

## *You can help protect groundwater*

In your home or business, you can take the following steps to protect groundwater:

- Make certain your well and septic system are up to code and working properly. Unused wells should be abandoned by a professional.
- Practice water conservation.
- Minimize or eliminate your applications of fertilizer, pesticides, and herbicides.
- Protect streams and watersheds.
- If you know of any sinkholes, caves, or springs on your land, inform the Door County Soil and Water Conservation Department.
- Report any dumping or inappropriate disposal of wastes.



Larval habitat (above),  
larva (right)—Dan Soluk

## *Find out more*

For maps that show the groundwater contributing areas and for more information about how you can prevent surface-water and groundwater contamination, visit the Web site: [map.co.door.wi.us/swcd/](http://map.co.door.wi.us/swcd/).

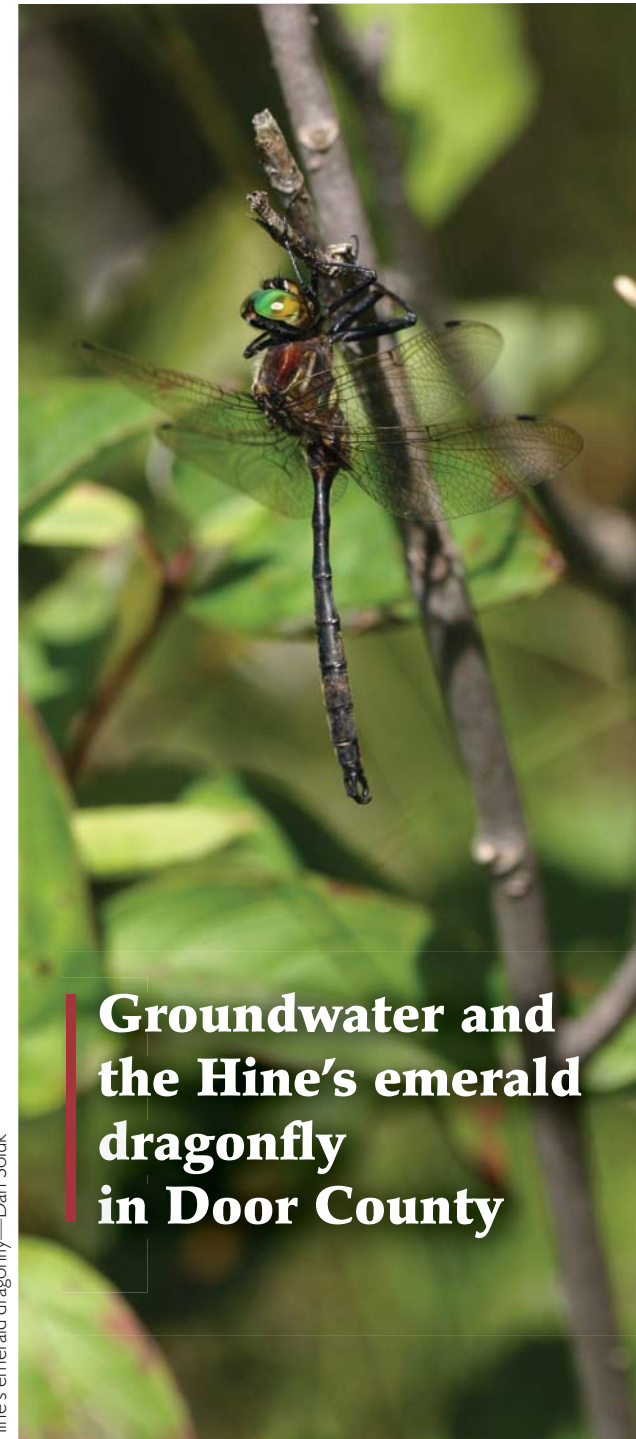
For additional information:

- U.S. Fish and Wildlife Service, Green Bay Field Office  
920/866.1717  
[www.fws.gov/midwest/Endangered/insects/index.html#hines](http://www.fws.gov/midwest/Endangered/insects/index.html#hines)
- The Nature Conservancy—Door Peninsula  
242 Michigan Street  
Sturgeon Bay, Wisconsin  
920/743.8695  
[www.nature.org/wherewework/northamerica/states/wisconsin/preserves/art5034.html](http://www.nature.org/wherewework/northamerica/states/wisconsin/preserves/art5034.html)
- Door County Soil and Water Conservation Department  
Sturgeon Bay, Wisconsin  
920/746.2214  
[map.co.door.wi.us/swcd/](http://map.co.door.wi.us/swcd/)
- Wisconsin Department of Natural Resources  
Madison, Wisconsin  
608/266.0924  
[dnr.wi.gov/org/land/er/invertebrates/dragonflies](http://dnr.wi.gov/org/land/er/invertebrates/dragonflies)



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Program

Hine's emerald dragonfly—Dan Soluk



# Groundwater and the Hine's emerald dragonfly in Door County

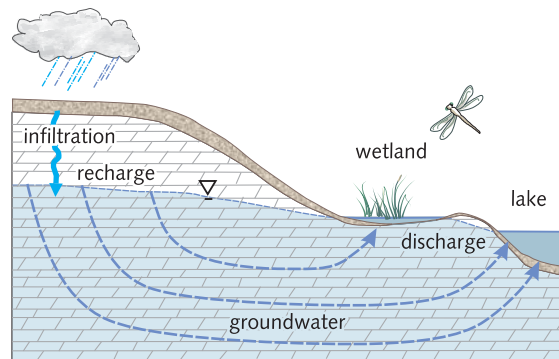
## A endangered species in need of clean groundwater

The coastal springs and wetlands of Door County, Wisconsin, provide rich habitat for the Hine's emerald dragonfly (*Somatochlora hineana*), a state and federal endangered species that exists in only a few locations in Wisconsin, Illinois, Michigan and Missouri.

Hine's emerald dragonflies live as aquatic larvae for up to five years before emerging as adult dragonflies. The larvae flourish only in streams, springs, and wetlands fed by high quality groundwater. To protect the dragonfly, the groundwater must remain clean and abundant.

In Door County contaminants can easily enter the groundwater system. Rain and snowmelt pass quickly through the area's thin soils, infiltrating the fractured dolomite bedrock aquifer. Flow is rapid, and groundwater can travel many miles to a stream, lake, or wetland in only a few weeks or months.

Contamination in groundwater also travels far and fast, from areas of recharge (where water replenishes the groundwater system) to areas of discharge. Like any water well in Door County, the dragonfly's larval habitat is at risk from contamination.



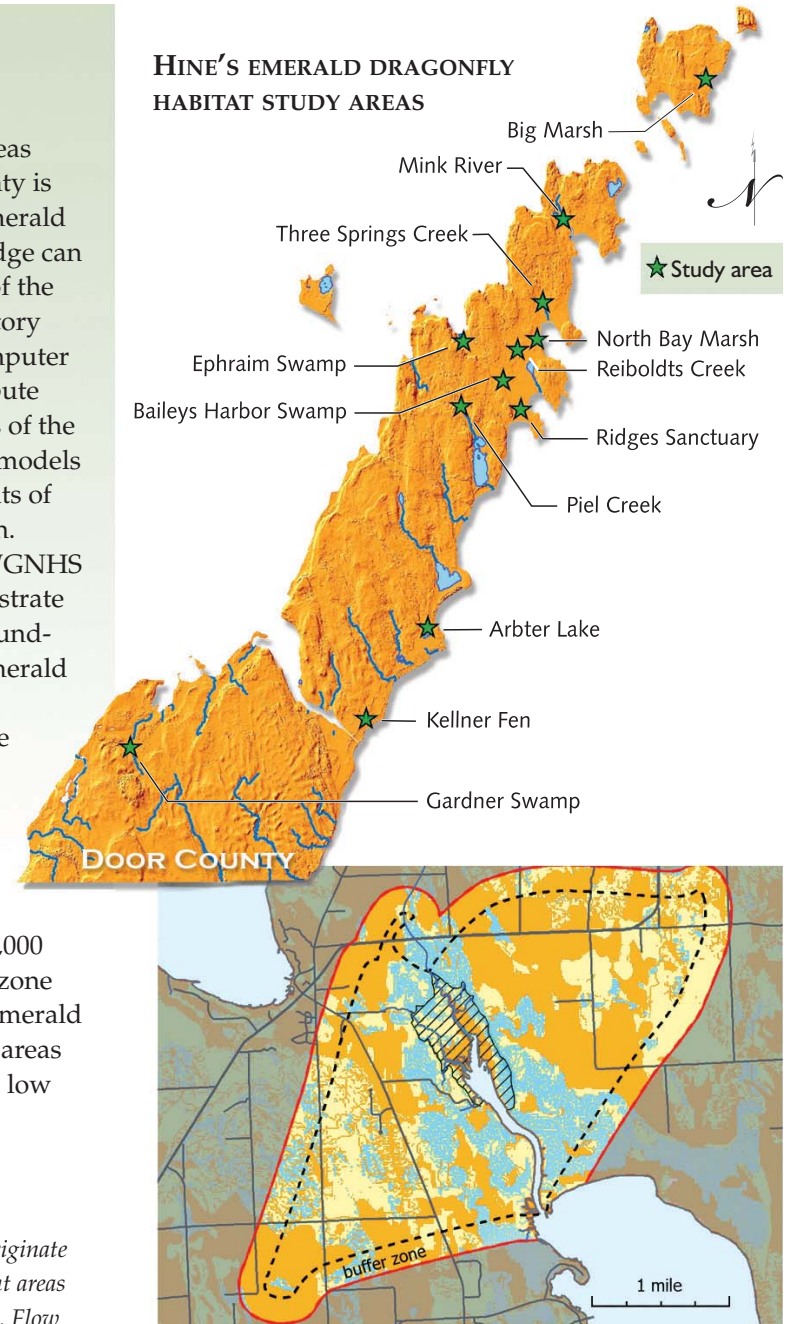
## Mapping the areas that recharge wetlands

Knowing the groundwater recharge areas that feed larval wetlands in Door County is vital for the protection of the Hine's emerald dragonfly and its habitat. This knowledge can also help protect our well water. Staff of the Wisconsin Geological and Natural History Survey (WGNHS) have developed computer models to predict the areas that contribute groundwater to twelve known habitats of the Hine's dragonfly in Door County. The models were calibrated with field measurements of stream flow and groundwater elevation.

On the basis of these models, the WGNHS staff prepared a series of maps that illustrate the estimated area that contributes groundwater recharge to each of the Hine's emerald dragonfly habitats in Door County.

In the sample map (lower right), the model-predicted contributing areas (dashed line) are shown under a variety of simulations, such as high and low recharge conditions. Because any model prediction is always somewhat uncertain, the shaded area extending 1,000 feet beyond the dashed line is a buffer zone where recharge may affect the Hine's emerald dragonfly's habitat. The map indicates areas of high (orange), medium (yellow) and low (blue) potential for recharge.

◀ Groundwater discharge to a wetland can originate nearby or from several miles away. Different areas can recharge groundwater at different rates. Flow through the fractured dolomite in Door County can be rapid, making the county's groundwater extremely vulnerable to contamination.



**MINK RIVER ESTUARY CONTRIBUTING AREA**

Legend for Mink River Estuary Contributing Area:  
 Dragonfly habitat (hatched area)  
 Groundwater recharge potential:  
 high (orange), medium (yellow), low (blue)