JOURNEY NORTH

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JOURNEY NORTH
A Global Study of Wildlife Migration and Seasonal Change

Too Cold to Fly?
The Effects of Temperature on Fall Migration

By Elizabeth Howard and Rita Welch

Photo © Journey North

A Race Against Time

Monarchs must hurry during fall migration. The butterflies must leave their northern habitat before they get trapped by the cold!

Photo © Journey North

Paralyzed

Cold temperatures paralyze monarchs. A monarch can't fly unless its flight muscles are warm enough. In temperatures below 50°F degrees, it took one hour for this butterfly to crawl a few feet.

Photo © Journey North

Flight Threshold

A monarch's flight muscles must be 55°F (13°C) before the butterfly can fly.

Photo © Journey North

Cold-blooded

Monarchs are **cold-blooded**. This fact affects *every moment* of their lives. Cold-blooded animals do not maintain a warm body temperature. Their temperature depends upon the surrounding environment.

Warming Up

Cold-blooded monarchs have special behavioral adaptations for warming up. Monarchs can bask in the sun and they can shiver. Both adaptations help a monarch raise muscle temperatures to flight threshold.

Basking
Monarchs can bask to warm their muscles.

Photos © Journey North

Shivering
Monarchs can shiver to warm their muscles.

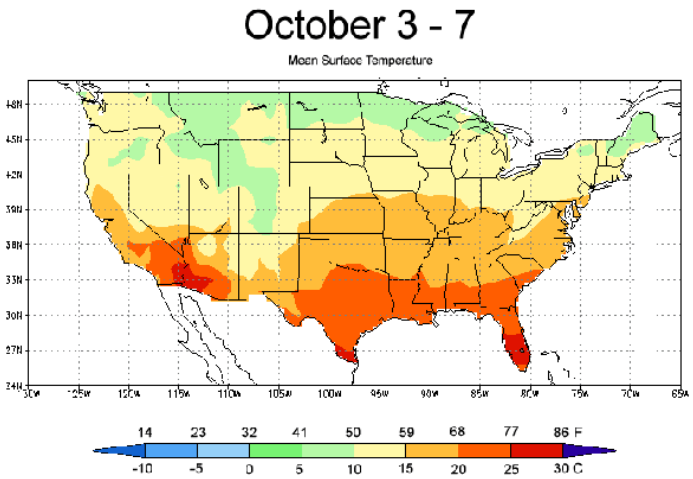

Photo © Journey North

Falling Temperatures

These maps show how quickly air temperatures drop as the fall season progresses. Watch what happens between August and December. As temperatures fall, monarchs have a smaller and smaller window of time in which they can fly.

Photo © Journey North

Warm Enough to Fly?

Air temperatures help us predict whether a monarch could warm its muscles to flight threshold. As a general rule, monarchs need air temperatures of at least 50°F on a sunny day (or 60°F on a cloudy day).

Photo © Journey North

Temperature and Migration

Temperatures influence when, where, how fast, and how high monarchs can fly. As you follow fall migration, predict when and where a monarch could fly based on daily temperatures.