Project Name: Living Roadway Trust Fund – Pollinator Poster Series

Project Location: State of Iowa

Project Purpose:

The Living Roadway Trust Fund (LRTF) was established by the Iowa Legislature in 1989. The LRTF works with partners to promote and educate the public about the need for integrated roadside vegetation management (IRVM), and the use of native plants along Iowa's roadsides. Their goals are supported through grants, publications, research, and education programs. As part of their goal to produce educational publications, the LRTF, partnering with Trees Forever and the Xerces Society, conceived a set of 4 posters that would focus on the types and variety of pollinators and their significance to the environment. The posters intend to communicate the beauty, complexity, and interconnectedness of the natural world; our place in it; and our power to affect positive change.

Role of the Landscape Architect or Relevant Party

- Engagement and coordination with partners
- Concept development
- Design development, graphic design and layout
- Reviews, proofs, and revisions
- Coordination with printer

Special Factors and Project Significance

- The significance of the project is the education of the public on our dependence on pollinators and the current risk to their health and habitat.

- The posters explain in four installments the importance of
  - Monarch butterflies
  - Bees
  - Butterflies and Moths
  - Beneficial insects

- They aim to create awareness of our impact on pollinators in our daily activities and in the normal course of economic development and growth.

- Most importantly, the posters offer suggestions for changing behaviors that have been and continue to be detrimental to pollinators and their habitat, as well as new ways to engage and participate in further understanding and appreciating pollinators.

Collaboration between the designer and the client partners was the prime contributor to the success of the project.

Iowa Living Roadway Trust Fund

Trees Forever

The Xerces Society

engagement and collaboration

The focus of the Pollinator Poster Series is educating the public on:

1. **The role of pollinators**
2. **The risks to pollinator health and habitat**
3. **How we can help**
4. **The value of roadsides** and the work of LRTF and its partners

concept development

1

The Role of Pollinators

One third of all the food we eat depends on pollinators. 85% of plants exist because of bees. Pollinators play a critical role in maintaining our ecosystems. Other wild animals rely on pollinators for the production of food sources such as wild fruits.

concept development

2

Risks to Habitat

Common to all pollinators has been a steady loss of habitat including losses to agriculture and development; the degradation of habitat; and the fragmentation of habitat. Chemicals, pathogens, and invasive species are also serious threats.

concept development

3

How we can help

Each poster describes ways we can improve the environment for pollinators including; creating patches of monarch habitat in a pot on your balcony, in your yard, parks, or schools. Planting native flowers provides habitat for nest sites. Reducing the use of insecticides, and herbicides also helps.

concept development

4

The Value of Roadsides

Roadsides offer valuable wildlife habitat, often connecting remnant patches and creating linear areas of refuge. With more than 75% of Iowa's land allocated to agriculture, roadsides are especially important to wildlife.

Flowering plants along roadsides are important sources of nectar and pollen for pollinators.

concept development

Multiple graphic looks were explored with the client. After the concept stage, a preferred style was chosen, a template was developed that established a set of design features; color, typography, etc., that would create consistency between the posters as they were developed.

Photography from a multiple collections and several contributors enhanced the overall message of the posters and beautifully communicated the topics and themes.

Narrative was developed from partner resources and vetted between them.

Many topics were best described with illustrations and diagrams designed specifically for the topic.

design development

Poster 1 **Monarchs and Milkweed**

Poster 2 **Bees**

Poster 3 **Butterflies and Moths**

Poster 4 **Beneficial Insects**

In all, there are 4 posters in the series, developed over the course of approximately 1 year.

The posters are full-color offset print on heavy satin finish paper. Printed front and back, they each measure 23 ¼" x 35 ¼".

design development

Poster 1:
Monarchs and Milkweed

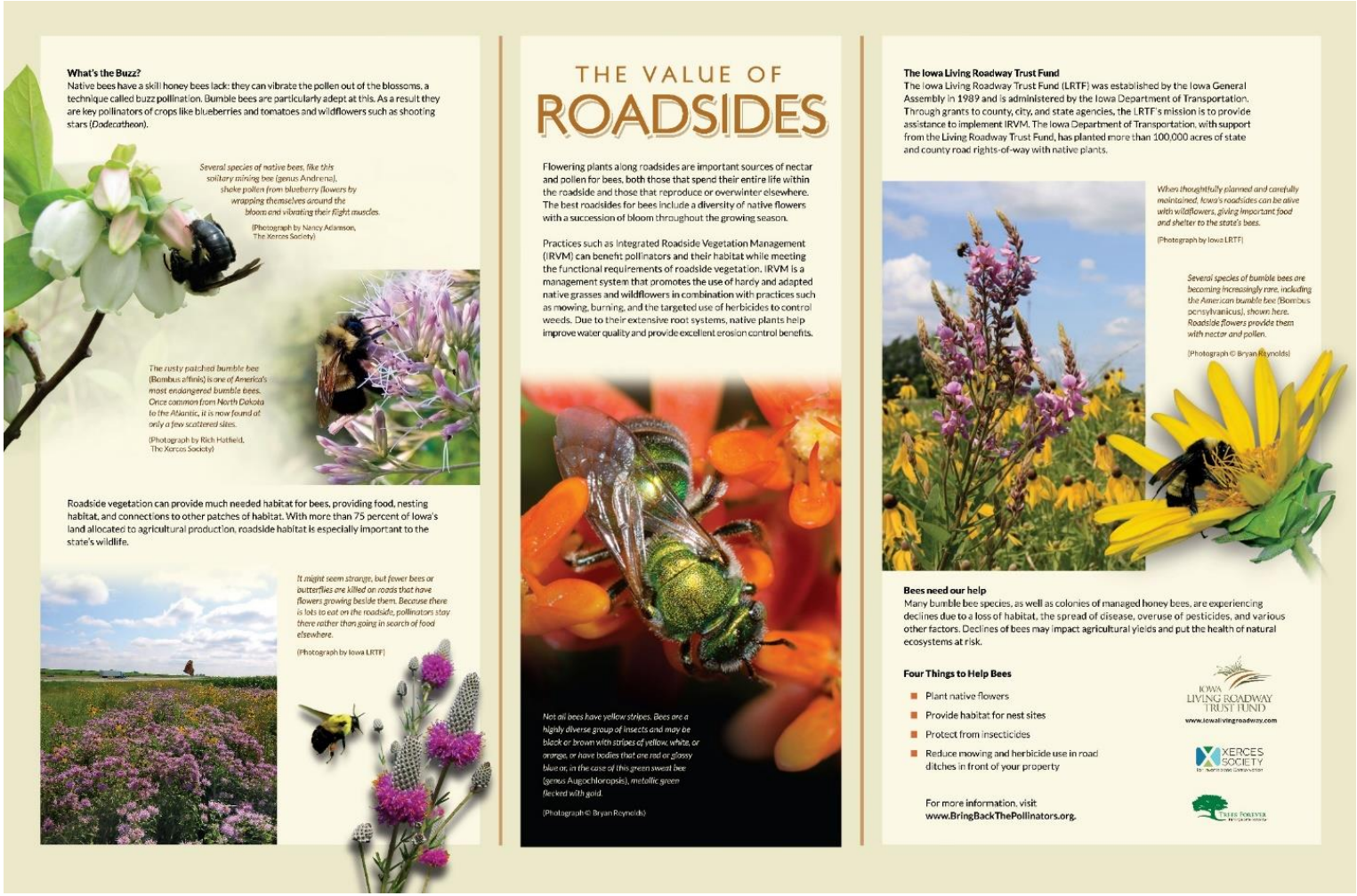
Female monarchs search for milkweeds on which they lay eggs. Once the eggs hatch, the caterpillars feed voraciously on their host plants for up to two weeks before forming chrysalises. Up to three generations of butterflies are born during the summer.

Poster 1:
Monarchs and Milkweed

By September, monarchs begin migrating southward and it is possible to see hundreds of butterflies per hour, in flight or gathering nectar on late-blooming flowers.

Poster 2:
Bees

At least 3,600 species of native bees call the U.S. their home with nearly 300 species found in Iowa. Honey bees live in large colonies of 20,000 individuals or more that work cooperatively.



What's the Buzz?
Native bees have a skill honey bees lack: they can vibrate the pollen out of the blossoms, a technique called buzz pollination. Bumble bees are particularly adept at this. As a result they are key pollinators of crops like blueberries and tomatoes and wildflowers such as shooting stars (*Dodecatheon*).

Several species of native bees, like this solitary mining bee (genus Andrena), shake pollen from blueberry flowers by wrapping themselves around the bloom and vibrating their flight muscles.

(Photograph by Nancy Adamson, The Xerces Society)

The rusty patched bumble bee (Bombus affinis) is one of America's most endangered bumble bees. Once common from North Dakota to the Atlantic, it is now found at only a few scattered sites.

(Photograph by Rich Hatfield, The Xerces Society)

Roadside vegetation can provide much needed habitat for bees, providing food, nesting habitat, and connections to other patches of habitat. With more than 75 percent of Iowa's land allocated to agricultural production, roadside habitat is especially important to the state's wildlife.

It might seem strange, but fewer bees or butterflies are killed on roads that have flowers growing beside them. Because there is lots to eat on the roadside, pollinators stay there rather than going in search of food elsewhere.

(Photograph by Iowa LRTF)

THE VALUE OF
ROADSIDES

Flowering plants along roadsides are important sources of nectar and pollen for bees, both those that spend their entire life within the roadside and those that reproduce or overwinter elsewhere. The best roadsides for bees include a diversity of native flowers with a succession of bloom throughout the growing season.

Practices such as Integrated Roadside Vegetation Management (IRVM) can benefit pollinators and their habitat while meeting the functional requirements of roadside vegetation. IRVM is a management system that promotes the use of hardy and adapted native grasses and wildflowers in combination with practices such as mowing, burning, and the targeted use of herbicides to control weeds. Due to their extensive root systems, native plants help improve water quality and provide excellent erosion control benefits.

Not all bees have yellow stripes. Bees are a highly diverse group of insects and may be black or brown with stripes of yellow, white, or orange, or have bodies that are red or glossy blue or, in the case of this green sweat bee (genus Augochloropsis), metallic green flecked with gold.

(Photograph © Bryan Reynolds)

The Iowa Living Roadway Trust Fund
The Iowa Living Roadway Trust Fund (LRTF) was established by the Iowa General Assembly in 1989 and is administered by the Iowa Department of Transportation. Through grants to county, city, and state agencies, the LRTF's mission is to provide assistance to implement IRVM. The Iowa Department of Transportation, with support from the Living Roadway Trust Fund, has planted more than 100,000 acres of state and county road rights-of-way with native plants.

When thoughtfully planned and carefully maintained, Iowa's roadsides can be alive with wildflowers, giving important food and shelter to the state's bees.

(Photograph by Iowa LRTF)

Several species of bumble bees are becoming increasingly rare, including the American bumble bee (Bombus pensylvanicus), shown here. Roadside flowers provide them with nectar and pollen.

(Photograph © Bryan Reynolds)

Bees need our help
Many bumble bee species, as well as colonies of managed honey bees, are experiencing declines due to a loss of habitat, the spread of disease, overuse of pesticides, and various other factors. Declines of bees may impact agricultural yields and put the health of natural ecosystems at risk.

Four Things to Help Bees

- Plant native flowers
- Provide habitat for nest sites
- Protect from insecticides
- Reduce mowing and herbicide use in road ditches in front of your property

For more information, visit **www.BringBackThePollinators.org.**

IOWA LIVING ROADWAY TRUST FUND
www.iowalivingroadway.com

XERCES SOCIETY

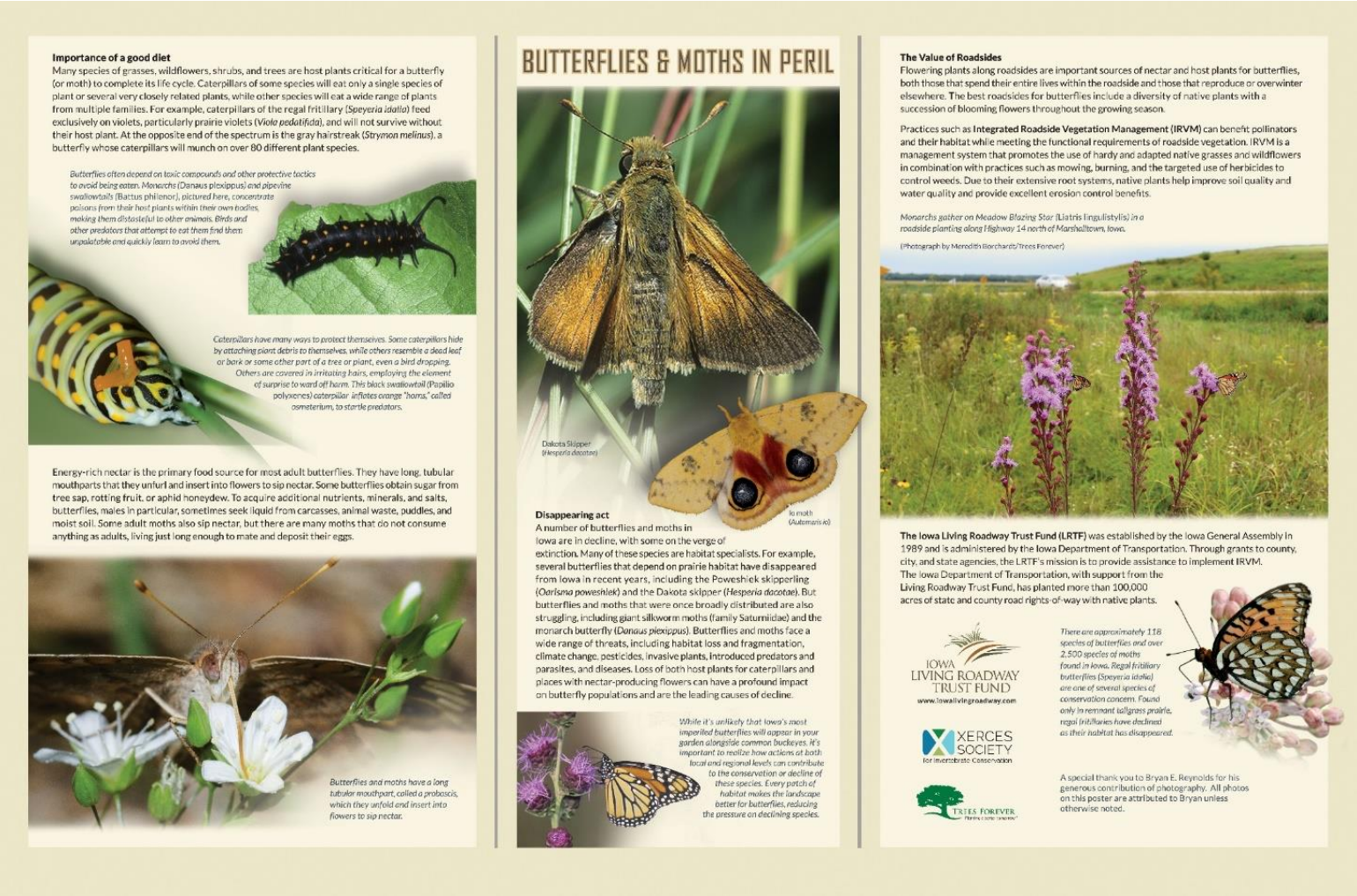
TREES FOREVER

Poster 2:
Bees

Bees are not only at risk from habitat loss but also the use of pesticides, herbicides, and exposure to pathogens. Competition from non-native species is also a risk factor.

Poster 3:
Butterflies And Moths

For millennia, these large and showy insects have attracted the attention and admiration of people around the world. In addition to their beauty and grace, butterflies and their close relatives, moths, play important ecological roles.



Importance of a good diet

Many species of grasses, wildflowers, shrubs, and trees are host plants critical for a butterfly (or moth) to complete its life cycle. Caterpillars of some species will eat only a single species of plant or several very closely related plants, while other species will eat a wide range of plants from multiple families. For example, caterpillars of the regal fritillary (*Speyeria idalia*) feed exclusively on violets, particularly prairie violets (*Viola pedatifida*), and will not survive without their host plant. At the opposite end of the spectrum is the gray hairstreak (*Strymon melinus*), a butterfly whose caterpillars will munch on over 80 different plant species.

Butterflies often depend on toxic compounds and other protective tactics to avoid being eaten. Monarchs (Danaus plexippus) and pipevine swallowtails (Battus philenor), pictured here, concentrate poisons from their host plants within their own bodies, making them distasteful to other animals. Birds and other predators that attempt to eat them find them unpalatable and quickly learn to avoid them.

Caterpillars have many ways to protect themselves. Some caterpillars hide by attaching plant debris to themselves, while others resemble a dead leaf or bark or some other part of a tree or plant, even a bird dropping. Others are covered in irritating hairs, employing the element of surprise to ward off harm. This black swallowtail (Papilio polyxenes) caterpillar inflates orange "horns," called osmeterium, to startle predators.

Energy-rich nectar is the primary food source for most adult butterflies. They have long, tubular mouthparts that they unfurl and insert into flowers to sip nectar. Some butterflies obtain sugar from tree sap, rotting fruit, or aphid honeydew. To acquire additional nutrients, minerals, and salts, butterflies, males in particular, sometimes seek liquid from carcasses, animal waste, puddles, and moist soil. Some adult moths also sip nectar, but there are many moths that do not consume anything as adults, living just long enough to mate and deposit their eggs.

Butterflies and moths have a long tubular mouthpart, called a proboscis, which they unfold and insert into flowers to sip nectar.

BUTTERFLIES & MOTHS IN PERIL

Dakota Skipper (*Hesperia dacotae*)

Io moth (*Automeris io*)

Disappearing act

A number of butterflies and moths in Iowa are in decline, with some on the verge of extinction. Many of these species are habitat specialists. For example, several butterflies that depend on prairie habitat have disappeared from Iowa in recent years, including the Poweshiek skipperling (*Oarisma poweshiek*) and the Dakota skipper (*Hesperia dacotae*). But butterflies and moths that were once broadly distributed are also struggling, including giant silkworm moths (family Saturniidae) and the monarch butterfly (*Danaus plexippus*). Butterflies and moths face a wide range of threats, including habitat loss and fragmentation, climate change, pesticides, invasive plants, introduced predators and parasites, and diseases. Loss of both host plants for caterpillars and places with nectar-producing flowers can have a profound impact on butterfly populations and are the leading causes of decline.

While it's unlikely that Iowa's most imperiled butterflies will appear in your garden alongside common buckeyes, it's important to realize how actions at both local and regional levels can contribute to the conservation or decline of these species. Every patch of habitat makes the landscape better for butterflies, reducing the pressure on declining species.

The Value of Roadsides

Flowering plants along roadsides are important sources of nectar and host plants for butterflies, both those that spend their entire lives within the roadside and those that reproduce or overwinter elsewhere. The best roadsides for butterflies include a diversity of native plants with a succession of blooming flowers throughout the growing season.

Practices such as **Integrated Roadside Vegetation Management (IRVM)** can benefit pollinators and their habitat while meeting the functional requirements of roadside vegetation. IRVM is a management system that promotes the use of hardy and adapted native grasses and wildflowers in combination with practices such as mowing, burning, and the targeted use of herbicides to control weeds. Due to their extensive root systems, native plants help improve soil quality and water quality and provide excellent erosion control benefits.

Monarchs gather on Meadow Blazing Star (Liatris ligulistylis) in a roadside planting along Highway 14 north of Marshalltown, Iowa.

(Photograph by Meredith Borchardt/Trees Forever)

The Iowa Living Roadway Trust Fund (LRTF) was established by the Iowa General Assembly in 1989 and is administered by the Iowa Department of Transportation. Through grants to county, city, and state agencies, the LRTF's mission is to provide assistance to implement IRVM. The Iowa Department of Transportation, with support from the Living Roadway Trust Fund, has planted more than 100,000 acres of state and county road rights-of-way with native plants.

IOWA LIVING ROADWAY TRUST FUND
www.iowalivingroadway.com

XERCES SOCIETY for Invertebrate Conservation

TREES FOREVER

There are approximately 118 species of butterflies and over 2,500 species of moths found in Iowa. Regal fritillary butterflies (Speyeria idalia) are one of several species of conservation concern. Found only in remnant tallgrass prairie, regal fritillaries have declined as their habitat has disappeared.

A special thank you to Bryan E. Reynolds for his generous contribution of photography. All photos on this poster are attributed to Bryan unless otherwise noted.

Poster 3:
Butterflies And Moths

Loss of habitat includes loss of natural areas to agriculture or development, the degradation of habitat, and the fragmentation of habitat. Many migratory species depend on native vegetation along the route. Fragmentation may cause weaker individuals to fail during the journey.

Poster 4:
Beneficial Insects

Beetles, wasps, and flies also help with pollination, but they are possibly more important as pest control. As predators or parasitoids, they eat other insects and help keep pest populations in check. Their work, and that of other beneficial insects, is essential in natural systems, gardens, yards, and parks.

Put Out the Welcome Mat

In addition to flowering plants, many beneficial insects also require shelter for overwintering or for egg-laying. Predatory wasps (such as potter, thread-waisted, digger, mud dauber, and sand wasps) will dig underground, occupy cavities, or build their nests using pieces of grass, mud, or resin. Some beetles need leaf litter or clumps of bunch grasses in which to reproduce and overwinter.

Land management practices can greatly impact these beneficial insects in both positive and negative ways. Insecticide use has negative effects, but tillage, and mowing of ditches and fence lines also can harm beneficial insect populations by depleting their needed food, shelter, or overwintering habitat. On the other hand, adding native flowering trees, shrubs or wildflowers, including on roadsides, creates habitat that supports these insects.

Potter wasps (above) create beautiful earthen cells (right) attached to plant stems.

There are additional benefits to welcoming these insects. The same habitats that support predators and parasitoids also support a diverse array of pollinators, including bees and butterflies. All of these insects in turn provide food for other wildlife such as songbirds and game birds. Native shrubs, grasses, and wildflowers can also reduce soil loss and improve water quality by filtering runoff from cropland or urban landscapes.

Smaller than a grain of rice, pirate bugs prefer to feed on aphids, whiteflies, caterpillars, and other soft-bodied insects, but will drink nectar when prey is scarce.

(Photograph: USDA-ARS, Jack Dykinga.)

Paper wasps scrape wood fibers from fences, decks, and other exposed timbers, which they mix with saliva to make their nests, hence their name. Each cell is supplied with paralyzed prey (like caterpillars) to feed their offspring.

Be a good neighbor to helpful insects

Insects that prey upon or parasitize crop pests tend to be more susceptible to insecticides than pests. Strategies to reduce impacts of insecticides to beneficial insects include:

- Use insecticide only when pressure from pests provides no other option
- Target insecticide use to where a pest problem exists
- Use chemicals with short residual toxicity or specifically targeted for that pest
- Reduce insecticide drift to keep applications on target

This thread-waisted wasp (Podalonia spp.) sips nectar from butterfly milkweed (Asclepias tuberosa). Nectar is high-energy, fueling the wasp's hunting activities.

The Value of Roadsides

Flowering plants along roadsides are important sources of food and native grasses and undisturbed soil serve as shelter for beneficial insects. Roadsides that include a diversity of native plants with a succession of blooming flowers throughout the growing season provide the best habitat for the insects that provide natural pest control. Roadside habitat can also support populations of beneficial insects that provide pest control in nearby crop fields.

Practices such as Integrated Roadside Vegetation Management (IRVM) can benefit predators, parasitoids, and pollinators as well as their habitat while meeting the functional requirements of roadside vegetation. IRVM is a management system that promotes the use of hardy and adapted native grasses and wildflowers in combination with practices such as mowing, burning, and the targeted use of herbicides to control weeds. Due to their extensive root systems, native plants help improve soil quality, water quality, and provide excellent erosion control benefits.

The adults of green lacewings fly with glass-like wings from flower to flower to drink nectar and seek places to lay eggs. Their larvae are fierce predators, scurrying across foliage in search of soft-bodied prey such as aphids or whiteflies.

(Photo: The Xerces Society/ Sarah Foltz Jordan.)

The Iowa Living Roadway Trust Fund (LRTF) was established by the Iowa General Assembly in 1989 and is administered by the Iowa Department of Transportation. Through grants to county, city, and state agencies, the LRTF's mission is to provide assistance to implement IRVM. The Iowa Department of Transportation, with support from the Living Roadway Trust Fund, has planted more than 100,000 acres of state and county road rights-of-way with native plants.

IOWA LIVING ROADWAY TRUST FUND
www.iowalivingroadway.com

XERCES SOCIETY
for Invertebrate Conservation

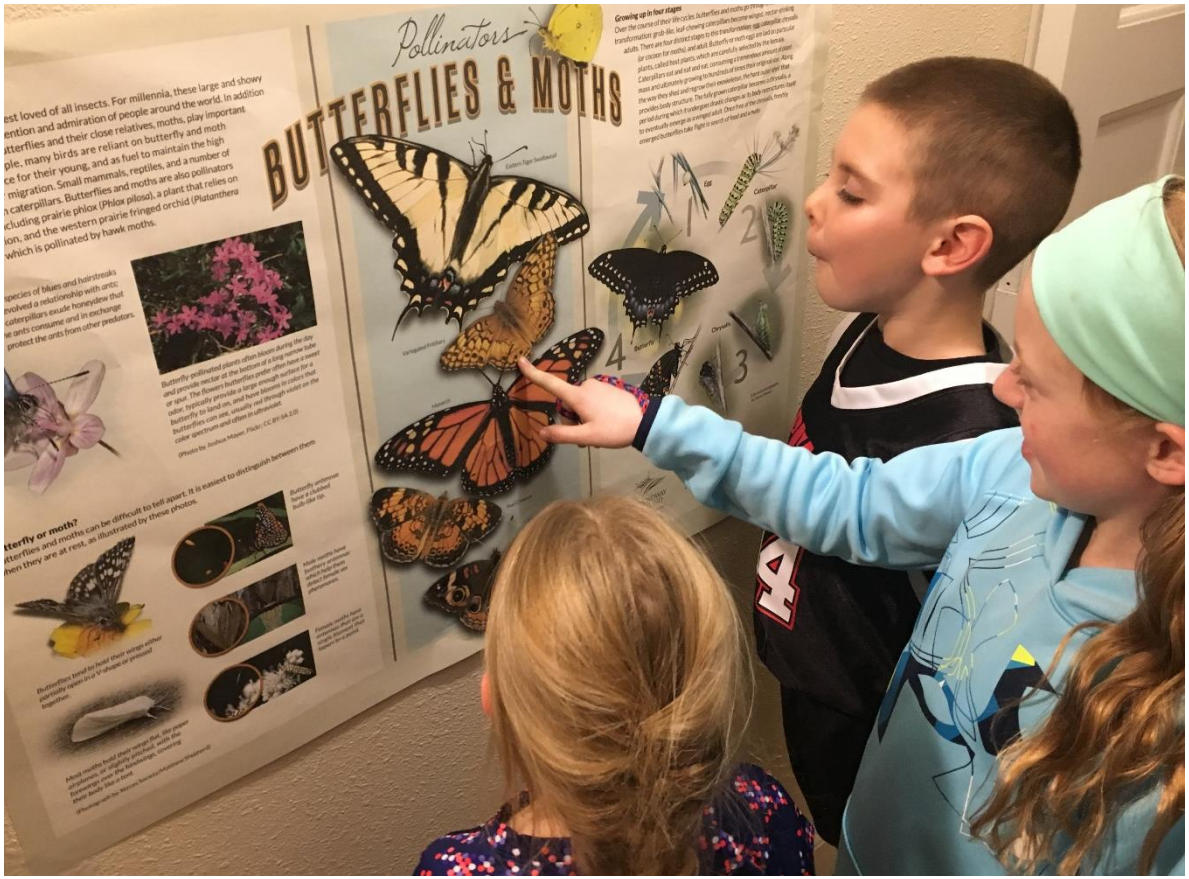
TREES FOREVER

Not all "beneficial insects" are insects! Spiders, mites, and harvestmen —arachnids rather than insects— all have a role to play in controlling pests and maintaining a balanced environment.

A special thank you to Bryan E. Reynolds for his generous contribution of photography.

Poster 4:
Beneficial Insects

Many insects feed on nectar or pollen during one or more of their life stages; nectar fuels the hunt and pollen is a supplemental source of protein for some predatory insects. Flowers enable them to complete their life cycle.



The Iowa Living Roadway Trust Fund distributes the posters through the Iowa Department of Transportation. They are commonly used in classrooms but are available free of charge to anyone interested in pollinators.

public education