A Multi-tiered Response to Appearance of Red Swamp Crayfish (*Procambarus clarkii*) in Southeast Wisconsin

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A Few 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

Esquire Estates Association
Germantown, WI

- 6 acres
- 5.5’ mean depth
- Registered fish farm
- Three 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

Containment
Barrier Fence

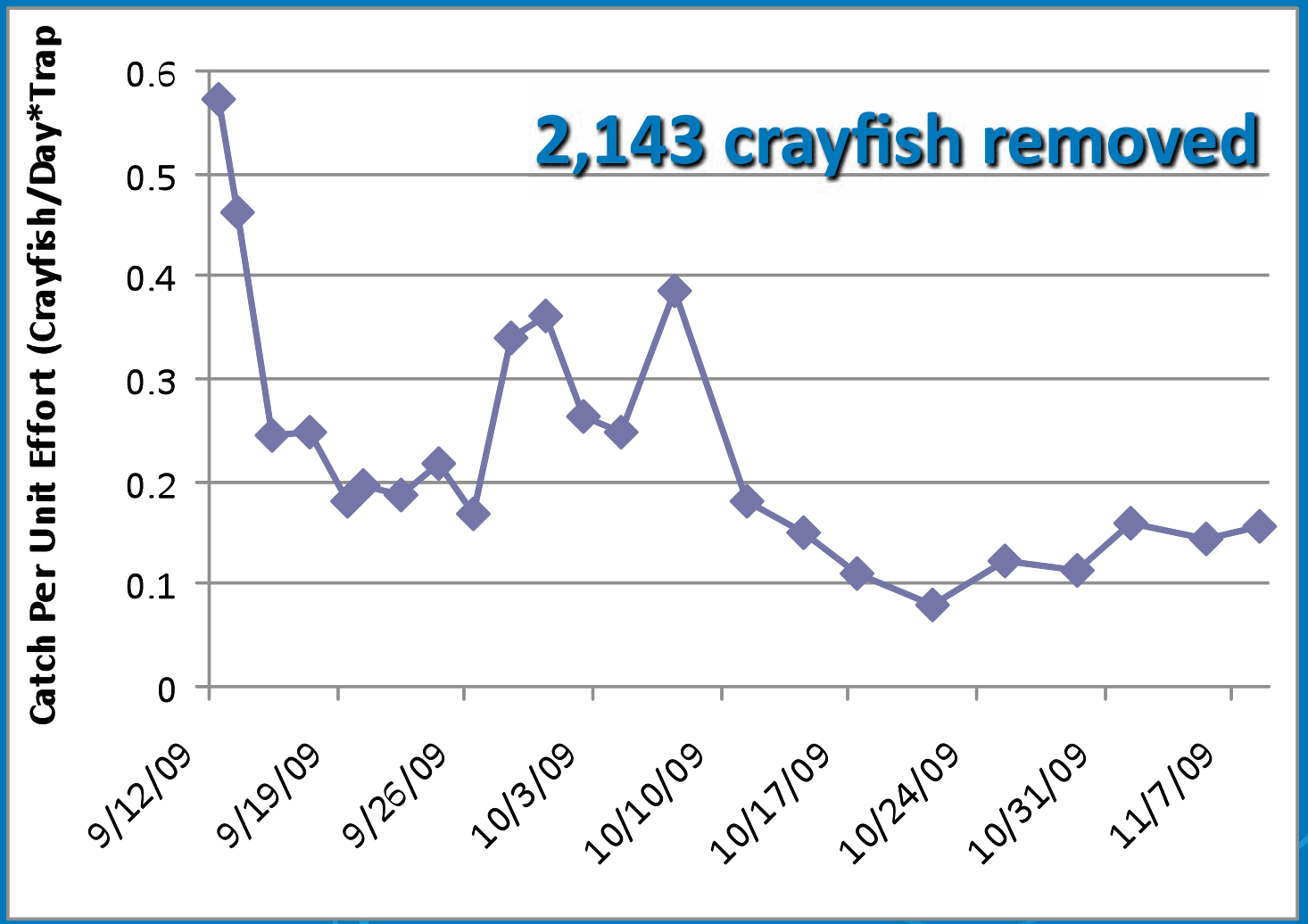
Containment
Block inlets and outlets

Containment
Manual Removal

Esquire Estates

154 baited traps set

Containment
Manual Removal



A high level of reproduction was occurring.

% of females with eggs or young reached 67% by beginning of October

Chasing our Tails or It's Time to Chemically Treat

- What is in the toolbox?
- Sodium hypoclorite (bleach); non selective
- Easy to obtain from a local source, relatively inexpensive

Selective Insecticides

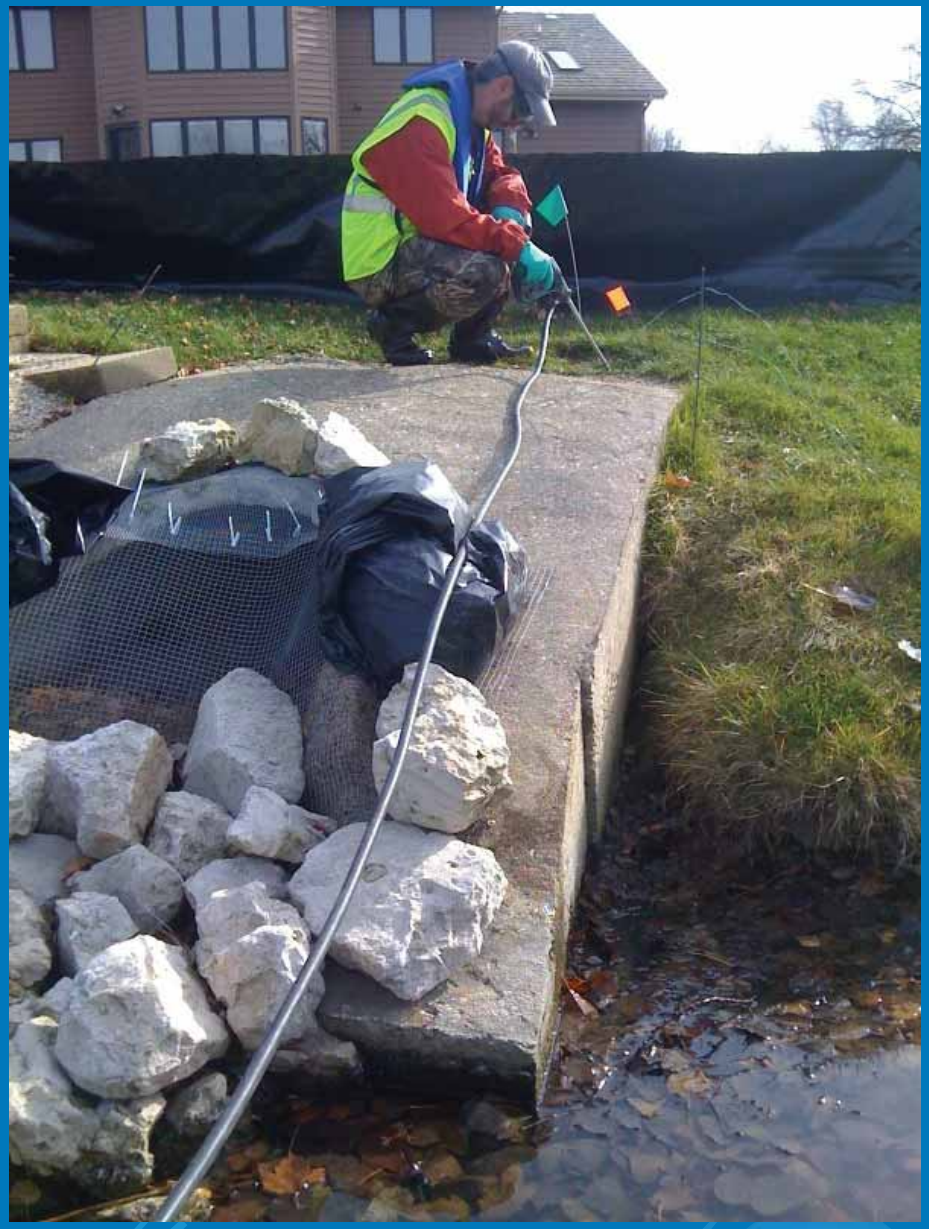
- Pyrethrins are botanical insecticides derived from chrysanthemum flowers most commonly found in Australia and Africa.
- They work by altering nerve function, which causes paralysis in target insect pests, eventually resulting in death.
- Hard to obtain, very costly

Bioassay Work Was Undertaken to Determine Treatment Concentrations of Bleach (Sodium Hypochlorite)

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

Three boats pumped full strength chemical below water surface

Burrows were flagged and treated with 200 ppm solution

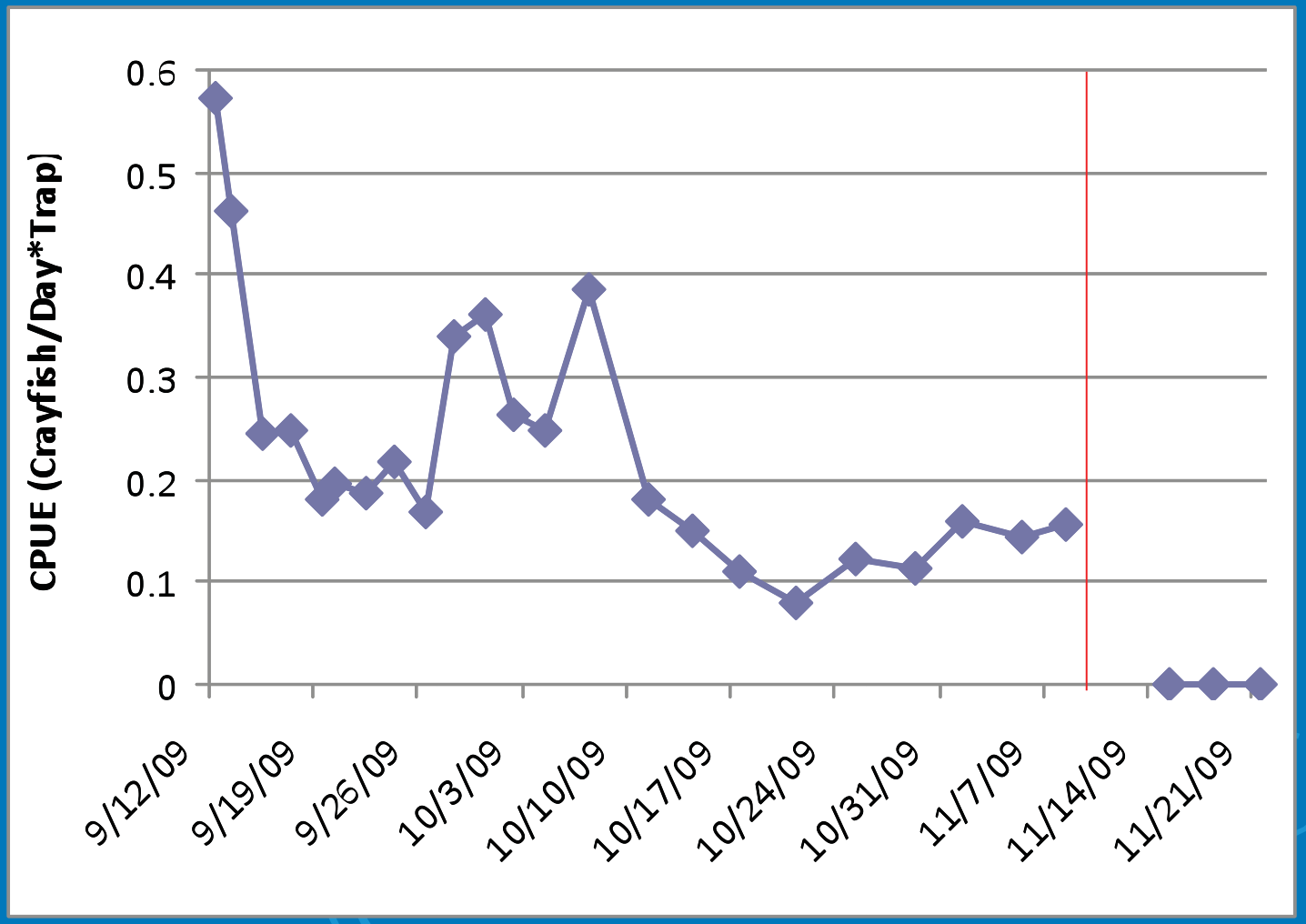


Bioassay Work was Completed After Chlorine Treatment – Live Cages

Chlorine does kill crayfish!

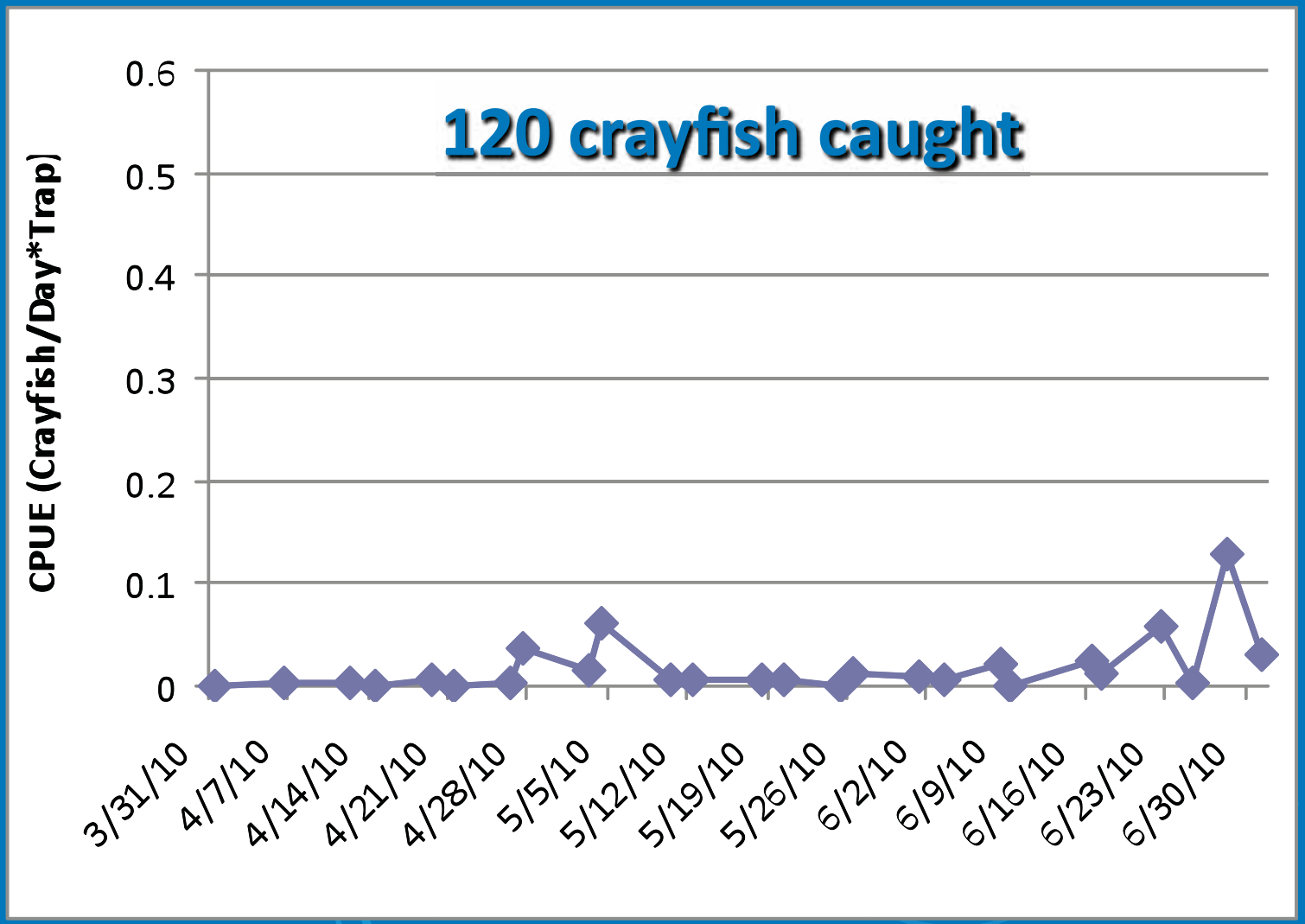
- Test cages set deep and shallow
- Deep test cages had 100% mortality after 24 hours
- Shallow test cages had 60-80% mortality after 24 hours; 100% mortality after 72 hours

Eradication Attempt
Sodium Hypochlorite
Esquire Estates Pond

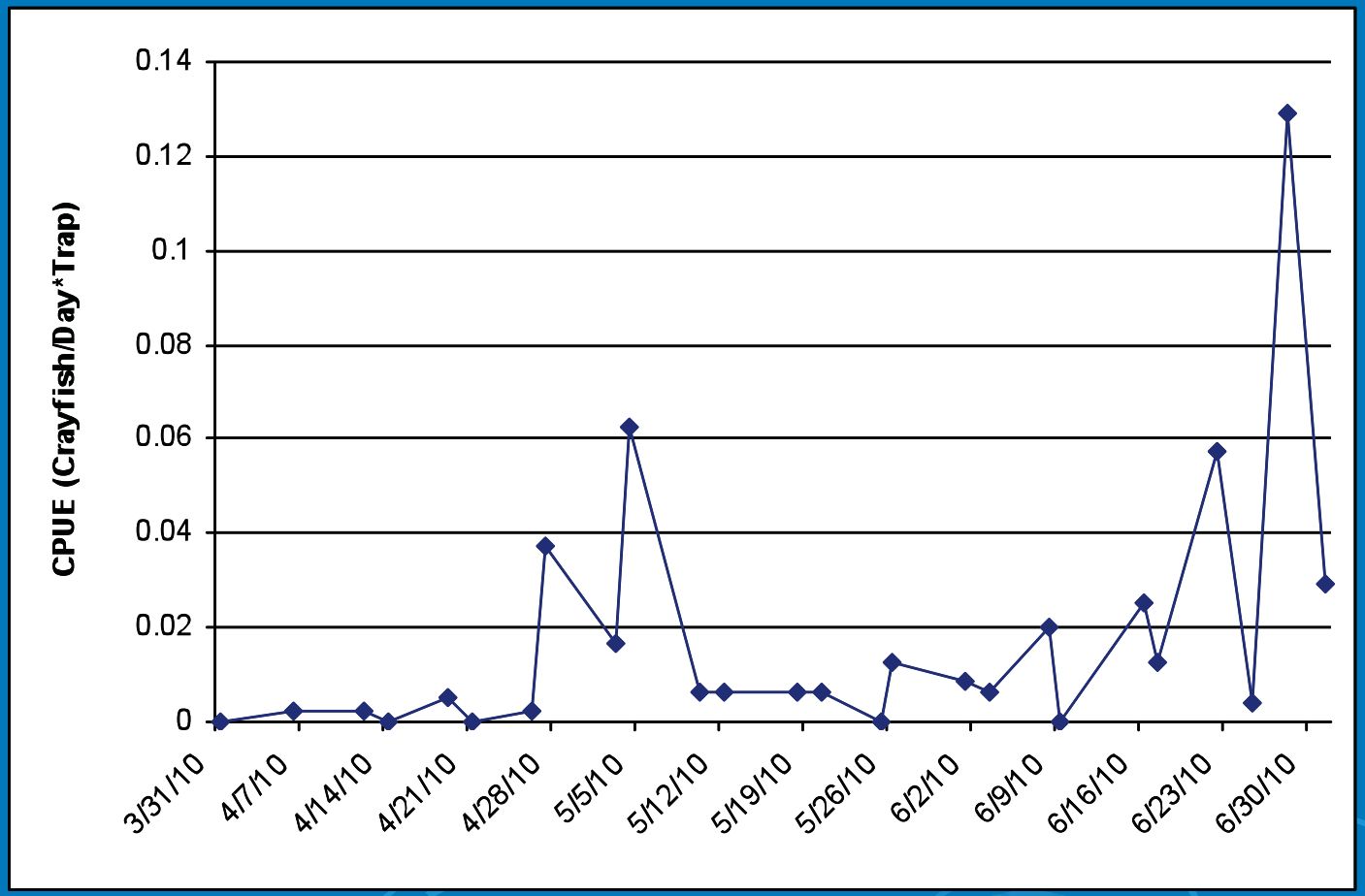


Winter Drawdown – Approximately 1 foot in Esquire Estates, December 2009

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

CPUE Was Low, But Steady




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

Trapping July - September

- 67 more crayfish were caught in Esquire Estates in July 2010
- 127 additional crayfish were caught in the Police Pond and the wetland outlet area in July, August and September 2010.
- A total of 314 crayfish were caught in 2010 by trapping.

Next Steps - Germantown

- Treated Police pond and burrows with Pyronyl 303 on November 30th, 2010
- Winter drawdown of Police pond was completed by December 3rd, 2010
- Police Department Pond is scheduled to be dredged in the spring of 2011; attempt to remove burrows
- Continue to monitor for Red Swamp Crayfish in April and May 2011
- Maintain nicotarp barrier and inlet/outlet barriers
- Follow up on any new reports of red swamp crayfish in the immediate area

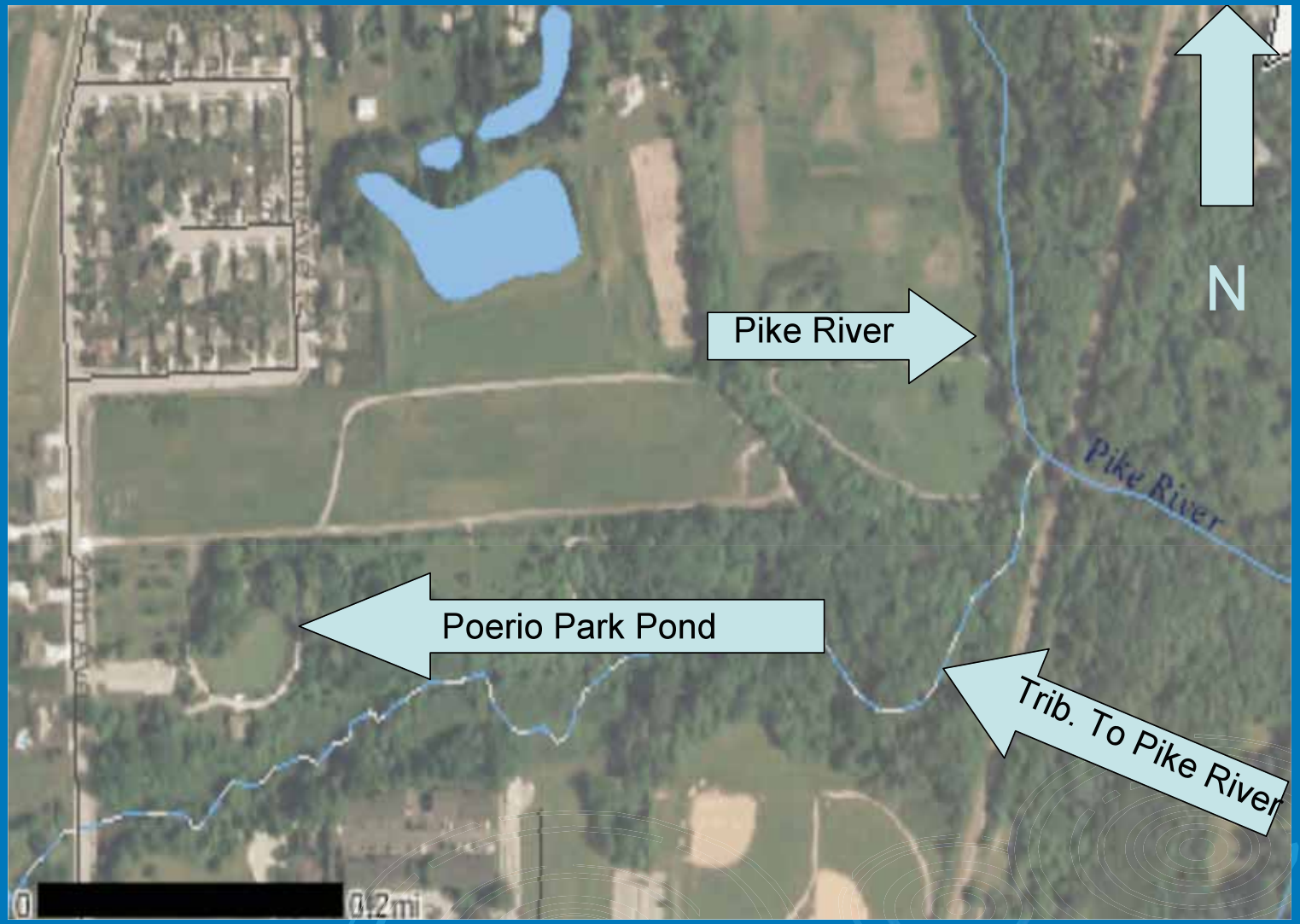
December 9th, 2010 Drawdown of Police Pond, Village of Germantown

Another Finding - October 2009

Sam Peorio Park, City of Kenosha

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

Monitor surrounding waters



Trapping at Sam Peorio Park in 2010

- WDNR begins trapping March 15, 2010 and commences on March 31st, 2010; 163 RSC are captured
- UW-Parkside begins trapping on April 1st, 2010 and commences on April 19th, 2010; 117 RSC crayfish are captured
- A total of 280 RSC are captured in just over a month before chemical treatment

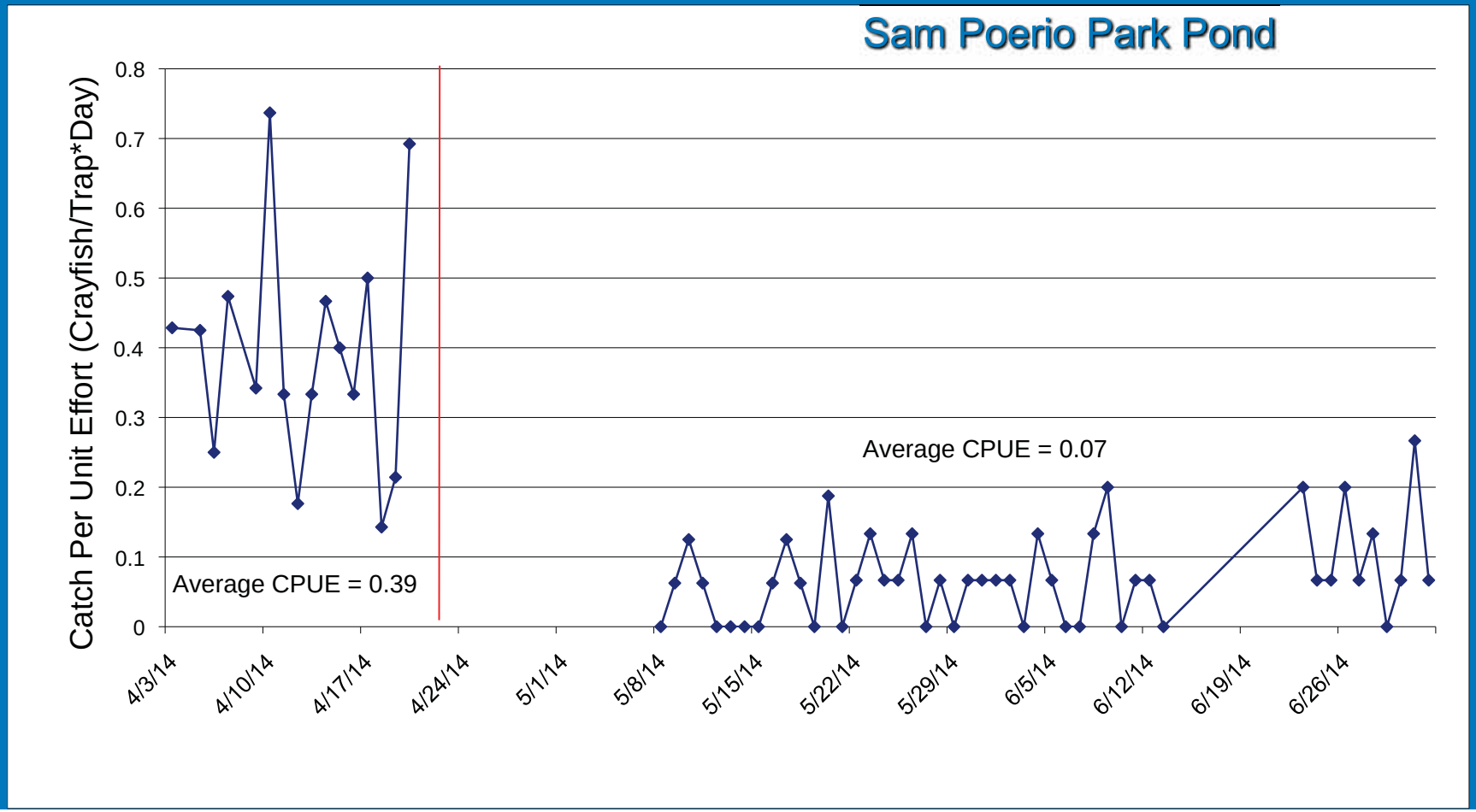
Chemical Treatment at Sam Peorio Pond, City of Kenosha, Part 1

- Chlorine treatment on April 22nd, 2010; shoreline treatment with Pyronyl 303
- UW-Parkside counts 135 dead RSC on the shoreline and edge of water after treatment
- Trapping resumes May 7th, 2010 and commences on July 1st. 2010; 50 additional RSC crayfish are captured
- Catch rate is 82% lower after treatment
- Fish were stocked on May 12th, 2010; 50 smallmouth bass (4.5 inch) and 5 pounds of 1.25 inch fathead minnows

Chlorine Treatment April 22nd, 2010 Sam Peorio Pond

Chemical Control

Sodium Hypochlorite + Pyronyl 303 shoreline/burrow treatment



Bioassay Work Was Completed 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

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
- Pool size decreases from 0.6 acres to 0.25 acres
- Exposed shoreline and burrows treated with Pyronyl 303 August 23rd – August 26th, 2010
- The remaining standing water in Poerio Pond is treated on August 27th, 2010
- Count of dead crayfish on August 31st was 422; most were small crayfish in the 1.5 inch to 2.5 inch size
- September 1st, several burrows were excavated; live red swamp crayfish were found

Drawdown at Peorio, August 2010

Red Swamp Crayfish burrowing behavior

Red Swamp Crayfish burrowing behavior

Eradication Attempt

Issues:

- Burrowing behavior makes eradication difficult.
- No documented successful eradications of RSC, although few attempts.
- No EPA registered pesticides specifically for crayfish.

EPA and DATCP Approval Process

- Pyrethroid pesticides used in Scotland were not registered by EPA.
- As an alternative plan in 2009, we sought permission to use a non-selective pesticide – sodium hypochlorite ("bleach").
- Granted a Special Local Needs Approval from FIFRA for the use of the sodium hypochlorite in 2009 and 2010
- 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
- Plan for the time it takes to get permission to use a suitable chemical for control.

The Costs Really Add Up!

- DNR Permanent Staff Salaries: $ 89,030
- DNR LTE Staff Salaries: $ 18,585
- Supplies (Chemicals, etc.): $ 63,914
- UW-Madison (Germantown): $ 14,880
- UW-Parkside (Peorio): $ 4,390
- Village of Germantown: $ 4,536
- **TOTAL: $ 195,335**

Labor Hours

- DNR Permanent Staff: 3718 hours
- DNR LTE Staff: 1510 hours
- UW-Madison: 850 hours
- UW-Parkside: 260 hours
- Village of Germantown: 64 hours
- Volunteer Labor: 125 hours
- **Grand Total: 6527 hours!!**

A Statewide Response Plan

- **Containment**
  - barrier fence
  - blocking outlets
  - manual removal
- **Control**
  - Drawdown/Freeze-out
  - Request to DATCP and EPA for FIFRA Exemptions
  - Chemical treatment
    - Sodium hypochlorite
    - Pyrethroid insecticide
  - Stock bass as predators

- **Surveillance**
  - Monitor surrounding waterbodies
- **Source investigation**
  - Schools
  - Pond managers
  - Riparians
- **Communication and education**
  - Landowners
  - Local press releases

Conclusions – Sodium hypochlorite

- Chlorine *can* kill Red Swamp Crayfish.
- Chlorine degrades rapidly – its difficult to obtain a concentration of 50 ppm even right after application.
- Not a suitable remedy for RSC control in large waterbodies, or those with valuable aquatic resources.
- Crayfish in burrows at the time of treatment will likely survive

Conclusions – Pyronyl 303

- Pyronyl 303 is very toxic to crayfish that walk across a treated grassed area
- Toxicity of the chemical is accute, but short lived (likely 12 to 24 hours at most)
- Pyronyl 303 is toxic to crayfish in water at very low concentrations
- Crayfish that have mud over their bodies are much less affected and can survive a direct spray of Pyronyl 303
- Crayfish in burrows at the time of treatment will lively survive

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Questions?