized and mitigated.

The DNR can authorize itself to conduct, fund or approve an activity that results in the take of an endangered or threatened species, if the activity meets the criteria listed above. As an activity that the DNR is, in part, conducting and funding, implementation of the *Wisconsin Statewide Karner Blue Butterfly Habitat Conservation Plan* may not result in the take of state endangered or threatened species unless incidental take is authorized.

The DNR conducted an analysis of potential impacts to listed species that occur in the Karner blue butterfly's high potential range and on partner lands throughout the state. The anticipated impacts to state listed species known to occur, or likely to occur, on partner lands in the high potential range can be grouped into three categories:

- those where neither positive or negative impacts are expected,
- those where negative impacts, if any, are expected to be short-term or not significant to

the species' state or regional population, and

- those where negative impacts could be significant for one or more of the proposed management activities.

The first category includes most of the rare species known to occur, or likely to occur over the next ten years, on partner lands within the Karner blue butterfly's high potential range. These species are not expected to experience any significant impacts, positive or negative, as a result of the Proposed Action alternative. Typically, this is due to the fact that these species' habitat needs are not associated with Karner blue butterfly, pine/oak barrens or dry, sandy soils. Species falling into this category are listed in Table 4.1 (pages 257-258).

Under the Proposed Action alternative, the DNR does not intend to authorize any incidental take of these species because no significant adverse effects are anticipated as a result of HCP implementation. Any actions resulting in the take of these species are subject to the state's endangered species law and will need to be reviewed on an individual basis.

Several of the rare species known to occur, or likely to occur, on partner lands within the Karner blue butterfly's high potential range are closely associated with the Karner blue butterfly and are expected to experience similar positive benefits as a result of the Proposed Action alternative. These species are included in the second category and are identified in Table 5.2 (page 321). As with the Karner blue butterfly, some of these species are dependent upon disturbance of their existing occupied habitat which, although resulting in the taking of individuals or populations, benefits the species over the long-term. Other species in this group are those for which any taking would be limited, both in terms of frequency of occurrence as well as the magnitude of the taking. That is, although there will likely be no positive benefit to the species, any takings will be not be substantial and are not expected to result in any long-term harm to the species distribution or status in the state.

It is the DNR's conclusion that any incidental take of the species listed in Table 5.2 (page 321) which may result from HCP implementation meets the criteria outlined above. As such, the DNR intends, as part of the Proposed Action alternative, to authorize the incidental take of these species in the Karner blue butterfly's high potential range, or other areas approved by the DNR, in the following situations:

- incidental take that results from management actions conducted in the course of implementing the HCP,
- incidental take that take place on partners lands, and
- incidental take that results from management actions conducted by the partners or the activities of voluntary participants under the non-partner participation strategy.

Finally, some listed species could be negatively affected by certain management activities and guidelines described in the HCP (Table 5.3, page 321). For this third category of species, given

their life history needs and the nature of the management activity, further review is necessary to ensure that impacts are minimized and that any incidental take is acceptable. For these species, review on a case-by-case basis is warranted and take of these species will not be authorized.

The DNR will provide partners with a listing of known element occurrences of these species on partner lands. The number of known occurrences on partner lands is small. Partners will be responsible for determining if any of the known element occurrences are located on lands planned for management under the HCP. Management activities proposed where any of these species occur will require individual consultation with the DNR to resolve any potential incidental take and will likely require some form of annual monitoring and reporting. As new information becomes available and management guidelines are developed and revised, the DNR may re-evaluate decisions relative to take authorization. As guidelines are completed, they will be shared with HCP partners and the DNR may reconsider options for incidental take.

B. No Action Alternative

This section describes the No Action alternative. It includes a general overview of the alternative and some description of land management activities currently being engaged in by HCP partners. It should be recognized that many of these land management activities could not legally occur on sites with Karner blue butterflies in the absence of the proposed or an individual HCP and ITP.

1. General Overview

Under the No Action alternative, a statewide ITP would not be issued and activities involving take of Karner blue butterflies on non-federal lands would be prohibited under section 9 of the ESA. The DNR would likely not be leading a similar statewide conservation strategy for Karner blue butterflies (the Karner blue butterfly is not listed as threatened or endangered by the state). Land disturbance activities on non-federal lands could continue only where Karner blue butterflies would not be affected; the HCP partners would continue to conduct land management activities, but would need to avoid Karner blue butterfly-occupied sites.

Individual government agencies and private landowners would attempt to continue their respective land use activities and development projects on a project-by-project basis under the terms and conditions imposed by presently existing local, state and federal plans, statutes and regulations. Existing incidental take options available to individual landowners and various levels of government -- section 7 consultations and section 10 HCPs -- would be employed on a case-by-case basis. Legally-binding conservation agreements would not be developed between the individual HCP partners and the DNR; individual entities would carry out their land use and land management activities independent of each other, the DNR, and the proposed implementation oversight committee.

Individual project development would likely preclude coordinating conservation measures. Broad statewide conservation strategies (e.g., management for long-term habitat, management for a shifting mosaic of habitat, or management for dispersal corridors; see Tables 2.13 and 2.15, pages 78-79 and 95-96, respectively) would likely not be coordinated over large acreages or diverse ownerships. A statewide conservation effort, gaining and incorporating the support of landowners and land users throughout Wisconsin, would not be undertaken (i.e. in the absence of the HCP and ITP, there would be no need for the non-partner participation plan described in Part F of Chapter II, pages 127-142). Extensive public outreach and education efforts would likely not be undertaken; the DNR's and the USFWS's ability to conduct such efforts in the absence of the HCP Partnership would be severely limited.

Responsive conservation efforts, such as adaptive management, also would be limited, because

they are best formulated and implemented at a landscape scale. Statewide surveying and monitoring across a range of land management and conservation strategies would be difficult, and potentially, precluded. Land management activities would continue to occur as they currently do, with little or no incentive to modify them, except to avoid take of Karner blue butterflies. The range of guidelines and agreed upon protocols, currently referenced in the partners' conservation agreements or included in the HCP or Appendix F, would not necessarily be used by individual land owners and managers. Decisions related to changes in management techniques would be made more difficult, since fewer monitoring or auditing efforts would be in place. The focus of ESA compliance would be on avoidance of Karner blue butterfly-occupied sites rather than on proactive conservation.

Under the No Action alternative, the partners' estimated annual commitment of $600,000 to surveying, monitoring, research, public outreach and education, ITP administration, land acquisition and other related activities would not be made. The DNR would likely commit its resources for Karner blue butterfly conservation in a different manner. In the absence of the HCP partnership, it is unlikely that the DNR would allocate a Bureau of Forestry staff position to serve as the HCP Coordinator. Karner blue butterfly conservation efforts would likely remain primarily within the purview of the Bureau of Endangered Resources, would rely on the USFWS section 10 permitting process, and would likely be subject to USFWS section 6 or other funding. Private landowners would need to obtain individual incidental take permits. In addition, overall costs for successfully conserving the Karner blue butterfly and its habitat would likely far exceed the amount currently committed, because conservation done on an uncoordinated, property-by-property basis would cost more.

Partners committing lands to federal recovery efforts (Table 2.20, page 150) would do so outside of the context of the nearly 265,000 acres proposed for proactive management with consideration of Karner blue butterflies (Table 2.11, pages 65-66); of the 265,000 acres included, at least 23,000 acres are committed to federal recovery efforts. The DNR and the Nature Conservancy would likely continue to participate in the federal recovery planning effort. However, the inclusion of DNR lands in the federal recovery plan would likely be viewed differently by department biologists in the absence of the extensive private lands being included in the HCP. Karner blue butterfly conservation efforts would focus more on traditional species protection, than on habitat conservation and management. It is possible that some other HCP partners would also participate in the recovery process, but there would be little or no incentive to do so.

In the absence of the HCP, on-going Karner blue butterfly-related research would likely not be carried out by the individual partners. There would likely not be an institutional forum (i.e. the IOC) for identifying research needs or establishing priorities, and there would be no institutional mechanism for sharing the results of research conducted. Individuals would

continue to rely on traditional ways of finding out about pertinent research results (e.g., through independent library literature searches, participation in professional meetings and conferences,

etc.).

2. Land Management Activities (as Currently Practiced)

The following descriptions represent typical land management activities that are currently being done by the various partner groups. This section presents an overview of how lands are normally managed without modifications to consider Karner blue butterfly conservation. Many of these activities would be prohibited or would require modification in situations where Karner blue butterflies have been documented, unless an individual HCP and ITP was pursued. Currently, emphasis is being placed on avoiding Karner blue butterfly-occupied sites to ensure compliance with the ESA. some examples of such avoidance measures are noted below.

Forest Management. Forest management activities occur on many of the lands within the Karner blue butterfly's documented range. The following are typical land management practices for industrial forestry. Information for this section was drawn primarily from *Forest Management Guidelines* (Lane 1997) and is provided here to give the reader a synopsis of forest management practices.

Timber harvest, site preparation, forest regeneration, stand improvement and road development are all integral to industrial forest management. Each of these aspects is influenced by, among other things, site conditions and characteristics. Soil type, vegetation type, proximity to special features (such as a river or a stream) also help shape the choices available to managers.

Timber Harvesting. A variety of components make up the harvesting process. These include the timing, felling method, skidding method and skid road layout. Similarly, a variety of factors influence the harvest methods chosen, such as site preparation needs, vegetation type and site conditions.

Timber harvest may occur in any season, particularly in areas of sandy soils such as in the Karner blue butterfly's documented range. This is primarily due to the better drainage on these sites, giving operations more flexibility. The time it takes to grow the crop of trees being harvested is called rotation length, and varies with the site index and cover type. Site index measures forest productivity and is expressed as the height of the dominant trees in a stand at an index age. Higher quality sites demand less time to produce a merchantable crop. In general, the rotation age for red pine (*Pinus resinosa*) and oak (*Quercus* spp.) is longer than that for jack pine (*P. banksiana*) (Benzie 1977a, b). In the

Karner blue butterfly's documented range, the average rotation length is 60 to 110 years for a red pine crop and 40 to 60 years for a jack pine or aspen (*Populus* spp.) crop. Scrub oak (*Quercus* spp.) may fit either rotation length, depending on the site conditions.

There are two types of harvesting methods: (1) clear cutting, and (2) selective harvest. These are generally used in combination, according to the species being harvested. Due to its longer life span, red pine (*Pinus resinosa*) is more commonly selectively thinned between ages of 30 and 100 years (typically at ten year intervals) and eventually harvested. Jack pine, scrub oak and aspen are more commonly clear cut at their rotation age, typically 40 to 65 years. All of these species are managed in the documented Karner blue butterfly range. Under the No Action alternative, harvest efforts would likely be focused on older stands where the probability of Karner blue butterfly occurrence is lowest.

Felling, or the manner in which a tree is cut down, also has two different methods to choose from: hand harvesting and mechanical harvesting. The choice of method essentially depends on cost efficiency. Mechanical harvest, however, is increasingly becoming the trend. either method could be employed under the No Action alternative, but would be largely restricted to sites unoccupied by Karner blue butterflies. Hand harvesting could be used to harvest around occupied sites. Changes in timing could also help address take concerns in occupied sites (e.g., felling in winter months could reduce the likelihood of adverse effects to Karner blue butterflies).

Skidding refers to the mode used to transport the felled tree. Skidding is commonly accomplished with the use of various types of vehicles. Choices range from wide tired skidders or torsion suspension tracked vehicles to narrow tired machines or normal tracked vehicles. The choice of skidding method is determined primarily by vehicle availability, but also somewhat by site conditions. In the Karner blue butterfly's documented range, the sandy soils allow more flexibility, so the choice of skidding equipment is unfettered. Skidding through Karner blue butterfly-occupied sites could result in take, so efforts would need to be made to avoid such sites.

In order to have a means and route for transporting trees, skid roads are used to access harvest areas. These "roads" are usually informal dirt trails from the area of felling to a defined collector road where hauling trucks are located. Skid roads are more defined and are usually the rows between timber lines in places where selective harvest occurs. For clear cut areas, skid roads are generally undefined and the most efficient means of transporting the cut timber is used. Generally, areas where skid roads may occur are planned and approved; restrictions include, most notably, the edges of waterways. Under the No Action alternative, restrictions would also need to include sites occupied by Karner blue butterflies.

In forest management, slash refers to the residue or brush remaining after a timber harvest. Some harvest systems produce more slash than others; cut-to-length and tree length harvest systems result in more slash than whole tree harvest systems. During the process of harvesting, slash may be managed in a number of ways.

Slash may be stockpiled in one place on the site or evenly scattered. The forest industry

usually prefers lopped and scattered treatment of slash, because tops and branches may simply be left where the tree was felled. Stockpiling is less common, but is more likely when tree processing occurs at a central landing on the site. In these situations, slash is stockpiled at the central landing where the tree was processed. Under the No Action alternative, slash would need to be managed in ways that reduce the likelihood of take (i.e. occupied sites would be avoided, slash would not be stockpiled in dense piles that preclude lupine, etc.).

Under the No Action alternative, timber harvesting activities would have to be designed to avoid Karner blue butterfly-occupied sites or would otherwise require a USFWS permit.

Site Preparation. The objective of site preparation is to reduce competitive vegetation, expose mineral soil and remove logging residues to prepare the site for regeneration. Often, the harvest system methods are chosen to achieve the mechanized soil disturbance desired for the regeneration of the next tree crop. Additional site preparation is usually needed for jack and red pine regeneration. The need to control competing vegetation, however, increases with the quality of the site (Benzie 1977a). Under the No Action alternative, site preparation activities would have to be designed to avoid Karner blue butterfly-occupied sites or would otherwise require a USFWS permit.

The desired site preparation results can be achieved by prescribed burning or by mechanical or chemical methods. The type of site preparation selected has a strong influence on which species survive and which species colonize following disturbance (Cleary, *et al.* 1978).

Prescribed burning is used in forest management to prepare sites for planting, remove slash piles and eliminate refugia for eastern cottontails (*Sylvilagus floridanus*), porcupines (*Erethizon hudsonius*), etc. and to eliminate certain kinds of diseases, such as dwarf mistletoe (*Arceuthobium pusillum*). A primary goal of prescribed fire is to create more open stand structures, thereby improving tree vigor and reducing vulnerability to insects, disease and severe fire (Fiedler 1996). Broadcast burning is fairly common in forest management and conducted throughout the year, except during the spring fire season. In the documented Karner blue butterfly range, however, prescribed burning is generally not used. By definition, the butterfly's range has dry sandy soils; burning in this area is potentially too hazardous.

Mechanical site preparation includes the use of machinery to prepare the soil for regeneration of the next timber crop. This may be achieved by an assortment of machines that break up slash and sod competition or expose patches of bare mineral soil. Scarifying, disking and roller-chopping are some of the functions of these machines. For areas where minor soil disturbance is needed, blading is also done. In the absence of an ITP, most of these activities would be precluded in areas where Karner blue butterflies are known to occur, preventing disturbance that is necessary to maintain important habitat characteristics.

Mechanical site preparation is quite common and is usually done in combination with

chemical site preparation. Herbicides are also used in site preparation, since they are often the most effective and economical way to control competing vegetation. Chemicals may be applied selectively to individual or groups of plants or can be broadcast over the entire site. Use of herbicides by the forest industry is more common than use by public forest management.

Within the Karner blue butterfly's documented range, herbicides are almost always used at the time of planting a new stand. Application is either by broadcast spraying at the time of site preparation or by strip/band spraying while planting. While use of herbicides with artificial regeneration is common, it is rare when natural regeneration is chosen. Entities using herbicides in areas where the Karner blue butterfly occurs would need to design their herbicide applications to avoid take or obtain a permit from the USFWS to authorize any take that may occur.

Forest Regeneration. Regeneration is the establishment of a new stand of trees following harvest. The harvest method will have a significant impact on options for site preparation and regeneration. Likewise, the age and condition of the existing stand may influence the selection of the harvest method. For example, a forest infested with jack pine budworm will often require clearcutting, which then dictates the method of regeneration. Generally, the harvest system and site preparation methods are chosen to optimize the regeneration of the new crop. Regeneration methods may be generally categorized as natural or artificial.

Land managers artificially regenerate a forest stand by establishing new trees either by direct seeding or by planting seedlings. Direct seeding can be done by aerial or ground methods and seedlings planted by machine or by hand. Natural generation may be used for jack pine if there are stands with at least ten seed trees per acre with serotinous cones (Benzie 1977b). Two common species, jack and red pine, are typically planted as seedlings. As mentioned, this provides the most reliable means of regeneration and control over stand density and spacing not found with artificial or natural seeding.

Both county forests and the timber industry in the Karner blue butterfly's documented range use natural and artificial regeneration. Because of its speed, forest industries commonly plant seedlings when conducting artificial regeneration. Public land managers, however, are likely to use a combination of seeding and planting as their method of artificial regeneration. Seeding is done by machine, which is most commonly a seed bomb.

An important decision influencing the impact of forestry practices on site characteristics is the choice of the dominant tree species (Mitchell and Kirby 1989). Likewise, site quality affects the selection of the crop species. Jack pine and oak sites with suitable conditions for red pine production, for example, are often converted to red pine. In the Karner blue butterfly's documented range, red and jack pine crop species are quite common, with white

pine, scrub oak and aspen used as well. Under the No Action alternative, there would be no attempt by partners to apply a shifting mosaic approach to harvest and regeneration. Sites would likely be planted immediately following harvest to avoid Karner blue butterfly occupancy precluding regeneration. Landscapes would continue to be managed in a fragmented manner, with little coordination or cooperation between adjoining owners.

Stand Improvement. During the stand rotation (the period from regeneration to final harvest), several types of management practices are conducted to achieve production goals. These include managing the rotation length, thinning and pruning, controlling pests and pathogens and releasing the crop species from competing species. The decision to conduct timber stand improvement depends on management objectives, the value of the species being managed, the point in the rotation and the need to prevent stand mortality or to increase merchantability (Minnesota DNR 1994).

Site quality influences the need for release treatment. In general, there will be a greater need to control competing vegetation on high quality sites (Benzie 1977a). The species of competing vegetation will also determine optimal release treatments (Minn. DNR 1994).

Release refers to the reduction or elimination of vegetation that inhibits the growth or development of the crop species. This "releases" the crop species to grow. Vegetation release treatments are either mechanical or chemical. The release from competing vegetation may be accomplished with the same methods as those used for site preparation.
For mechanical treatments, control of a light cover of woody vegetation can usually be achieved by full-tree skidding, hand-cutting, hand-scalping or machine scalping (Benzie 1977b). Medium cover may require more severe methods such as roller-chopping or disking, and heavy cover may require bulldozing or shearing (Benzie 1977b). Release can be conducted throughout the year (except for oaks). The advantage of mechanical methods is that the competing species are controlled without being permanently eliminated from the site. Although chemical release is more common in the Karner blue butterfly's documented range, both methods are used regularly. The frequency of application is based on necessity, but is usually required only once for any given stand. Chemical treatment is done according to the specifications of the herbicide chosen; glyphosate, for instance, is applied in late August to mid-September. Under the No Action alternative, partners would need to change herbicide applications to avoid potential take of Karner blue butterflies or obtain a USFWS permit authorizing take.

Stand density is best controlled by planting seedlings in lieu of naturally or artificially seeding an area. Thinning, however, is another option for controlling stand density when seeding is the preferred method of regeneration. By selectively removing saplings, an optimal density may be attained. In the Karner blue butterfly's documented range, tree crop thinning is common. Both mechanical and manual methods are used -- sometimes in combination.

Thinning is conducted to increase the quality and quantity of crop trees. The site index, species grown and product type of a stand influence the use of thinning. Thinning is ideally conducted when the crowns or roots of adjacent trees begin to compete for resources (Huebschmann and Martin 1988). There are three types of thinning common to these systems: (1) thinning from below, called low thinning; (2) crown thinning, referred to as thinning from above or crop tree release; and (3) mechanical thinning (Huebschmann and Martin 1988). When thinning from below, trees are cut in the two lower crown classes. Crown thinning removes trees from the upper crown classes, creating small gaps in the canopy. Mechanical thinning is not conducted based on crown position or quality of trees, but rather on a predetermined spacing or pattern. Under the No Action alternative, thinning would need to be conducted at times of year when Karner blue butterflies are not susceptible to damage from the equipment used.

Pruning is often conducted on trees grown for sawtimber to produce strong, high quality, clear wood (Benzie 1977a, b). Pruning is not usually economical if the management objective is to produce pulpwood. In the Karner blue butterfly's documented range, the primary purpose of tree crop production is for pulpwood. Pruning, therefore, is not typically done. Under the No Action alternative, any pruning activities that would be conducted would need to avoid Karner blue butterfly-occupied sites or would need to be otherwise authorized by a USFWS permit.

Other strategies, such as pest and pathogen control, are also used in stand improvement. In the documented Karner blue butterfly range, broadcast spraying is done as needed. Its use is currently fairly rare, except in controlling gypsy moth (*Lymantria dispar*). The gypsy moth is a continuing problem, although little of the Karner blue butterfly's range is affected by this infestation. Gypsy moth is controlled with *Bacillus thuringiensis* var. *kurstaki* (BT), a bacterial insecticide that kills moths and butterflies when it is ingested by their larvae. The frequency of BT spraying depends on the conditions, the season and the vigor and resilience of the pest being controlled. Applications are done during the growing season, typically in June. Under the No Action alternative, federal agencies involved in pest control are required to consult with the USFWS under section 7 of the ESA, if there is a potential for take of Karner blue butterflies. The USFWS has been consulting for several years with the state and U.S. Department of Agriculture (U.S.D.A.) on the potential impact of spraying programs on Karner blue butterflies. To date, the U.S.D.A. has been able to avoid spraying Karner blue butterfly-occupied areas.

Forest Roads. The forest industry constructs roads in order to provide access for harvesting, regeneration and stand improvement operations. Because of the good drainage of the sandy soils in the Karner blue butterfly's documented range, little is done for road construction. Typically, forest roads are not surfaced, but are simply cleared corridors. The initial clearing width of the corridor may range from 16 to 20 feet, but the final width used is generally only about ten feet. Under the No Action alternative, forest roads would be constructed to avoid

Karner blue butterfly-occupied sites or a USFWS permit authorizing take would be required.

Barrens, Prairie and Savanna Management. Some sites within the Karner blue butterfly's documented range are managed as natural communities, such as barrens, prairie or savanna. Land managers of natural communities include the DNR, the Nature Conservancy and some counties. The techniques employed hinge primarily on the management goals for the site. Some land managers, for instance, may be controlling for a specific wildlife species, while others for the ecosystem.

For the larger barrens ecosystem, which includes sand prairie, oak/pine savanna and oak/pine woodlands, vegetation may be controlled with grazing, prescribed fire, mechanical management, herbicide treatment and/or native plant propagation. The design and implementation of a land management regime needs to be appropriate. Individual site variables such as size, landscape context, natural processes, site goals and available personnel and equipment all influence management choices. Under the No Action alternative, parties involved in barrens, prairie and savanna management would need to obtain a section 10 permit from the USFWS which would likely require following the "Wildlife Management Guidelines" included in Appendix F or similar guidelines to avoid or minimize take of Karner blue butterflies. Some barrens management practices would be precluded, unless individual HCPs or scientific take permits were pursued. The DNR currently holds a USFWS research permit that authorizes take of Karner blue butterflies due to barrens, prairie and savanna management. Management is being conducted according to the "Wildlife Management Guidelines" included in Appendix F.

Grazing. Some landowners may wish to consider moderated grazing as a management tool for barrens. Together with other natural factors, herds of native bison and elk undoubtedly historically played an integral role in maintaining prairies and savannas. At the DNR's Sandhill State Wildlife Area, the opportunity exists to study how the bison herd impacts the barrens landscape. Grazing, however, is not currently used as a form of management.

Prescribed Burning. Prescribed burning is currently the most widely used tool for barrens management. The effects of fire varies according to, among other things, the vegetation, weather and the timing and intensity of the burn. For barrens management, the frequency of prescribed burns depends on what the land manager is trying to achieve. For those focusing on managing for the Karner blue butterfly, prescribed burning is typically conducted once every three to five years per burn unit. This commonly occurs in the spring dormant season, although more managers are beginning to do fall burning or summer burning where fuels loads allow.

Mechanical Treatment. Commonly used mechanical tools for barrens restoration and maintenance include mowing, girdling, brush-hogging, tree/brush cutting, site scarification (via rotovating, disking, or bulldozing). Tree cutting or girdling is often a necessary first step when restoring woodland to a more open barrens landscape. Often, these practices are

combined with prescribed burning to better simulate the historical interactions between animal herbivory and wildfire.

Pesticide Treatment. In barrens management, the most common use of herbicides is for stump treatment or wick application to control the growth of woody shrubs. Herbicides can be much more effective than burning or mechanical cutting alone in controlling trees and shrubs that resprout, such as Hill's oak (*Quercus ellipsoidalis*), black oak, hazel and aspen. Herbicides may be necessary to control aggressive herbaceous species such as leafy spurge (*Euphorbia esula*), quack grass (*Agropyron repens*) and spotted knapweed (*Centaurea maculosa*). The most commonly used herbicides for barrens management are triclopyr, ester and glyphosate. Under the No Action alternative, herbicide applications would need to avoid Karner blue butterfly-occupied sites or would need to be authorized through a USFWS section 10 permit.

Control of pest species, such as gypsy moths, would also be subject to the ESA under the No Action alternative. Individual property owners not involved in a federal program would be required to obtain an ITP if their gypsy moth spraying activities could affect Karner blue butterflies.

Native Plant Propagation. The introduction of native plant species is often a part of barrens restoration and enhancement. The native plants emphasized will depend on the management goals for these natural areas. For instance, some areas are managed by the DNR, Nature Conservancy and counties with attention to the needs of the Karner blue butterfly. The land managers, consequently, may seed ares with wild lupine, nectaring plants, or tall prairie grasses to favor the Karner blue butterfly. By providing adequate nesting and food source plants, other species, such as grassland and savanna birds, may be encouraged as well. Optimally, one would plan a seed mixture that includes several of the Karner blue butterfly's preferred nectar sources and would provide several different types of flowers at any given time throughout season. Flowering will vary for given plants from year to year, depending on weather, management, etc. (Rock 1977; Nichols, *et al.* 1997). Such diversity will help provide for differences in butterfly flight times from year to year.

As a general rule, one should harvest no more than 10-25 percent of available seed from a site to ensure continued reproduction of plants at the site of origin. Guidelines for wild lupine propagation can be obtained from the DNR's Bureau of Endangered Resources. General propagation and planting guidelines for native prairie and barrens species are also available in Umbanhowar (1990), Henderson (1995b), Nichols, *et al.* (1997), and from the Bureau of Endangered Resources or the many native plant nurseries around the state.

Recreation Management. Recreational activities occur on public lands throughout the Karner blue butterfly documented range. Possible construction and management practices related to these activities are provided below. Specifications in this section are taken from the DNR's

Design Standards Handbook and *Operations and Maintenance Standards Handbook for Recreational Areas*. While descriptions of several construction activities are provided below, these types of activities would not be undertaken in occupied sites under the No Action alternative as they would result in permanent take. In order for parties to proceed with these activities, they would need to prepare individual HCPs and ITP applications.

Trail/Road Construction. Recreational trail specifications differ somewhat for scenic, nature, bicycling, horse, skiing and snowmobile trails. The trail width during construction and as maintained varies depending on its intended use, although most trails are developed on existing roads formerly used for farm or logging access. Trail widths range from two to 18 feet tread with one to two feet of clearance on either side. Vegetation cleared from the tread and trailside include vines, shrubs, small trees and overhanging branches. Trail surfacing also varies according to use. For most trails, surfacing will be stable soils, grass, sawdust, woodchips, granular material, bituminous paving, or a boardwalk. Typical equipment used during recreation trial development includes small hand tools such as chainsaws, walking mowers, small tractors with brush cutters and small bulldozers for grading.

Recreational areas are likely to need few, if any, new roads. If constructed, however, new roads would be kept as narrow as possible to retain the rustic character of the area. A one-way road may be a minimum of eleven feet wide, and a two-way road a minimum of 22 feet. Drainage ditches too would be kept as narrow as possible. Surfacing for recreational roadways may be native soils, run of gravel pit, screened and crushed gravel or asphalt. Main access roads in recreational areas are commonly paved with asphalt. Equipment involved in recreational road development may include both heavy and light equipment, such as a road grader, bulldozer, turn-a-pull and a small tractor with a blade. Under the No Action alternative, Karner blue butterfly-occupied sites would need to be avoided or individual HCPs and ITP applications would need to be prepared for each project.

The area required for parking development in recreational areas is contingent on the activity and the intensity of use. General requirements, however, are a level area with five percent maximum slope, standard 10 x 20 feet parking stalls, handicapped 11 x 20 feet parking stalls with a five foot walk, oversized 10 x 40 feet parking stalls, and a minimum width of 16 feet for a one way parking lot lane and 25 feet for a two lane. The range of choices for both surfacing and equipment used in parking lot development in recreational areas is the same as those used for roads, as mentioned above. Like road construction, parking lot construction could only be done in unoccupied areas under the No Action alternative.

Facilities Construction. Campsite development may require some clearing of forest cover; the size of the area cleared is contingent on both the type of campsite (individual, group, auto access, pedestrian/bicycle access) and the number of sites desired. For this reason, a description of the area affected is not possible. Currently, the county forests within the Karner blue butterfly's documented range have no plans for new campsites. When campsites are

developed, however, equipment typically used in construction ranges from hand tools for primitive sites to heavy equipment such as bulldozers and road graders for auto-access sites.

The size and density of picnic area development can vary according to the sensitivity of the site, proximity to other amenities and other land management considerations. These areas require adjacent parking with a density of six to 20 spaces per acre, as determined by the density of persons per acre. Picnic areas may include amenities such as picnic tables, grills and shelters. During construction, equipment used may include tractors and/or backhoes with a bucket and claw. Under the No Action alternative, Karner blue butterfly-occupied sites would need to be avoided or individual HCPs and ITP applications would need to be prepared for each project.

As with camping and picnic sites, the scale of development for other public facilities such as toilet/shower and maintenance shop/storage buildings depends on the amount of use and activity in the area. While toilet/shower buildings are ordinarily built as part of a campsite, shop/storage buildings are usually located where convenient to maintenance operations. In addition to the building footprint, shop/storage buildings typically have paved areas associated with them that are more than twice the area of the building. A standard shop/storage detail specifies a building area of 40 by 100 feet. Under the No Action alternative, Karner blue butterfly-occupied sites would need to be avoided or individual HCPs and ITP applications would need to be prepared for each recreational development project.

Maintenance Activities in Developed Areas. Typically, large areas in campgrounds are not mowed; individual campsites or their collective corridor are mowed, with the remainder left natural. An exception to this would likely be group campsites situated in a large fields. The standard mowing frequency for campsites is between one to three times per year. Control of noxious plants, such as poison ivy, is a concern in intensively used recreational areas such as campsites, picnic areas and trails. Control methods for poison ivy typically involve spraying with one of a variety of herbicides.

Mowing frequency is generally determined by use of the area, type of turf, season and rainfall. Picnic areas are usually maintained at a minimum of two inches and a maximum of five inches, and mowing frequency is dictated by this standard. Although maintenance of picnic areas primarily involves mowing, some areas may require aeration, dethatching, raking, mulching or weed and pest control. As mentioned, noxious weed control is a concern in picnic areas as well. Areas may be sprayed with herbicides. Mowers, aerators, dethatchers and sprayers are among the equipment used for maintenance.

Recreation standards do not specify a requirement or width for roadside maintenance in recreational areas. Nevertheless, mowing is suggested for the control of undesirable roadside vegetation. Maintenance frequency should be minimal; mowing is only conducted as

necessary for health, safety or ecology. For example, necessary sight distances at intersections would be considered, as well as the encouragement of native flora. The standard mowing frequency for roadsides is between one to three times per year.

Recreational trail management includes regular clearance of vegetation along and above the trail through trimming, mowing and spraying. Following trimming, brush and stumps are often sprayed with an approved herbicide. Approved pesticides may likewise be used to control insects along the path. As with roadways, the standard mowing frequency for trails is one to three times per year. Equipment typically used in trail maintenance includes either a hand mower or a small tractor with a mower. For some trails, such as cross country skiing, regular grooming is also necessary. Typical grooming equipment for cross country skiing trails includes a large snowmobile, a packer and a track setter.

Under the No Action alternative, mowing in sites where Karner blue butterflies occur would be prohibited. Mowing would likely continue, but such sites would be avoided, at least during the growing season when the butterfly's various life stages are present.

Active and Passive Recreation and Light Consumptive Uses. Activities occurring in recreational areas are themselves a type of use. Accordingly, recreation should be recognized as a type of land management. A multitude of active and passive recreational pursuits occur within the Karner blue butterfly's documented range. Active recreation includes hiking, biking, skiing, horseback riding, snowmobiling and all-terrain vehicle use, while sightseeing, bird watching and educational tours are considered more passive forms of use. Trail specification ranges given previously indicate the breadth of requirements for these activities. Some activities, such as hiking, occur all year, while others, such as snowmobiling, are season-specific. Many of the trails serve dual purposes for activities occurring in different seasons. Management for these activities may involve assuring that incompatible uses are segregated for safety. Under the No Action alternative, some uses could be prohibited in areas where Karner blue butterflies are known to occur. Others could be restricted by season (e.g., ATV use of trails with dense lupine stands might be considered off limits during summer months, but opened for snowmobiling during deep snow cover).

Light consumptive uses constitute a third class of recreational activities. Fishing, hunting and berry, nut and mushroom gathering fall in this category. Management for these activities may include strategies to ensure a continuation of the resource for consumption. Under the No Action alternative, these uses would continue. Most of these activities would not likely occur in areas occupied by Karner blue butterflies.

Transportation Management. The following are typical land management practices by the DOT and county highway departments. Information is summarized from the Wisconsin DOT's *Facilities Development Manual* and *Maintenance Manual*, as well as interviews with DOT and county staff. Land managed by these entities typically occurs on an easement or fee-title right-of-way corridor, with widths varying according to road type, terrain and soils. About 150,000 acres of the Wisconsin state highway system is devoted to roadsides (Ritzer 1990).

Under the No Action alternative, it would be extremely difficult to monitor ESA compliance by town and county highway departments engaged in road construction and maintenance. the DNR would not likely make efforts to bring such entities into a statewide conservation effort. These entities could conceivably continue with their planned activities without considering the Karner blue butterfly or its habitat. Such activity would be in violation of the ESA and would be subject to USFWS enforcement.

Road Development. New road construction and reconstruction requires several steps that may include clearance of the corridor, regrading and surfacing. Equipment used during the road development process for these activities include bulldozers, scrapers, graders, pavers, rollers and dump trucks.

Within the High Potential Range, the DOT has plans for converting approximately six hundred acres into ROW for several new road sections. Typical ROW widths for a four-lane

corridor is 200 feet, with about 50 feet of actual paved roadway. For two-lane highways, ROW widths are 60 to 70 feet, with about 25 feet of actual paved roadway.

The following are new four-lane sections for various highways within the High Potential Range. A new eight mile stretch of state highway 29 is planned between Interstate 94 and Chippewa Falls. This will be a new alignment. In St. Croix County, state highway 64 will have several new sections of about two to three miles between Houlton and New Richmond, and state highway 35 will have a new one to two mile section between River Falls and Interstate 94. About seven miles of new ROW will also be added to highway 53 for the Eau Claire bypass. The DOT has committed, in the EIS for this project, to acquiring expanded rights-of-way and planting native seed mixes, which include lupine, in select portions of the corridor which are adjacent to suitable barrens habitat. Highway 29 is planned for widening from two to four lanes in the existing ROW on a nine mile stretch in Chippewa and Dunn counties. The new four lanes will be constructed adjacent to the existing lanes. There may be opportunities for establishing or enhancing lupine, and thus Karner blue butterfly habitat, along some sections of this corridor.

Several new segments of two-lane highway will also be added. On state highway 54, approximately three miles of new corridor will be added west of Plover. About five miles will be added to U.S. highway 10 in several sections from the Waupaca County line to Amherst. Near Wautoma, one mile of new corridor will be added to state highway 21. Finally, two to three miles of will be added to county highway HH.

The extent of construction on county highways in the documented Karner blue butterfly's range is expected to be limited to widening of existing rights-of-way. Other construction, however, includes two new rest areas along Interstate 94. These usually consist of two to three acres of paved area and 30 to 40 acres of undeveloped area.

Prior to new road construction, a corridor of 66 feet is typically cleared for a two-lane highway and about 200 feet for a four-lane. In this process, most of the vegetation is removed, and the area is regraded according to design specifications. Following construction, the seeding chosen for the right-of-way is conditioned on the existing soil types. On dry upland areas with sandy soils, fescues (*Festuca* spp.), wild ryes (*Elymus* spp.), Kentucky bluegrass (*Poa pratensis*), Canada rye (*Elymus canadensis*), little bluestem (*Andropogon scoparius*) and sideoats gamma grass (*Tripsacum dactyloides*) are seeded. Provisions for native plantings in certain areas are made on rare occasion in "planned vegetation management areas." For these areas, specific roadside management plans accommodate special needs.

During construction, the road and shoulder are graded for drainage off of the road and into the remaining right-of-way. Runoff from the road surface is directed to a drainage ditch 15 to

25 feet from the pavement edge. These ditches then direct runoff water to a nearby stream, lake or wetland. The area paved in highway construction is typically twelve feet per lane, although the gravel and/or paved shoulder and grass area within ten feet of the traffic lane are considered part of the road. Beyond this, collector highways typically have 15 feet on each side for vegetation management, arterial highways have 25 feet and interstate highways have 40 feet, plus another 50 feet for the median. The reconstruction process typically disturbs the entire roadbed, ditch to ditch. Excepting any necessary regrading, soil disturbance from reconstruction in the vegetated area is approximately three inches. This disturbance is primarily from heavy construction equipment.

Under the No Action alternative, each highway construction and reconstruction project that could affect Karner blue butterflies would require an individual HCP and ITP application or consultation with the USFWS pursuant to section 7 of the ESA. It is also possible that the DOT could prepare a single HCP and ITP application to cover all of the state's proposed projects. Note: Under the Proposed Action alternative, road construction and maintenance activities for all state highways would be covered by the HCP and ITP.[i]

Road Maintenance. During the winter months, various techniques are use to keep roadways clear of ice and snow. These include plowing, sanding and salting. The frequency of application for these methods is contingent on weather; these activities are done as needed. Snow precipitation in Wisconsin averages 40 to 80 inches, with the heaviest snowfall occurring in the months of December, January and February.

Typical equipment for plowing both state and county highways is a 14 ton truck with a 10-12 foot blade. The distance snow is thrown from the pavement edge is influenced by the weight of the snow and the speed of the vehicle. The unvegetated shoulder normally extends eight to ten feet from the pavement edge. Under the No Action alternative, this type of maintenance would continue unchanged.

Salt is used to reduce the amount of snow and ice cover that occur on roadways. Salting is done on most county and state highways. Statewide, Wisconsin uses on a five-year average about 349,000 tons of salt per year on its roadways. As snow and ice melt, the salt residue either remains in the soil along the roadside or is eventually washed into surface waters.

Sanding is used on roads with snow and ice cover to increase traction at intersections, hillsides, or in very cold weather when salt will not melt the ice. Sanding is done in combination with salt, but salt is still the primary component of the mixture. On county and state highways, sand is typically left on the roadside. These activities would continue under the No Action alternative, unless road salt was shown to have significant adverse effects on occupied lupine or nectaring plant patches. In such a case, an ITP would be needed to continue this important safety activity.

Vegetation Control. Within the ROW, different types of vegetative controls are implemented to keep the area free from visual obstruction and maintain aesthetic appeal (Wisconsin DOT, n.d.). A "clear zone" that is free of large woody vegetation is maintained within 25 to 35 feet of the driving lane. For sight distance, some counties may maintain clearance beyond this. Maintenance is usually done by trimming back woody plants, and perhaps treating them with an herbicide.

Herbicides are also used to control woody vegetation within the clear zone. They are used either in small areas or in spot applications. Following pruning, herbicides are often applied to the remaining stubble or stumps. Herbicide types used include clopyralid, which is the most common; Plateau, which is used for leafy spurge (*Euphorbia esula*); and triclopyr or fosemine ammonium, which are used for brush and small trees. The frequency of application is based primarily on the growth rate of the vegetation.

The most common method of vegetative control is mowing. This is administered along roadsides as needed. For both two-lane and divided state highways, outside shoulders are mowed at a maximum of fifteen feet or to the bottom of the drainage ditch, whichever is less. Counties administer all mowing, and throughout the year they maintain the clear zone as time permits. Roadsides are usually mowed twice during the summertime to a minimum vegetation height of six inches. The county and state highway departments do not use prescribed fire as a method of vegetation control. It has been used two or three times historically, but only experimentally.

Under the No Action alternative, vegetation control methods would continue to be applied along roadsides. Mowing and herbicide application would be used, but Karner blue butterfly-occupied sites would need to be avoided to preclude take of the Karner blue butterfly. The timing and method of such maintenance activities would likely be changed in areas where Karner blue butterflies occur. Individual HCPs and ITPs would be needed by the state, county and townships to conduct maintenance activities in areas occupied by the Karner blue butterfly.

Utility Right-of-Way Management. The following are some standard land management practices by the private utility industry. Like county and state highways, lands managed by these entities are typically corridors, with widths varying according to the type of utility line. Because many of these corridors are held as easements, the utility industry serves as the land manager, but not the owner.

Construction of New Overhead Electric Facilities. When a new electric overhead line is necessary, the utility first procures an easement from the property owner. The terrain is then surveyed and obstructions such as trees are removed. Construction crews drill the holes, insert the utility poles, backfill with gravel and then attach the wire to the pole. Gravel used

for this process may be stockpiled. Persisting ruts are leveled as necessary, and the area is seeded with grass.

Utility construction can occur throughout the year. Depending of the size of the line, the area disturbed ranges from 20 feet for a distribution line to 150 feet for a transmission line. For electric facilities, this area of original disturbance is also the corridor width maintained with vegetation control. Utility companies employ various types of large scale equipment to complete the development process. Pickup trucks, small dump trucks, pole trucks, boom trucks, tractor trailers, track vehicles and all-terrain vehicles are typically involved in the development of a new line. Disturbance from the actual construction will usually last three to four weeks for a given mile of line.

Construction of New Pipelines. Pipelines for gas may be constructed of either steel or plastic. Steel pipe lines are typically installed in a trench from three to six feet below the ground surface. Plastic pipes are installed with a plow or a plug plow. Pipe is laid, and the soil is returned to the trench and seeded. The disturbance area for new pipeline construction is primarily linear with a horizontal area of disturbance that may be up to 100 feet wide. However, after construction is completed, the area of disturbance is allowed to revegetate and a permanent ROW of up to 80 feet wide is established. Owing to higher construction costs in winter, pipeline construction usually occurs between April and November.

Corridor Operations and Maintenance. Various types of vegetation control are applied to suppress growth and prevent entanglement of woody vegetation with pipes or lines. Management practices differ somewhat between Utility Partners. The frequency of the cycle for the different vegetation controls is dependent on the method used, the type of vegetation present and the height or depth of the line. Currently, prescribed fire is not a common method of vegetation control used by the utility industry.

On smaller plant growth, utility companies mow in order to maintain an open corridor for power and pipelines. Mowing practices vary amongst Partners. Some mow between November and April, with five year cycles; others keep different schedules, such as all year mowing with three to five year cycles. Mowing may be accomplished with a variety of equipment, from a tractor and five foot rotary mower for flat areas to a hydro-axe with a five to seven foot head and a rotary drum head on a backhoe unit with a four foot head for hilly areas. Typically, a four to eight inch stem height is left.

Brush cutting is the primary means of controlling larger plant growth. Chainsaws are used to clear woody stems in excess of fifteen feet. This is typically done throughout the year, on three to seven year cycles.

Typical herbicides used for woody vegetation control include triclopyr, Escort, Accord and

Arsenal. Applications are administered either with a truck boom sprayer or a backpack sprayer. Areas are treated throughout the year, with foliar compounds applied from June through August for some Partners, May through October for others.

Powerline Operations and Maintenance. Operations and maintenance of an overhead powerline include a general facilities inspection once per year. This requires each line to be driven by an all-terrain vehicle or pickup truck and each pole to be inspected from the ground up. Transmission lines are also visually inspected once per year by helicopter. A more detailed inspection is performed once every ten years, also requiring the use of an ATV or pickup truck. Emergencies are typically the result of storm damage and lines to be untangled and replaced. Repairs require essentially the same procedures and equipment as the original construction.

Pipeline and Underground Transmission Line Operations and Maintenance. Once installed, pipeline operation and maintenance requires infrequent, typically low intensity disturbance from vehicle traffic. Periodically, the pipeline corridors are patrolled with a truck or an ATV. The pipeline ROW may also be patrolled using aerial surveillance techniques. In addition, leak surveys are performed on a periodic basis, also using a truck, ATV, or aerial surveillance technology. Emergency operations typically result from excavators damaging a pipe. In such an event, procedures include accessing the site via truck, exposing the area of the break and performing the repair and remedial activities associated with the leak.

Under the No Action alternative, utility construction and maintenance activities would need to avoid impacts to Karner blue butterflies. Construction and maintenance activities that may affect the Karner blue butterfly would require individual section 10 permits or section 7 consultations with the USFWS per the ESA.

C. Comparison of Alternatives

Parts A and B of this chapter described the Proposed Action and No Action alternatives, respectively. The main features of each of the alternatives are summarized in Table 3.3 (pages 240-243). This table provides a qualitative comparison of the No Action and Proposed Action alternatives.

Table 3.3. Comparison of Proposed Action and No Action Alternatives

	Proposed Action Alternative	No Action Alternative
Incidental Take Permit	statewide ITP issued by USFWS to DNR as lead applicant for HCP partnership	no statewide ITP issued by USFWS to DNR; individual partners pursue individual HCPs/ITPs or research permits; DNR renews its research permit for barrens, prairie and savanna management
Implementing Agreement	signed implementing agreement between USFWS and DNR	no signed implementing agreement; individual partners enter into individual agreements with USFWS
Species and Habitat Conservation Agreements (Conservation Agreements)	signed, legally-binding agreements between partners and the DNR	no signed, legally-binding agreements between partners and the DNR; individual partners pursue individual permits and enter into individual agreements with USFWS
Acres Committed to Proactive Management for Karner Blue Butterfly	264,916 acres committed by partners, with potential for additional acres to be added	unknown number of acres committed
Commitment of Public Lands to Karner Blue Butterfly Conservation	181,222 acres committed by state agencies and county forests, with potential for additional acres to be added; 21,665 acres of state lands included in federal recovery efforts	unknown number of acres committed, but likely some committed to conservation and federal recovery efforts by the DNR and the Nature Conservancy

Table continues on next page.

Table 3.3. Comparison of Proposed Action and No Action Alternatives, Cont.

	Proposed Action Alternative	No Action Alternative
Land Disturbance/Land Management Activities	legally allowed to occur in areas where Karner blue butterflies occur, consistent with HCP and ITP provisions; specific activities modified by agreed upon guidelines and protocols; relatively easy to monitor and enforce	legally prohibited in areas where Karner blue butterflies occur without modification to avoid or minimize take, but allowed in areas without Karner blue butterflies; activities covered by numerous individual permits; no agreed upon guidelines and protocols; extremely difficult to enforce
Broad Conservation Strategies	broad strategies, coordinated over large acreage and diverse ownership; coherent approach to conservation	multiple, uncoordinated, individual efforts at best; fragmented approach to conservation in most cases
Participation Strategy	statewide, with geographic areas of focus	no statewide participation strategy; individual efforts uncoordinated, or, at best, weakly coordinated
Public Outreach, Education and Information	statewide, with geographic areas of focus; funded by multiple partners; multiple targeted audiences	based on opportunities as they arise with limited or no focused efforts; limited number of targeted audiences by the DNR and USFWS, at best

Table continues on next page.

Table 3.3. Comparison of Proposed Action and No Action Alternatives, Cont.

	Proposed Action Alternative	No Action Alternative
Adaptive Management	applied across a broad landscape, with commitments to monitoring, research and appropriate changes to management practices	no coordinated, statewide strategy underlying efforts; fragmented approach to conservation; uncertain commitment to monitoring and research
Surveying/Monitoring	statewide strategy, encompassing full range of management activities and conservation strategies; usable for adaptive management	property-by-property at best; less surveying and monitoring completed; limited use for adaptive management
Guidelines/Protocols	clearly defined, guidelines included in conservation agreements, HCP and ITP; shared learning through IOC; useful for adaptive management	individually tailored guidelines developed as individual entities pursue individual HCPs/ITPs; no shared learning through IOC; limited use for adaptive management
Auditing/Reporting	formal system with agreed upon format and DNR/USFWS oversight	no formal system; individual applicants monitored by USFWS
Financial Commitment	approx. $600,000 annually	unknown

Table continues on next page.

Table 3.3. Comparison of Proposed Action and No Action Alternatives, Cont.

	Proposed Action Alternative	No Action Alternative
Research	carried out by HCP partners; institutional means of identifying needs and priorities	likely no institutional means for identifying needs and priorities; limited research expected
Multi-species Protection	commitment by several partners to manage associated species; indirect benefits to other disturbance-dependent species form Karner blue butterfly management	unknown; likely little or no commitment to proactive management for disturbance-dependent species
Enforcement	legally-binding agreements and auditing process facilitates ESA compliance over large acreages	USFWS enforcement on a case-by-case basis

D. Alternatives Not Selected for Detailed Analysis

During the course of the development of the Wisconsin Karner Blue Butterfly HCP, the partners and participants considered a number of alternatives to the statewide plan and the No Action alternative. These alternatives and the reasons they were not selected are discussed in Part J of Chapter II of the HCP (pages 183-185).