## Long Term Groundwater Influences to Wetlands





Nate Fuller Conservation & Stewardship Director www.swmlc.org





### Who We Are

501(c)3 non-profit organization

Established in 1991

5-person full-time, 4 parttime + 4 seasonal field staff

Governed by volunteer Board of Directors

Supported by members and donors (75-80%), endowment foundations, state and federal government grants



## **Our Completed Work**



54 Preserves + 90 Conservation Easements = 14,000+ acres



# Background

![](_page_5_Figure_1.jpeg)

- Federally listed as Endangered in 1992
- Known historically from 30 sites spread across 4 states (Michigan, Indiana, Ohio, New Jersey)

Surface Features Water Peat and muck Postalacial alluvium Dune Sand Lacustrine clay and silt Lacustrine sand and gravel Glacial outwash sand and gravel and postglacial alluvium Ice-contact outwash sand and gravel Fine-textured glacial till End moraines of fine-textured till Medium-textured glacial till End moraines of medium-textured till Coarse-textured glacial till End moraines of coarse-textured till Thin to discontinuous glacial till over bedrock Exposed bedrock surfaces Artifical fill

> BS BW

## Background

 Currently only known regionally from Michigan and Indiana (outliers in AL, MS, VA)

 Associated with fens and glacial till.

 Currently <16 sites, 6-7 considered viable

# Mitchell's Satyr Identification

- dark chocolate brown
- med. size-1.5 to 1.75 in
- row of 4 to 5 black, yellowringed eyespots on underside of forewing and hindwing
- central 3 eyespots on hindwing are largest
- 2 orange bands encircle the eyespots
- slow bobbing flight pattern

![](_page_7_Picture_7.jpeg)

![](_page_8_Picture_0.jpeg)

## **Rare Fen Species**

![](_page_9_Picture_1.jpeg)

![](_page_9_Picture_2.jpeg)

![](_page_9_Picture_3.jpeg)

![](_page_9_Picture_4.jpeg)

![](_page_9_Picture_5.jpeg)

![](_page_9_Picture_6.jpeg)

#### Photos courtesy of MNFI

#### Habitat (vegetation) Management – varied success

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Invasive species are often a symptom of a natural system out of balance – surplus nutrients, inputs of salt, sedimentation from erosion events, etc.

# But what if it is coming from underground?

![](_page_11_Figure_0.jpeg)

Glacial moraines of southern Michigan

![](_page_11_Figure_2.jpeg)

![](_page_12_Figure_0.jpeg)

![](_page_13_Picture_0.jpeg)

## Grand Rapids Museum

![](_page_14_Picture_0.jpeg)

![](_page_15_Figure_0.jpeg)

![](_page_16_Figure_0.jpeg)

![](_page_17_Picture_0.jpeg)

![](_page_18_Figure_0.jpeg)

## **Vertical Profile Modeling**

![](_page_19_Picture_1.jpeg)

### **Turner Creek Wetlands Fen**

![](_page_20_Picture_1.jpeg)

## **Glacial Landforms**

![](_page_21_Figure_1.jpeg)

## What is there left to worry about it the groundwater is not contaminated?

## Is it still flowing like it used to?

![](_page_22_Picture_2.jpeg)

![](_page_23_Figure_0.jpeg)

![](_page_24_Picture_0.jpeg)

![](_page_25_Figure_0.jpeg)

Recent large-scale water withdrawals in Michigan, according to the Michigan Department of Environmental Quality.

Water, water everywhere in Michigan – but is it enough? 21 October 2013 by <u>Jeff Alexander</u> Bridge Magazine

![](_page_26_Picture_0.jpeg)

#### **Over-Wintering Strategies Depend on Groundwater**

![](_page_27_Picture_1.jpeg)

![](_page_27_Picture_2.jpeg)

![](_page_27_Picture_3.jpeg)

![](_page_27_Picture_4.jpeg)

## Water Security – Where Does Your Water Come From?

![](_page_28_Picture_1.jpeg)

Municipalities take water quality seriously

#### **Reasons for Optimism**

- Groundwater research capabilities are greater than ever before.
- Michigan is revisiting its groundwater withdrawal permitting process.

- Water security is getting more attention than ever before.
- Conservation efforts continue!