Hey!

What Are They Doing Over There?

John Randall
The Nature Conservancy
Barrow Island Biosecurity
Cactus Moth......

On it’s way to California’s Deserts??
Weed Detection Dogs

Biosurveillance for Emerald Ash Borer with *Cerceris fumipennis*

Michael Bohne et al.

USFS & state agencies CT, NA, ME, NH, NY, RI, VT and U. Guelph
Aquatic weed surveillance using Robotic Aircraft

Salah Sukkarieh
University of Sydney
Land & Water Australia
Even here, weeds aren’t safe from the eye in the sky!
Lateral Flow Devices to detect Phytophthora ramorum (the Sudden Oak Death Pathogen)

Like a pregnancy test – uses antibodies to detect specific proteins
Rats on Pearl Island, New Zealand

Survivors?

OR

Re-invaders?

James C. Russell
Steven D. Miller
Grant A. Harper
Hamish E. MacInnes
Malcolm J. Wylie
Rachel M. Fewster

2010. Biological Invasions
Environmental DNA (eDNA) monitoring of Asian carp in the Chicago Area Waterway system

W. Lindsay Chadderton¹, Christopher L. Jerde², Andrew R. Mahon², & David M. Lodge²

¹University of Notre Dame
²The Nature Conservancy
Detection limitations most likely

Probability of detection using traditional methods in canal & at low densities is poor

Electric fishing – Effective down to 2-3 meters
- Carp capable of avoiding electric field

Asian carp adept at avoiding static nets
Inspired by other research using DNA based - indirect detection methods

Techniques in use for ≥20 years

DNA from environment, e.g. feces, shed hair, sloughed skin

Asian Carp environmental DNA

- Fish naturally shed sloughed cells in mucus, scales, feces, and urine
- Some cellular material will remain in suspension and can be collected
Areas sampled on - one date
- two dates
three or more dates

Environmental DNA sampling effort
(April 2009 – June 2010: 1,687 water samples collected)

Sampling effort inversely proportional to detection probability
Electric barriers

Sampling effort inversely proportional to detection probability
## Data Interpretation

<table>
<thead>
<tr>
<th>Strength of Evidence</th>
<th>eDNA Observations</th>
<th>Asian Carp Examples in the CAWS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>eDNA detection with support from alternative detection methods</td>
<td>Calumet River/Lake Calumet: commercial net Lockport Pool below electric barrier: Rotenone Brandon Road Pool: observed electroshocking Dresden Island Pool: captured electroshocking</td>
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<tr>
<td></td>
<td>Repeated trips with positive samples over different years</td>
<td>Little Calumet River South of O’Brien Lock North Shore Channel of the Chicago River (near the Wilmette pump station) Chicago Sanitary and Ship Canal</td>
</tr>
<tr>
<td></td>
<td>Repeated trips with positive samples</td>
<td>Indiana and Michigan Canal Calumet-Sag Channel</td>
</tr>
<tr>
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<td>Multiple positive samples from a single trip</td>
<td>Calumet Harbor</td>
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<tr>
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<td>Single positive sample</td>
<td>Downtown Chicago near Navy Pier Des Plaines River (below Hoffman Dam)</td>
</tr>
<tr>
<td></td>
<td>No detections</td>
<td>St. Joseph River (South Bend, Indiana) Des Plaines River (above Hoffman Dam)</td>
</tr>
</tbody>
</table>
Supporting evidence
Capture or observation of live Asian carp

Silver carp - Electrofishing
Bighead carp - Commercial net
Bighead carp - Rotenone treatment
Electrofishing: -Summer 2009 Invasion front
New detection of a 30-year-old population of introduced mongoose *Herpestes auropunctatus* on Kyushu Island, Japan

Yuya Watari, Junco Nagata and Kimitake Funakoshi

*Biological Invasions*  DOI 10.1007/s10530-010-9809-5
Self-resetting traps
Goodnature Limited, Wellington, NZ
Florida Keys Python Patrol

“TREADMILLING”
Assessment of eradication success was undertaken using attractive baits. The absence of exotic ants at bait stations and the return of native ants (such as the Savanna Strobe Ant (*Opisthopsis haddoni*) shown in this picture) indicated successful eradication. Hoffmann & O’Connor 2004 Ecological Management & Restoration; Hoffmann 2010 Biological Inv.