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Knowledge to Go

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan Water Use Requirements 2011 Update

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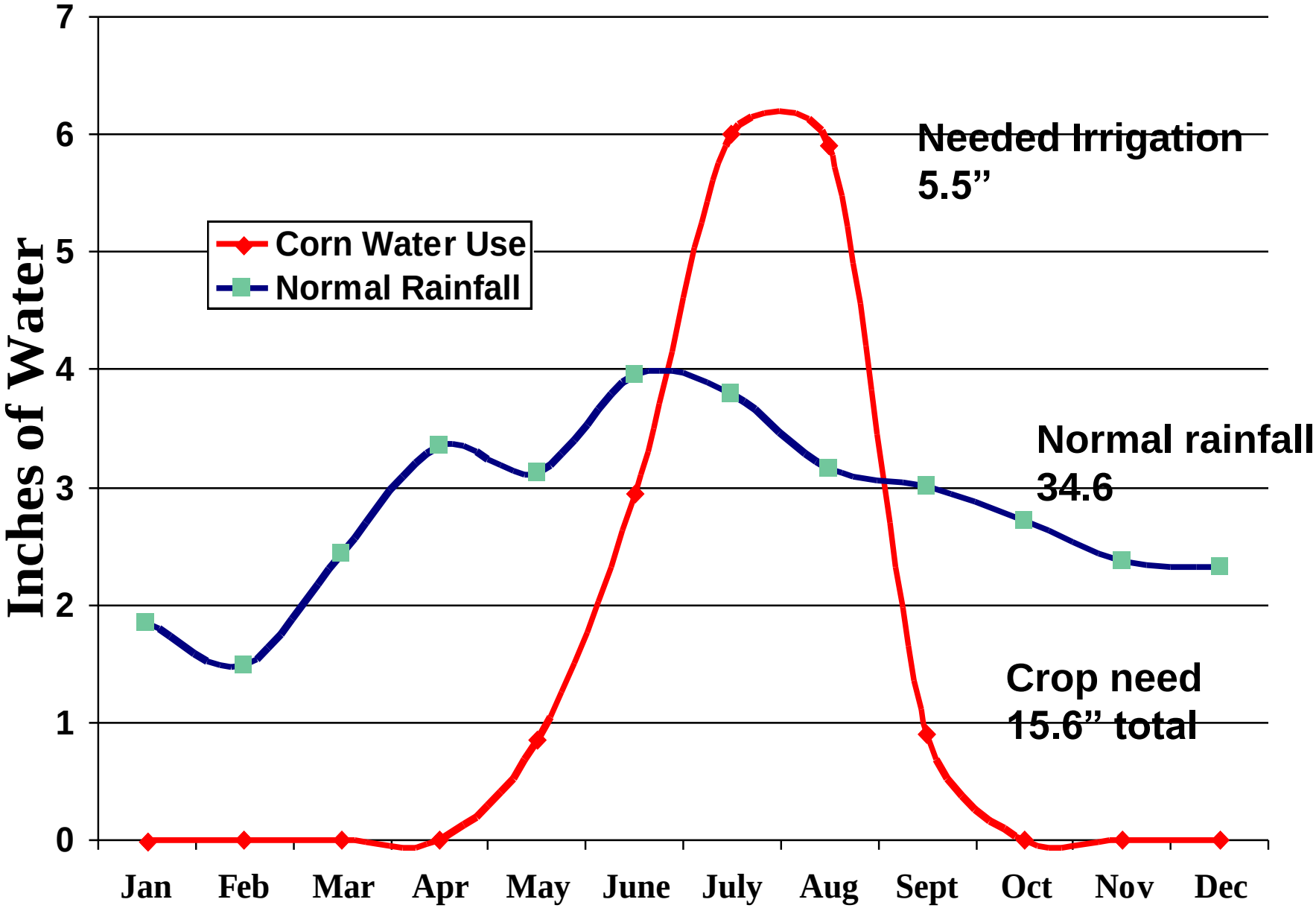
www.msu.edu/stjoseph
- then hit the Irrigation button


Inches of Water
7
6
5
4
3
2
1
0
Corn Water Use
Normal Rainfall
Needed Irrigation
5.5”
Normal rainfall
34.6
Crop need
15.6” total
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec

Prior Appropriation

West of Mississippi

- first in use, first in right
- allows transfer of water rights

Riparian Doctrine

East of Mississippi

- based on Common Law
- handed down from British law
- legal “doctrines”
- interpreted by the courts
  - sets precedents
- may be modified by legislative action

Riparian Doctrine

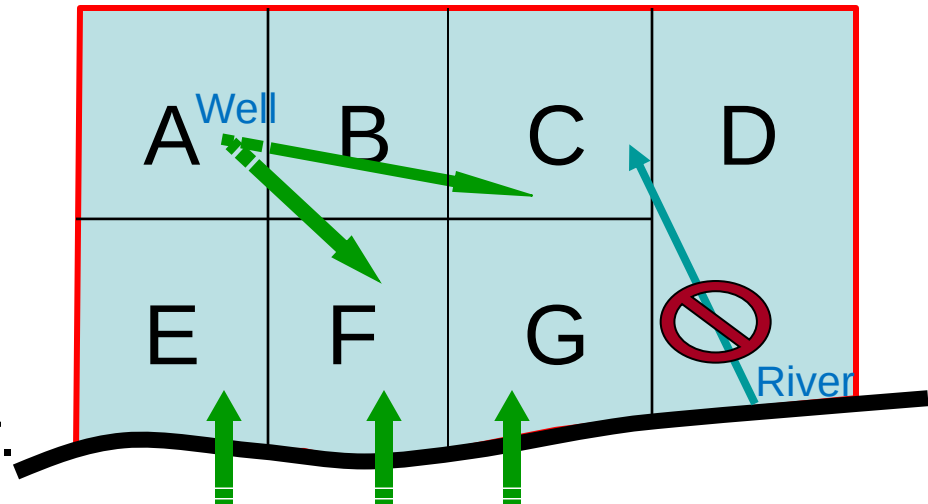
- From ancient public trust doctrine
- Tidelands held by the king for the benefit of all English subjects
- Navigable lakes and streams held in trust for benefit of the people of the state
- Riparian rights subservient to state's public trust authority

A riparian may not…

- Sell or give away those rights
  - Example: drawing water to irrigate non-riparian lots
  - Ground water rights are not the same….
- Diminish rights of other riparian owners
  - Example: excessively lowering lake level through irrigation

Riparian Doctrine, Severance Rule

- Once a parcel has been subdivided, the parcels no longer retaining waters edge loose their Riparian Rights.
- Once rights are lost they may not be regained (reattachment of subdivided parcels does not re-establish their water rights)
- Complaint must be brought to court by a Riparian that can show
- a loss due to another.
- Commonly violated, but one of the easy ways to get injunction against a neighbor.



Large volume water users have a legal responsibility for neighboring wells

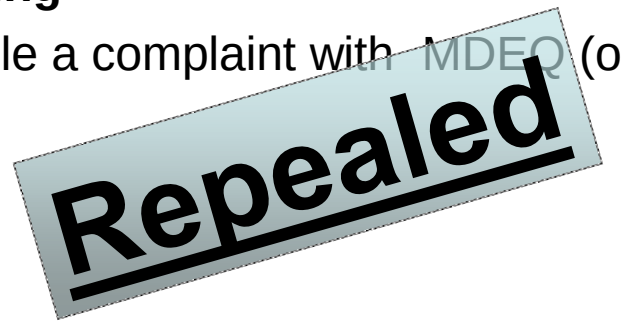
Where neighboring wells were negatively impacted courts have forced large volume water users to improve the affected well to regain its function.

PA 177

<u>Repealed</u> December 2009 due to lack of funding

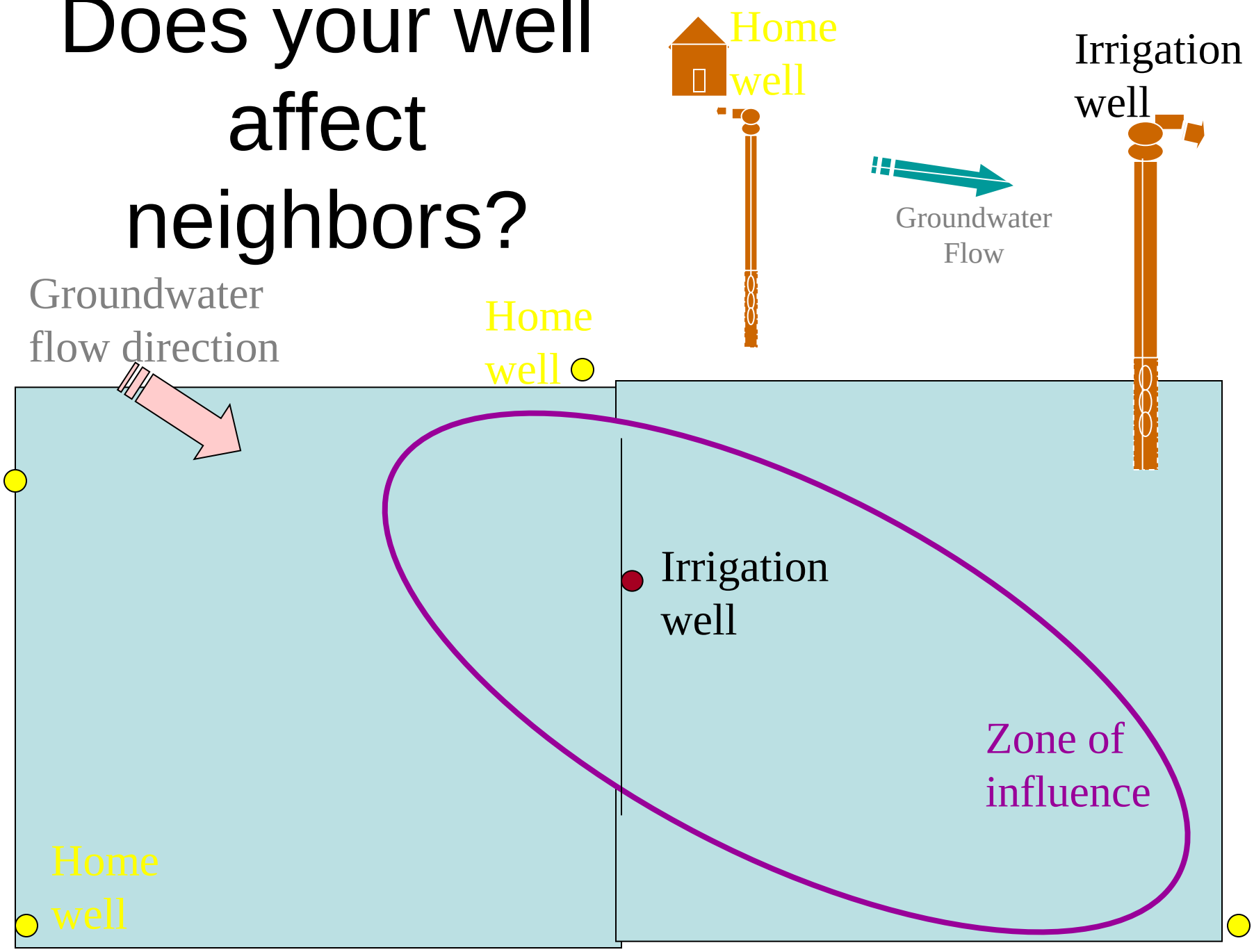
Act 177 allowed owner of a "small quantity well" to file a complaint with MDEQ (or MDA) if well:

- Failed to furnish normal water supply
- Failed to provide potable water

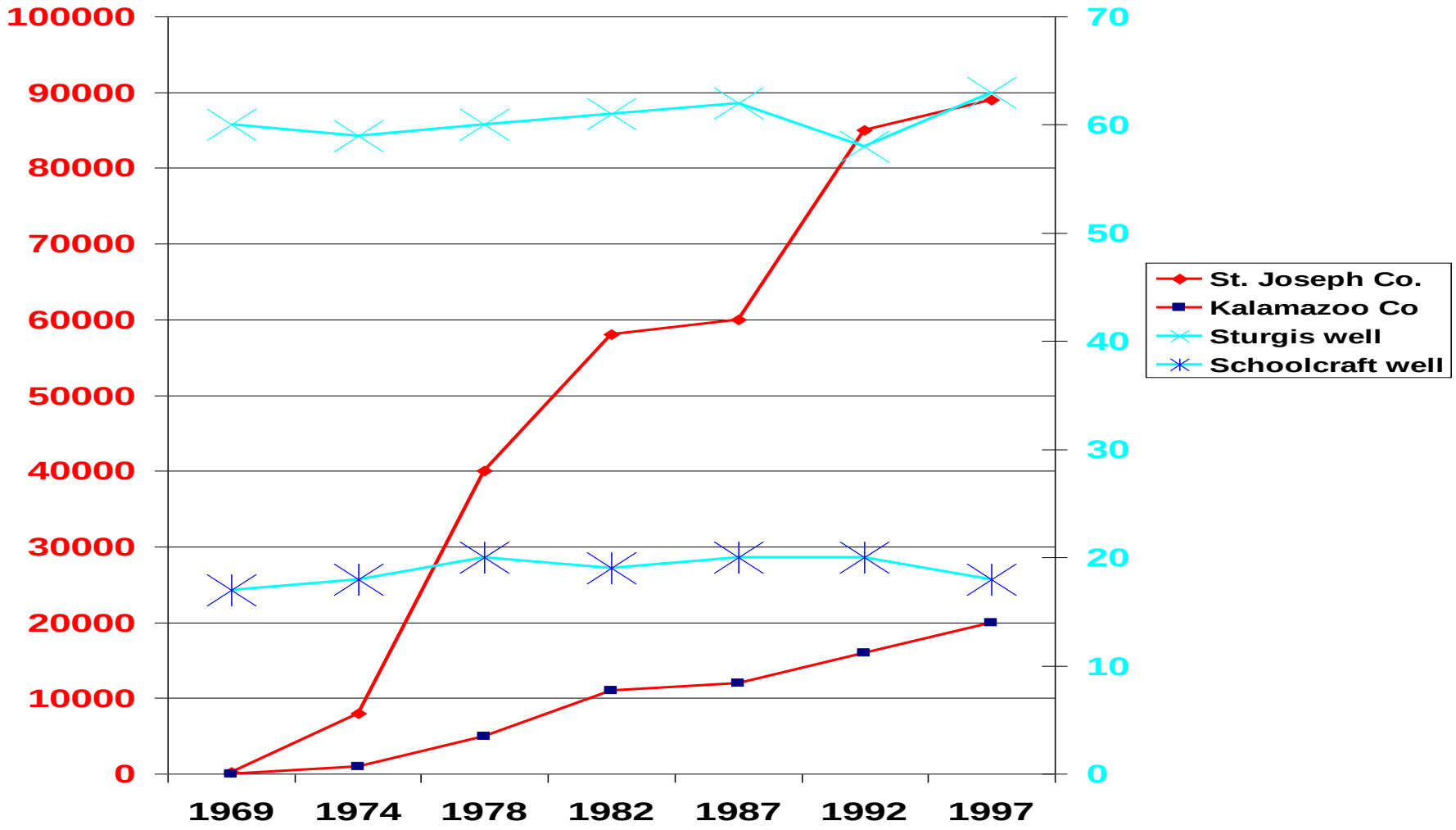


Complainant must have had a credible reason to believe that the problem is caused by a HIGH CAPACITY WELL

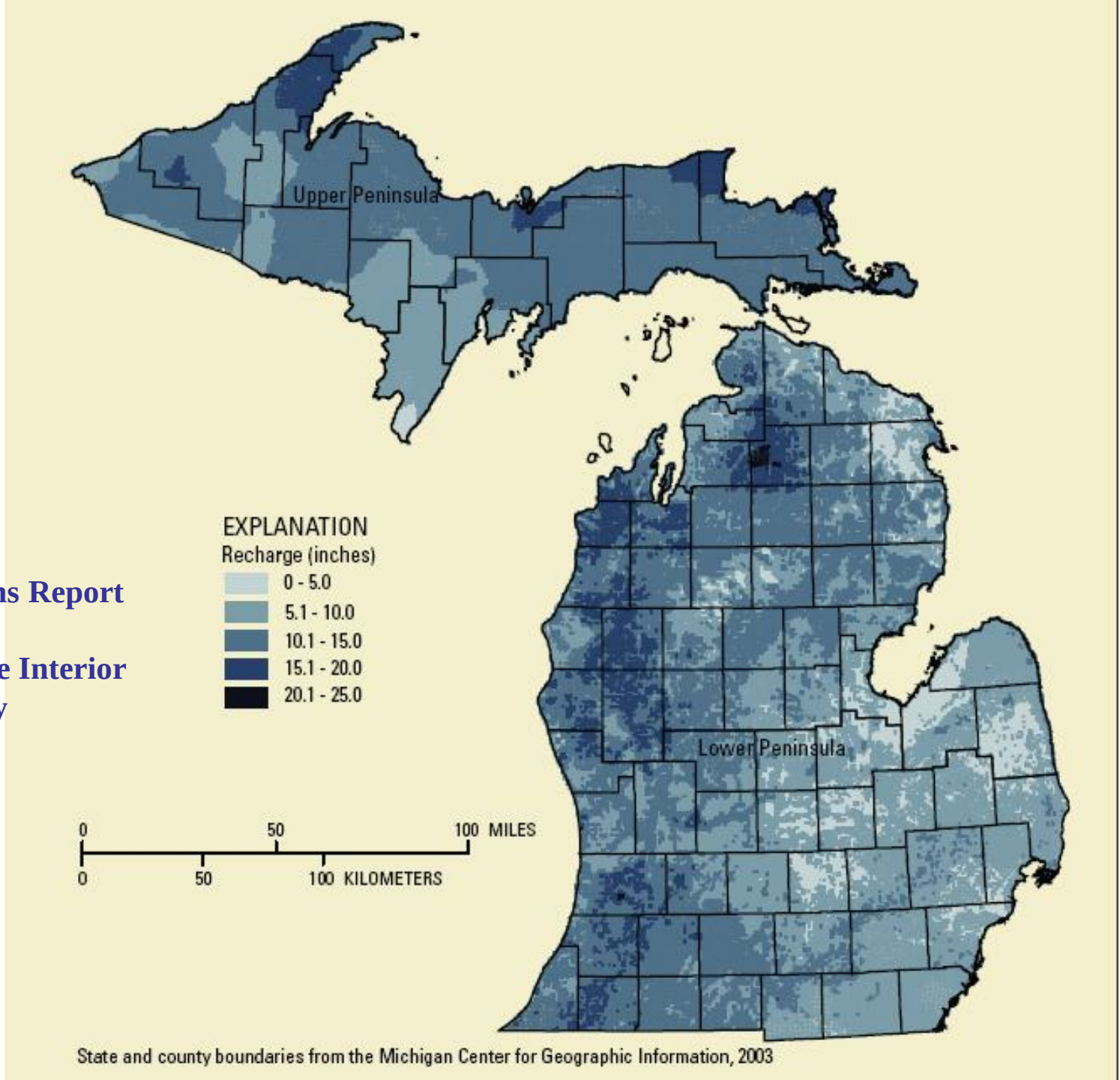
Does your well affect neighbors?



Thirty Years of Increasing Irrigation Have Not Impacted Municipal Water Well Depths



Estimated rainfall recharge



Scientific Investigations Report 2005–5284
U.S. Department of the Interior
U.S. Geological Survey

Irrigation assets of Michiana

- Over 600,000 irrigated acre within 2 ½ hour drive of the intersection of US-131 and I 80/90
- Largest pool of irrigated ground east of Mississippi.
- Closest pool of irrigated land to the USA major population centers.
- Sustainable - annual recharge is greater than irrigation use.
- Centered on excellent transportation and utility resources.

Future of Irrigation in Michiana

- Higher transport cost increase interest in moving vegetable/food production back to Midwest.
- Higher input cost increase the desire to reduce risk.
- Michiana has a renewable source of water and only need supplemental irrigation to assure yields and quality

Expect expansion in vegetable, seed production and other specialty crops.

Irrigated land is most often sandy loams that provide improvement for both planting and harvesting options while reducing drought risk.

Great Lakes Charter and Annex Agreements -
The Great Lakes States/Provinces chance to show they can manage water use and deserve the right to control the Great Lake's water resources.

Water Use Reporting
2006 Requirements -PA 33 -34

– Require permits for new uses over 2 million gallons per day.

– Sets a performance standard for Large scale water users. (> 70 gallon/minute) and reporting

" no adverse resource impact”

– Where agriculture fits:

> 100,000 gal. a day < 2 million gal. per day.

Need to register and report, no permit required

Permit Threshold - 2 mg/d 30 day average, common distribution system

100,000 gal./day = 70 gal./min. capacity - report

1 million gal./day = 700 gal./min. capacity

2 million gal./day = 1400 gal./min. capacity - permit

30 day average example:

1400 gal./min. capacity at 50% use = 700 gal./min. capacity

Baseline capacities for pre-2006 withdrawal where establish by the 2006 reporting

2006 WATER USE CONSERVATION PLAN

Required under Part 327 of P.A. 451 of 1994, as amended, MCL 324.32708

Due by April 2, 2007. Failure to report water use as required may result in a civil fine of up to $1,000.

KEEP A COPY OF YOUR COMPLETED REPORT.

Mail to:
Michigan Department of Agriculture
ESD- Water Use Reporting
P.O. Box 30017
Lansing, MI 48909

1. FARM INFORMATION:

Farm Name: _____ Manager/Owner: _____ Phone: _____

Mailing Address City State Zip Code

2. PUMP INFORMATION: PLEASE COMPLETE THE FOLLOWING FOR EACH PUMP YOU OWN AND/OR OPERATE. DO NOT REPORT WATER FROM MUNICIPAL/PUBLIC WATER SUPPLIES. COPY AND COMPLETE ADDITIONAL SHEETS AS NECESSARY.

A. PUMP ID, LOCATION, AND CAPACITY	B. WATER SOURCE	C-1. WATER USES	C-2. WATER USES	C-3. WATER USES
Pump ID: _____ County: Township: Rated Capacity: Gal/Min If a Well, is well log attached? Yes No	☐ Groundwater ☐ Surface Water ☐ Pond Supplied by Well	Crop _____ Acres _____ *Or* Other Use	Crop _____ Acres _____ *Or* Other Use	Crop _____ Acres _____ *Or* Other Use

Static water level: _____ ft. _____ in. Date Taken: _____

Location: Lat. _____ Long. _____

Static water level no longer required

Lat/Lon required only for Wells

Baseline capacity

D. WATER USE BY MONTH: INDICATE REPORTING UNITS ☐ acre-inches ☐ gallons

Jan	Feb	Mar	Apr	May	June	ANNUAL Total:
July	Aug	Sept	Oct	Nov	Dec	

2011 reports due April 1,2012

New online reporting system available *soon* at:

www.michigan.gov/mdard/waterusereporting

Paper version of 2011 reporting form will be posted soon.

Baseline Capacity – 2006 one time opportunity

- "**Baseline Capacity"** - Rated capacity of the system as of February 28, 2006, reported as pump capacity in gal/min.
- Water withdrawal prior to February 2006 are granted a rebuttable presumption of no "adverse resource impact."
- Expansion > 70 gpm constitutes a new withdrawal

Baseline Capacity –one time opportunity repeated in 2008

New vs. Old Water Withdrawals

Old water withdrawal have a rebuttable presumption of no "adverse resource impact"

- **Withdrawal must be established prior to February 28th of 2006**
- **Properly registered and have reported**
- **Not expanded by > 70 gpm**

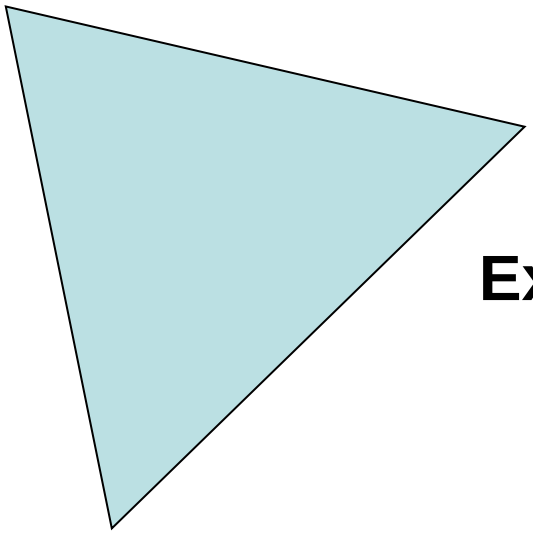
New water withdrawals

- **Must meet the no "adverse resource impact" standard**
- **Compete for the water available with old withdrawal, fire, municipal and clean-up water uses.**

(Water users committees)

Can the three way balance?

Riparian Rights
New water users



Grand Fathering
Existing water users

"no adverse resource impact"
Fish population

Requirements that Large Capacity Withdrawals (LCW) not cause an Adverse Resource Impact (ARI)

Date	2/28/2006	2/28/2008	7/9/2008	2/1/2009	7/9/2009
ARI standard:	narrative	narrative	narrative	quantitative	quantitative
Presumed no ARI:	1320 feet away from Trout Stream > 150 feet deep	1320 feet away from Trout Stream > 150 feet deep	1320 feet away from all streams > 150 feet deep	1320 feet away from all streams > 150 feet deep	Zone A or B in WWAT DEQ site specific review
Applies to:	Trout Streams	all streams	all streams	all streams	all streams

Narrative: Shall not functionally impair a stream's ability to support characteristic fish populations.

Quantitative: Withdrawal limited to percent reduction of Index Flow as specified in legislation (max 25%).

Water Quantity Needed

- Irrigation water replaces the plant water use (removed from soil)
- Water use is directly correlated to light interception
- 50% light interception results in about 50% of the maximum water use
- Maximum water use mid-July early August, full light interception, highest temperatures and brightest days.

Evapotranspiration (ET) = **fn (net radiation) +**
fn (temperature) +
fn (wind speed) +
fn (air humidity)

FO-01322 Revised 2002

Irrigation Scheduling Checkbook Method

Table 2. Average water use for CORN in inches/day

Temperature F	Week after emergence																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
50-59	.01	.02	.03	.04	.05	.06	.08	.09	.09	.10	.10	.10	.09	.07	.06	.05	.04	.03
60-69	.02	.03	.04	.06	.08	.09	.11	.12	.13	.15	.14	.14	.13	.11	.09	.07	.06	.04
70-79	.03	.04	.05	.07	.10	.12	.15	.16	.17	.19	.19	.18	.17	.14	.11	.09	.07	.05
80-89	.03	.05	.07	.09	.13	.15	.18	.20	.22	.24	.23	.22	.21	.17	.14	.11	.09	.06
90-99	.04	.06	.08	.11	.15	.18	.21	.24	.26	.28	.27	.26	.25	.20	.17	.13	.11	.07
Corn growth stages		↑ 3 leaf			↑ 8 leaf			↑ 1st tassel	↑ silk		↑ blister kernel			↑ early dent	↑ dent			

Table 3. Average water use for SOYBEANS in inches/day

Temperature F	Week after emergence																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
50-59	.02	.02	.04	.04	.06	.07	.08	.09	.09	.09	.09	.08	.07	.05	.05	.03	.02
60-69	.02	.03	.05	.07	.09	.10	.11	.13	.13	.13	.13	.11	.10	.08	.07	.04	.02
70-79	.03	.05	.07	.09	.12	.13	.15	.17	.18	.18	.17	.15	.13	.10	.09	.05	.03
80-89	.04	.06	.10	.13	.16	.19	.20	.21	.22	.22	.21	.18	.16	.13	.11	.06	.03
90-99	.05	.07	.11	.14	.17	.20	.22	.25	.26	.26	.25	.22	.19	.16	.13	.08	.05
Soybean growth stages				↑ 3rd trifoliate				↑ 1st flower	↑ full flower			↑ upper pod filling			↑ 1st yellow pod		

Converting acre inches to gallons for trickle irrigation

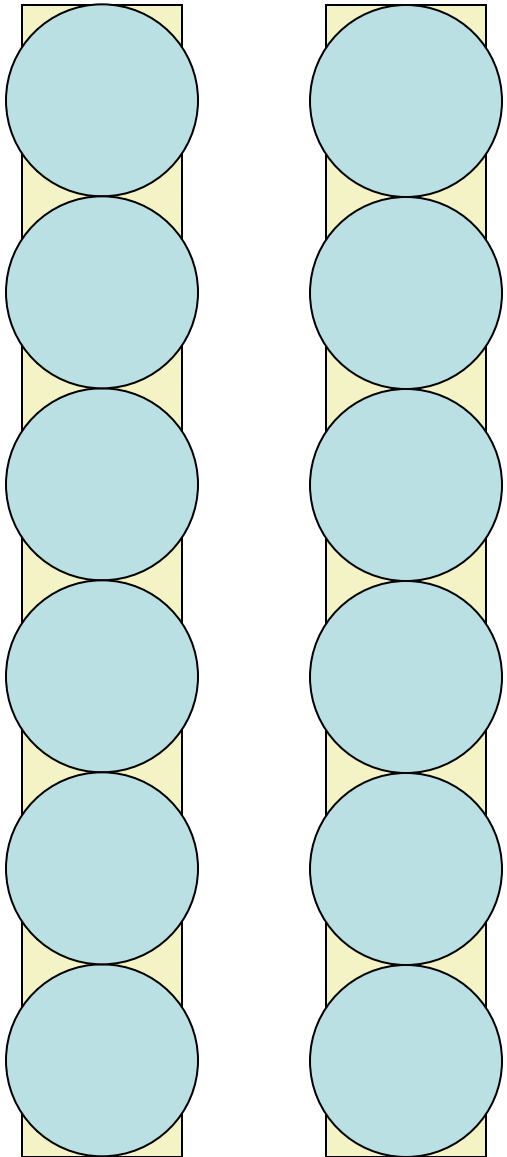
- **Calculate the % of area covered by the plant (% of area you intend to water / plant)**
- **One acre = 43,560 sq.ft.**
- **One acre inch = 27,154 gallons**

Example:
The plants you are watering have a diameter of 6.5 ft.

6.5 ft. x 6.5 ft. = 42 sq.ft. roughly 1/1000 of an acre
26 to 27 gallon / tree = 1” of irrigation

(include uncontrolled grass or weed area that is watered in plant area)

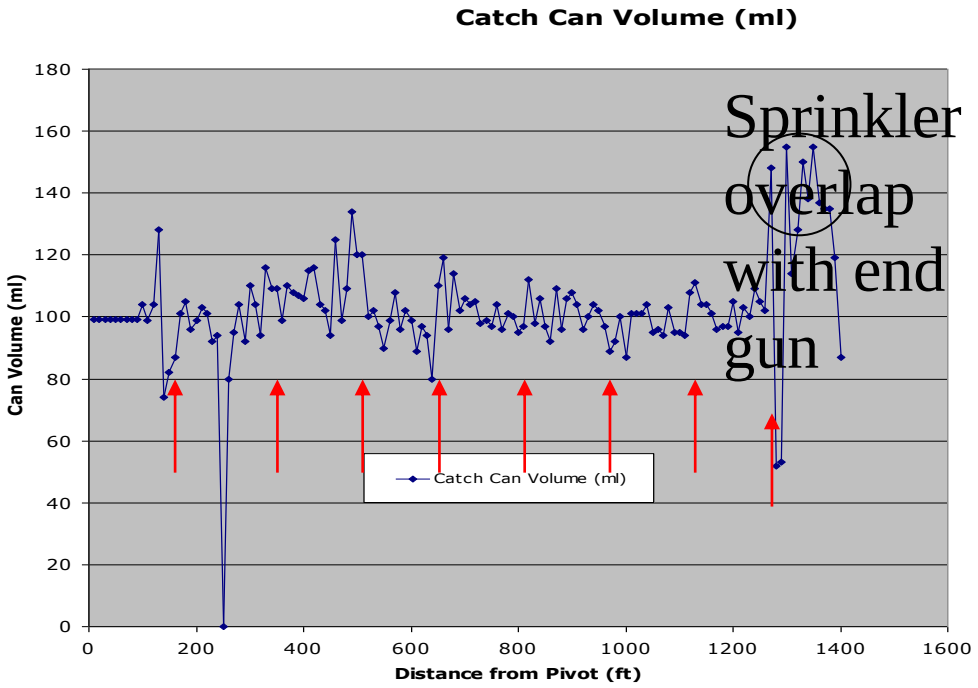
example
1/1000 of an acre, 27 gal = 1” application
10’ x 4.3’ 100’ x 0.4’
20’ x 2.2’ 6.5’ x 6.5’



Three factor reducing effective water application

2. Lack of system uniformity

• 5-35% loss in effectiveness



1. Irrigation Runoff

(comparing irrigation application rate to soil infiltration rate) 0 -30 % loss

3. Evaporative loss to the air

•Minimal loss in our humid area

•0 – 6%

•Estimated 4-6% loss in Nebraska

Quantity Needed

- Maximum water use for most crops is .27 - .32 in./day
- 3 gal/minute/acre pump capacity = 1”/week
- 5 gal/minute/acre pump capacity = .25 in./day
- 7 gal/minute/acre pump capacity =.33 in./day, 1”every 3 days
- 500 gal/minute pump can provide 1” every 4 days on 100 acres

Calculating drought capacity

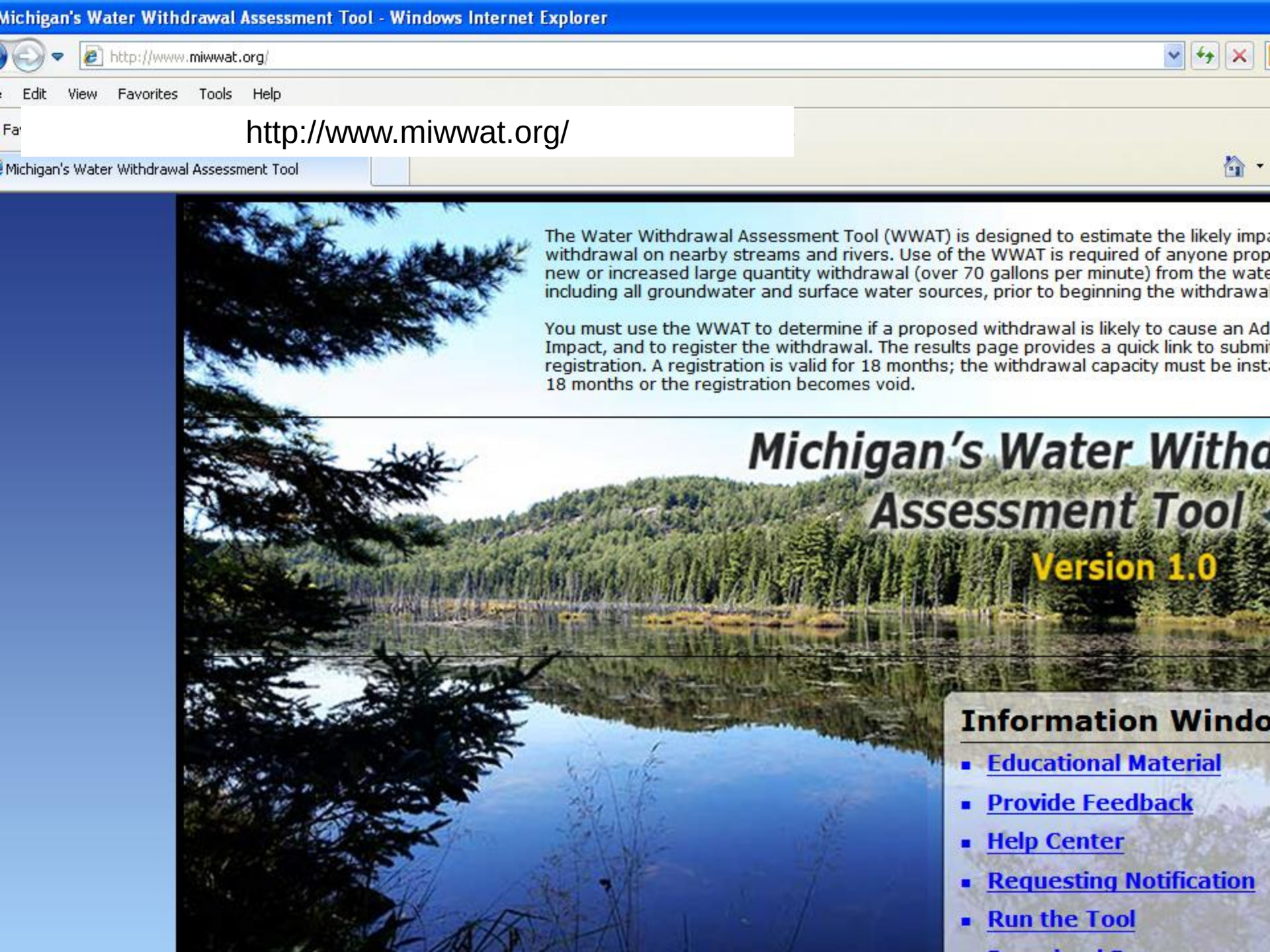
- Crop ET. was 0.30 in./day
- Available water capacity of **03.0 in.** (AWC)
-
- Irrigation system can apply 0.20 in./day.
- Started irrigating when the AWC was **1.0 in.** down
- 3.0 in. (AWC) - 1.0 in. = 2.0 in. available capacity
- 2.0 in. available capacity / 0.10 daily deficit = 20 days
- 20 days of drought capacity.

Can you Irrigate every hour you want ?

Limited Water Supply Irrigation Management

- Diversify the crops sharing the water supply between high and low water use.
- Stagger planting date to stagger peak water need times.
- Plant part of irrigated area to a sacrifice crop to neglect during extended drought.

- Start irrigating early to bank water ahead.
- Stagger forage crop cutting dates to avoid simultaneous peak use.


Michigan's Water Withdrawal Assessment Tool - Windows Internet Explorer
http://www.miwwat.org/
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http://www.miwwat.org/
Michigan's Water Withdrawal Assessment Tool
The Water Withdrawal Assessment Tool (WWAT) is designed to estimate the likely impa
withdrawal on nearby streams and rivers. Use of the WWAT is required of anyone prop
new or increased large quantity withdrawal (over 70 gallons per minute) from the wate
including all groundwater and surface water sources, prior to beginning the withdrawa
You must use the WWAT to determine if a proposed withdrawal is likely to cause an Ad
Impact, and to register the withdrawal. The results page provides a quick link to submi
registration. A registration is valid for 18 months; the withdrawal capacity must be inst
18 months or the registration becomes void.
Michigan's Water Withd
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Version 1.0
Information Windo
Educational Material
Provide Feedback
Help Center
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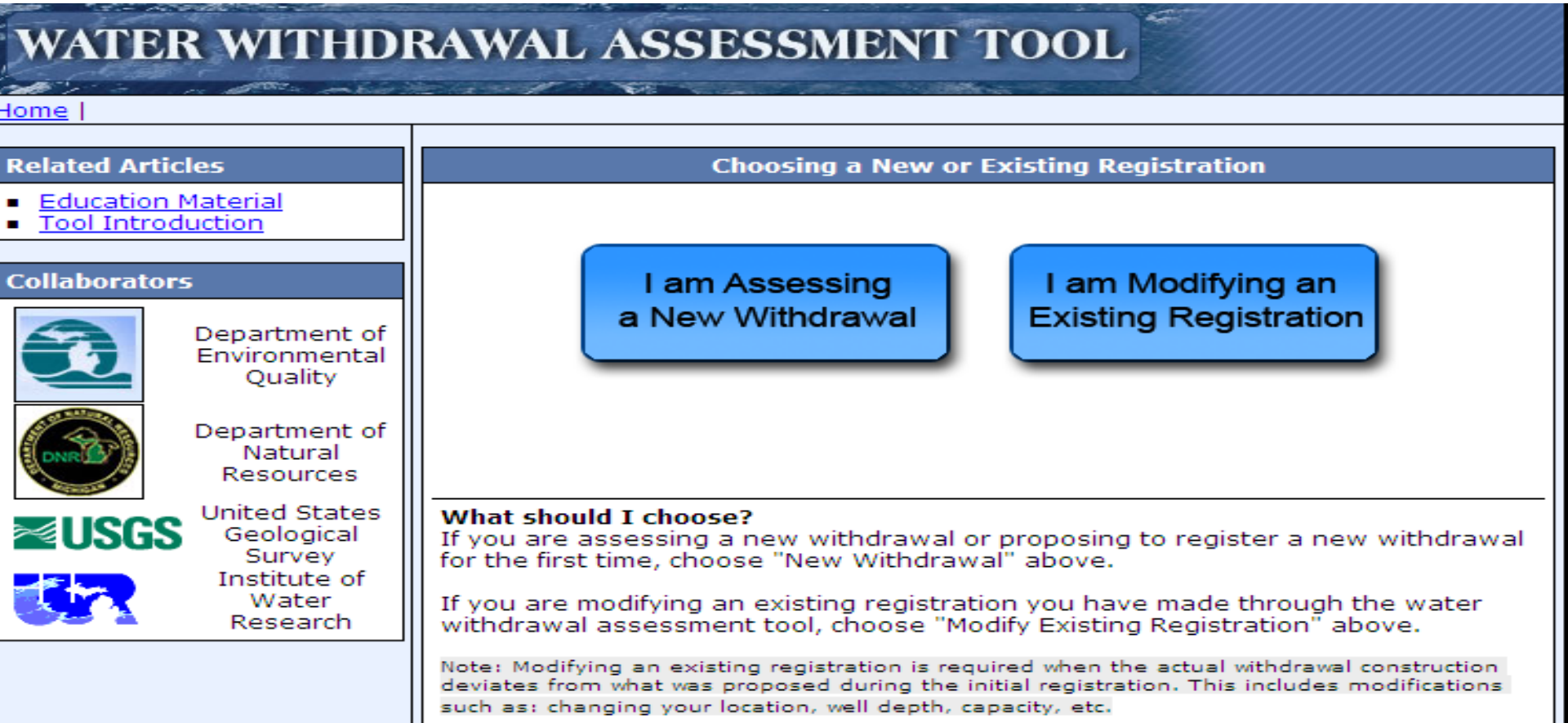
Registration of New Withdrawals

- Proposed withdrawal registered through MIWWAT tool after July 8, 2009 should use the “Modify” button of the MIWWAT to complete an as built registration.



drawal Assessment Tool - Windows Internet Explorer

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miwwat

Tools Help

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al Assessment Tool

Page Safety Tools

Resources

United States Geological Survey

Institute of Water Research

Locate by County

To select the county where the water withdrawal will occur, click the map or choose from the drop down menu.

Sanilac

Find County

Locate by Latitute and Longitude

Enter the latitude and longitude coordinates at or near the withdrawal location. Please input data correctly in order to ensure system accuracy.

Decimal Degrees

Degree Minute Second

Latitude(Y):

Longitude(X):

Find Point Clear

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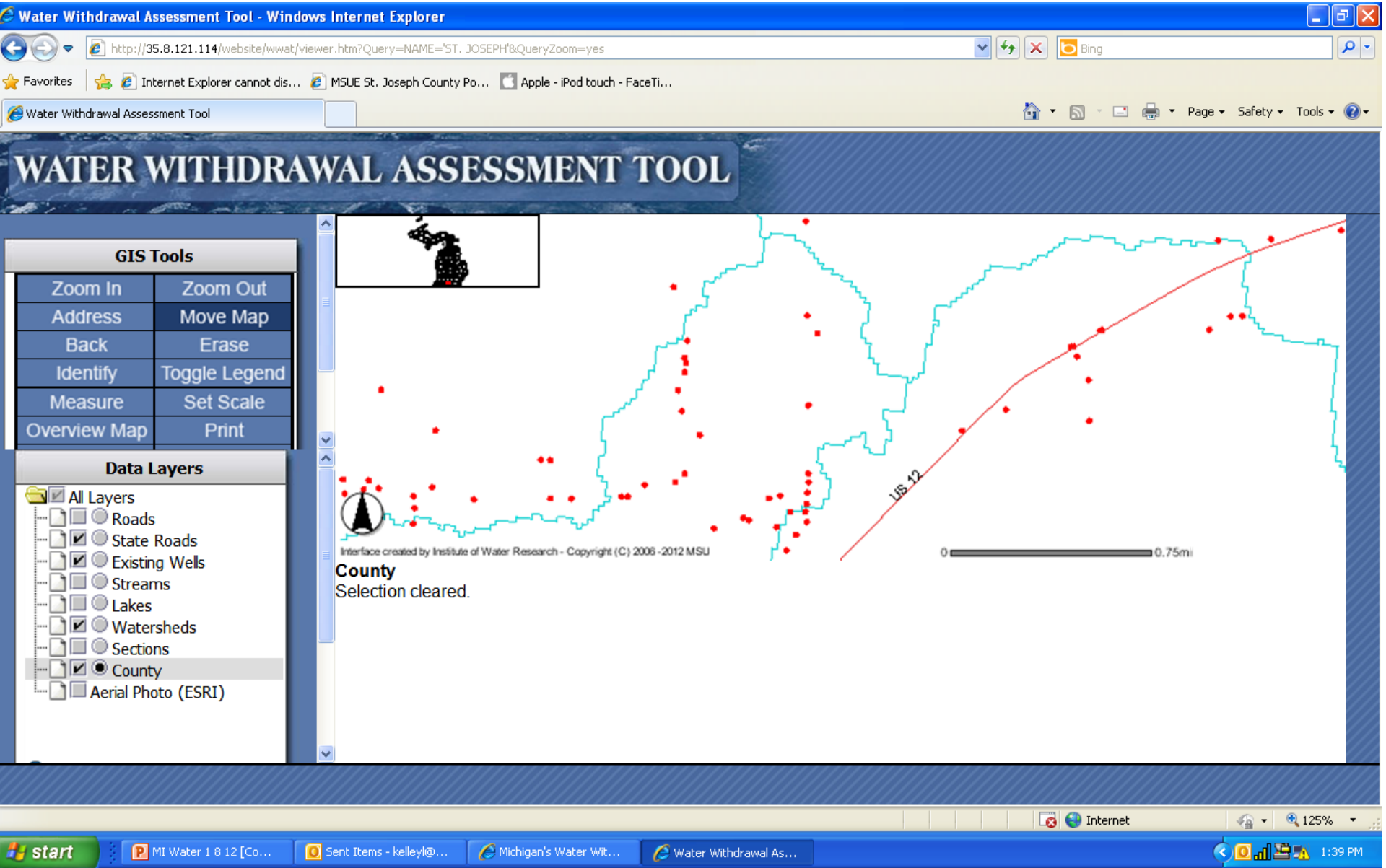
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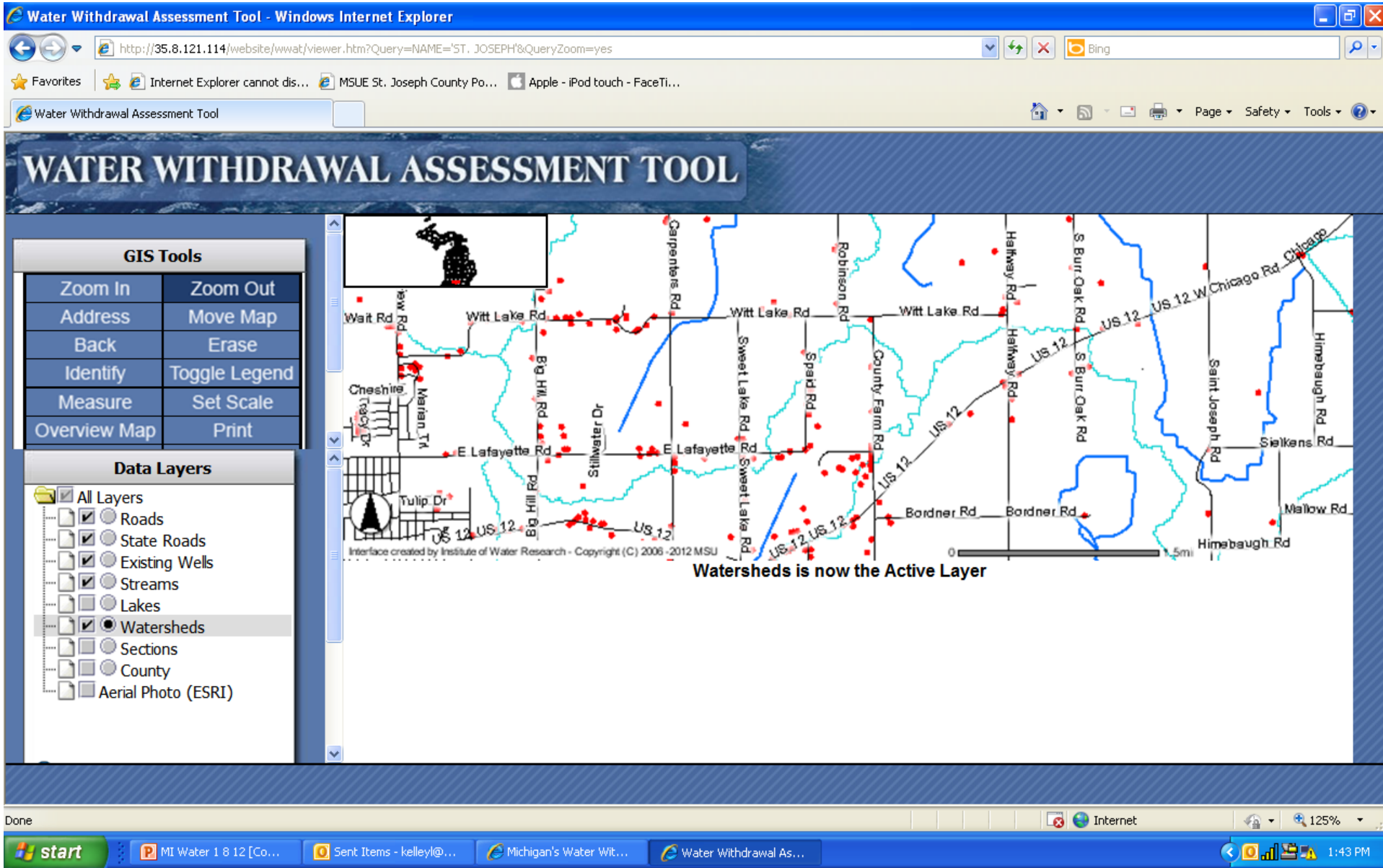
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Sielkens Rd
E Lafayette Rd
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Bordner Rd
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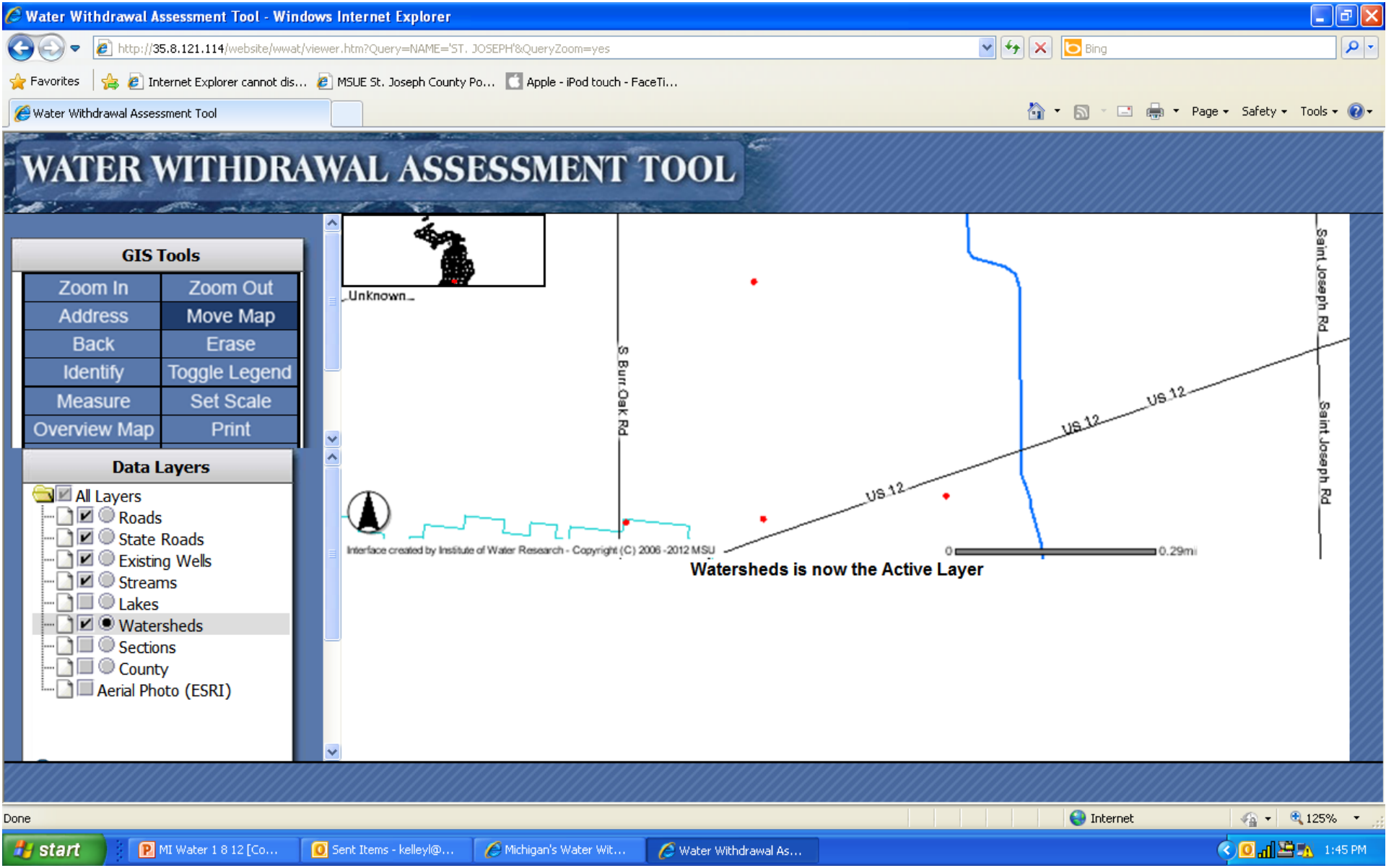
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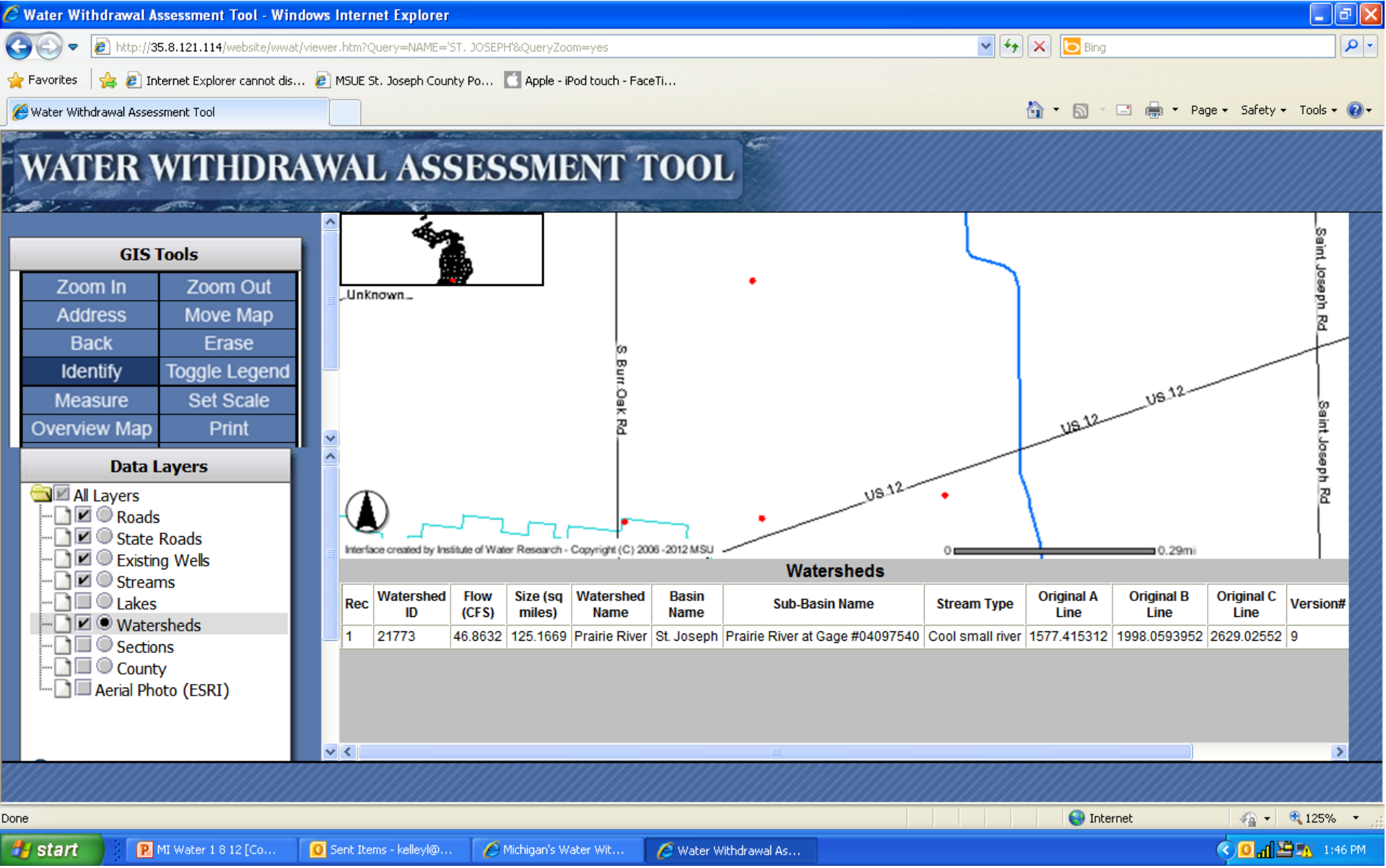


Watersheds

Rec	Watershed ID	Flow (CFS)	Size (sq miles)	Watershed Name	Basin Name	Sub-Basin Name	Stream Type	Original A Line	Original B Line	Original C Line	Version#	Current A Line	Current B Line	Current C Line
1	21773	46.8632	125.1669	Prairie River	St. Joseph	Prairie River at Gage #04097540	Cool small river	1577.415312	1998.0593952	2629.02552	9	409	1381	2839

C- cut off calculation

Base flow = 46.86 cfs

46.86 cfs x 450 gpm = 21,087 gpm

21,087 gpm x 12.5% = 2636 gpm

water shed # 21773

Resulting Maximum Removal

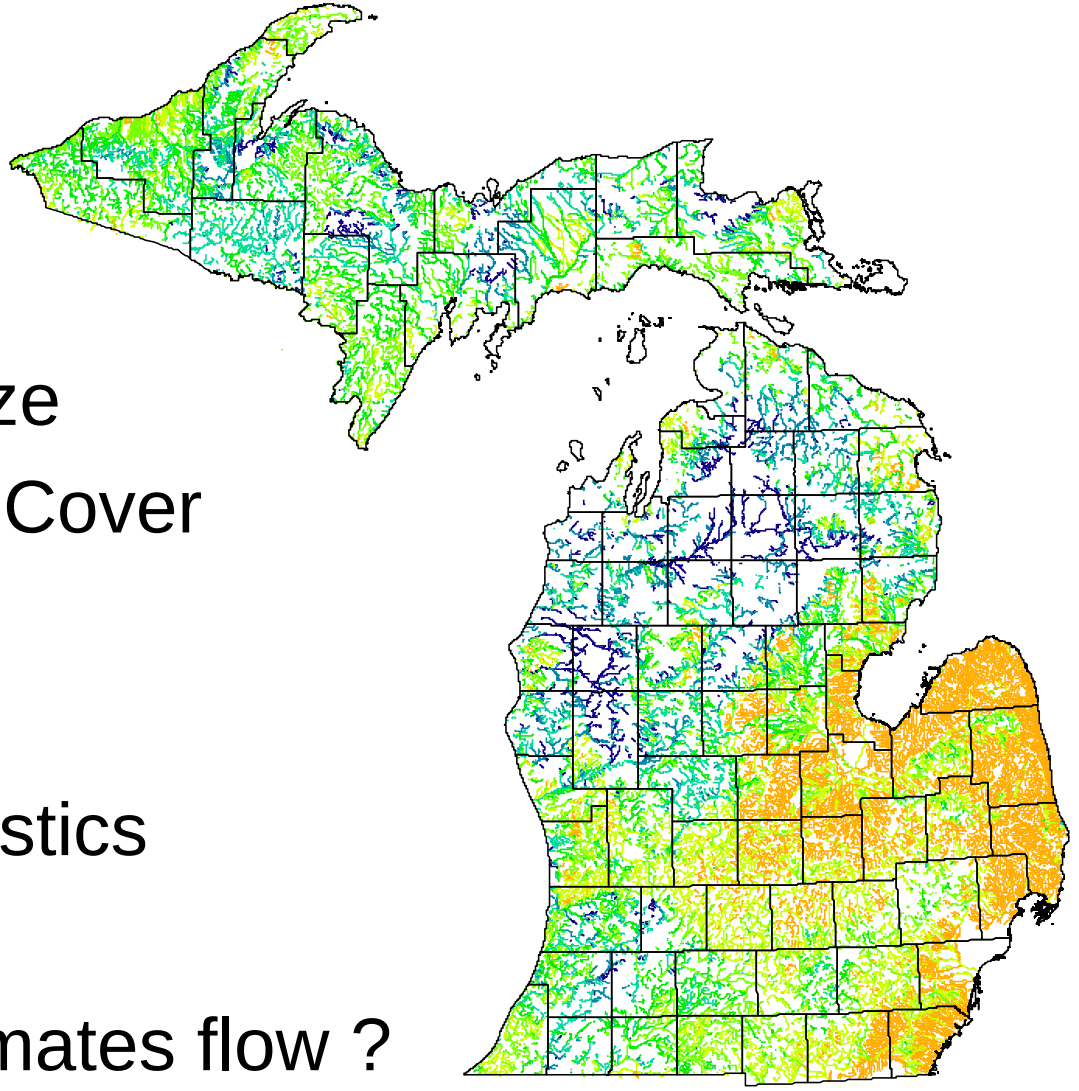
- 25% of warm steams and rivers
- 12.5 % of cool streams and rivers
- 6.25% of transitional cool streams and rivers

Rec	Watershed ID	Flow (CFS)	Size (sq miles)	Watershed Name	Basin Name
1	21773	46.8632	125.1669	Prairie River	St. Joseph

Watersheds

Sub-Basin Name	Stream Type	Original A Line	Original B Line	Original C Line	Version#	Current A Line	Current B Line	Current C Line
Prairie River at Gage #04097540	Cool small river	1577.415312	1998.0593952	2629.02552	9	409	1381	2839

Estimate of stream flow



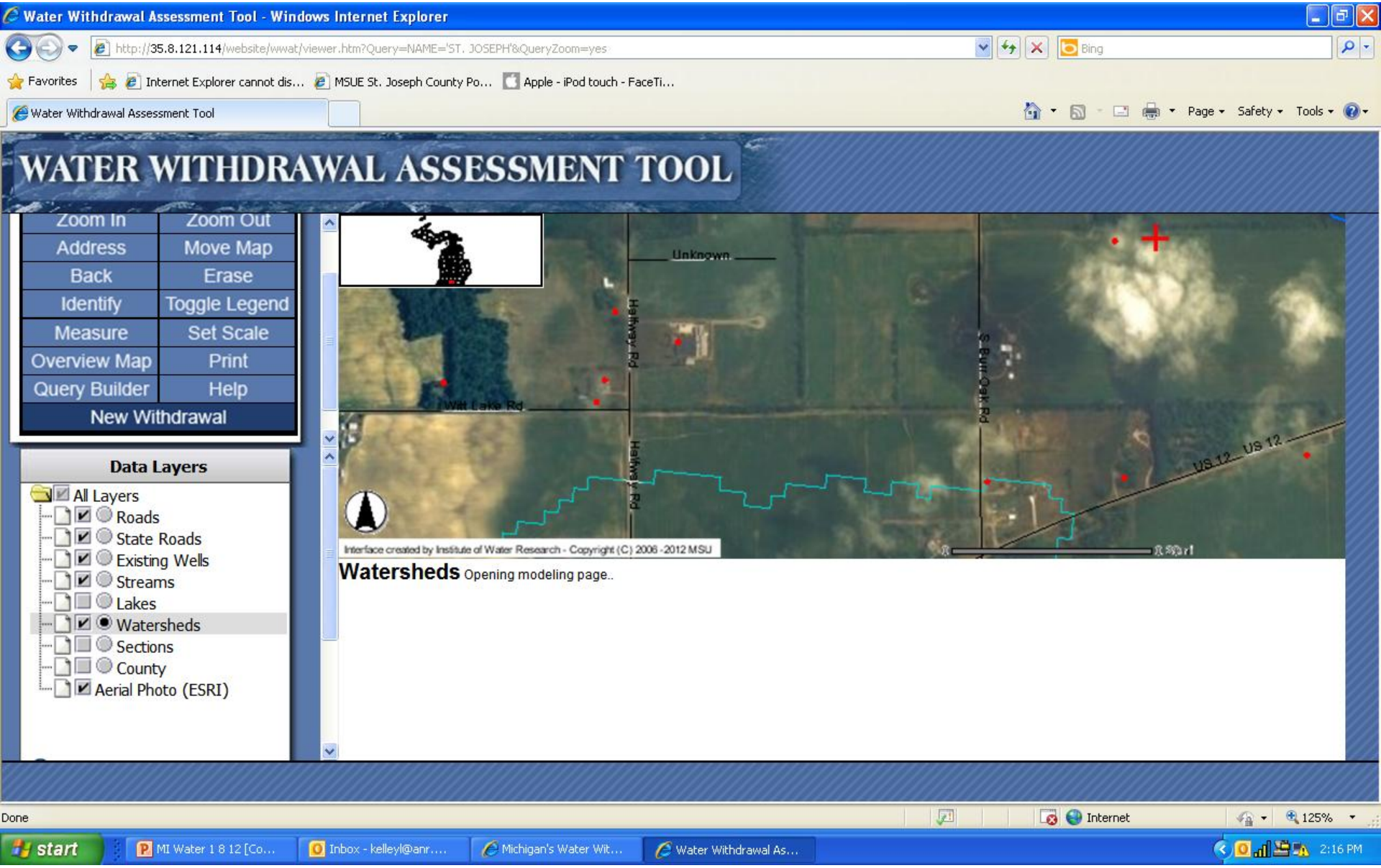
Major Factors Used

- Drainage Basin Size
- Land Use - Forest Cover
- Geology and Soils
- Region
- Uncertainty in statistics

Under or over estimates flow ?

" **No Adverse Resource Impact**" standard

- Defined by changes in the fish population.
- Estimated the removal at base flow (low summer flow) that may result in fish population changes.
- Late additions created a 25% (12 ½% for designated trout stream) maximum allocation named the “C cut off”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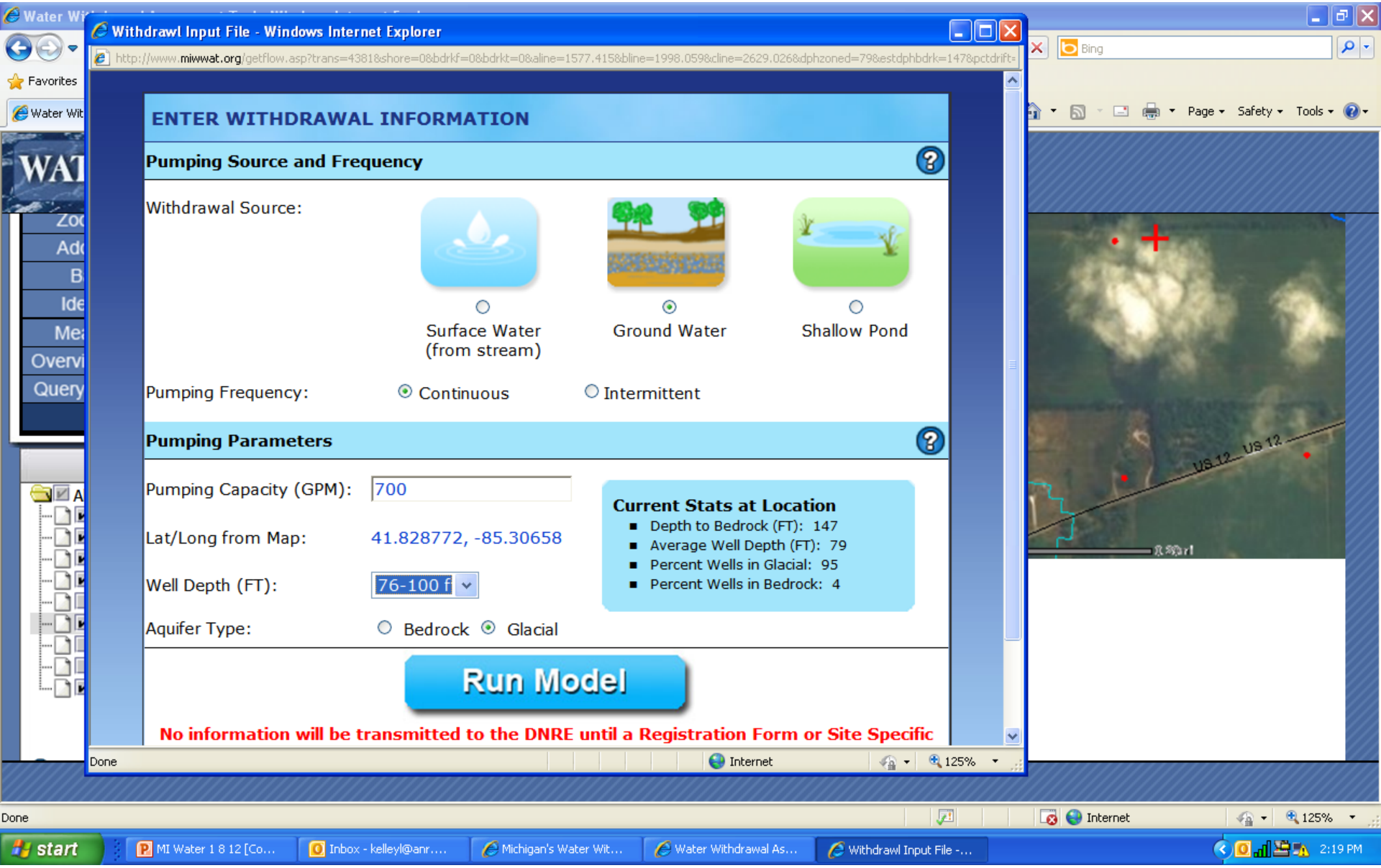
Safety
Tools
WATER WITHDRAWAL ASSESSMENT TOOL
Zoom In
Zoom Out
Address
Move Map
Back
Erase
Identify
Toggle Legend
Measure
Set Scale
Overview Map
Print
Query Builder
Help
New Withdrawal
Data Layers
All Layers
Roads
State Roads
Existing Wells
Streams
Lakes
Watersheds
Sections
County
Aerial Photo (ESRI)
Unknown
Hanway Rd
Wilt Lake Rd
S Centre Rd
US 12
Interface created by Institute of Water Research - Copyright (C) 2006 -2012 MSU
Watersheds Opening modeling page..
Done
Internet
125%
start
MI Water 1 8 12 [Co...
Inbox - kelleyl@anr....
Michigan's Water Wit...
Water Withdrawal As...
2:16 PM

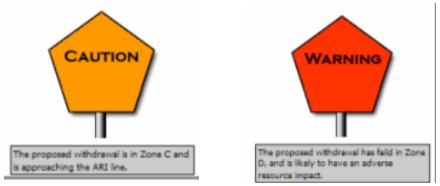

Withdrawl Input File - Windows Internet Explorer
http://www.miwwat.org/getflow.asp?trans=4381&shore=0&bdrkf=0&bdrkt=0&aline=1577.415&bline=1998.059&cline=2629.026&dphzoned=79&estdphbdrk=147&pctdrift=
ENTER WITHDRAWAL INFORMATION
Pumping Source and Frequency
Withdrawal Source:
Surface Water (from stream)
Ground Water
Shallow Pond
Pumping Frequency:
Continuous
Intermittent
Pumping Parameters
Pumping Capacity (GPM):
700
Lat/Long from Map:
41.828772, -85.30658
Well Depth (FT):
76-100 f
Aquifer Type:
Bedrock
Glacial
Current Stats at Location
Depth to Bedrock (FT): 147
Average Well Depth (FT): 79
Percent Wells in Glacial: 95
Percent Wells in Bedrock: 4
Run Model
No information will be transmitted to the DNRE until a Registration Form or Site Specific
Done
Internet
125%
US 12
US 12
Done
Internet
125%
start
MI Water 1 8 12 [Co...
Inbox - kelleyl@anr....
Michigan's Water Wit...
Water Withdrawal As...
Withdrawl Input File -...
2:19 PM

MIWWAT Output

- All new withdrawals >70 gpm require a MIWWAT registration.

- Green or yellow MIWWAT registrations proceed

- Orange, red or yellow cool stream (trout) require a site specific review



- If the site specific review yields a “NO” then a Water Users Committee can be formed for the water shed.

Michigan's Water Withdrawal Assessment Process for Planning and Watershed Management

- **Water users committees**
  - All persons making LQWs within a watershed are encouraged to establish a water users committee to evaluate the status of current water resources, water use, and trends in water use within the watershed and to assist in long-term water resources planning.
  - A water users committee may be composed of all registrants, permit holders, and ***local government officials*** within the watershed.

Slide from Dr. Lusch

Michigan's Water Withdrawal Assessment Process for Planning and Watershed Management

- **Regulatory "teeth" – Civil Actions**
  - Effective Oct. 7, 2008, the MDEQ may request the AG to commence a civil action for a violation under this part, including **falsifying a record** submitted under this part.
  - The court of jurisdiction may restrain the violation and require compliance. It may also impose a civil fine:
    - For a person who **knowingly causes an ARI with a LQW**, a civil fine of not more than **$10,000.00 per day of violation**.
    - For all other violations of this part, a civil fine of not more than $1,000.00.
    - In addition, the AG may file suit to **recover the full value of the costs of surveillance and enforcement by the state** resulting from the violation.

Slide from Dr. Lusch

http://www.miwwat.org/getflow.asp?trans=4381&shore=0&bdrkf=0&bdrkt=0&aline=1577.415&bline=1998.059&cline=2629.026&dphzoned=79&estdphbdrk=147&pctdri

ENTER WITHDRAWAL INFORMATION

Pumping Source and Frequency

Withdrawal Source:

○ Surface Water (from stream)

◉ Ground Water

○ Shallow Pond

Pumping Frequency: ◉ Continuous ○ Intermittent

Pumping Parameters

Pumping Capacity (GPM): 700

Lat/Long from Map: 41.828772, -85.30658

Well Depth (FT): 76-100 f

Aquifer Type: ○ Bedrock ◉ Glacial

Current Stats at Location

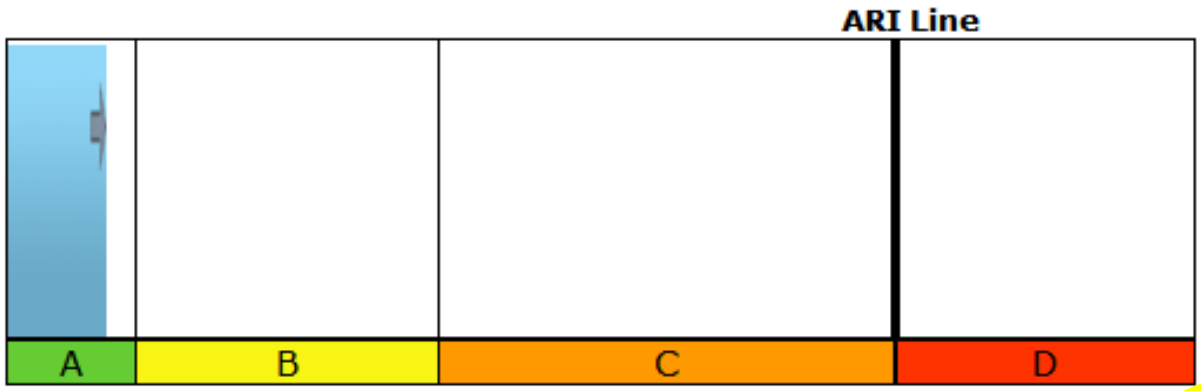
- Depth to Bedrock (FT): 147
- Average Well Depth (FT): 79
- Percent Wells in Glacial: 95
- Percent Wells in Bedrock: 4

Run Model

No information will be transmitted to the DNRE until a Registration Form or Site Specific

Water Withdrawal Screening Results

Adverse Resource Impact (ARI) Graph



The ARI graph above illustrates the estimated removal of water from a nearby [illegible] and its potential for causing an adverse resource impact (ARI).

[illegible]ed withdrawal has passed in

328.16 gpm impact on water shed # 21773 12.5% of the available (1/8) of available

STREAM CLASSIFICATION: C[illegible]

Learn More..

RESULTS:

The proposed withdrawal has passed[illegible]. The projected impact of the withdrawal lies within 'Z[illegible]t likely to cause an adverse resource impact.

REGISTRATION:

Help

Rerun

Register Now

Feedback

Registration Certification
Are you the owner or an authorized representative of the property where this withdrawal will be located?
(•) Yes ( ) No

Receiving Agency
Is the proposed withdrawal for an agricultural purpose*?
(•) Yes ( ) No

*Agricultural purpose includes the commercial production, harvest, and storage of farm products, such as grain and feed crops, forage and sod crops, dairy and livestock, poultry, fruit and vegetables, fish, and nursery stock. Facilities that only process agricultural products, and landscaping businesses that do not raise their own horticultural stock, are not considered for agricultural purposes.

Facility Owner Contact Information

First Name:	Lyndon
Last Name:	Kelley
Facility Name:	J&L Farms
Address:	000000 Burr Oak
City:	Burr Oak
State:	Michigan
Zip:	49032
Phone:	269-535-0343 i.e. 517-123-1414
E-mail:	kelleyl@msu.edu

Withdrawal Information

County:	St. Joseph
Primary Purpose of Use:	Irrigation
Discharge (receiving entity)	none (name/description of discharge location)

Withdrawl Input File - Windows Internet Explorer

http://www.miwwat.org/getflow.asp?trans=4381&shore=0&bdrkf=0&bdrkt=0&aline=1577.415&bline=1998.059&cline=2629.026&dphzoned=79&estdphbdrk=14

ENTER WITHDRAWAL INFORMATION

Pumping Source and Frequency

Withdrawal Source:

(•) Surface Water (from stream)

( ) Ground Water

( ) Shallow Pond

Pumping Parameters

Pumping Capacity (GPM): 700

Lat/Long from Map: 41.828564, -85.300387

Current Stats at Location

- Depth to Bedrock (FT): 147
- Average Well Depth (FT): 79
- Percent Wells in Glacial: 95
- Percent Wells in Bedrock: 4

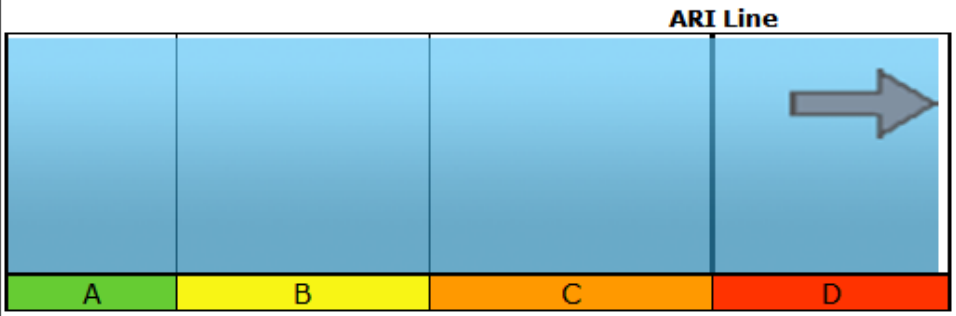
Run Model

No information will be transmitted to the DNRE until a Registration Form or Site Specific Review Request Form has been filled out and submitted. You will have the opportunity to fill out and submit the appropriate form after running the WWAT model.

http://www.miwwat.org/response.asp?id=20061&a=22.3408152&b=55.852038&c=93.08673&welltype=Surface%20Water&rate=700

Water Withdrawal Screening Results

Adverse Resource Impact (ARI) Graph



The ARI graph above illustrates the estimated removal of water from a nearby stream and its potential for causing an adverse resource impact (ARI).

The proposed withdrawal is in Zone D, and is likely to have an adverse resource impact.

Screening Results - SITE SPECIFIC REVIEW IS REQUIRED

STREAM CLASSIFICATION: Cool small river

Learn More..

RESULTS: The projected impact of the withdrawal lies within
likely to cause an adverse resource impact The withdra
without a site-specific review conducted by the Mi
Environmental Quality. To pursue approval fo
submit a request for a site-specific revi

MODIFYING A PROPOS
Changing certain char se
the flow taken from ne elihood of
an adverse resource im teristics may be

Review
Feedback
Print Report
Administrator

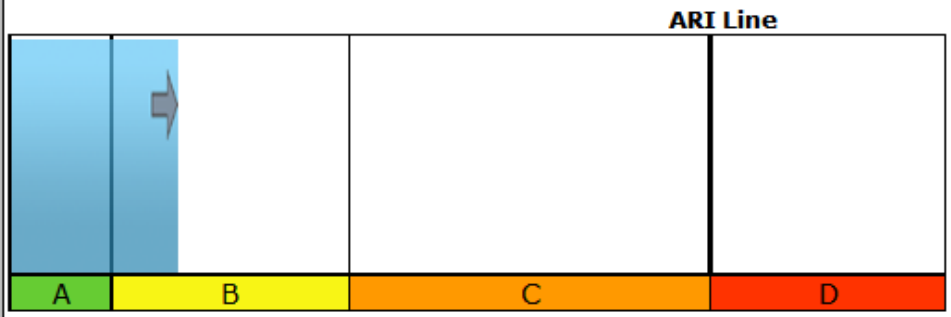
Adverse resource impact predicted
700 gpm impact on water shed
#20061

Sept. 2011
water shed #20061

http://www.miwwat.org/response.asp?count=13&id=21773,19923,20038,20152,20781,20814,20815,20944,21009,21710,21913,21961,21975&estrm=687.457032354161

Water Withdrawal Screening Results

Adverse Resource Impact (ARI) Graph



The ARI graph above illustrates the estimated removal of water from a nearby stream and its potential for causing an adverse resource impact (ARI).

The proposed withdrawal has passed in Zone B.

Screening Results

STREAM CLASSIFICATION: Cool small river

Learn More..

RESULTS:
The proposed
impact of the w
adverse resourc

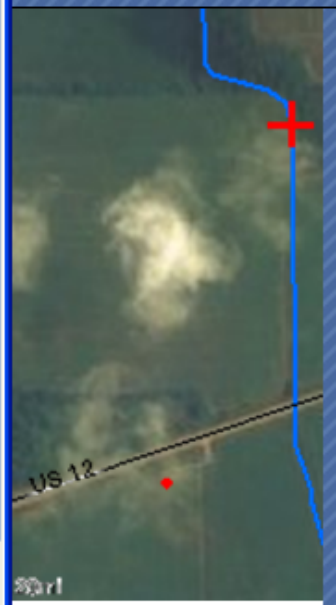
REGISTRATION:
A large quantity wit or greater must
be registered with t mental Quality, or with
the Michigan Departr QW is for an agricultural
purpose, before the w gin. A registration is valid for 18

Actions:

- Help
- Rerun
- Register Now
- Feedback
- Print Report
- Administrator

687.5 gpm impact on water shed # 21773 26% of the available (1/4) of available

Page ▾ Safety ▾ Tools ▾



How much of the Prairie River Watershed could be irrigated?

Water shed # 21773
125 Sq Mi
= 80,000 acre

Direct withdrawals
2629 gpm/5 gpm
=526 acres
0.66% of the total

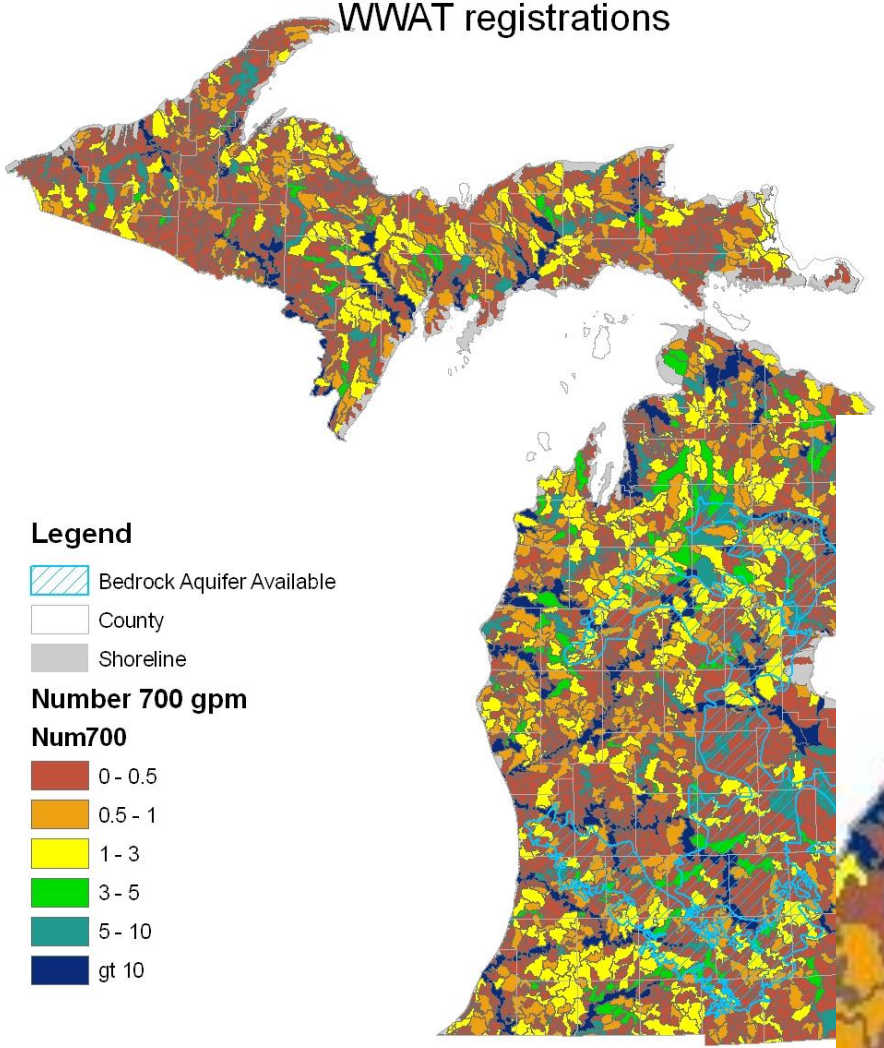
Ground water withdrawals
Assuming 25% impact
2629 gpm/5 gpm=526
526 acres x 4=2100 acres
2.6% of the total

Rec	Watershed ID	Flow (CFS)	Size (sq miles)	Watershed Name	Basin Name
1	21773	46.8632	125.1669	Prairie River	St. Joseph

Watersheds

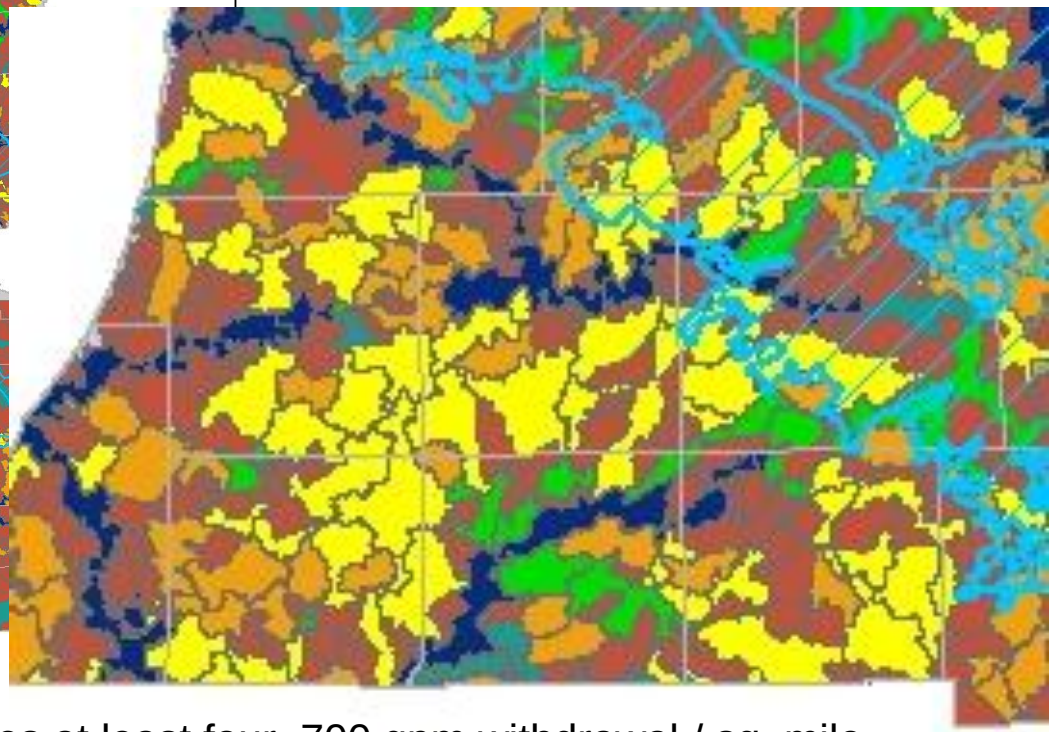
Sub-Basin Name	Stream Type	Original A Line	Original B Line	Original C Line	Version#	Current A Line	Current B Line	Current C Line
Prairie River at Gage #04097540	Cool small river	1577.415312	1998.0593952	2629.02552	9	409	1381	2839

Max number of 700 gmp direct withdrawals per watershed
Does not account for any new withdrawals since 2006
Also does not account for WWAT registrations



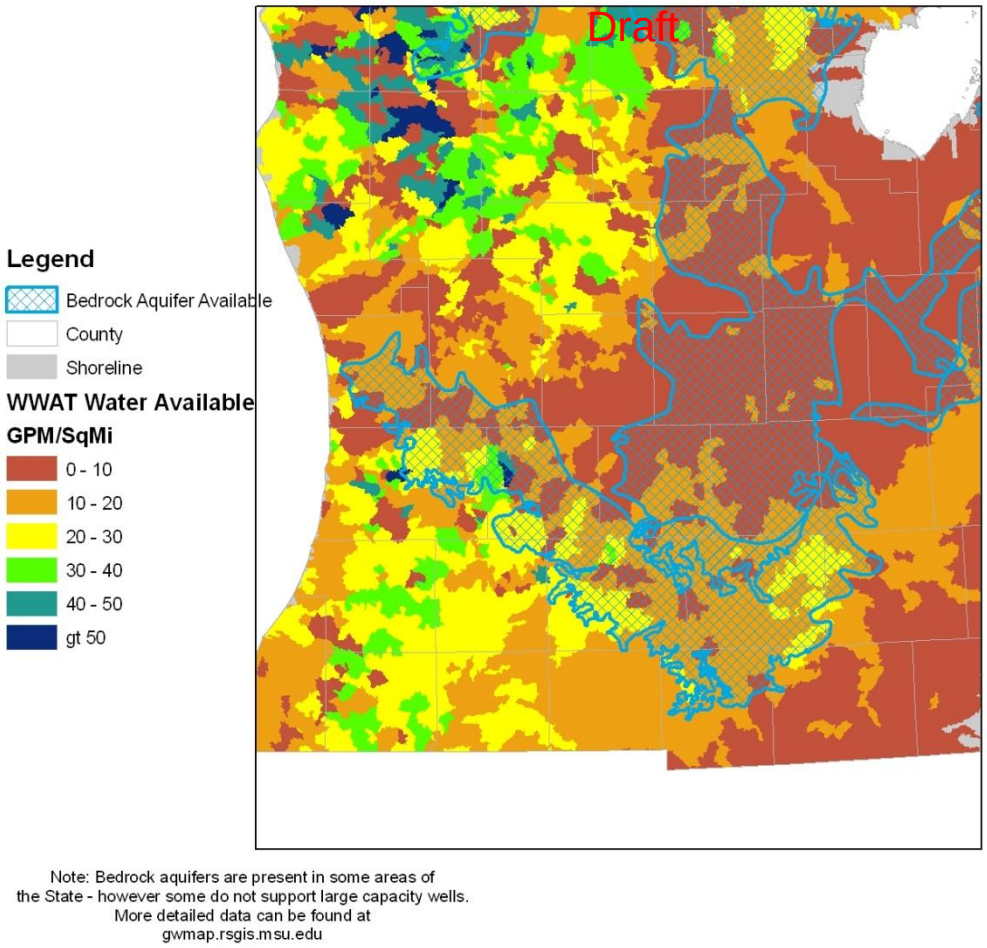
Note: Bedrock aquifers are present in some areas of the State - however some do not support large capacity wells. More detailed data can be found at gwmap.rsgis.msu.edu

Will Michigan's new water policy negatively impact Agriculture and industrial opportunities?



Irrigation requires at least four 700 gpm withdrawal / sq. mile
Watershed range in size from 6 -98 sq. miles

WWAT water available (GPM/sq mi)
Does not account for any new withdrawals since 2006
Also does not account for
WWAT registrations



Note: Bedrock aquifers are present in some areas of the State - however some do not support large capacity wells. More detailed data can be found at gwmap.rsgis.msu.edu

Most of Michigan's irrigate land falls in the 10 to 40 GPM/SqMi. averaging 25 GPM/SqMi.

2800 gpm is required to irrigate a square mile supplying an E.T. of .23"/day

25 GPM/SqMi. / 2800 =0.89%

Roughly only 1% of the area could be supported for irrigation directly from the stream by MIWWAT calculation.

Roughly only 2% of the area could be supported for irrigation if all new withdrawal where strategically placed wells.

4% of the area could be supported for irrigation by use of Site Specific Review system – "Safety factor"

- DNRE may add addition available water as part of the Site Specific review process.
- Bed Rock aquifers maybe an additional source in some areas.

If data used by MIWWAT is correct the index flow would be completely depleted in many heavily irrigated Michigan Counties

County	Irrigated Acres	Total acres	% of county
St Joseph	**104,000**	**325,120**	32
Montcalm	**47,000**	**455,680**	10
Branch	**39,300**	**323,840**	12
Kalamazoo	**29,600**	**362,880**	8
Cass	**25,400**	**312,320**	8
Van Buren	**23,900**	**388,480**	6
Berrien	**19,200**	**371,200**	5
Allegan	**15,300**	**530,560**	3
Ottawa	**13,500**	**360,960**	4
Calhoun	**10,400**	**453,760**	2
Tuscola	**5,800**	**522,240**	1

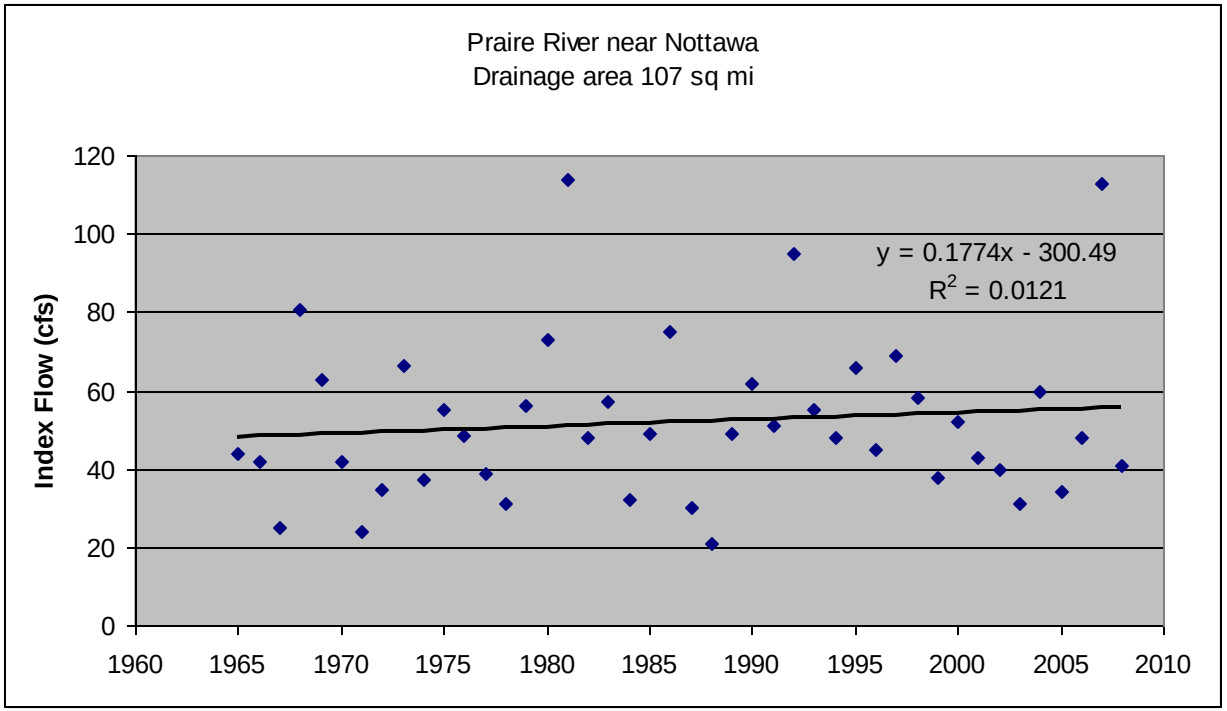
452,000 Michigan irrigated acres

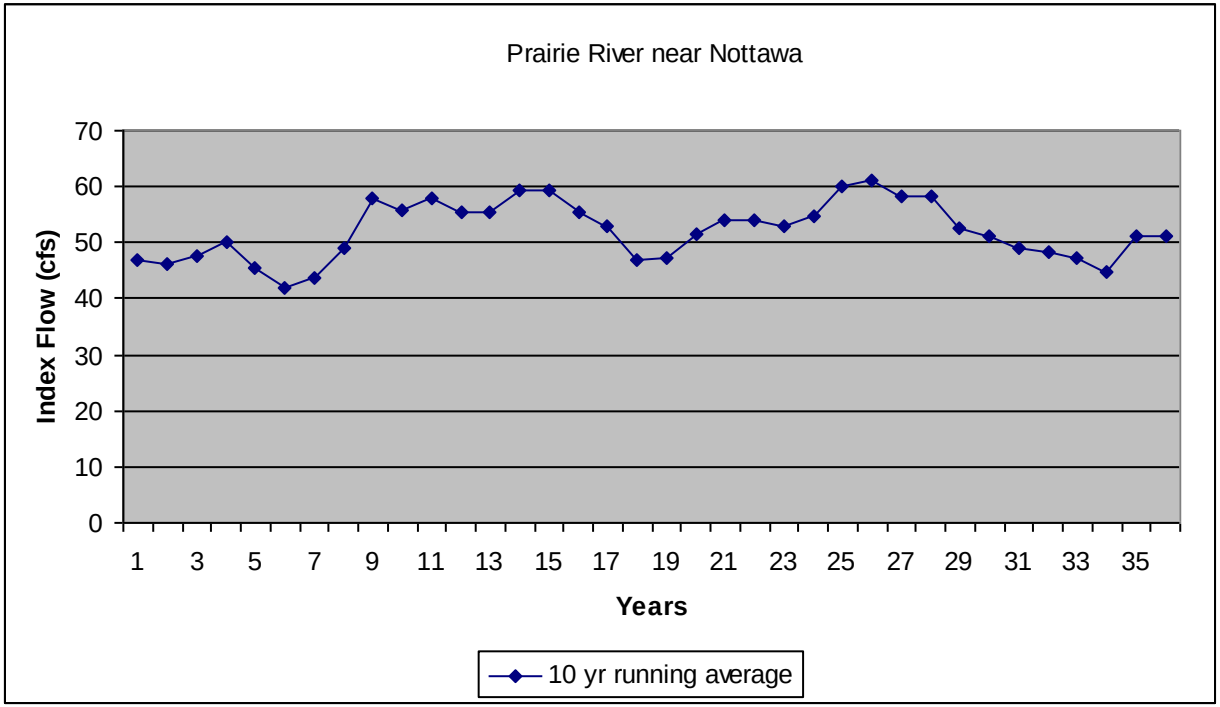
Michigan Ag Census 2002

11 Counties = 73.8 % of total Michigan Irrigation

Summarized from 2002 Agricultural Census

Many Irrigated areas have experienced a 25% expansion since 2002





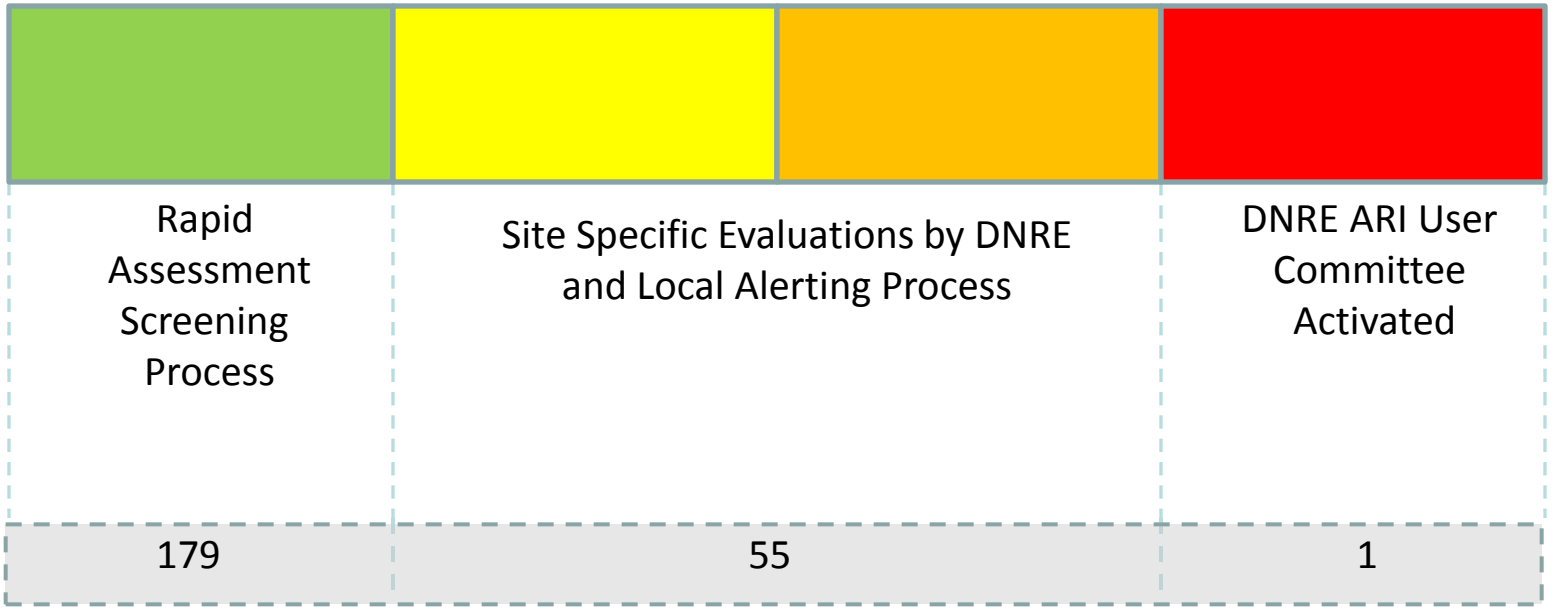
The Prairie River watershed has went from no irrigation in the 1960's to one of the most heavily irrigated watersheds in Michigan in 2009.

Can you find the corresponding reduction in flow?

Are deeper irrigation wells drawing from a Regional aquifer?

Michigan's Water Legislation

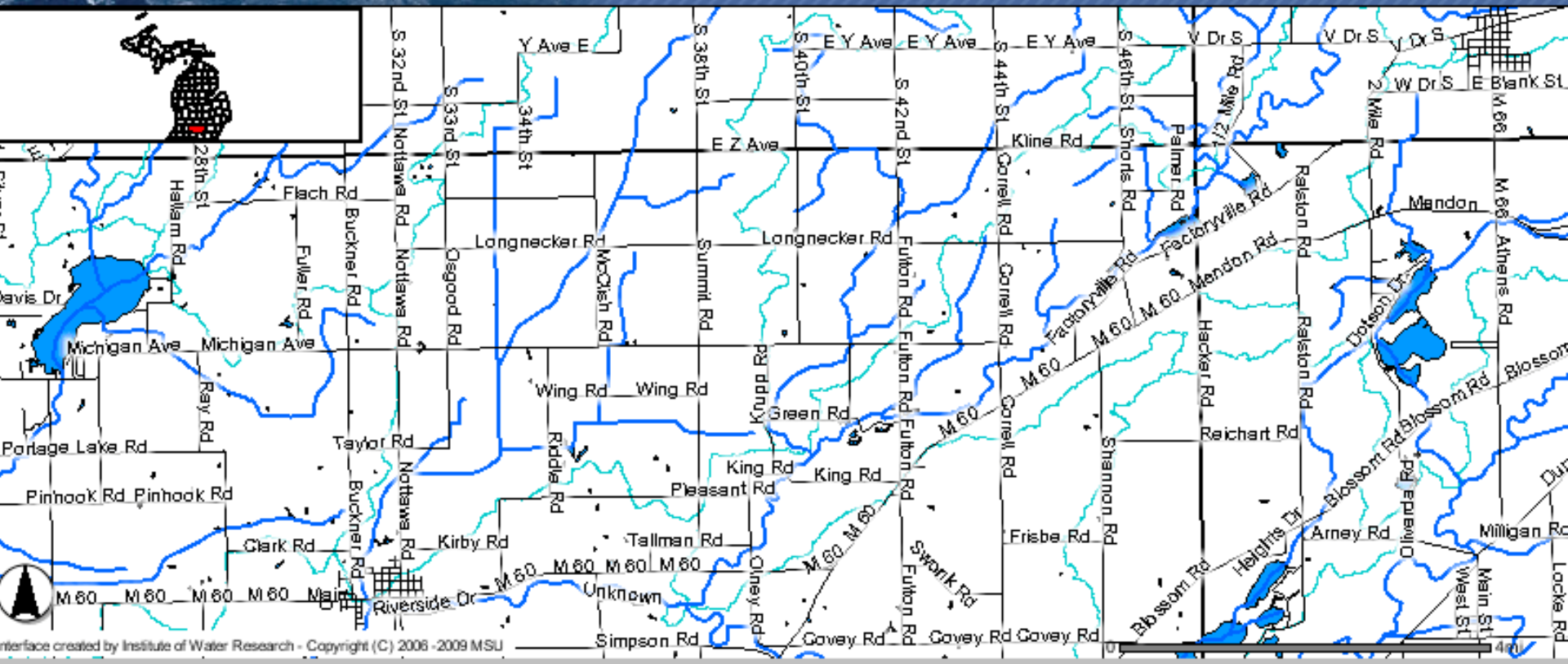
Water Withdrawal Assessment Process



Note: The diagram above does not necessarily depict the A,B,C,D zones of the online screening tool, but generalize their context and illustrate categories of increasing risk

http://www.miwwat.org/

AL ASSESSMENT TOOL



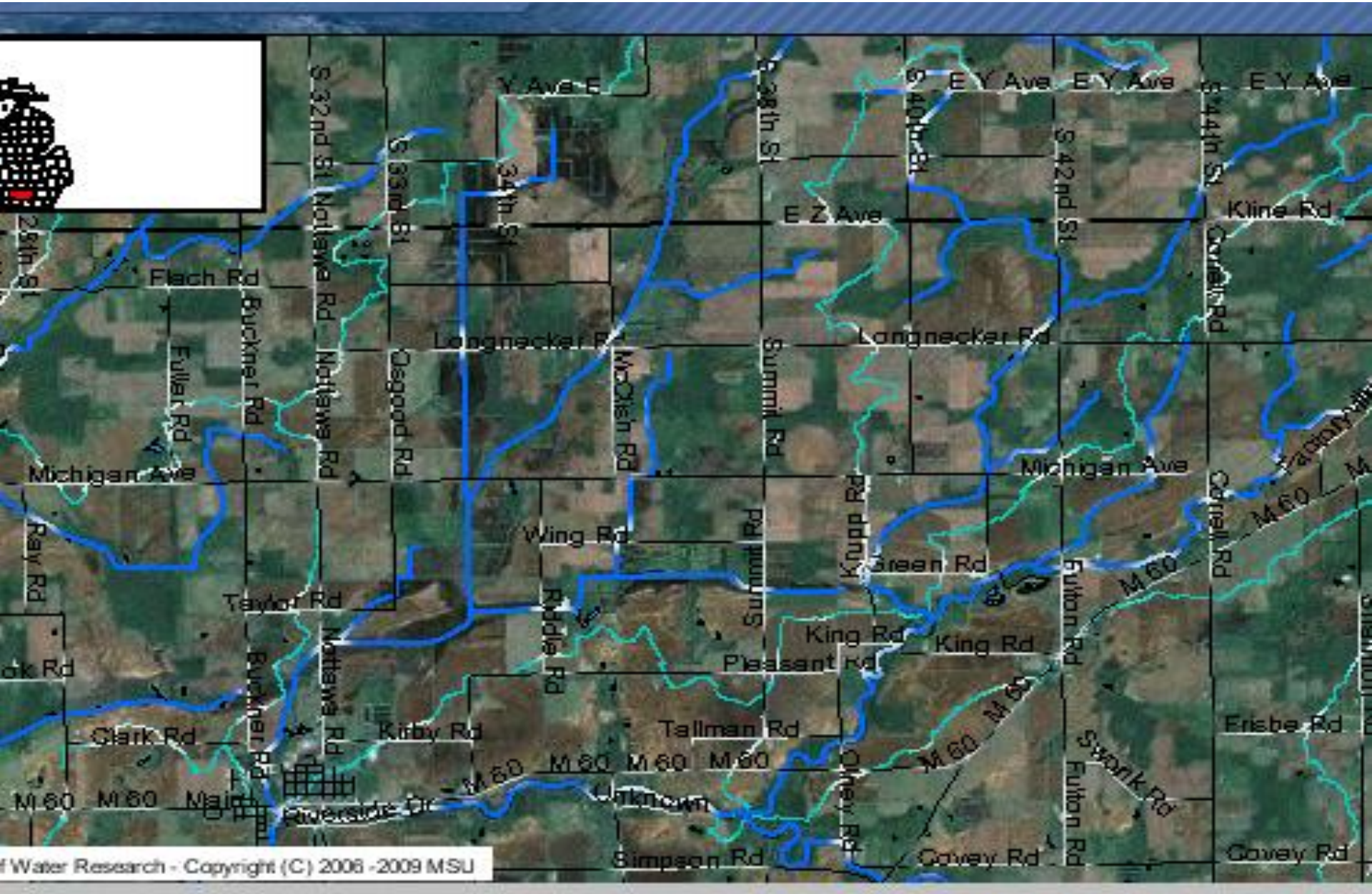
Watersheds

Rec	Watershed ID	Flow (CFS)	Size (sq miles)	Watershed Name	Basin Name	Sub-Basin Name	Stream Type	Version#
1	21048	13.4164	44.3975	Little Portage Creek	St. Joseph	Little Portage Creek at Gage #04097060	Warm stream	8

Little Portage Creek, 44.4 sq. Miles = 28416 acres
13.4 CFS = 6000 gpm
25% available for pumping = 1500gpm
1500gpm / 5gpm / acre = 300 acre of irrigation
300 acre / 28,416 acres = 1% of acre could be irrigated directly from the stream

About 7000 acres are irrigated presently
7000 / 300 = 23X

Little Portage Creek



Example: New Vegetable Processing Plant

- 25,000 acres of green beans
- 4 ton average yield = 100,000 ton
- Estimated 3,000 gpm capacity for plant use
- 25,000 acres on a two year rotation = 50,000 irrigated acres.
- 50,000 irrigated acres X 6 gpm = 300,000 gpm

Processing Plant use is only about 1% of total water need