TEXAS PARKS AND WILDLIFE

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Texas Monarch Watch
is sponsored by the
Wildlife Diversity Branch
of Texas Parks and Wildlife Dept.

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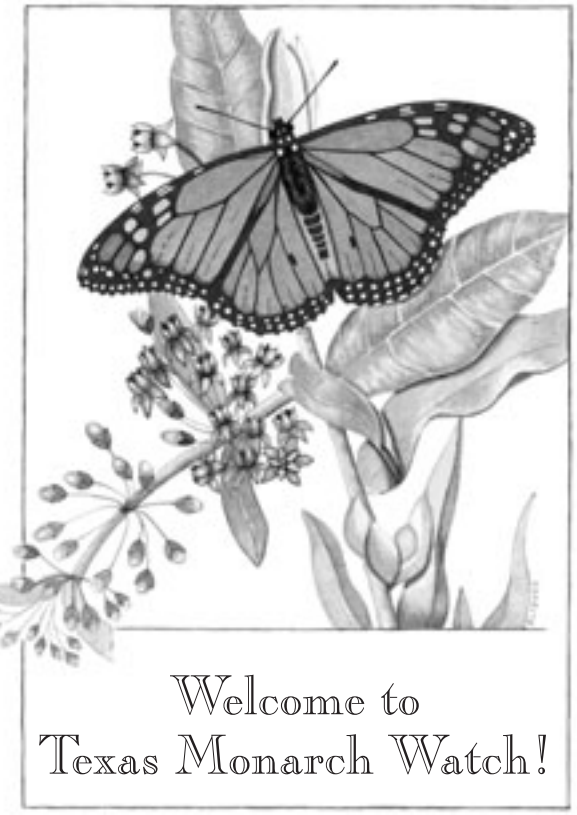
TEXAS Monarch Watch

MONITORING PACKET

Migration of the monarch butterfly is truly one of the world's greatest phenomena! Though many animals, from whales to wildebeests, make well known annual mass movements, monarchs are the world's only insects to make a complete round trip migration. Texas occupies a central position on their annual route; tens of millions pass through our state every spring and fall and there's even a small overwintering population that resides along Texas' upper coast. Thanks to Texas Monarch Watch, citizens like you can help collect information about these fascinating insects. Scientists need the help of Texans throughout the state because there is still much to learn about the monarch butterfly. Where and when are monarchs breeding in the state? How do weather factors and food sources impact the monarch? What predators affect monarchs as they pass through Texas? These are just a few of the research questions that scientists need your help in answering. This booklet will give you the necessary background to help you work with scientists in answering questions about monarch biology and migration.

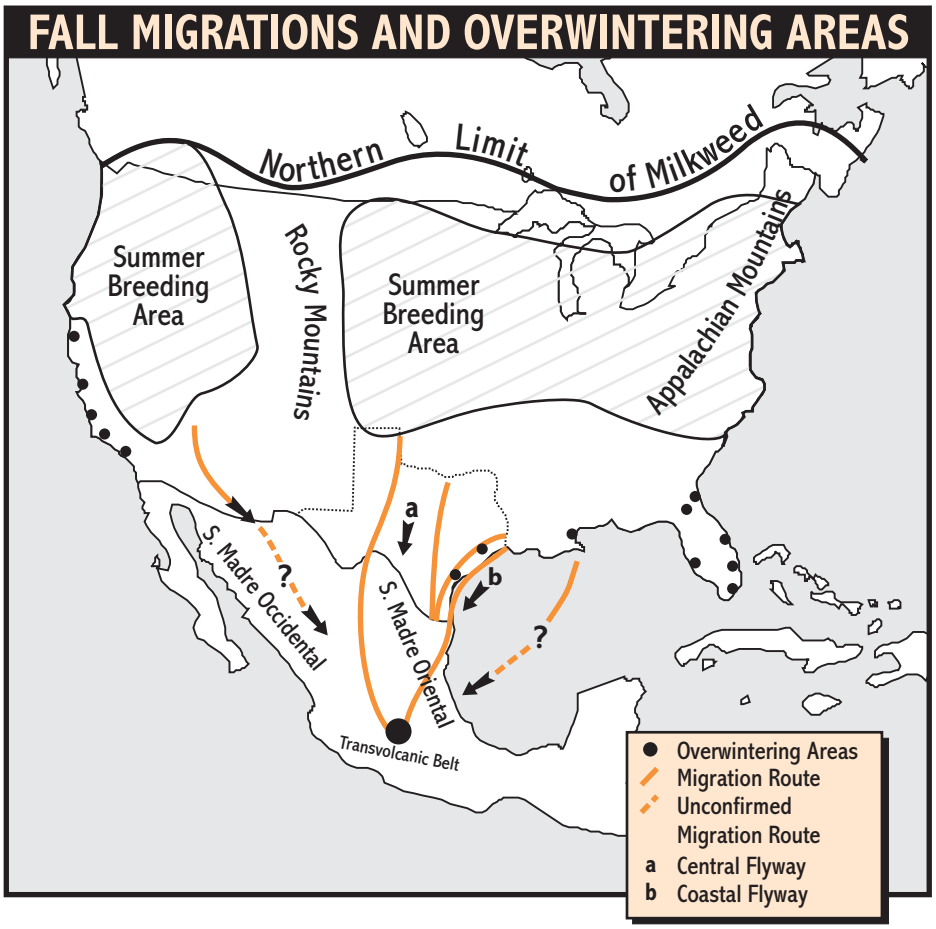
The purpose of Texas Monarch Watch is to gather information about the migratory and resident populations in Texas and to share information about monarchs with the public.

You may participate in any or all steps of the research process including generating questions, collecting data, and sharing results. You can collect data that will be impossible for scientists to obtain without your help.



The mystery of Monarch Migration

Each autumn as days shorten and temperatures drop, a number of natural events occur in plants and animals. Trees turn gold and crimson after shutting down their photosynthetic machinery for the season. Ducks, geese and hundreds of other species of migratory birds begin to move out of the north into warmer areas with more abundant food. Many insects spend the winter as eggs or larvae, and dehydrate themselves to get rid of water from their bodies. Like migratory birds, monarch butterflies (Danaus plexippus) *have evolved the ability to fly long distances, escaping freezing temperatures and the absence of food.*



Monarch Migration in North America

The miraculous thing about the monarch is that it is not a bird–it is not even a vertebrate! It is an insect with a nervous system much smaller and simpler than that of a vertebrate. With its tiny brain, it guides itself thousands of miles over terrain it has never seen before to overwintering sites where it has never been before.

There are two main migratory populations of monarchs in North America. A western population breeds on the slopes and valleys of the Sierra Nevada and other ranges west of the Rocky Mountains. This group migrates southwest and overwinters along the California coast from San Diego to north of San Francisco. The largest winter aggregations in California are located in the center of the range between Santa Barbara and Santa Cruz.

The far larger eastern population's main breeding areas are located in the northern United States and in southern Canadian provinces east of the Rocky Mountains. It is this eastern population of monarchs that each fall migrates south and southwest across the continental United States, funnels through Texas, enters Mexico, follows the eastern chain of mountains, the Sierra Madre Oriental, and arrives at the Transvolcanic belt in central Mexico.

The mystery of Monarch Migration

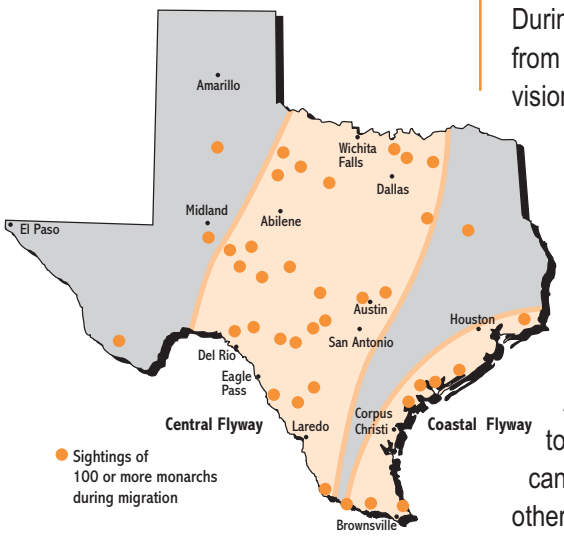
Non-migratory Populations

Other monarch populations do not appear to migrate but remain in coastal areas of the United States and in streamside areas, pastures, and valleys throughout tropical and subtropical Mexico. These groups breed more or less continuously. The exact status of these populations is poorly understood, but they are totally dependent on the availability of their milkweed host plants. During especially cold winters those that breed along the Texas coast may die back or even perish. Monarchs also exist in Central America where they migrate relatively short distances in response to seasonal changes in rainfall.

Why is Texas Important to Monarchs?

Because it is situated between the principal breeding grounds in the north and the overwintering area in Mexico, Texas is one of the most important states in the migration. Monarchs move through Texas both in the fall and the spring. During the fall they use two principal flyways, one through the center and the other along the coast. The central flyway through the middle of the state is about 300 miles wide and is centered on a line between Wichita Falls and Eagle Pass. Monarchs enter the Texas portion of this flyway during the last days of September.

The second flyway is situated on the coast. Monarchs fly along the Texas coast, roughly from the third week of October through the first week of November. The monarchs in this flyway are fewer in number and use it with less consistency than those that use the central flyway. The coastal monarchs may be from the eastern part of the continent, while the ones that use the central flyway are almost certainly from the mid-western prairie states and Canadian provinces.



Monarchs tend to migrate in pulses punctuated by cold fronts arriving from the north. During interim periods, when winds oppose them, they linger in low riparian woodlands and feast on nectar plants that are usually abundant in the fall. But the moment the winds turn around from the north, they catch a rising parcel of warm morning air, ride it high into the sky circling lazily, and then soar off in a southerly direction in much the same manner as hawks and vultures. The direction and strength of the winds determines their daily progress. Strong frontal systems tend to "bunch" them up into discreet pulses. When the winds are northerly and strong, they may fly as much as 400 miles in a day and over-fly your location entirely. However, in active flyways, several pulses per year are likely, and monarchs may yet pass through your area.

During afternoons monarchs descend from heights sometimes beyond our vision to feed in flower fields. Favored nectar plants in central Texas are goldenrods, *Eupatorium* species and gay feathers in fields, or frostweeds and cowpen daisies near forest edges or in moist canyons. In North Texas you may find them feeding on ox eye. About dusk they stop feeding and fly toward silhouettes of trees. Within the canopies of trees, they search for each other, and if they are numerous, they form nighttime roosts. Some years these roosts can cover the branches with an orange tapestry that astonishes those fortunate enough to witness one of these "butterfly trees." The next morning the sun warms the butterflies and the roost breaks apart. They fly off to feed again, or if the winds are correct, they are off once more on a rising thermal to heights often beyond our vision.

The mystery of Monarch Migration

By the second week in November, most have passed through Texas and into Mexico. Flying principally in inter-montane valleys, monarchs make their way southeastward to about ten, 1/2 to 2-acre areas in the high Trans-volcanic Belt that cuts across Mexico at the latitude of Mexico City (20-21N latitude). They begin to arrive at their destination around the first of November.

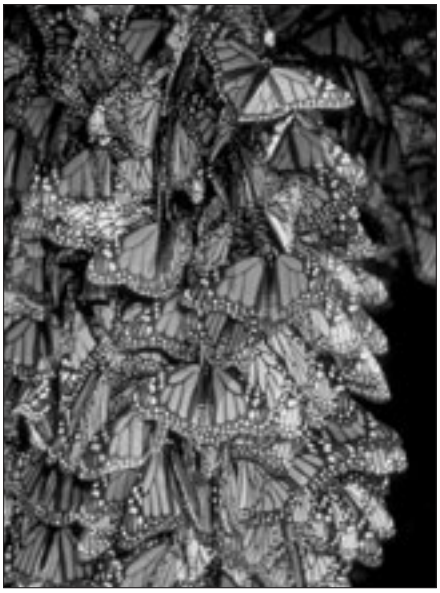


Photo by Bill Calvert

Overwintering

The number of individuals packed in fir trees in the Mexican overwintering sites is enormous. Estimates are that some tree boughs may contain as many as 20,000 individuals. Colonies are estimated to contain ten million butter-flies per acre and have been as large as ten acres. The phenomenon of millions of monarchs at once in the air is indescribably awesome. On warm days in late February or March, millions fly at once forming what is clearly one of the biological wonders of the world. During winters with mild temperatures, an estimated 10 to 15% of monarchs that reach the overwintering areas in Mexico never leave. These are consumed by bird and mouse predators, or die due to freezing temperatures and starvation. During cold winters when freezing temperatures penetrate the forest canopies, many millions of monarchs succumb to the cold.

Monarch Navigation

The means by which monarchs navigate from almost continent-wide breeding grounds to a dozen or so tiny areas in Mexico has mystified entomologists for over a century and remains one of the most intriguing questions of monarch biology. One group of scientists has shown that a sun compass is involved, another that plane polarized light is used, while some scientists think that monarchs may use the earth's magnetic field in navigation.

Whichever orientation mechanisms are used in their long trek to central Mexico, it seems clear that it is complicated. Monarchs flying over relatively open terrain, fly towards the southwest, a direction, which if continued into Mexico, would carry them north of the overwintering sites and out into the Pacific Ocean. Once in Mexico they strike the mountain massifs of the Sierra Madre Oriental, then turn and follow these mountain ranges into the heart of Mexico. Somewhere in the southern portion of these ranges they appear to make another smaller course correction before arriving at the center of the Trans-volcanic Belt. This change of course implies two separate guidance mecha-nisms, one of which is perhaps overrid-den by the second. Understanding the guidance system used by monarchs to arrive at the overwintering colonies is further complicated by the necessity of monarchs returning to the southern United States.

Spring Migration

The guidance mechanisms employed on the way south during the fall migration must now be used in reverse during the spring. Considerably less is known about the spring migration. Predators, disease, collisions with automobiles, and perhaps simple exhaustion have caused high mortality in the population. Thus there are fewer monarchs returning in the spring than passed through during the fall. Adults are widely dispersed throughout the prairies, Hill Country, and Rolling Plains of Texas, and spring larvae may be found wherever milk-weeds are growing.

The Biology of the Monarch

The Monarch Life Cycle

Monarch larvae use various species of milkweeds *(Asclepiadaceae)* as food plants. During the late winter and early spring in Texas, roughly between March 15th and April 15th, female monarchs that have overwintered in Mexico lay eggs on milkweed plants. Eggs are also laid prior to and possibly during the fall migration, although not as many as during the spring.

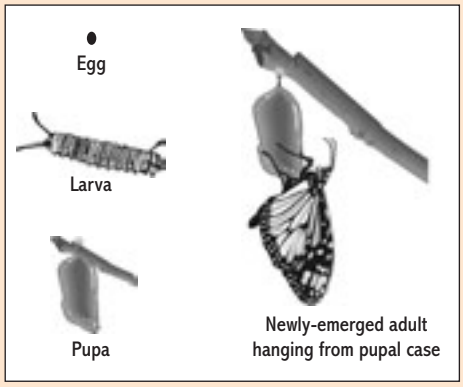


Photo by David Millard

On first appearance the egg looks like an ivory to pale yellow-colored blob about the size of the head of a pin usually glued to the surface of a milkweed leaf. Under magnification, look for a series of vertical ridges that run from base to apex. Each ridge has a number of four-sided facets that give the egg the appearance of a jewel. Just before the caterpillar is about to hatch (3-6 days under normal temperature regimes), the egg turns to a dark gray color.

The eggs hatch into larvae that eat the plant's leaves and occasionally the flowers. The first hatched larvae are so small that they cannot chew through the leaf and must "mine" the surface for food. After the first stage or instar, the larvae pass through four more instars. Their business is to eat and grow, which they do with remarkable efficiency.

Photo by Paul Montgomery

The easiest way to distinguish monarch larval instars is by the head capsule and tentacle size. (The term instar describes the period between hatching and the first molt and between subsequent molts). The tiny first instar caterpillar (average length is about 4mm, a little more than 1/8 inch) lacks the strong colored banding of the later instars. It is pale green to grayish-white in color. Its head is black. Its front tentacles are very short and appear as nubbins. There are two pairs of these tentacles – one near the front and one near the back. The number and location of these tentacles is very important for Texans because our state has other Danaid butterflies, namely queens and soldiers, that also use milkweeds as a food plant. These other Danaid species in Texas have three pairs of tentacles.

Beginning with the second instar, monarch caterpillars develop a progressively more distinct pattern of black (or dark brown), yellow and white bands. These bands circle the body perpendicular to its long axis. The tentacles and head capsules become longer and larger. After two to three weeks the larvae have grown to 200 times their birth weight! Although the process of complete metamorphosis looks like four very distinct stages, the larvae are actually changing continually. The wings and other adult organs develop from tiny clusters of cells already present in the larvae, and by the time

The Biology of the Monarch

the larvae pupate, the major changes to the adult form have already begun. An excellent field guide to monarch caterpillars, which describes in detail the larval stages, is available through Karen Oberhauser, Department of Ecology, Evolution and Behavior, University of Minnesota, St. Paul, MN 55108.

Photo by Mike Quinn

When monarchs are ready to pupate, they crawl off their caterpillar food plants into surrounding vegetation and hang upside down in pre-pupal "J" configurations which quickly form beautiful green chrysalises accented with gold spots. Monarch pupae are hard to find because they are well camouflaged to avoid predators. The function of the beautiful gold spots on monarch pupae is unknown. During the

Photo by Bill Calvert

pupal stage the transformation from larva to adult is completed.

Seven to ten days later the monarch pushes open the chrysalis. It begins the hour-long process of pumping up and hardening its wings. During this period it must hang freely so that its wings will develop properly. If it falls or is molested, its wings will most likely harden into a crinkled shape, and it will not be able to fly. The newly emerged adult should be left to hang for several hours before touching or moving it to another location.

The total process from egg to adult normally takes about five weeks, but it can be shorter if the weather is warm.

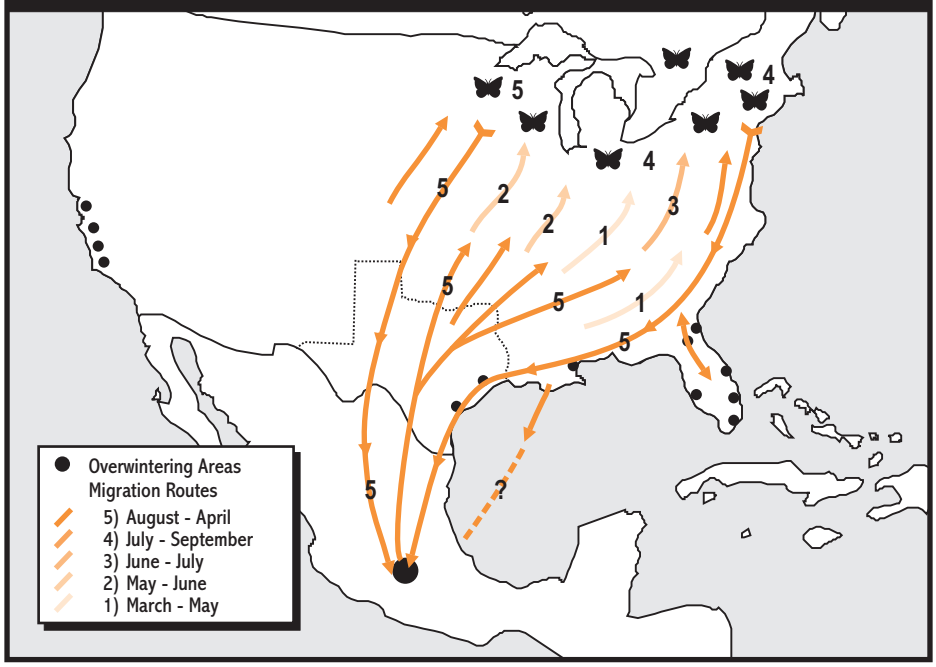
Monarch Yearly Cycle

Monarchs born during late summer and fall are different from spring and summer monarchs. Hormones are produced as a response to decreasing day length and colder temperatures. These chemicals tell the late summer monarchs not to reproduce, and instead, to begin the immense south-ward journey across North America. Instead of breeding immediately after becoming adults, they go into what is called "reproductive diapause." For the next five to six months (roughly late August through January) virtually no breeding occurs in this group of monarchs. During this period, they travel to central Mexico and establish overwintering colonies. In February some of them break the diapause and begin to mate. By mid-March there is a mating frenzy in the Mexican colonies and they begin to migrate northward, laying eggs on milkweeds that have just sprouted in the southern United States.

In the spring, monarchs are found as adults and larvae mainly in the southern United States. By late spring, most have left the Gulf coastal states and are breeding further north. Sometime in June they reach Minnesota and Massachusetts. They continue to breed in the northern states and southern Canada all summer, greatly augmenting population numbers.

The Biology of the Monarch

YEARLY LIFE CYCLE OF THE EASTERN MONARCH POPULATION



Monarch life spans vary depending on the time of the year. The generation that migrates to Mexico and back to the southern United States lives approximately eight months. In contrast, the spring and summer generations live only four to six weeks, depending on the temperatures where they develop. The warmer the temperature, the faster they develop.

Concerns

There has been much publicity about the decline of the monarch population. Is it really declining? If so, what are the causes and what can be done about it? Monarchs are threatened by many factors. The growing database supplied by Texas Monarch Watch volunteers, allows us to better understand the effect of certain hazards to the monarch population.

Mowing

One such hazard, the mowing down of milkweeds, has turned out not to be the threat that it was once thought to be. Timely mowing after seeds have set insures the growth of wildflowers and may also be an advantage to milkweeds. Most milkweeds that are important to monarch larvae as a food do not relish competition from other plants. They seem to thrive under certain mowing regimes which are not too frequent and which allow full seed maturity.

Fire ants

Perhaps the most serious factor threatening the Texas monarch population is the red imported fire ant. Fire ants arrived in Mobile, Alabama, from Brazil during the 1930s. Now, 70 years later, they have spread through much of the southern United States from North Carolina to Texas, an area where monarchs returning from Mexico in the spring are expected to lay eggs that will become the first spring generation. Fire ants are especially prolific on Texas prairies where their colonies may reach densities of 200-800 mounds per acre. Fire ants are general arthropod feeders and will consume monarch eggs and larvae. Dr. Chris Durden has monitored butterfly populations since before the arrival of fire ants. He reports a 50% decline in butterfly abundance from pre-fire ant levels. Butterfly species that are most affected are those that feed near the ground on grasses or low herbs, such as the monarch butterfly. Studies sponsored by Texas Parks and Wildlife suggest drastic reductions of monarch numbers by fire ants on Texas prairies during the spring.

The Biology of the Monarch

Herbicides
Widespread use of herbicides to eliminate undesirable plants in pastures ("improve" pastures for livestock) can have a negative impact on monarch populations since some of those plants provide food for monarchs and their larvae. Balancing the needs of wildlife species and agricultures is always an interesting challenge, but one that can be surmounted through an understanding of the needs of different wildlife species and careful planning.

Logging
Most publicity concerning monarch population decline is centered on the fate of the boreal fir (oyamel) forest of eastern Michoacan, Mexico where the monarchs overwinter. When asked, most elders who live near the monarch colonies, claim that monarch populations were much larger in the past than they are today. But no careful records were taken until the late 70s. Since then the populations have waxed and waned. Although a couple of years saw extremely low numbers, the population really never crashed.

However, pressure on the Michoacan forests by an ever-growing human population has been relentless. Although lumbering at the monarch sanctuaries in Mexico is controlled, the amount of logging in areas around the colonies has steadily increased through the years. Recently Mexico has begun reforestation efforts to create larger buffer zones around the sanctuaries.

The effect of cold air masses on monarch mortality is well established. When severely cold weather impacts the high altitude sanctuaries, monarchs perish by the millions. At those rare times, monarchs are dependent on the integrity of the forest to keep them warm.

Logging, even when practiced according to sound principles, destroys that integrity–at least until the forest can grow back. If the forest were degraded to the point where it could no longer protect the monarchs, could they move to a new, better location? The answer is not known, and nobody really wants to test it.

Paul Opler and Evi Buckner tag a monarch in northern Mexico. Photo by Mike Quinn

HOW TO DISTING

It is often difficult to distinguish mona might encounter one or more of these

monarch

TPWD photo

Photo by Paul Montgomery

Monarch (*Danaus plexippus*)
Wing span: 3 3/8 - 4 7/8 inches (8.6 - 12.4 cm).
Identification:
- Pale orange on the underside of the hindwing.
- Veins blackened above.
- Extensive black in the forewing tips or apices.
- Spring and fall migrant. Some overwinter along the coast.

Finding Monarchs in the field

GUISH MONARCHS FROM SIMILAR BUTTERFLIES

archs from other *Danaid* species and mimics. Depending upon the time of year and your location in Texas, you e species. The following information may be helpful to you in learning what to look for when studying monarchs.

queen

Photo by Paul Montgomery

Photo by Mike Quinn

Queen (*Danaus gilippus*)
Wing span: 2 5/8 - 3 7/8 inches (6.7 - 9.8 cm).
Identification:
- Brown above.
- Veins not outlined in black above.
- Notice row of white spots on forewing.
- Black restricted to wing margins.
- Common resident species in South Texas, expanding north in summer.

soldier

Photo by Mike Quinn

Photo by Mike Quinn

Soldier (*Danaus eresimus*)
Wing span: 2 3/4 - 3 3/4 inches (7 - 9.5 cm).
Identification:
- Similar to Queen, but with fewer white spots above.
- Smudged markings in center of hindwing below.
- Veins somewhat blackened above.
- Found in low numbers in South Texas in the fall.

viceroy

Photo by Paul Montgomery

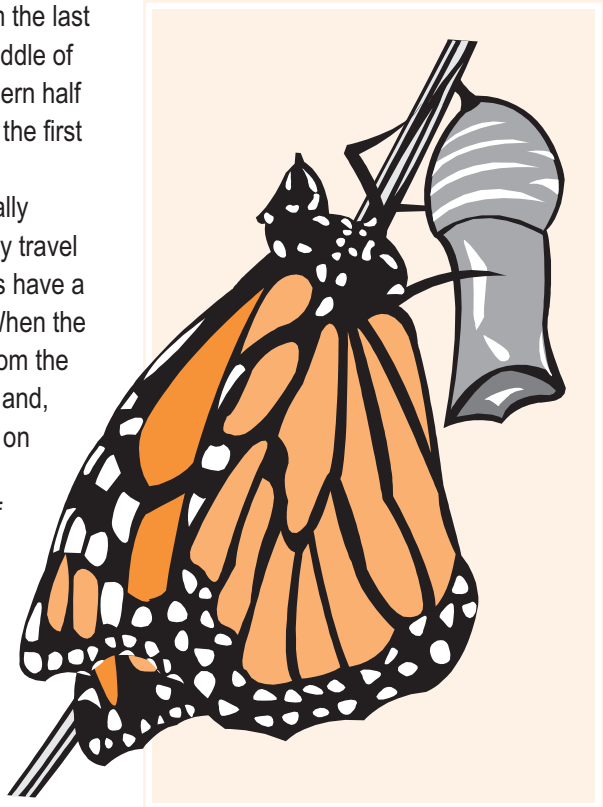
Viceroy (*Limenitis archippus*)
Wing span: 2 1/2 - 3 3/8 inches (6.3 - 8.6 cm).
Identification:
- Resembles the Monarch, but smaller.
- Notice black line cutting across the hindwings.
- Most commonly found in East Texas.
- Caterpillars feed on willows, not milkweeds.

Finding Monarchs in the field

Where to Find Monarchs in the FALL

Often monarchs are missed in areas where they are abundant. If you live in North Texas, look for them from the last week of September until the middle of October. If you live in the southern half of the state, look for them from the first week of October through early November. Monarchs are usually brought in by north winds. They travel great distances when the winds have a strong northerly component. When the winds turn around and come from the south, they tend not to migrate and, where possible, to concentrate on taking nectar. They often accumulate in low areas, out of the winds, often near streams. The best places to find them are streams or dry drainages, especially those with overhanging trees. Better yet are low areas with flower fields nearby.

In selected places, monarchs may be seen in migration in the tens of thousands. Look for the largest numbers during the second and third weeks of October in West-central Texas, from San Angelo to Bracketville to Eagle Pass. Many locations along the Devils, Frio, Sabinal, Llano and Guadalupe rivers are excellent. Call ahead to parks in the area to see if the monarchs have arrived. If they are there you must move quickly. They will linger in an area in hot, moist weather, but leave immediately with a passing front.



Where to Find Monarchs in the SPRING

Monarchs have a different strategy in the spring than in the fall. If male, they are looking for mates and will hang out near milkweed patches, sometimes perched high on nearby trees. If female, they are looking for milkweeds upon which to lay their eggs. You will find females flying low and slowly over fields. They will be more abundant in fields that contain milkweeds. Aggregation of monarchs in the spring is unusual and seldom seen north of Mexico. If anyone sees this behavior in the spring, please report it immediately to the Monarch Hotline (800-468-9719).

Places that traditionally report high numbers are coastal areas such as Matagorda Island and Sea Rim State Parks. Look for them to be especially abundant from the fourth week of March to the middle of April.

Monitoring Monarchs

There is still much to be learned about the monarch migration in Texas. You may participate in Texas Monarch Watch at several levels. The data that you send to us will be summarized in TPW newsletters "The Texas Nature Tracker" and "Eye on Nature" published several times each year.

Become a Monarch Spotter

If you elect to participate as a spotter, you will need to learn to identify monarch adults and to distinguish them from their look-alikes. When you spot a monarch adult, call the Texas Monarch Hotline 800-468-9719 (326-2231 in Austin) and report the sighting, the location, and the date as well as information about weather conditions in the area.

What should you do if you find a tagged monarch? Report the tag number to the University of Kansas Monarch Watch (www.monarchwatch.org) or (1-800-TAGGING). If it is alive, carefully catch it or read its number with binoculars, then report the tag number and the location where it was found.

Handling Monarchs Safely

You may have to handle monarchs in order to read the tag. Most species of butterflies have loose scales that slip off easily when they are grabbed by a potential predator. You do them a disservice by removing these scales prematurely. Monarchs have scales that are not so easily removed. Nonetheless you should be extremely careful in handling all butterflies. They should always be held by both forewings preferably near the forward margin. Here the scales are attached the most firmly, and the wing is the strongest. Release the monarch immediately after reading the tag.

Remember you need special permission to catch butterflies in Texas state parks. Permission may be sought by contacting
David Riskind
Resource Protection
Texas Parks and Wildlife
4200 Smith School Road
Austin, TX 78744 or
1-800-792-1112 ext. 4897.

Keep a Monarch Calendar or Journal

Monarch scientists are very interested in data collected by volunteers over the entire migration period. If possible, record your daily observances of monarchs in a journal or on a calendar, then send it to Texas Monarch Watch. You may supply your own calendar, download a calendar from our Web site (www.tpwd.state.tx.us/monarch), or request a calendar from Texas Monarch Watch. Finally, you can simply phone in your daily sightings to the Texas Monarch Watch Hotline listed above. Scientists can then compile the data to come up with a day by day snapshot of the migration throughout the entire state. Daily monitoring may mean simply looking for adults as a routine part of your day during migrations in the spring and fall. *Remember that not sighting any monarchs during the migration is also very important data.* At the end of the monitoring period, Texas Parks and Wildlife can use data supplied by volunteers to construct a long-term picture of when and where monarchs occur in Texas and how much they vary in abundance from year to year.

Tagging

If you elect to tag monarchs, you must order tagging kits from the University of Kansas Monarch Watch (888-TAGGING) or www.monarchwatch.org

Monitoring Monarchs

In-depth Monitoring

Volunteers who really enjoy monarch watching usually get curious about other life stages. Although we know that monarch larvae will only eat milkweed plants and female monarchs must lay their eggs only on milkweed plants, scientists still have many questions about when monarchs lay eggs, where they lay them, and which predators eat the eggs and larvae. If you are interested in participating at this level, Texas Monarch Watch plans to host a limited number of workshops to train volunteers. Contact Texas Monarch Watch or check our Web site. Or volunteers can access the Monarch Lab Web site– www.monarchlab.umn.edu/. This site provides information to help you identify monarch eggs and larvae and the various milkweed plants that serve as monarch hosts. (See the next page for Texas milkweed species.) You can examine the milkweed plants in your yard, in nearby fields, parks, or school grounds on a weekly basis to track monarch egg laying and larval development. You can also take detailed information on migrating adults. Scientists are interested in wing length, mass, wing condition, reproductivity, and the presence of spores. Monarch Lab provides a data sheet to record your data and on-line instructions for milkweed/larvae monitoring and for taking vital statistics on migrating adults.

Other Organizations

In addition to Texas Monarch Watch, there are other organizations that monitor the monarch migrations through Mexico, the United States and Canada.

Monarch Watch www.monarchwatch.org is a collaborative network of students, teachers, volunteers, and researchers dedicated to the study of the monarch butterfly. It is an educational outreach program at the University of Kansas and is responsible for the tagging program. Citizen scientist volunteers are asked to tag butterflies captured in their area and to keep records of the weather, sex, condition and, of course, the number on the tags. Recoveries are published once a year in the Monarch Watch Season Summary. This yearly publication is a rich source of information about monarch butterfly biology. This site also has photos and descriptions of milkweed species– www.monarchwatch.org/milkweed/guide/index.htm. If you want to tag monarch butterflies, you should contact Monarch Watch at (1-888-TAGGING) or at their Web site. Tagging kits are available only through the University of Kansas Monarch Watch and are no longer provided by Texas Parks and Wildlife. Texas Monarch Watch www.tpwd.state.tx.us is an independent member of the University of Kansas Monarch Watch. We cooperate with Monarch Watch by encouraging volunteers to tag butterflies.

Monarch Lab www.monarchlab.umn.edu/ was developed by scientists and educators at the University of Minnesota to provide a background for understanding the ecology, behavior, and evolution of monarch butterflies. It reports the results of recent scientific discoveries addressing monarch biology and provides an interactive forum for communication between students, teachers and scientists.

Journey North www.learner.org/jnorth which caters mainly to students and teachers in classroom situations, weekly posts observations coming from citizen scientist volunteers in Canada, the United States, and Mexico on migration maps. Students often ask thought-provoking questions about monarch biology. Experts in monarch biology then answer student questions. Both the spring and the fall migrations are covered.

Texas Milkweed Flora

Monarch larvae must have milkweed to eat. Nothing else will do. If the female makes a mistake and lays eggs on some other species, the larvae cannot correct the mistake by crawling to the correct plant species. They are doomed! An understanding of the monarch spring migration must include an understanding of the distribution and seasonal appearance of milkweeds. Some milkweeds contain cardiac glycosides which when eaten are stored in the bodies of both the caterpillar and adult. These poisons are distasteful and emetic to birds and other vertebrate predators. After tasting a milkweed butterfly, a predator might associate the bright warning colors of the adult or caterpillar with an unpleasant meal and avoid these butterflies in the future.

Texas has a very diverse milkweed flora–thirty-six species in the genus *Asclepias* alone according to Correll and Johnston's, *Manual of the Vascular Plants of Texas*. But most of these species are not abundant, and therefore are not of major importance to monarch reproduction. One of the goals of Texas Monarch Watch has been to determine the distribution of milkweeds that are important to monarchs.

The wooded sections of East Texas have small, scattered populations of ***Asclepias viridis* (green milkweed)** and ***Asclepias tuberosa* (butterfly weed)** located mainly along roadsides. *A. tuberosa* emerges too late for the first passage of monarchs returning from Mexico, but may be important for subsequent spring generations in Texas. East-central and South Texas, mainly east and south of IH 35, have an enormous population of *A. viridis*. This is likely the most important host plant for monarchs in the state. The greatest number of Texas monarch larvae feed on this species. The West-central Texas areas of the Hill Country and the Rolling Plains have mainly ***Asclepias asperula* (antelope horn milkweed)**, but also some ***Asclepias oenotheroides* (Hierba de Zizotes)**, and even less *A. viridis*. Although *A. oenotheroides* is clearly densest on the prairies, its range includes all of Texas except for the western deserts and eastern forests. It likely rivals *A. viridis* in importance to Texas monarchs. Traveling westward beginning around Junction, ***Asclepias latifolia* (broadleaf milkweed)** begins to appear. This plant does not come up early enough in the spring to be an important host for monarchs, but it may be important for monarchs traveling south in the fall. Not much is know about the *A. latifolia* population.

Asclepias viridis

Asclepias asperula

Asclepias oenotheroides

Texas Milkweed Flora

Finally we mention the non-native, very popular garden milkweed, ***A. curassavica* (Mexican or tropical milkweed)** of the American tropics and subtropics. This one is so showy with its two-colored red and orange-yellow flowers that it has been transplanted around the world. No one is quite sure of its origin. It is naturalized in coastal Texas. In Mexico it thrives along streams and in grazed pastures. In Texas it freezes back during all but the mildest winters, but usually comes back each spring. Mexican milkweed continues as a popular plant for butterfly gardens. But its total biomass is probably not significant enough to be an important source of food for monarchs in Texas.

Other possible food sources for monarchs are the **vine milkweeds**. The importance of these as monarch food resources is poorly known. One common vine milkweed, *Matelea reticulata* (pearl milkvine), is a food plant for the queen butterfly (*Danaus gilippus*), but monarchs apparently do not use it. *Cynanchum laeve* (blue-vine or sand-vine) is present in Texas and is used by monarchs further north, but it has never been reported to be used by them in Texas. Eggs and larvae have been found on *Sarcostema cynanchoides* (climbing milkweed or twine vine), but the importance of this plant to monarch reproductive biology is unknown. Citizen scientists could contribute greatly to our understanding of the use of vining milkweeds in Texas.

Summary of the Texas milkweeds important to monarchs

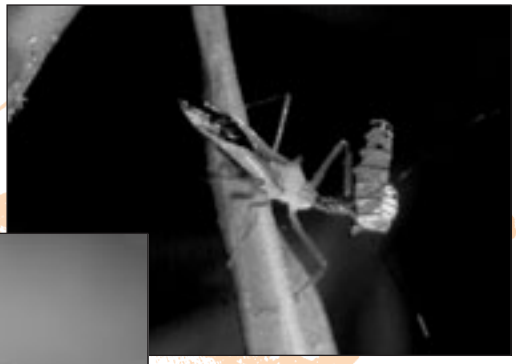
A. asperula	Antelope horn milkweed. Mostly found in the Hill Country and to the west.
A. curassavica	Mexican or tropical milkweed. A bi-colored showy plant; very popular in gardens.
A. latifolia	A broadleaf milkweed.
A. oenotheroides	Pale yellow flowers with long hoods.
A. tuberosa	Butterfly weed. A showy, pure orange-flowered milkweed that is sometimes confused with the Mexican milkweed.
A. viridis	Green or green-flowered milkweed. Abundant on grazed prairies.

Asclepias curassavica

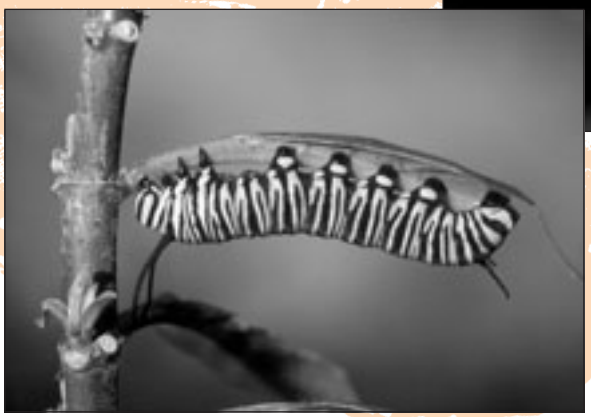
Asclepias latifolia

Parting Shots

Queen larva – note the third set of tentacles in the middle of the caterpillar's back! Photo by Mike Quinn



Assassin bug eating monarch larva. Photo by Mike Quinn



"Petiole notching" monarch larva chews halfway through the leaf petiole to reduce the amount of toxic latex entering the leaf. Photo by Mike Quinn

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For more information about these volunteer monitoring projects, contact the Texas Nature Trackers staff at 1-800-792-1112 ext. 7011 or marsha.reimer@tpwd.state.tx.us or view our Web site: www.tpwd.state.tx.us/nature

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