Containment, Control and Eradication of Ambitious Architects: *Procambarus clarkii*, The Red Swamp Crayfish

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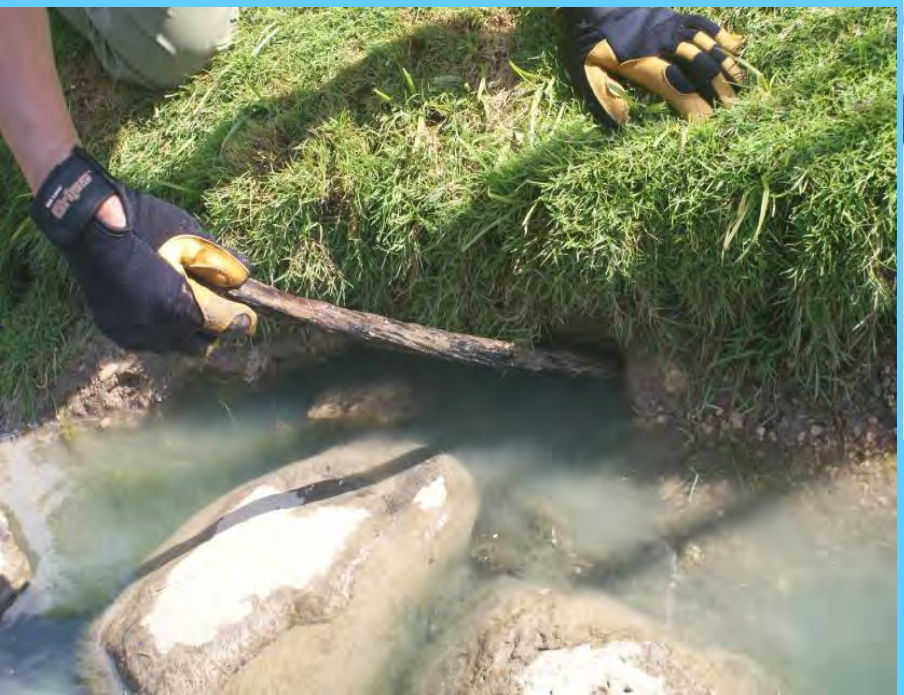
A Few Fun Facts About Red Swamp Crayfish

- Highly Plastic Species
- Up to four reproductive cycles in one season
- Outcompete native crayfish
- Quickly outgrow the size that predators can effectively control them

Red Swamp Crayfish burrowing behavior



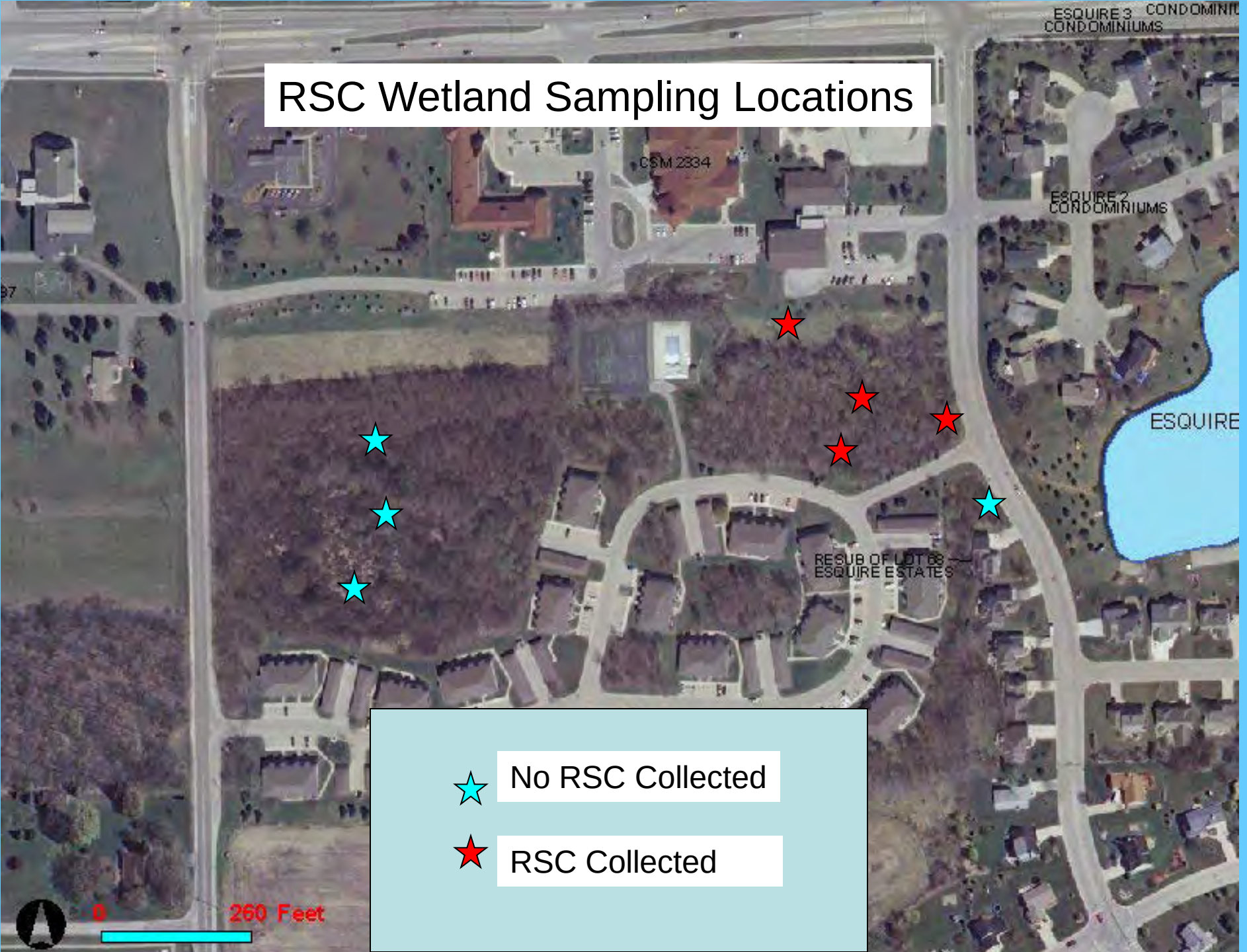
August 25, 2009

Esquire Estates Association
Germantown, WI

- 6 acres
- 5.5’ mean depth
- Registered fish farm
- Four storm sewer inlets
- One outlet
- Ultimately drains to the Menomonee River, tributary to the Milwaukee River

Police Department Stormwater Pond Germantown, WI

- ¼ acre retention pond
- Shallow
- Outlet eventually drains to Esquire Estates Pond


RSC Wetland Sampling Locations
ESQUIRE 3 CONDOMINIUMS
CSM 2334
ESQUIRE 2 CONDOMINIUMS
ESQUIRE
RESUB OF LOT 68 ESQUIRE ESTATES
No RSC Collected
RSC Collected
0
260 Feet

Containment
Barrier Fence

Containment
Block inlets and outlets

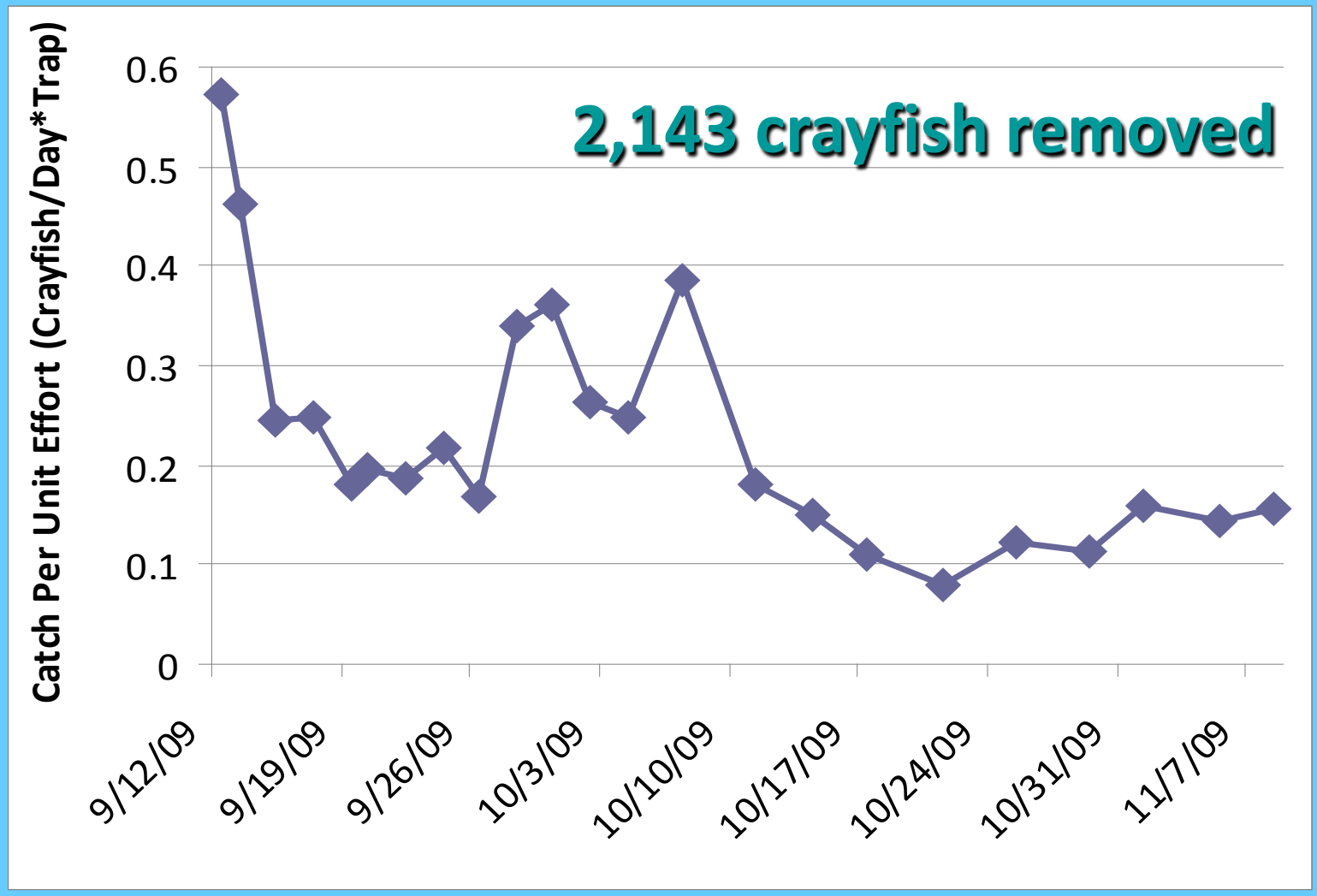
What Crayfish Really Think of Nicotarp…….

Containment
Manual Removal

Esquire Estates

154 baited traps set

Containment
Manual Removal



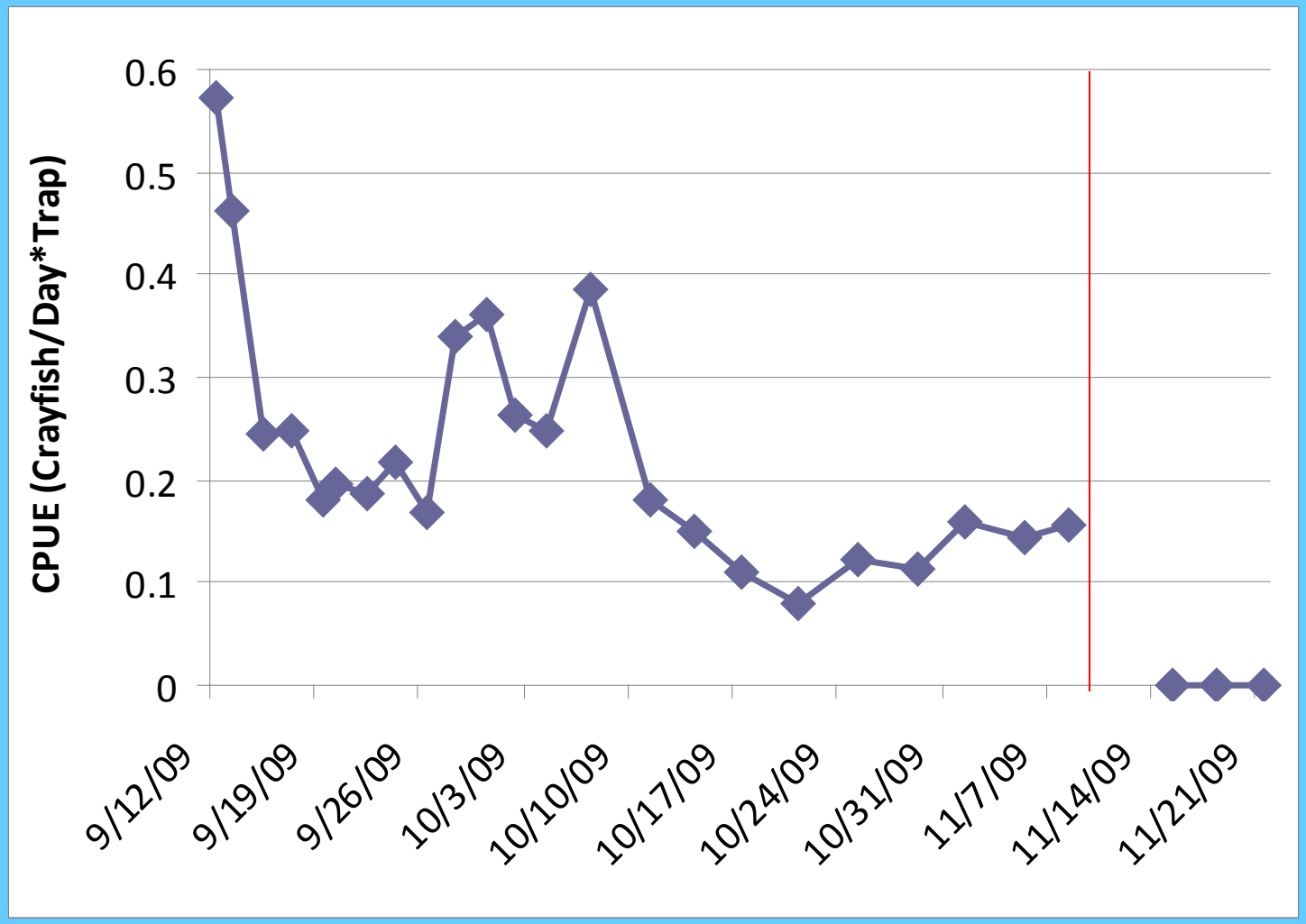
EPA and DATCP Approval Process

- Pyrethroid pesticides, used in Scotland, were not registered by EPA.
- Pyronyl, a botanical pesticide, was labeled for use in the US in wetlands and terrestrial environments, but not ponds.
- Determined that it would take a long period of time to receive approval for the use of Pyronyl.
- As an alternative plan in 2009, we sought permission to use a non-selective pesticide – sodium hypochlorite (“bleach”) combined with winter drawdown.
- Granted a Special Local Needs Approval from FIFRA for the use of the sodium hypochlorite in 2009 and 2010.

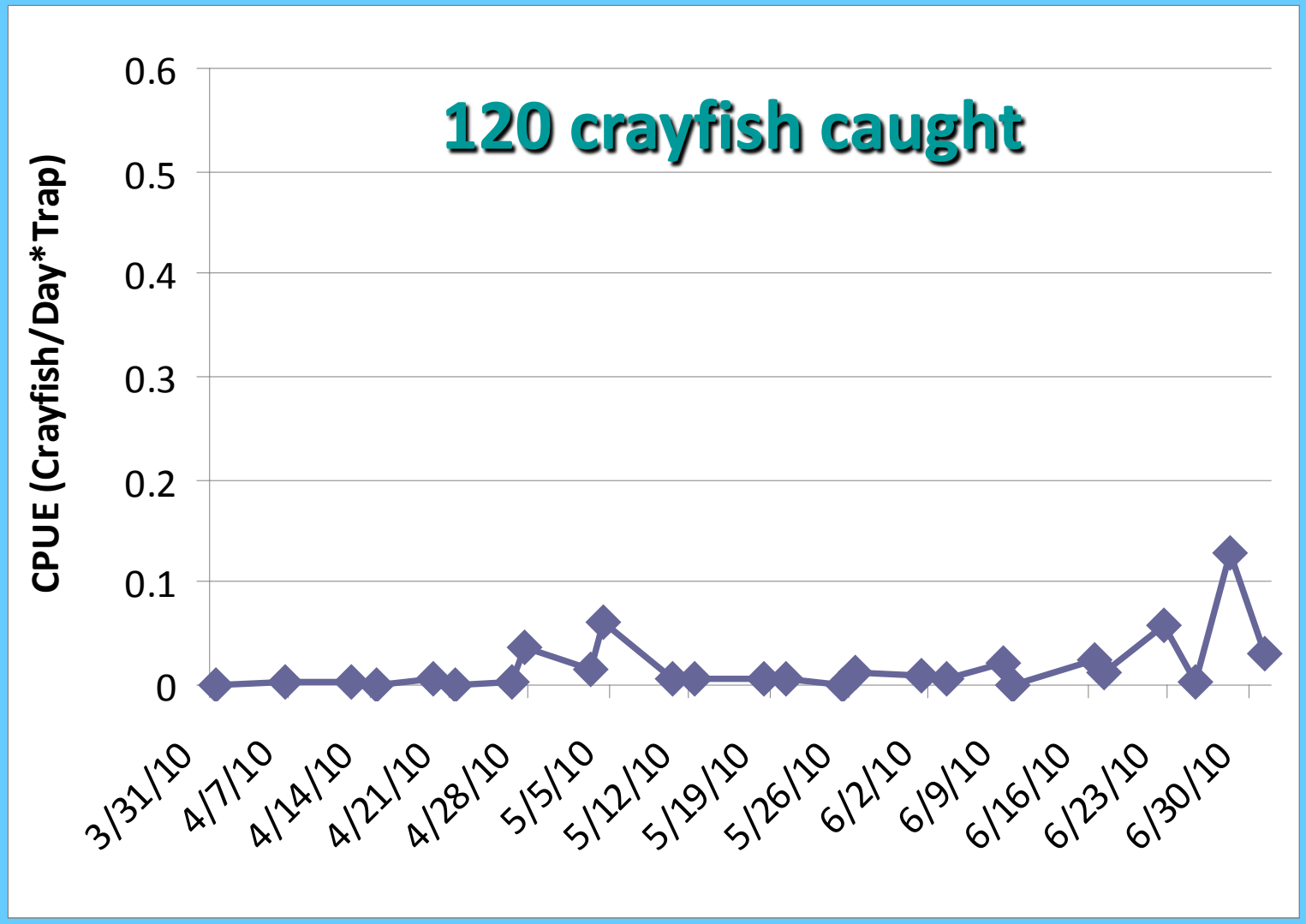
4000 gallons of 12.5% sodium hypochlorite used to treat Germantown ponds at 50 ppm on November 12th, 2009

Burrows were flagged and treated with 200 ppm solution

Eradication Attempt
Sodium Hypochlorite
Esquire Estates Pond



They're back!


120 crayfish caught
CPUE (Crayfish/Day*Trap)
0.6
0.5
0.4
0.3
0.2
0.1
0
3/31/10
4/7/10
4/14/10
4/21/10
4/28/10
5/5/10
5/12/10
5/19/10
5/26/10
6/2/10
6/9/10
6/16/10
6/23/10
6/30/10

October 2009 Finding

Sam Peorio Park, City of Kenosha

- 0.65 acre
- 7’ mean depth
- One pond outlet
- Urban fishing pond
- Close to Pike River tributary and Pike River
- ¾ mile from Lake Michigan

Chemical Treatment at Sam Peorio Pond, City of Kenosha, Part 1

- Question to be answered: Is a spring treatment with Chlorine more effective than a fall treatment?
- Trapping of crayfish occurred 1 month before treatment to determine catch rates.
- Chlorine treatment on April 22nd, 2010; shoreline treatment with Pyronyl 303.
- Catch rate of crayfish is 82% lower after treatment.

Stepping Back; Reevaluate

- Chlorine bleach killed many crayfish; however, some crayfish survived
- Move on to insecticide
- Original plan was to apply for Section 18 emergency exemption from EPA; approval takes time – which is why bleach was used in the fall of 2009
- Granted a Section 18 emergency exemption for the use of Pyronyl 303 in the Germantown Police Pond, Esquire Estates and Peorio Park Pond – exemption expired November 30th, 2010

Insecticide Treatment

- Pyronyl™ (303)
- Chemical alters nerve function, which causes paralysis in target insect pests, eventually resulting in death.
- Acute (Short Term) Effects

Chrysanthemum Flower

Bioassay Work Was Completed in the Summer of 2010 to Determine Treatment Concentrations of Pyronyl 303

Avoidance Tests

Conclusions from Pyronyl 303 Bioassay Work

- 2.0, 1.5, 1.0, 0.5 and 0.15 mg/liter in water killed all RSC within 24 hours
- 0.1, 0.075, 0.05, 0.025 and 0.001 mg/liter in water were tried the next day; again, all killed RSC within 24 hours
- Avoidance test – sod was sprayed at a ratio of 4 parts water to 1 part Pyronyl 303
- RSC encountering the treated areas lost equilibrium and movement within minutes
- RSC were on their backs and dead within 15 minutes
- No pattern of avoidance was noted on the sod
- Decision was made to try Pyronyl in Sam Poerio Park Pond in August/September 2010

Drawdown at Peorio, August 2010

Chemical Treatment at Sam Peorio Pond, City of Kenosha, Part 2

- Exposed shoreline and burrows treated with Pyronyl 303 August 9th – 12th, 2010
- On August 20th, 2010 Poerio Pond is drawn down
- Exposed shoreline and burrows treated with Pyronyl 303 August 23rd – August 26th, 2010
- Section 18 crisis emergency exemption received on August 24th, 2010 for treatment in water
- The remaining standing water in Poerio Pond is treated on August 27th, 2010
- September 1st, 2010, several burrows were excavated; live red swamp crayfish were found

What Had We Learned? (By the fall of 2010)

- Chlorine kills crayfish in water
- Pyronyl kills crayfish in water
- Neither is an effective tool to kill crayfish in burrows
- Trapping controls Red Swamp Crayfish but does not eradicate them

Now What?

- Physical manipulation of the banks is needed to eradicate Red Swamp Crayfish
- Need money!
- DNR watershed staff submitted a grant application to obtain federal grant dollars
- EPA awarded a Great Lakes Restoration Initiative Grant to DNR on September 1, 2011 of $286,843

Monitoring Summary 2011

- 47 traps in Esquire Estates; monitored and checked 40 times
- 971 RSC removed from Esquire Estates by trapping in 2011
- 40 RSC removed from the Police Pond by trapping in 2011; 10 were captured March through the end of July; 30 were captured in August

Filling of the Police Pond

- Activities started October 12th, 2011 and finished October 18th, 2011
- Germantown DPW and DNR fisheries staff worked together on the project
- City of West Bend contributed
- Payne and Dolan donated pavement millings
- Approximately 2000 cubic yards of fill
- Total cost: $47,631

Police Pond

Drawdown/Preconstruction

Finished!

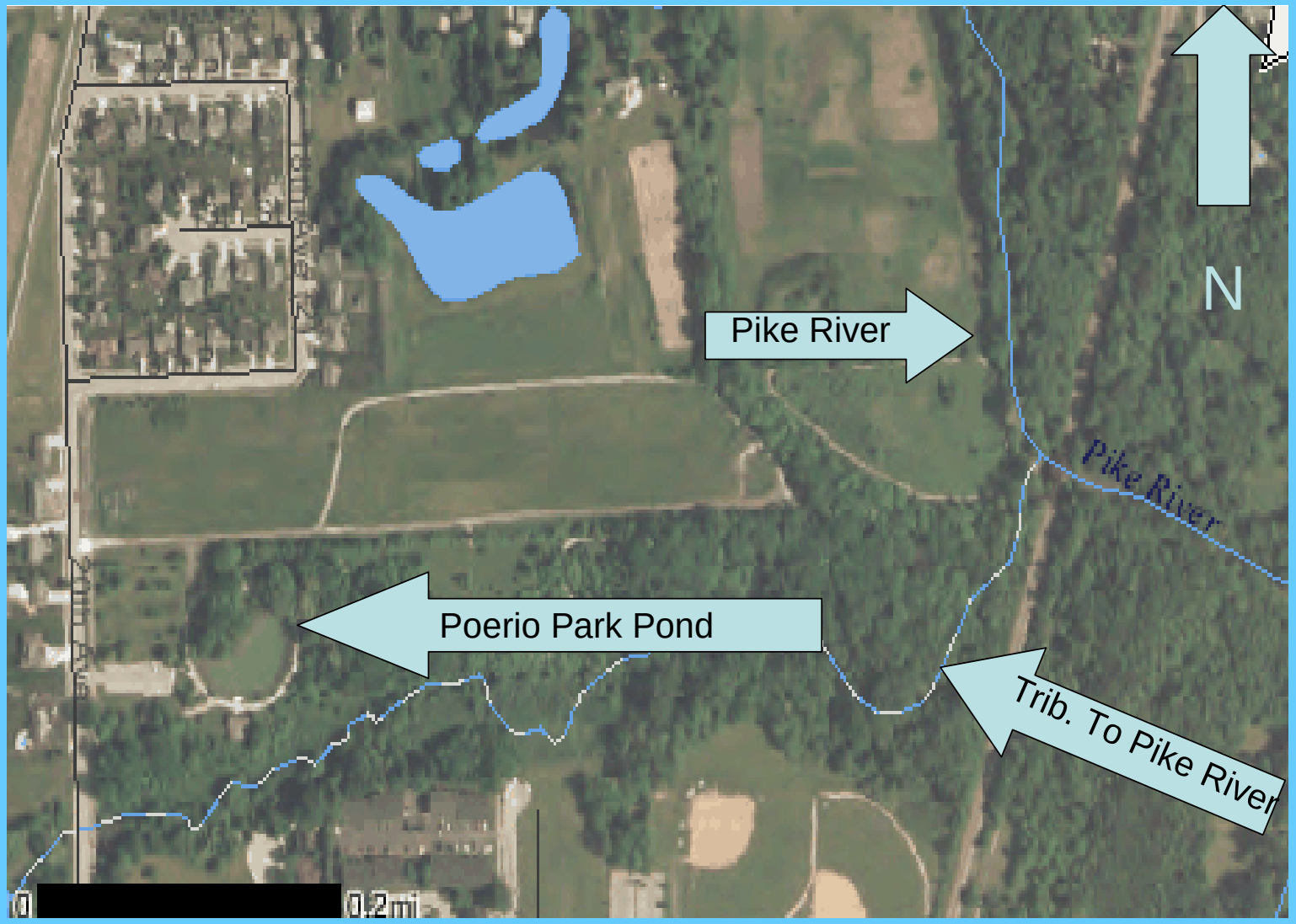
Filling of the Sam Poerio Park Pond, City of Kenosha

- Activities started December 1st, 2011 and finished December 29th, 2011
- City of Kenosha DPW staff completed the project
- City of Kenosha donated clay fill and topsoil; stone was purchased
- Approximately 6300 cubic yards of fill
- Cost: $93,592

Activities in 2012

- Conduct monitoring in Kenosha
- Continue monitoring in Germantown
- Conduct fish diet study
- Invite crayfish burrowing expert to visit the site
- Develop eradication plan for Esquire

Monitoring in Kenosha



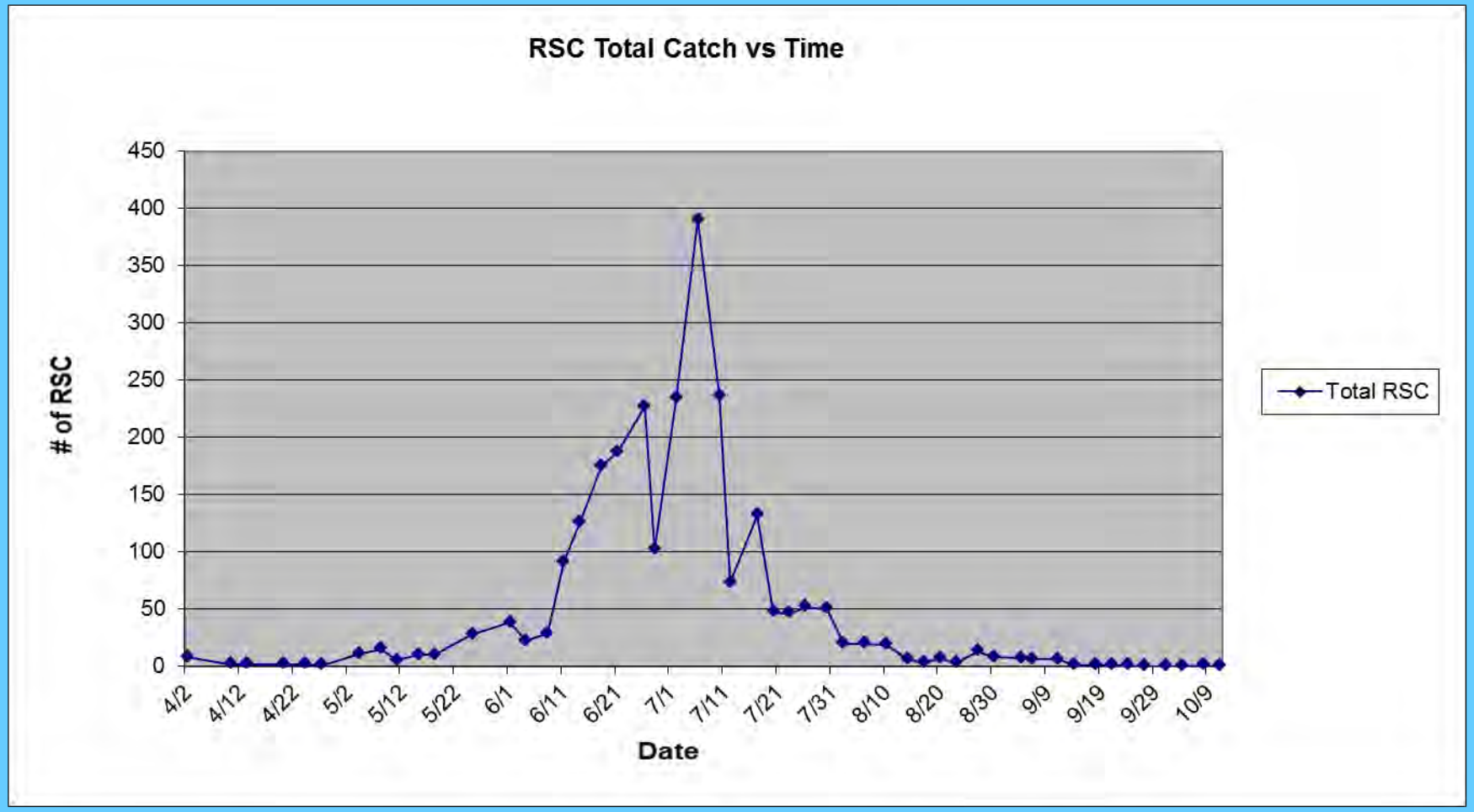
Kenosha Monitoring Study

- On April 6th, 2012, 25 traps were deployed: 10 traps to the Tributary to the Pike River, 10 traps in the North Pond and 5 traps in the Far North Pond.
- On April 11th, 2012, 10 additional traps were deployed in the Pike River.
- The now filled in Peorio Park Pond was also checked for burrows around the perimeter - no burrows were found.
- All traps were pulled on May 4th, 2012.
- Pond traps were checked 8 times.
- River traps were checked 7 times.
- Entire study was repeated July 10th, 2012 – August 6th, 2012.
- No red swamp crayfish were found.

Germantown Monitoring Summary, 2012

- 2480 Crayfish removed from Esquire Estates from 4/02/2012 through 10/25/2012
- 11 nearby ponds were checked in 2012 between 16 and 31 times; all negative for RSC
- 2 additional sites on the Menomonee River were checked 24 and 27 times in 2012; all negative for RSC
- 1 site on a tributary to the Menomonee River checked 24 times in 2012; negative for RSC

Red Swamp Crayfish - Catch 2012 Esquire Estates



Fish Diet Study

Bigger Fish Were Eating Crayfish

Smaller Fish Were Mainly Eating Insect Larvae

Development of Eradication Plan For Esquire Estates

- Meeting with DATCP took place January 27th, 2012 regarding federal chemical permitting for Pyronyl
- Meetings with local residents (Ashbury and Esquire) took place in February and March 2012.
- Worked on application for use of Pyronyl with DATCP and EPA

Planning for the use of Pyronol

- Applied for Wisconsin Section 18 Quarantine Exemption Request for the use of Pyronol in Esquire Estates in May 2012
- Approval received December 2012

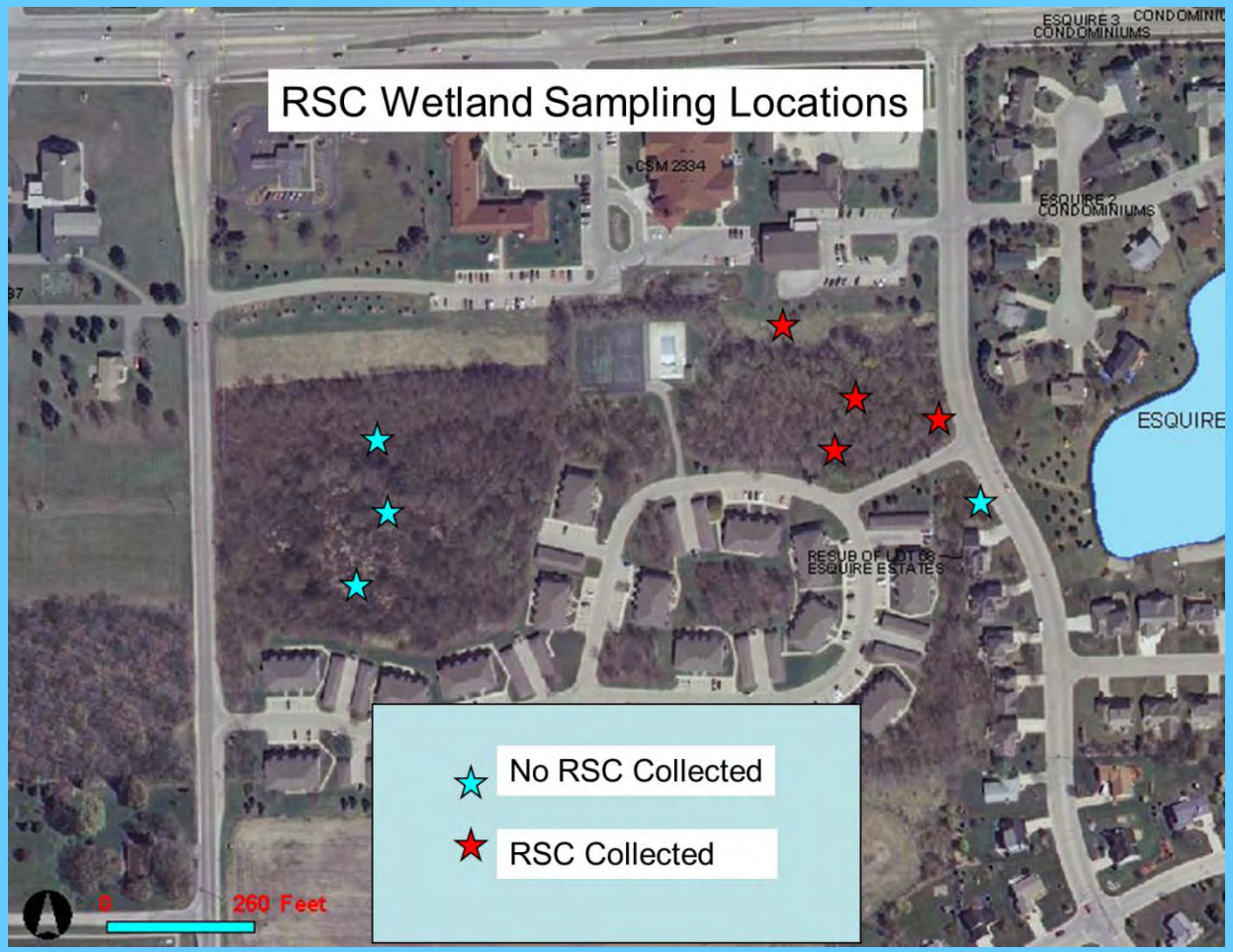
Week of June 25th, 2012

- Meetings took place to develop preliminary eradication plan for Esquire Estates
- Representatives from WDNR, University of Leeds, UW-Madison, Village of Germantown and two local contractors took part in the meetings
- Public meeting for residents on June 28th, 2012 to lay out the preliminary plan

Preliminary Eradication Plan

- Bank treatment to primarily cover the burrows
- Chemical treatment of the water with Pyronyl
- Goal #1 – Prevent any crayfish in the burrows from getting out
- Goal #2 – Prevent any crayfish in the water from burrowing in the banks

Ashbury Woods Construction Started October 31st, 2012



Before/After


Esquire Pond
Germantown, WI

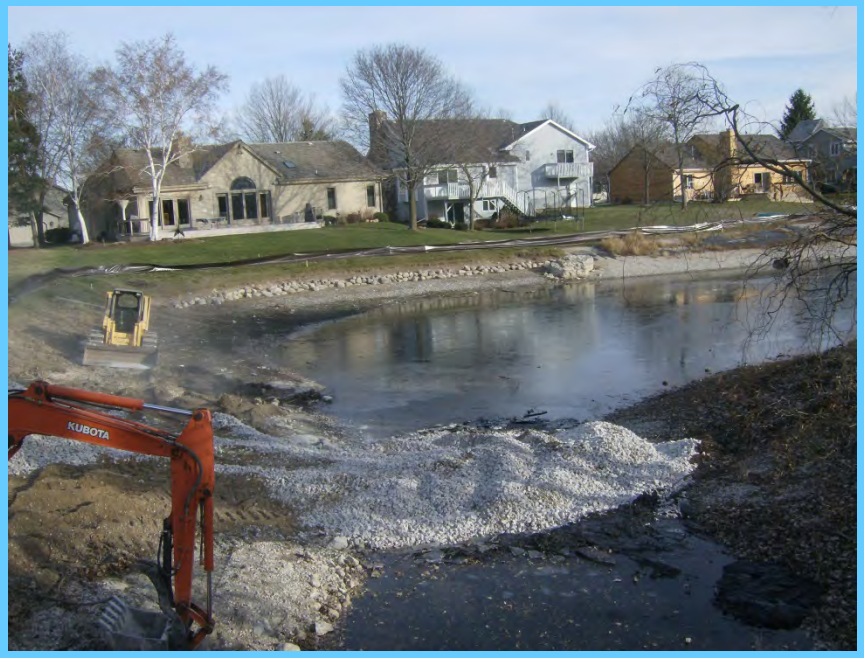
Pond Statistics

- Perimeter of pond = 2461 feet
- Perimeter of Island = 899 feet
- Total of 3360 lineal feet to deal with
- 15 foot (average) wide treatment = 53,884 square feet
- Add the inlet and Ashbury Woods

Example of Vegetation That Was Removed

Esquire Estate Island Construction – Clearing Vegetation

Building A Bridge



Fabric on Slopes

Placement of Rock

Esquire Estates Perimeter Construction

Finished Portion

September 17th and 18th, 2013
Pyronol Treatment

In Water and Shoreline Treatments

Monitoring

Integrated Pest Management for Red Swamp Crayfish

- Trapping
- Predatory Fish Stocking
- Chemical Treatment
- Habitat Destruction
- Human Resources – Agency and Partners
- Residential and elected officials buy in = Meetings, meetings, and more meetings

Questions?