

# Calumet Research Summit

January 10 and 11, 2006

The Center, Purdue University Calumet

PROCEEDINGS

Photo by Mike Jeffords



Hosted by

CHICAGO DEPARTMENT  
OF ENVIRONMENT

Richard M. Daley, Mayor  
Sadhu A. Johnston, Commissioner

*Advisory Group:*

Calumet Government Working Group •  
Chicago State University • Chicago  
Wilderness • Field Museum • Illinois  
Environmental Protection Agency •  
Illinois Department of Natural Resources  
• IDNR Illinois Natural History Survey •  
IDNR Illinois State Water Survey •  
Indiana Department of Natural Resources  
• U.S.D.A. Forest Service North Central  
Research Station • IDNR Waste  
Management and Research Center

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1, 2-Institute for Environmental Science and Policy, University of Illinois at Chicago

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## Setting the Context

Ms. Suzanne E. Malec

Chicago Department of Environment

The Calumet region provides a unique opportunity to rehabilitate wetland ecosystems in an urban environment. Researchers throughout the area are working to overcome the many challenges inherent in preserving healthy habitats for use by humans, flora and fauna. This work can inform similar urban natural environments that suffer from degradation, contamination, and fragmentation throughout the region and around the world.

The City of Chicago became involved in earnest in ecological preservation and improvements in 1997, followed by an official announcement in June 2000, where Chicago Mayor Richard M. Daley and former Illinois Governor George H. Ryan announced a significant new partnership for the Calumet area called the Calumet Initiative. The initiative is a collaborative effort to concurrently rehabilitate the region's open space parcels and its economy over a 20-square mile area with the goal of demonstrating that ecological and economic restoration can occur in a complementary process.

The key to the Calumet Initiative is collaboration. A large number of parties are involved, including the City of Chicago, State of Illinois, Chicago Park District, Forest Preserve District of Cook County, 17 other federal, state and local government agencies, residents and community groups, conservation organizations, local museums, cultural institutions and industrial groups. This presentation will touch on projects including the Calumet Open Space Reserve, the Calumet Area Ecological Management Strategy, the Calumet Ecotox Protocol, the Calumet Stewardship Initiative, and the Calumet Hydrologic Master Plan.

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Environment



# The Calumet Initiative

Suzanne E. Malec

*Deputy Commissioner*

*Chicago Department of Environment*



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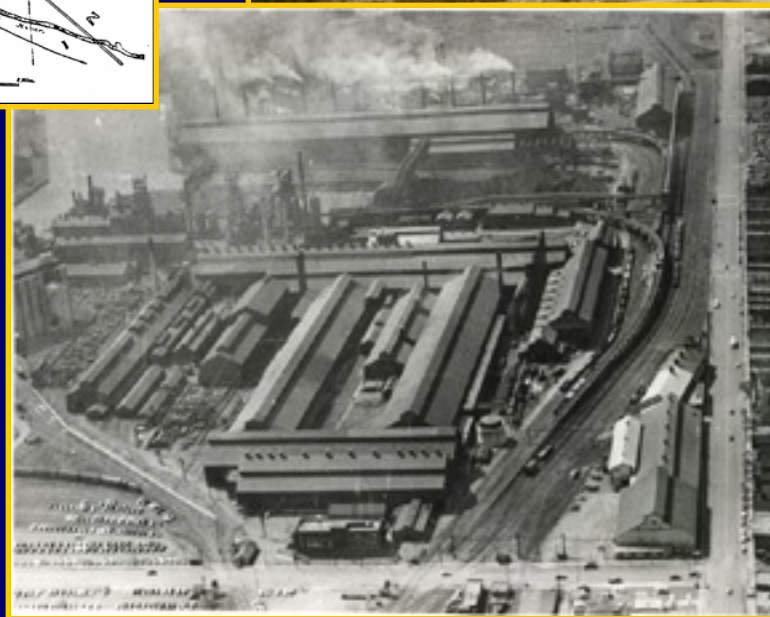
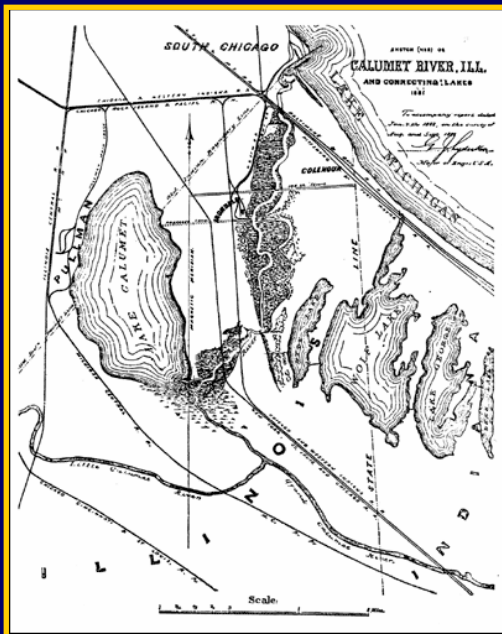
# The Calumet Region of Chicago, the South Suburbs, and Northwestern Indiana



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# History: Nature, Industry, Community





Calumet Area Of Chicago



Van Vlissingen Prairie/  
Marian R. Byrnes Natural Area

Lake  
Calumet

Big  
Marsh

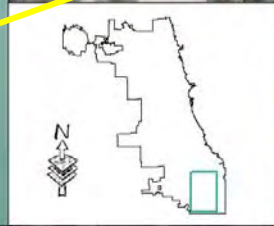
Cluster  
Site

Indian  
Ridge  
Marsh

Heron Pond

Deadstick  
Pond

Hegewisch  
Marsh





## Why are the Calumet wetlands important?



- Among the most ecologically significant in Illinois
- 11 Calumet area sites were listed in the Illinois Natural Areas Inventory (INAI)
- 1980 USACE designated certain wetlands as highest priority in its Special Areas Management Program (SAMP)
- National Park Service listed most Calumet wetlands as important natural resources in 1998 Calumet Ecological Park Feasibility Study
- October 2004 Audubon designated Lake Calumet one of 48 Important Bird Areas in Illinois





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# City – State Calumet Initiative Commitment Announced



June 2000, Harborside Golf Course

*Mayor Richard M. Daley, former Governor George H. Ryan,  
former Environment commissioner William F. Abolt,  
and Illinois Senate President Emil Jones*



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# Calumet Area Land Use Plan

- Designates 3,000 acres of industrial space and 4,800 acres of open space
- Approved by Chicago Plan Commission in 2002



*(Chicago Dept. of Planning and Development)*





# Calumet Open Space Reserve

- Expected to be finalized in 2006
- Details current and future ownership plans for Calumet open space parcels
- Identifies passive recreation activities that could occur on each site



(Chicago Dept. of Planning and Development)

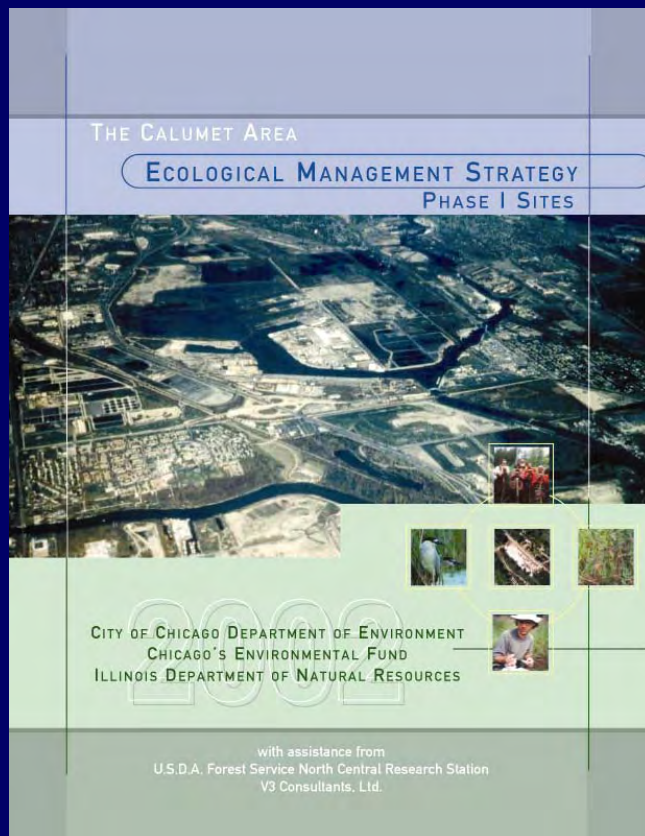


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# Calumet Area Ecological Management Strategy (EMS)



Chicago Department of Environment  
Illinois Department of Natural Resources  
Chicago's Environmental Fund

with assistance from  
USDA Forest Service North Central Research Station  
V3 Consultants and Jacobs/Ryan Associations





# Focus Group Sessions

Sediments & Toxics

Birds

Social Implications

Vegetation

Conservation Design  
Process

Hydrology

Fish

Critters

GIS

Economics

Recreation/Access





## Preserve, Improve, Create (PIC)

*Preserve* existing plant and animal habitats with high biological value

*Improve* existing habitats that will maximize potential for native diversity and ecological health

*Create* new habitats, where feasible, that will meet the full range of needs for individual native species and communities



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# Calumet Initiative Partners

**ACADEMIA:** Chicago State University, DePaul University, Governor's State University, Illinois Institute of Technology, Loyola University, Michigan State University, Northwestern University, Notre Dame, Purdue University, University of Illinois at Chicago, University of Illinois Urbana Champaign, University of Michigan-Ann Arbor

**LOCAL AND STATE GOVERNMENT:** Chicago Department of Environment, Chicago Department of Planning and Development, Chicago Department of Business and Information Systems, Chicago Park District, City of Hammond, Indiana, Forest Preserve District of Cook County, Illinois Department of Natural Resources, Illinois Environmental Protection Agency, Illinois International Port District Authority, Illinois Natural History Survey, Illinois State Geological Survey, Illinois State Water Survey, Illinois Waste Management Research Center, Indiana Department of Environmental Quality, Indiana Department of Natural Resources, Metropolitan Water Reclamation District of Greater Chicago, Northeastern Illinois Planning Commission, Cook County Dept of Office Technology

**FEDERAL GOVERNMENT:** Illinois-Indiana Sea Grant; Urban Resources Partnership, US Army Corps of Engineers, US Department of Agriculture Forest Service North Central Research Station, US Environmental Protection Agency, US Fish and Wildlife Service, US Geological Survey, US National Park Service, US Natural Resources Conservation Service

**ENVIRONMENTAL ORGANIZATIONS AND MUSEUMS:** Bird Conservation Network, Brookfield Zoo, Chicago Academy of Sciences, Chicago Audubon Society, Chicago Ornithological Society, Chicago Wilderness, Field Museum of Natural History, Friends of the Chicago River, Grand Calumet Task Force, Illinois Audubon Society, National Audubon Society, Openlands Project, Shedd Aquarium

**LOCAL RESIDENT-LED ORGANIZATIONS:** Calumet Ecological Park Association, Calumet Heritage Partnership, Hammond Parks Foundation, Hegewisch Chamber of Commerce, Historic Pullman Foundation, Lake Calumet Ecosystem Partnership, Ridge Historical Society, Southeast Environmental Task Force, Wolf Lake Bi-State Gatherings

**INDUSTRY:** Acme Steel, Calumet Area Industrial Commission, Ford Motor Company Southeast Chicago Development Commission, USA/Waste Management Corp

**CHICAGO AREA CONSULTING FIRMS:** V3 Consultants, Envirocom, Kudrna & Associates, TAMS Consultants, The Wetlands Initiative, Wolff Clements and Associates, Jacobs-Ryan Associates, Applied Ecological Services

**FOUNDATIONS:** Chicago's Environmental Fund, Gaylord and Dorothy Donnelley Foundation, Max McGraw Wildlife Foundation

**MISCELLANEOUS:** Institute of Nature and Culture, Nature, Polis and Ethics





# Hydrologic Master Plan

**Timeline:** 2001-2006 (in final review)

**Funding:** IDNR C2000 program, City of Chicago, Chicago Specialties Supplemental Environmental Project (SEP), US Dept of Housing and Urban Development

**Advisors:** George Roadcap (ISWS) and Michael Miller (ISGS)

**Sites:** Indian Ridge Marsh, Heron Pond, Deadstick Pond, Big Marsh, Lake Calumet and Conservation Area; later additions include Hegewisch Marsh and Van Vlissingen Prairie

**Goal:** To assess the hydrology of the region, connections between sites, status of water control structures, bathymetry of wetlands and topography of the area.







## Calumet Ecotox Protocol

### *Protecting Calumet's Plants and Animals*

- Multi-agency effort to create ecotoxicological standards for Calumet area open space rehabilitation plans
- Technical and Management teams
- Guidance Document to be finalized and approved in June 2005
- Test sites: Van Vlissingen Prairie and Hegewisch Marsh





# Calumet Biodiversity Blitz

*August 23 & 24, 2002*

William Powers  
Conservation Area  
(Wolf Lake), Powderhorn  
Marsh and Eggers Woods

- 130 scientists
- 31 taxa groups
- Public programming
- 2,257 species identified





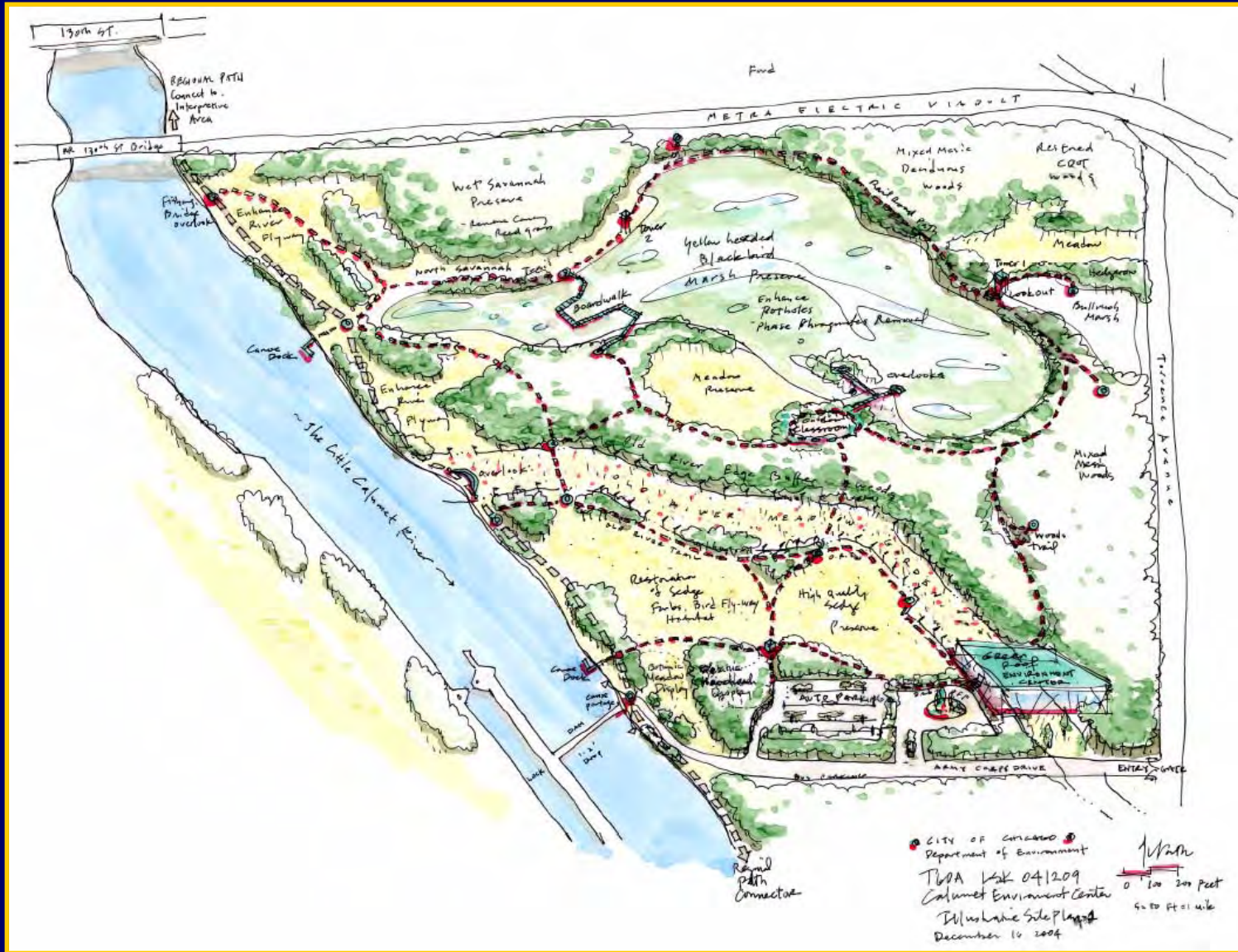
# Calumet Stewardship Initiative

- Partners include Field Museum, Chicago Park District, government agencies, local nonprofits, residents, cultural institutions
- Partners have regular events focused on engaging people of all ages to become stewards of the area's open spaces
- Calumet Stewardship Day in May of 2003 and 2004 brought 800 students to learn about the environment at Wolf Lake





# Site Planning: Hegewisch Marsh





# Site Planning: Van Vlissingen Prairie



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# Ford Calumet Environmental Center

Theme:

Coexistence of Nature, Industry and Community



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## Ford Calumet Environmental Center

- Will be a 24,000 square-foot LEED™ platinum-rated building at Hegewisch Marsh
- Scheduled to break ground in 2007 and open in 2008
- Funding from Ford Motor Company, the State of Illinois, City of Chicago and Chicago's Environmental Fund (totaling \$ 7.5 million)

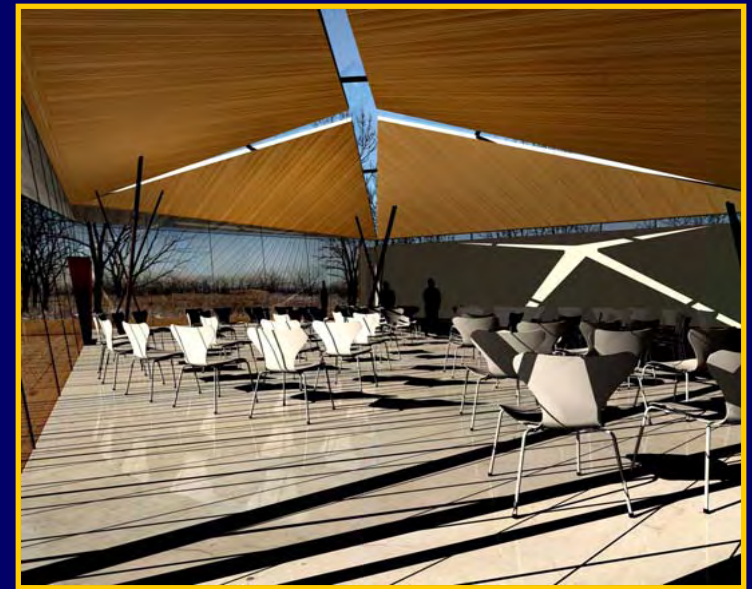
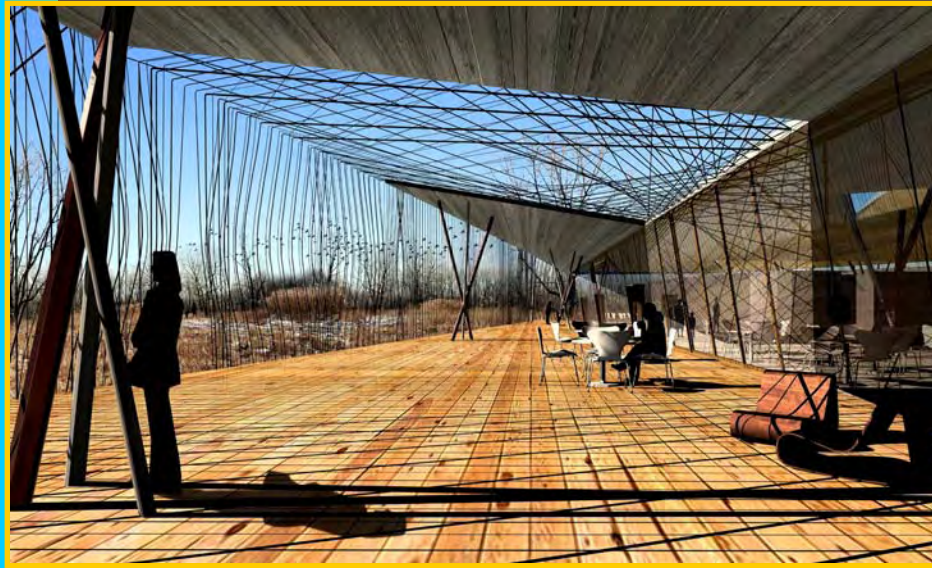


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# Ford Calumet Environmental Center International Green Building Design Competition



Competition Winner: Jeanne Gang and Mark Schendel,  
Studio Gang Architects, Chicago  
Entry Titled: "Best Nest"



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# Ford Calumet Environmental Center International Green Building Design Competition



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## **Integrated Research Approach**

Dr. Lynne Westphal

U.S.D.A. Forest Service North Central Research Station

An assessment of the scope of research projects throughout the region, the partners involved, and the mechanisms for information management and coordination. Also, how research connects to the Ford Calumet Environmental Center.

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# **Taking Stock: Natural Resource Research in Calumet**



**Lynne Westphal, USDA Forest Service, January 10, 2006**

# **Creating an Integrated Research Program in Calumet:**

## **The Quest for New Knowledge and the**

## **Money it Takes to Get It**



**Research to date has largely focused on specific and direct management needs at Calumet (*right here, right now*).**

**In the future, we promote viewing Calumet as a model system to use as a laboratory where we can explore general issues in the biological, physical and social overlay that is urban ecology . We feel that this would ultimately facilitate synergistic work that efficiently harnesses the local expertise, maximize the insights gained from coordinated research, and enhance long-term fundability.**



# Integration Across Discipline



**Social**



**Physical**



**Biological**

# Integration Across Scale: from the petri dish to the Ecosystem



Ford Supplier  
Campus

Fishing lure



Ball Fields

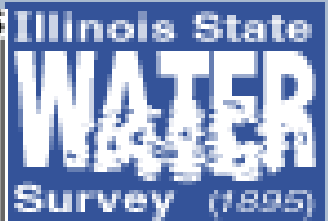
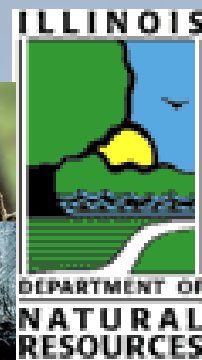
Indian Creek

Hyde Lake  
Wetlands





Illinois Natural  
History Survey



WMRC

Illinois Waste Management and Research Center



# Research to support The Calumet Initiative



**Social**

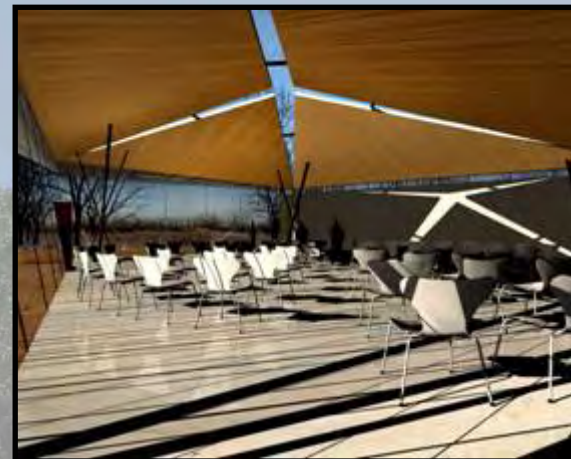


**Physical**



**Biological**

# The future face of research in Calumet: The Ford Calumet Environmental Center



**Break out sessions tomorrow to map out some of the next steps for research in support of the Calumet Initiative and urban ecology.**



*Simulation of boardwalk from the Environmental Center*

- A. Integrated Research Program for NSF-like funding**
- B. Hydrologic Master Plan next steps**
- C. Data Management**

## **Outcomes from this session:**

- **An initial list of some of the next research needed**
- **A sense of how these next projects integrate**
- **A sense of their generalizability/applicability outside Calumet**
- **A few people willing to flesh out a rough draft of a program in the coming months**

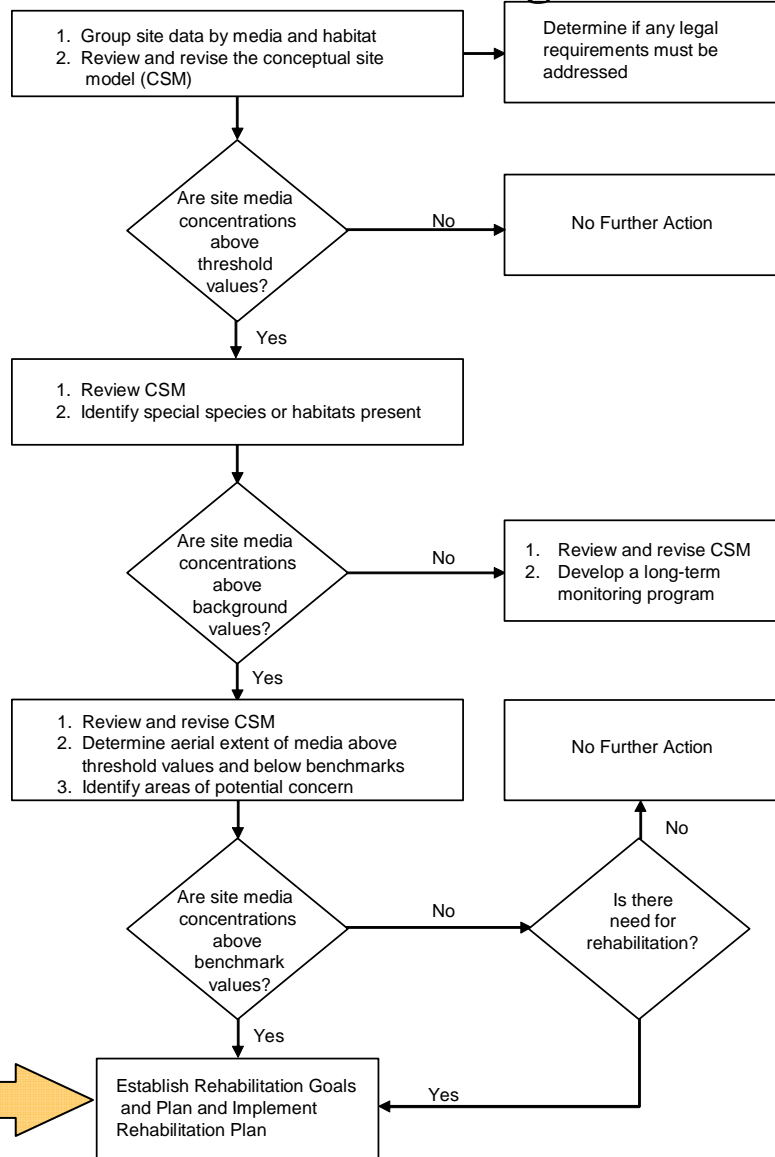


**Some fodder to get the discussion going...**

- **Forest Service Integrated Research**
- **Soucek & Levenson's Tree Swallow Study**
- **Indian Ridge Modeling Project**
- **Ecotox Protocol**



# Ecotox Protocol figure 4.1



Research inherent here

Research inherent here

## **Research Brainstorm**

- **list general ideas participants see as important next steps for research**
- **tie these ideas to other disciplines/questions**
- **frame vis-à-vis generalizability/applicability elsewhere**





## **Wrap up**

- **Report to full group**
- **Volunteers to work with Eric & I on fleshing out draft program? (there'll be plenty of opportunity for input & feedback).**



**And now its time for the research presentations....**

**Starting with the topic we began with in 2000:**



**How Clean is Clean?**



## Calumet Ecotox Protocol: Protecting Calumet's Plants and Animals

Dr. Thomas C. Hornshaw<sup>1</sup>, Dr. David Homer<sup>2</sup>, Calumet Ecotox Roundtable Members

1-Illinois Environmental Protection Agency, 2-Tetra Tech, Inc.

At the first Calumet Research Summit, the Illinois EPA presented its Tiered Approach for Corrective Action Objectives (TACO), developed for human receptors at residential and commercial sites, and its visions for the development of a companion rule for remediation sites with ecological concerns (Eco-TACO). TACO has since been improved by two updates, but the complexities of developing a rule to guide remediation for myriad environmental receptors in multiple habitat types has proven daunting, and Eco-TACO may never become a rule. In order to provide guidance for rehabilitating sites in the Calumet region, the Calumet Ecotoxicology Roundtable convened in 2003. The roundtable's Technical Team, consisting of ecotoxicologists, ecologists, hydrologists, and contaminant fate and transport experts, developed a protocol for rehabilitating chemical contamination to levels acceptable for ecological receptors. The team will finalize the Calumet Ecotox Protocol in 2006. This presentation outlines the protocol's three overall objectives: (1) provide guidance and standardization for site evaluation; (2) assist stakeholders in prioritizing sites to be rehabilitated; and (3) help stakeholders design the site rehabilitation to address chemical contamination, and how rehabilitation goals are met.

Contact Name: Thomas C. Hornshaw, Ph.D., Manager, Toxicity Assessment Unit

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Email: [thomas.hornshaw@epa.state.il.us](mailto:thomas.hornshaw@epa.state.il.us)

Phone: (217) 785-0832



# Calumet Ecotoxicology Protocol: Protecting Calumet's Plants and Animals



Thomas Hornshaw, Ph.D.  
Illinois Environmental Protection Agency



David Homer, Ph.D.  
Tetra Tech EM, Inc.

# Calumet Ecotoxicology Protocol

## Participants



Department of Environment and Chicago Park District



Forest Preserve District of Cook County



Illinois Department of Natural Resources



Illinois Environmental Protection Agency



U.S. Environmental Protection Agency



U.S. Fish and Wildlife Service



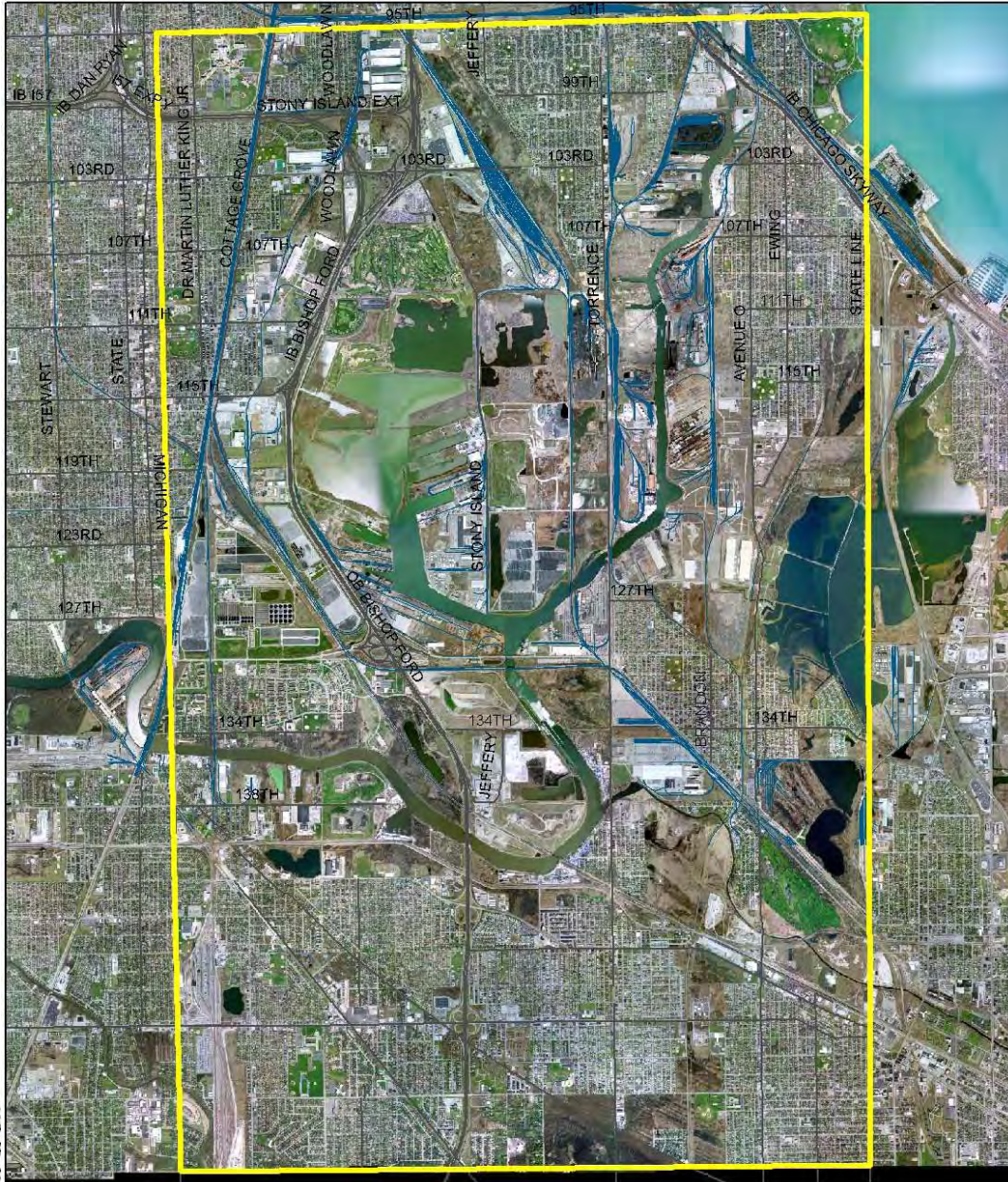
# Calumet Ecotoxicology Protocol

## Scope:

Provide guidance for investigating, evaluating, and rehabilitating the Calumet area sites from chemical contamination consistent with the Calumet Ecological Management Strategy

- ✓ Has no legal authority
- ✓ Does not replace any other regulatory or legal requirements
- ✓ Does not address human health issues





Calumet Ecotoxicology Project Boundary



# Calumet Ecotoxicology Protocol

- Objectives
  - Provide guidance and standardize the approach for site evaluation
  - Assist stakeholders in prioritizing sites to be rehabilitated from chemical contamination
  - Help stakeholders design the site rehabilitation





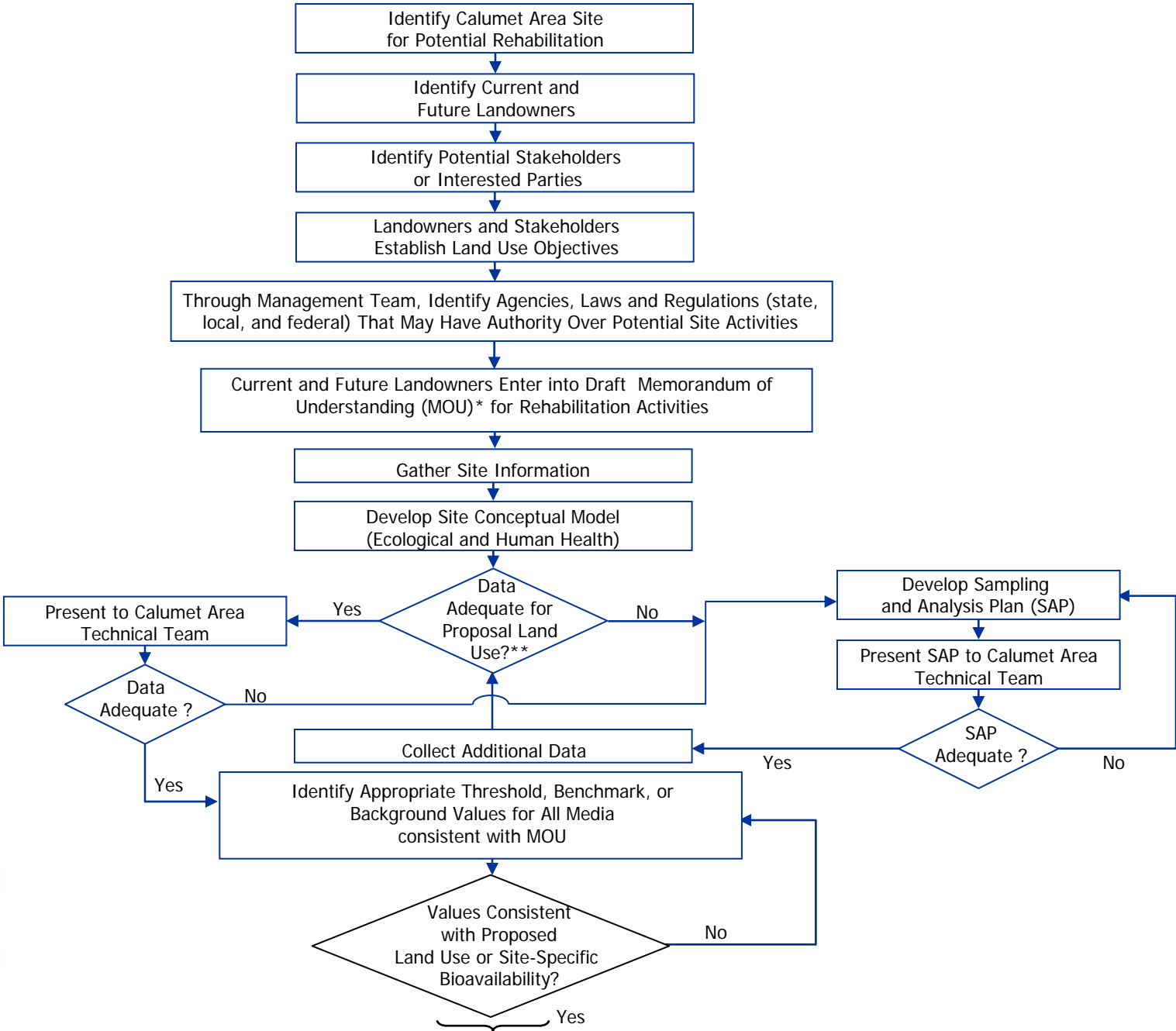
# Rehabilitation Process

## Oversight

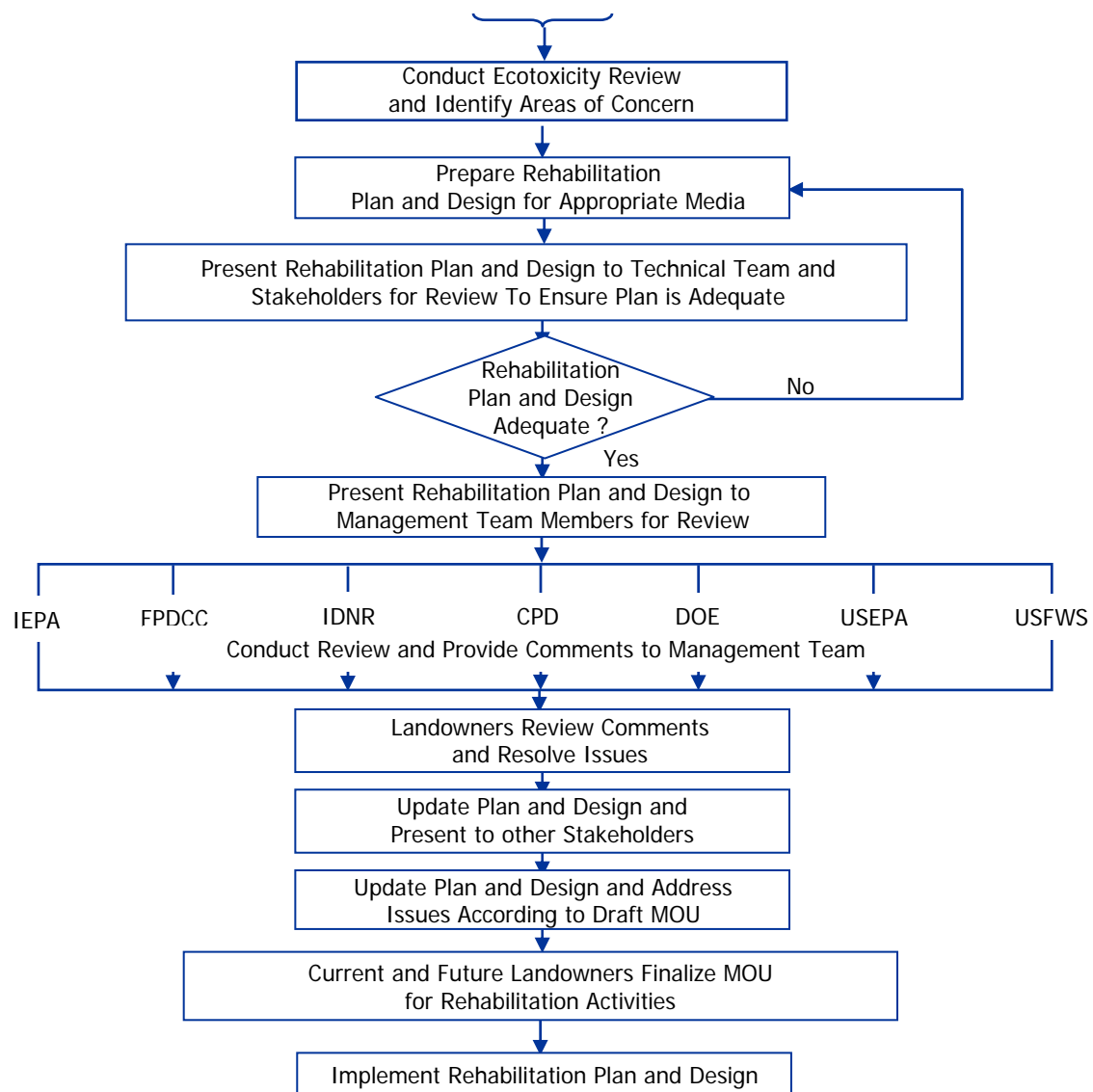
- Calumet Ecotoxicology Roundtable
  - Management Team – Overall responsibility
  - Technical Team – Provides technical guidance



### Calumet Area Ecotoxicology Site Rehabilitation Process



## Calumet Area Ecotoxicology Site Rehabilitation Process (continued)



\* MOU outlines site objectives and lines of responsibility for site investigation and rehabilitation.  
 \*\* This assumes the first analysis of the data's adequacy is done by the responsible agency before it is presented to the technical team.

# Calumet Open Space Reserve Background, Threshold, and Benchmarks Values

## – Media – Soils, Sediment and Surface Water

- **Background** – Levels due to ubiquitous releases in an urban area and naturally occurring concentrations in the Calumet Area – not pre-1860 conditions
- **Threshold** – Concentrations believed protective of ecological receptors in the Calumet area – derived from no observable adverse effect levels (NOAEL)
- **Benchmark** – Concentrations expected to impact ecological receptors in the Calumet area – derived from lowest observable adverse effect levels (LOAEL)



# Calumet Open Space Reserve Background, Threshold, and Benchmarks Values

## – General Guidance

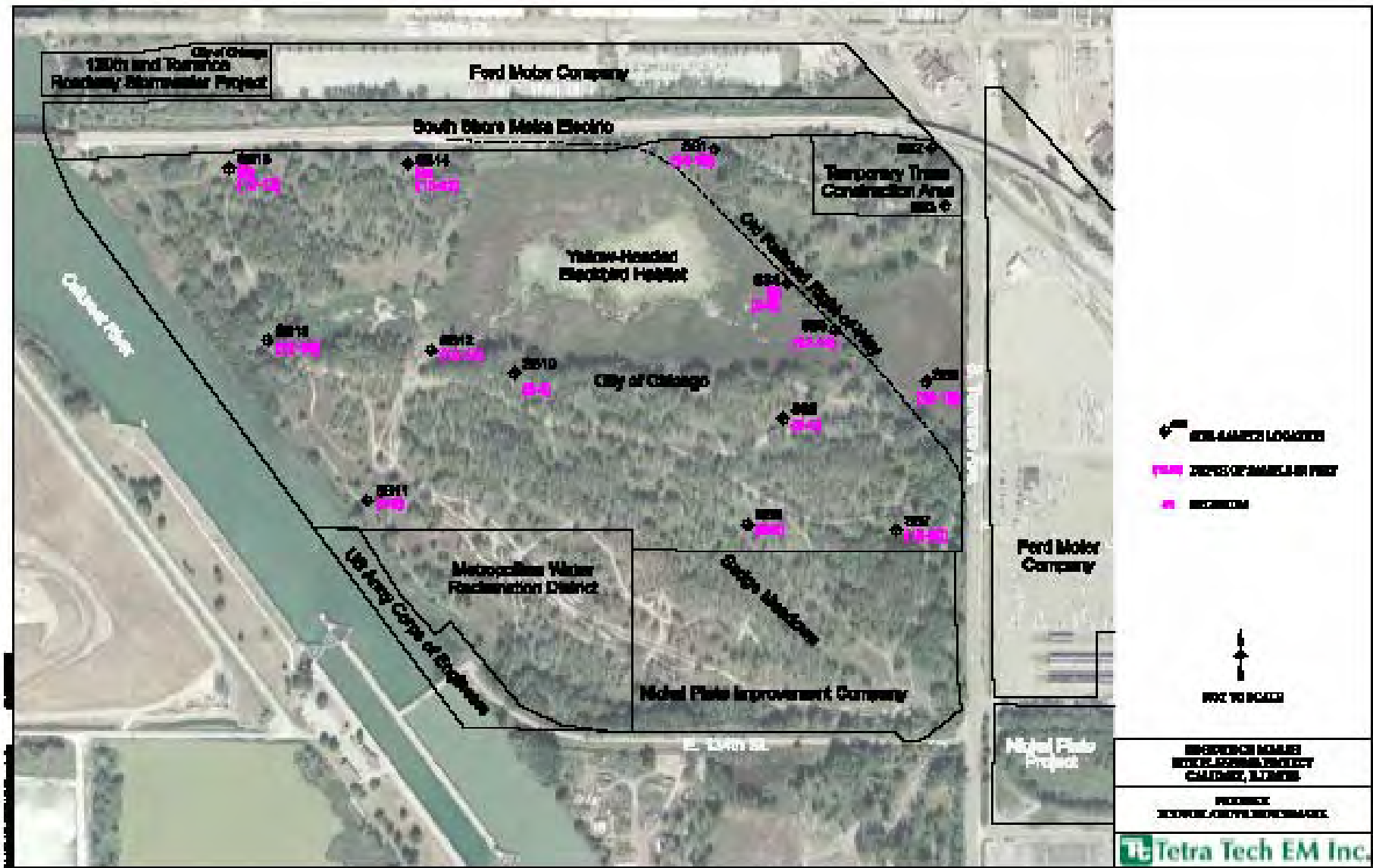
- Below Threshold Values – No rehabilitation required
- Above Threshold Values, But Below Background – No rehabilitation likely; may need to monitor if special status species present
- Above Threshold and Background Values, But Below Benchmark Values – Rehabilitation, monitoring, or additional study should be considered
- Above Benchmark Values – Rehabilitation should be considered

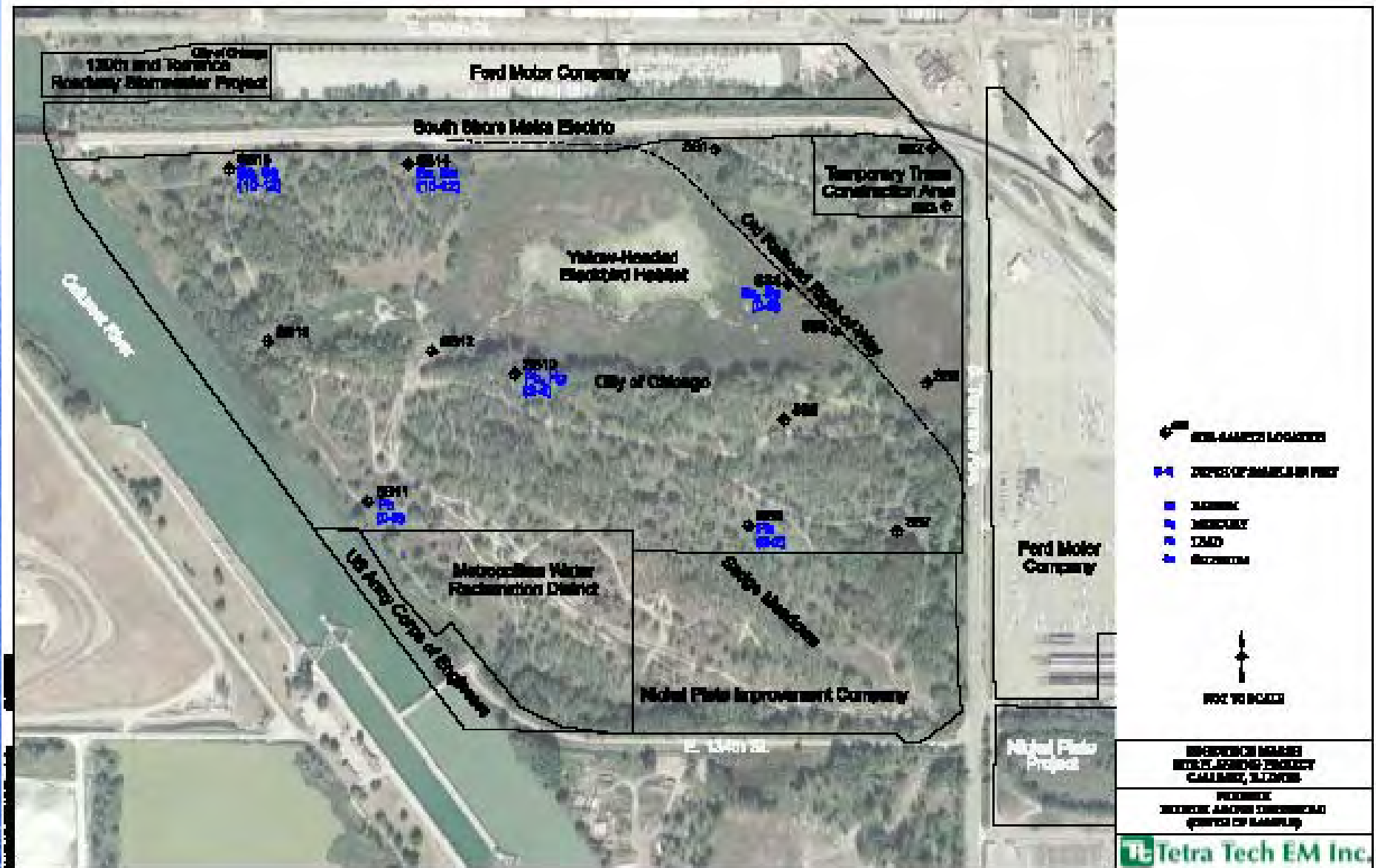


# Case Studies

- Hegewisch Marsh
- Van Vlissingen Prairie









# Future

- Threshold and Benchmark Values updated regularly
- Background Values for Sediment and Surface Water
- Adjust the protocol based on lessons learned from Hegewisch Marsh and Van Vlissingen Prairie



## The Black-crowned Night-Herons of the Lake Calumet Wetlands

Dr. Jeffrey Levensgood

IDNR Illinois Natural History Survey

We examined the nesting ecology and contaminant exposure of Lake Calumet Black-crowned Night-Herons during the 2002 and 2003 nesting seasons. Here we present information on historic population levels, nesting phenology, productivity, foraging ecology, and contaminant exposure and biomarker response of embryos for this population.

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Phone: (217) 333-6767



# The Black-Crowned Night-Herons of Lake Calumet Wetlands

Jeffrey M. Levenson  
Center for Wildlife and Plant Ecology Illinois Natural History  
Survey, and Program in Veterinary, Wildlife, and Ecological  
Toxicology, Dept. of Veterinary Biosciences, UICVM





**Field:**

Allison Klement

Maggie Kurcz

Walter Marciz

John Dassow

**Funding:**

IWMRC

Chicago DOE

IWPF (IDNR)

**Analytical:**

Gary Bordson

Christie Hart

Marv Piwoni

John Scott

Jon Talbott

Luann Wiedenmann



**Services:**

USGS UMESC

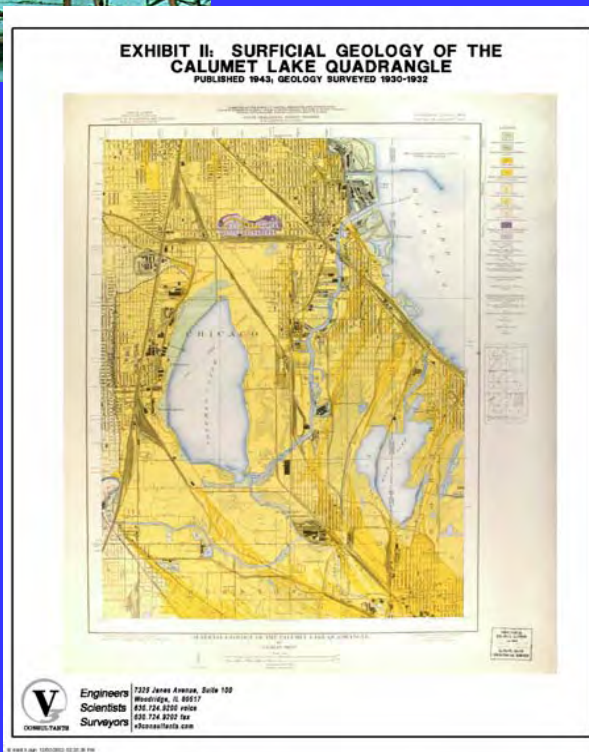
USGS Patuxent WRC

Texas A&M

USFWS Agassiz NWR

Three Rivers EA

IDOT



**CALUMET**  
 INDUSTRIAL CORRIDOR

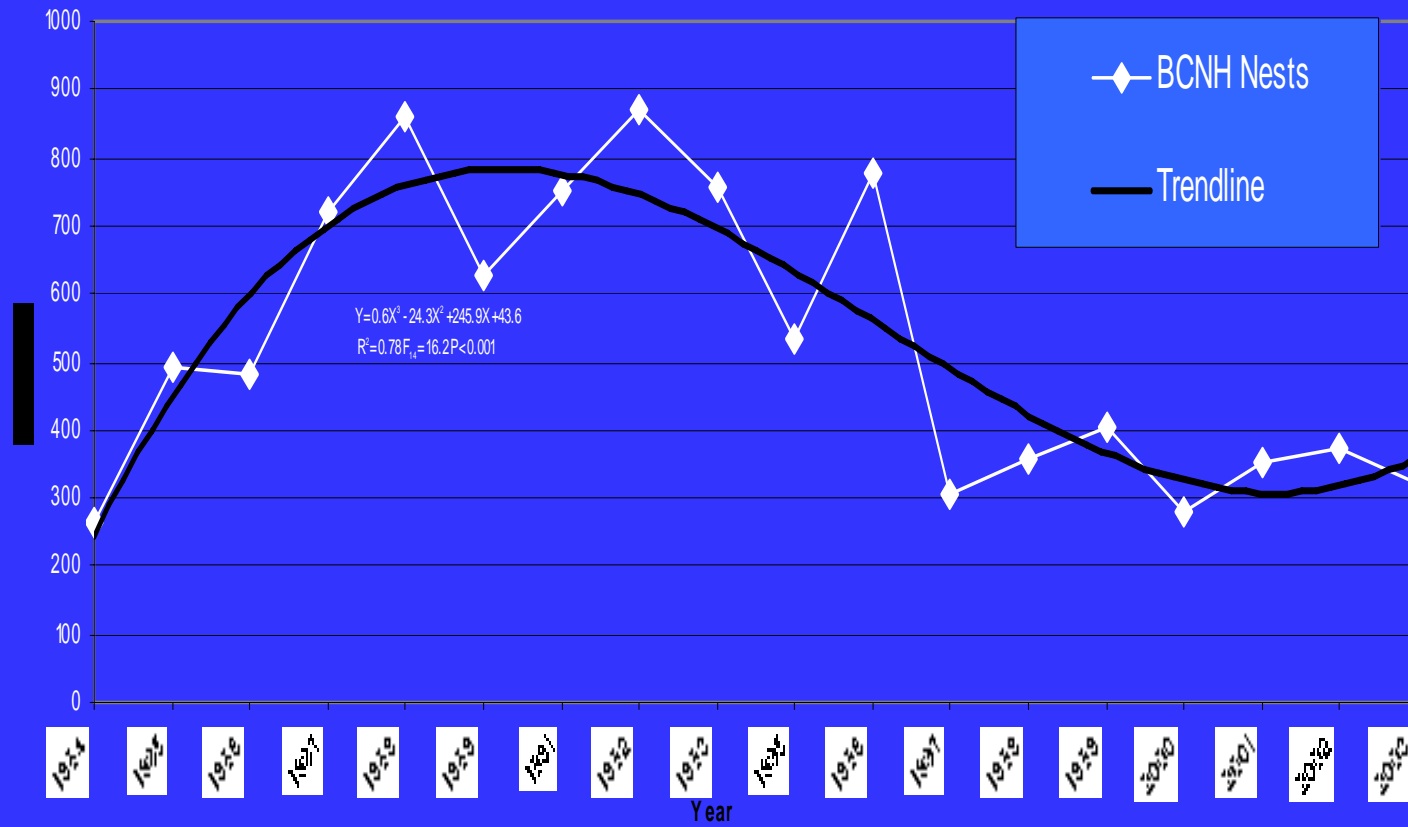
- Calumet Tank & Equip.
- Ceres Terminals
- Clean Harbors Services
- Emesco Marine
- Ferrolloy Corporation
- National Material
- Spraylat Corporation
- Steel Coils, Inc.
- Stolthaven Chicago
- The Steel Co. Group
- Town & Country
- LTV Copperweld

**CITY OF CHICAGO**  
 RICHARD M. DALEY, MAYOR

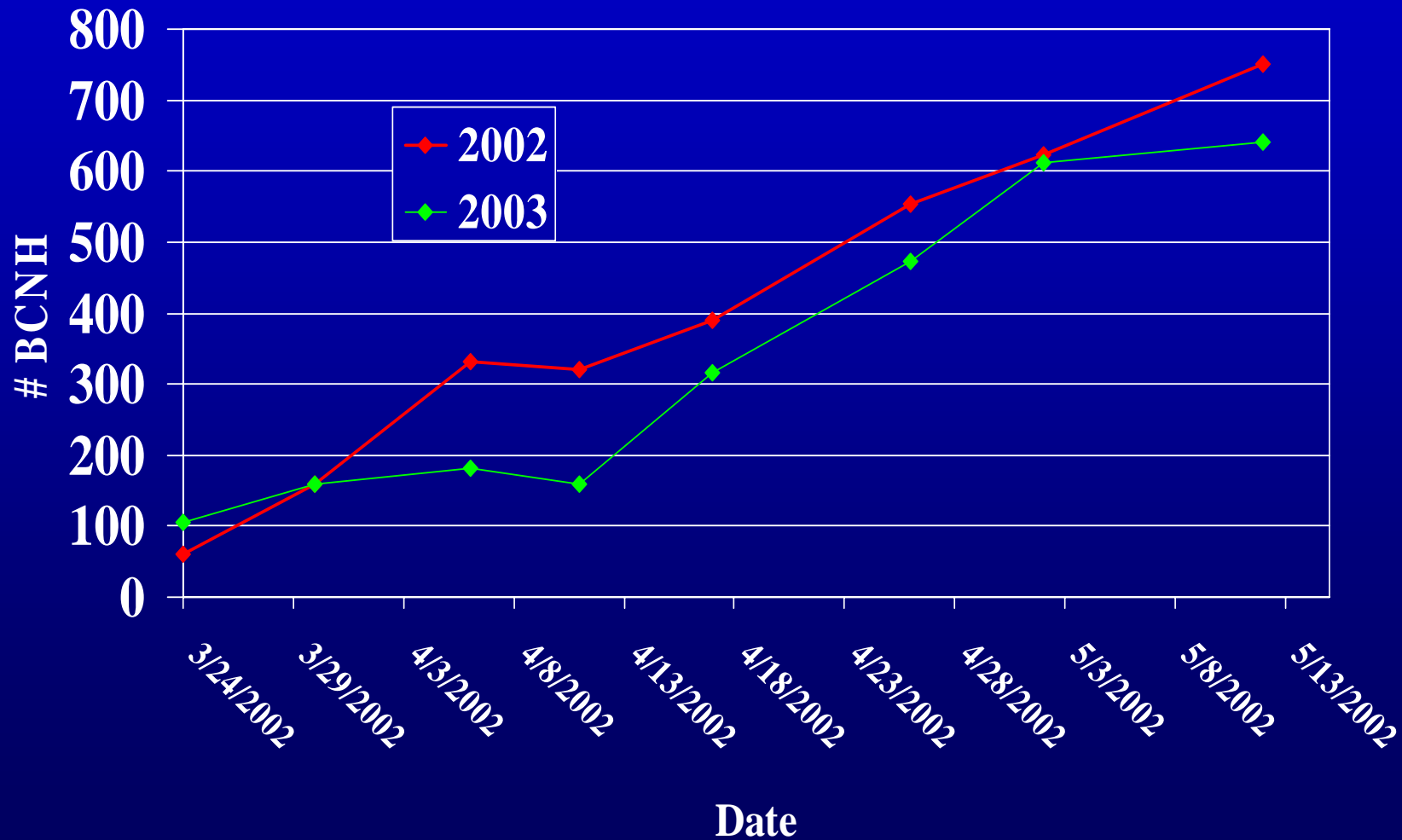
# Population Levels and Nesting Ecology

- ✓ Population Monitoring
  - ✓ Arrival, peak population levels, dispersal
  - ✓ Compile Historic data
- ✓ Nesting Chronology
  - ✓ Nest building through dispersal
- ✓ Productivity
  - ✓ Clutch size, egg survival, nest success
- ✓ Nesting Habitat
  - ✓ Water levels
  - ✓ Nesting Cover

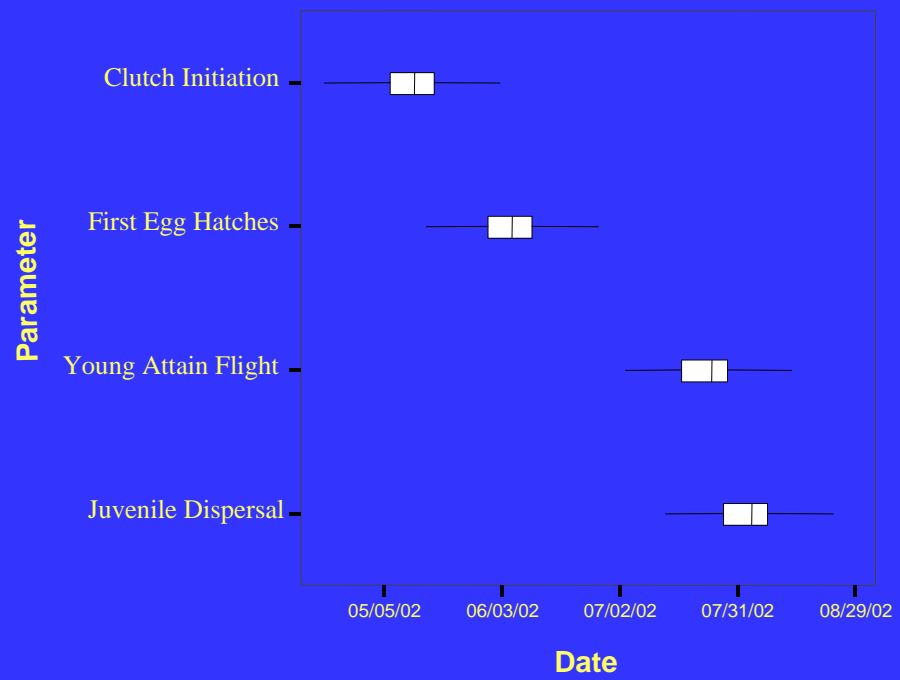




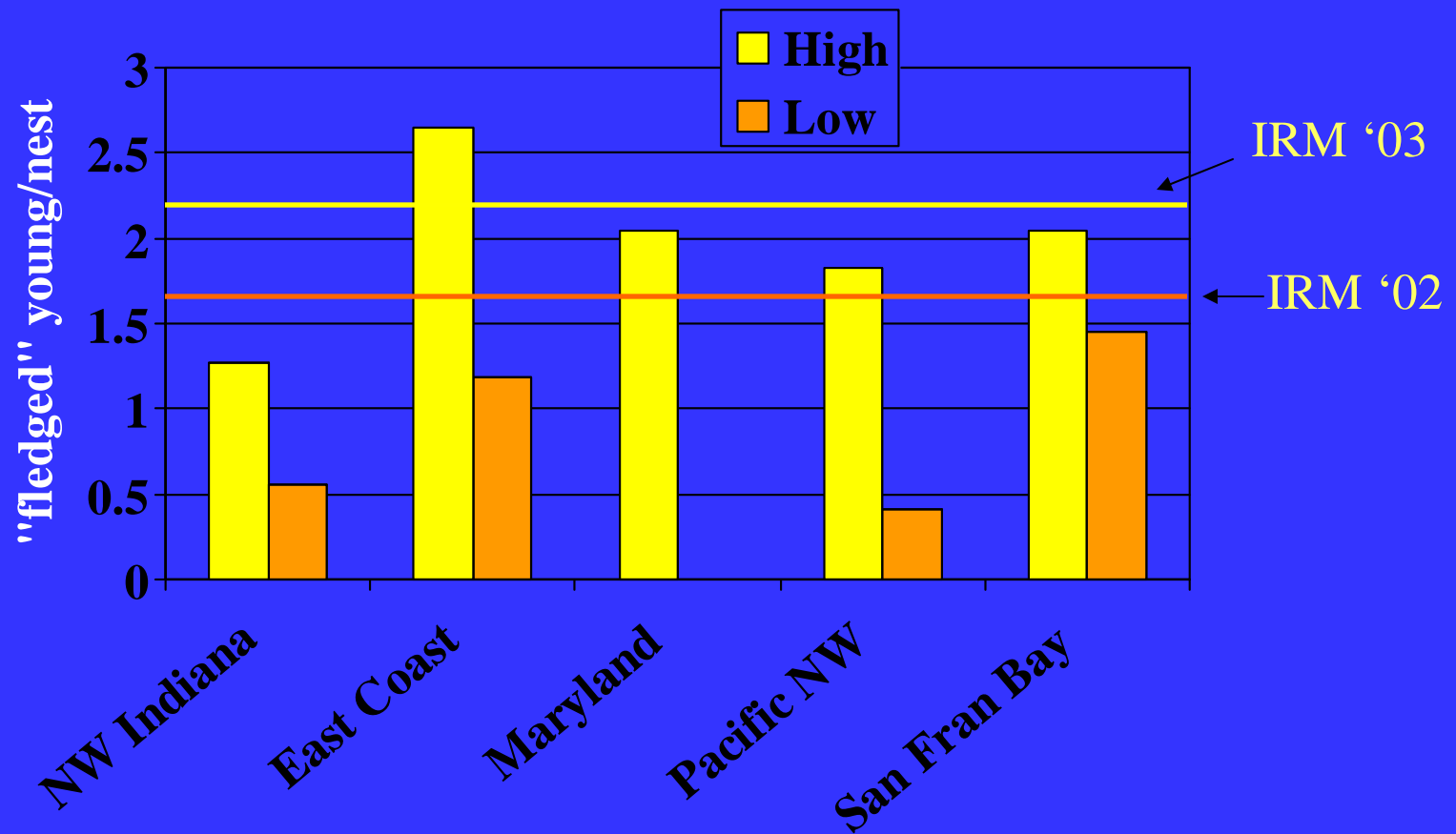
# Results of BCNH Population Surveys at Lake Calumet wetlands



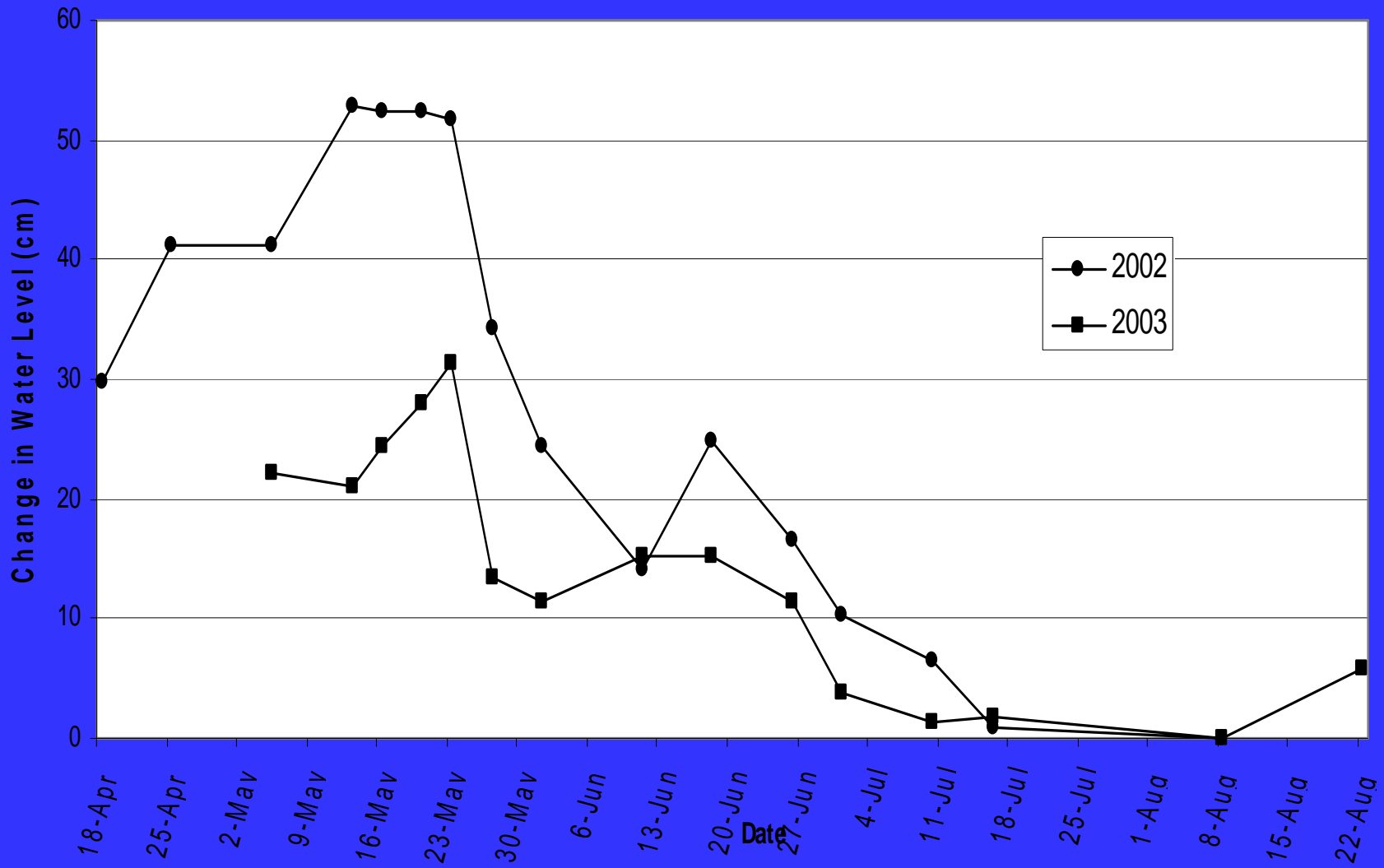




# Productivity of LCW BCNH vs. Other Colonies







ILLINOIS  
NATURAL  
HISTORY  
SURVEY

Black-crowned Night-Herons  
of the Lake Calumet Region,  
Chicago, Illinois



Article 3

Nesting Ecology of Black-crowned  
Night-Herons at Lake Calumet Wetlands  
Jeffrey M. Levensgood, Walter J. Marcisz,  
Allison M. Klement, and Margaret A. Kurcz

Article 4

Population Trends in a Black-crowned  
Night-Heron Colony at Lake Calumet  
Wetlands  
Walter J. Marcisz, Jeffrey M. Levensgood,  
Allison M. Klement, and Margaret A. Kurcz

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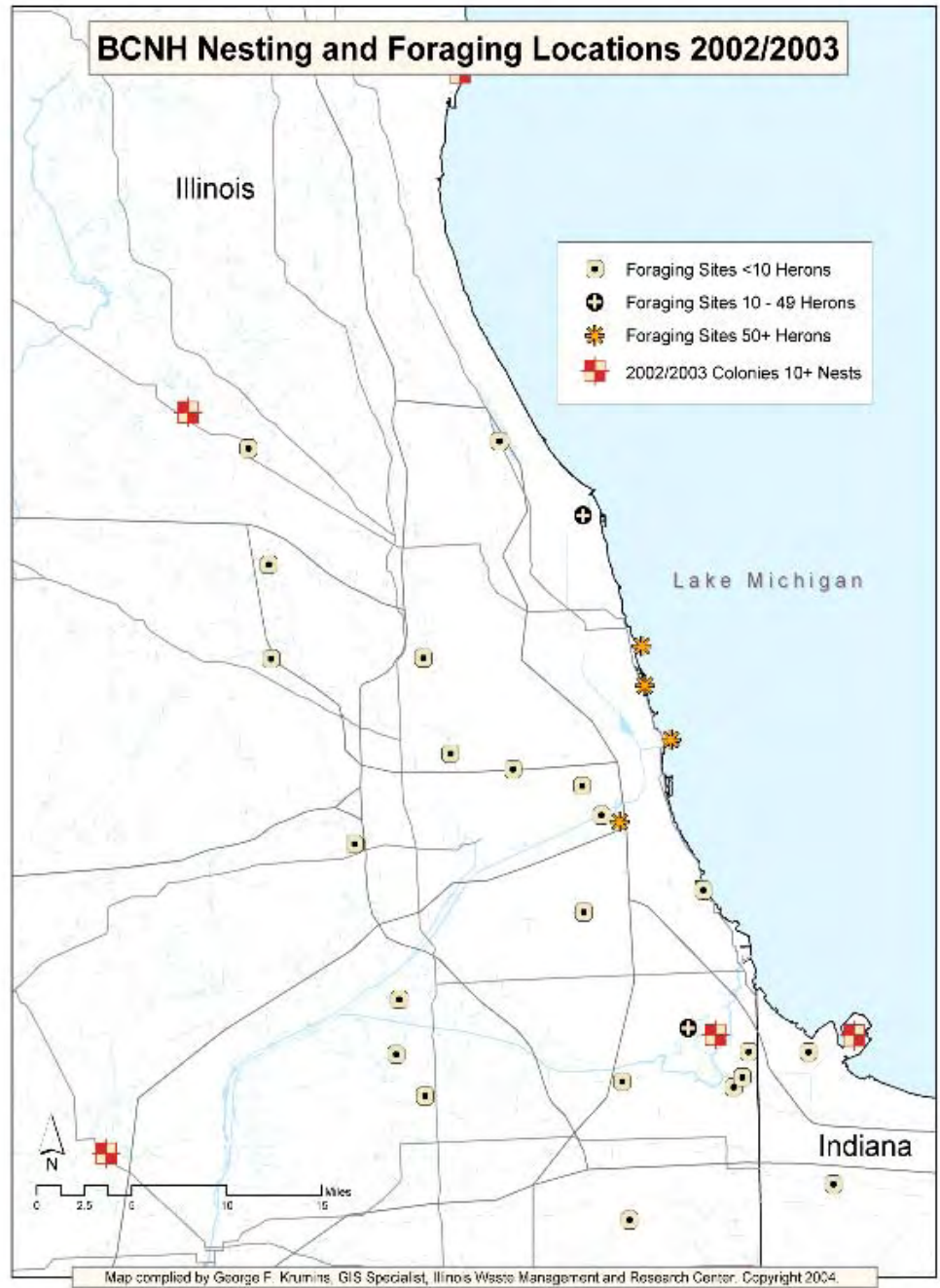
<http://www.inhs.uiuc.edu/chf/pub/bulletin.php>

# Contaminant Exposure and Effects

- ✓ Foraging Ecology
  - ✓ Nestling Diet
  - ✓ Adult Foraging Sites
- ✓ Food-chain Exposure
  - ✓ Regurgitates
  - ✓ Prey at Foraging Sites
- ✓ Exposure of BCNH to Contaminants
  - ✓ Levels of Contaminants in Embryos
  - ✓ Biomarker Response

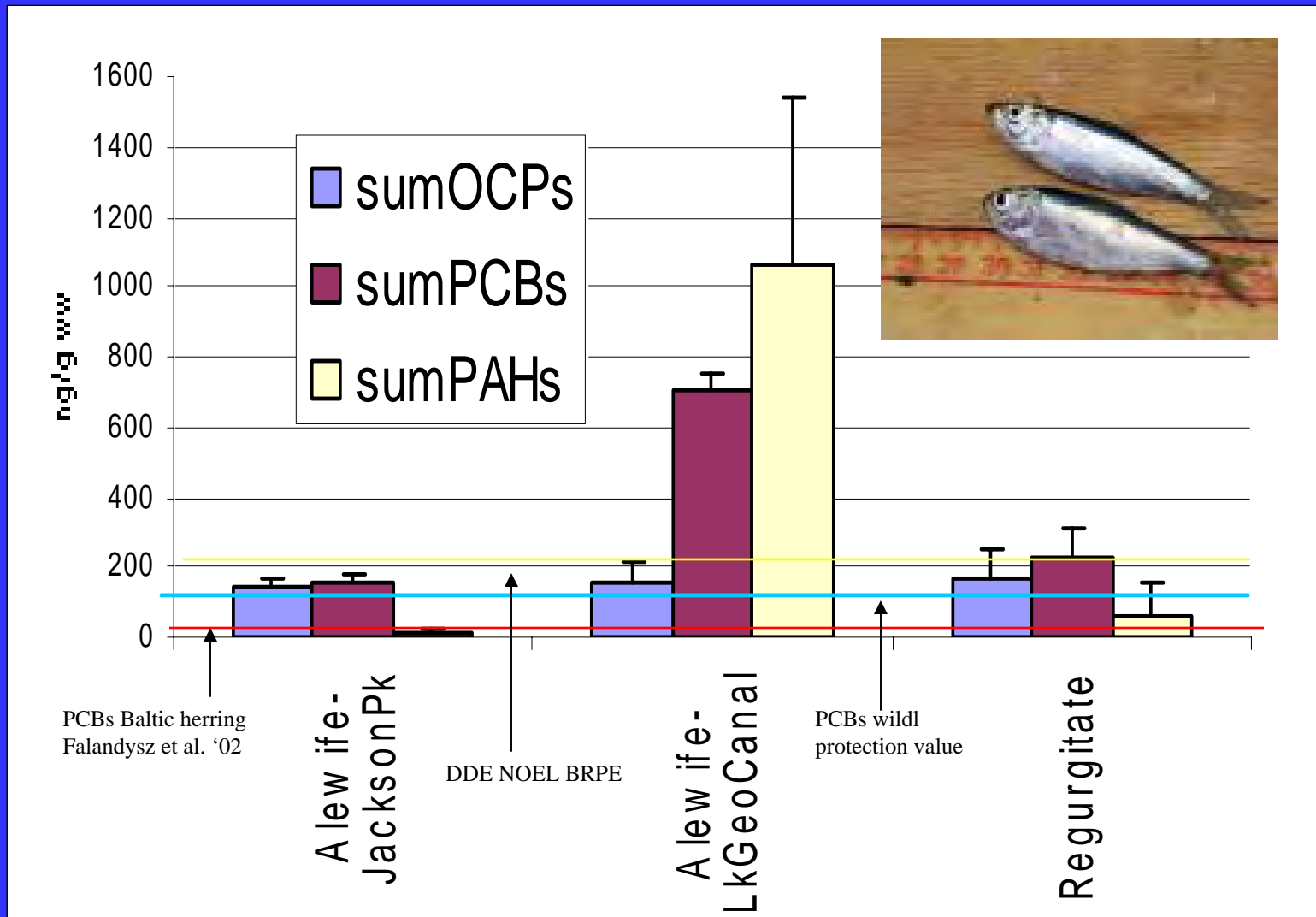


### BCNH Nesting and Foraging Locations 2002/2003



Map compiled by George F. Krumins, GIS Specialist, Illinois Waste Management and Research Center. Copyright 2004.

# Mean Concentrations (ppb wet wgt) of Selected Contaminants in Alewife from Locations in south Chicago, IL

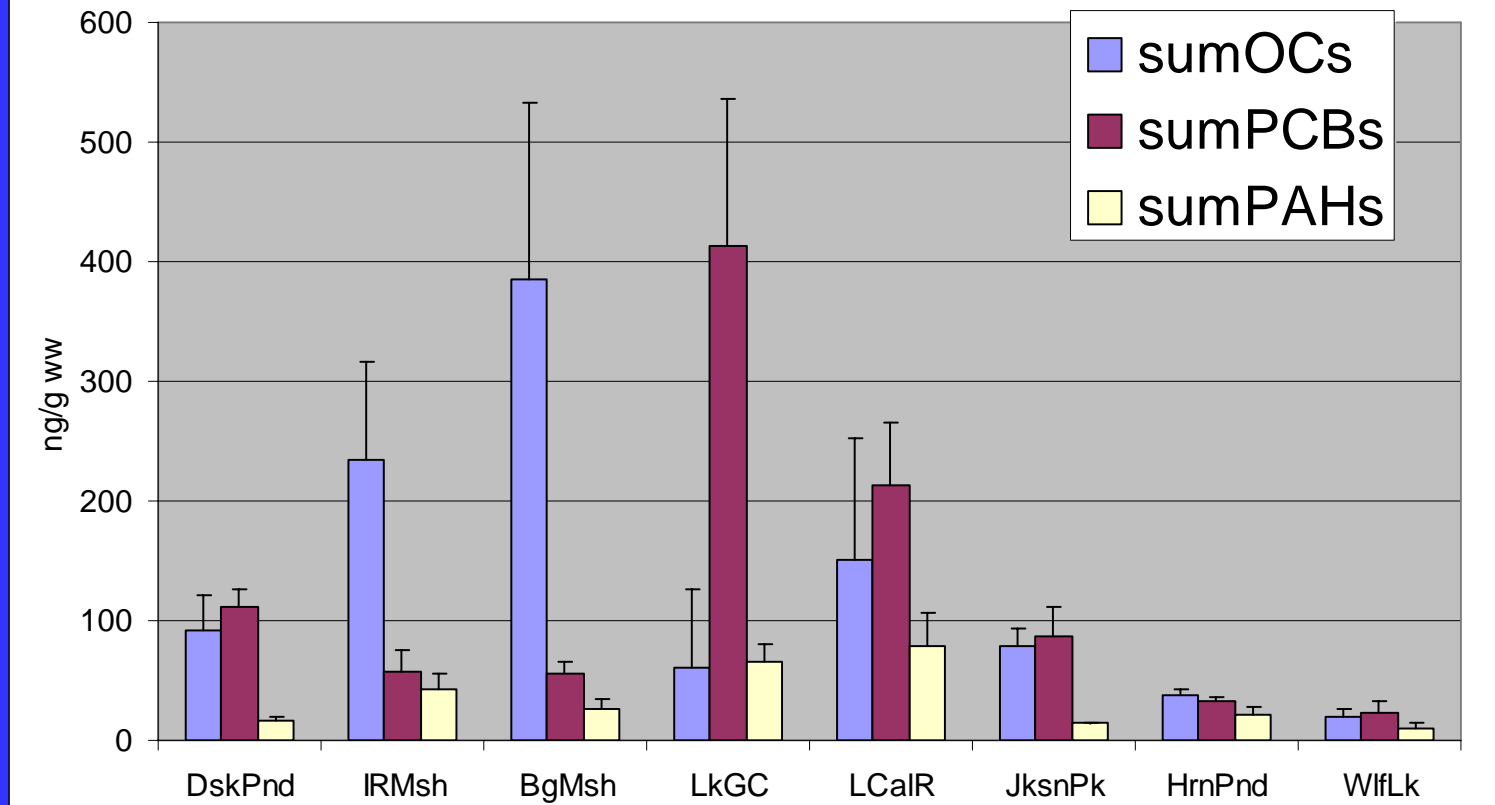






## Organic Contaminants in Sunfish

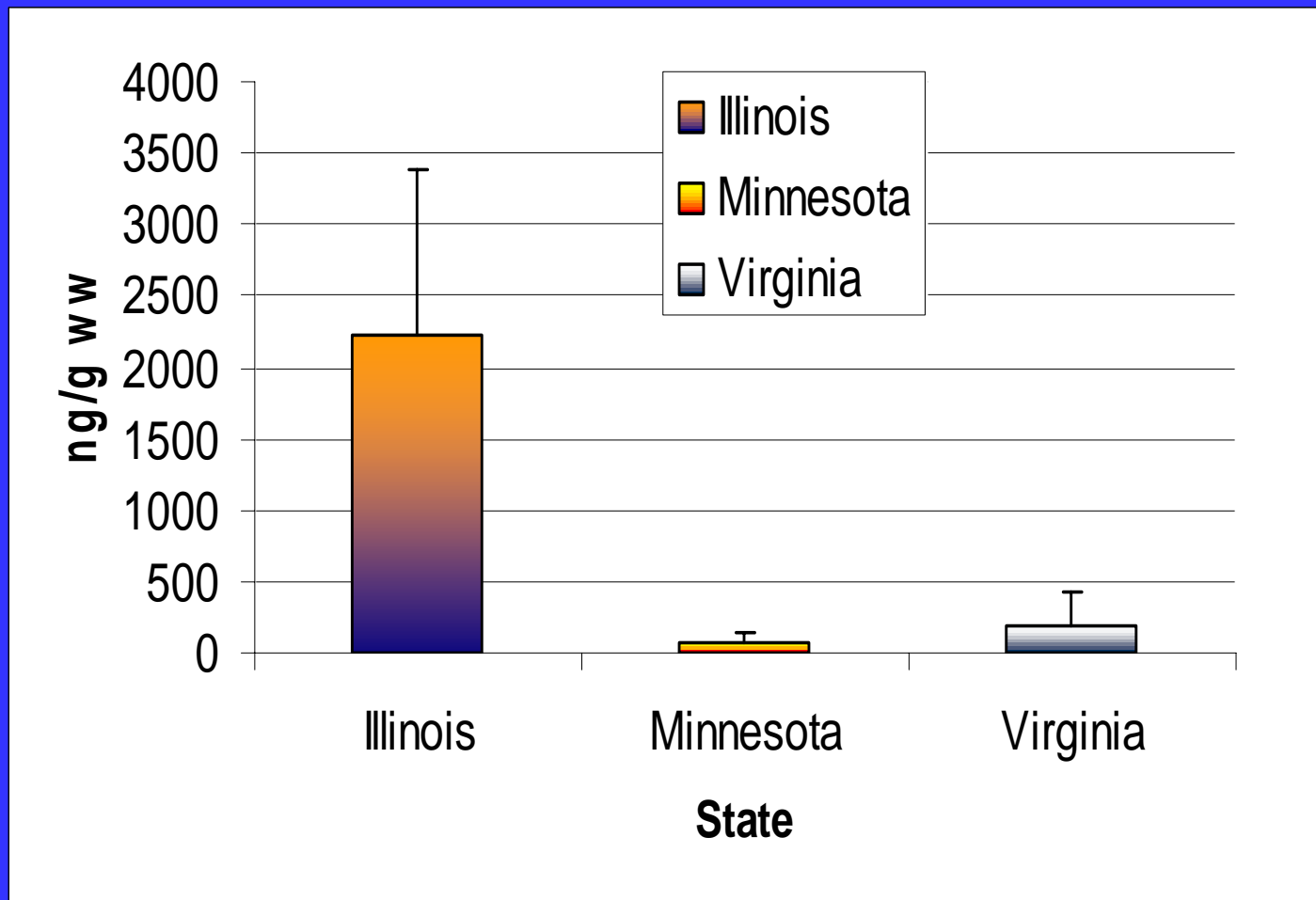
J. Levensgood INHS unpubl data  
Chemistry by IWMRC



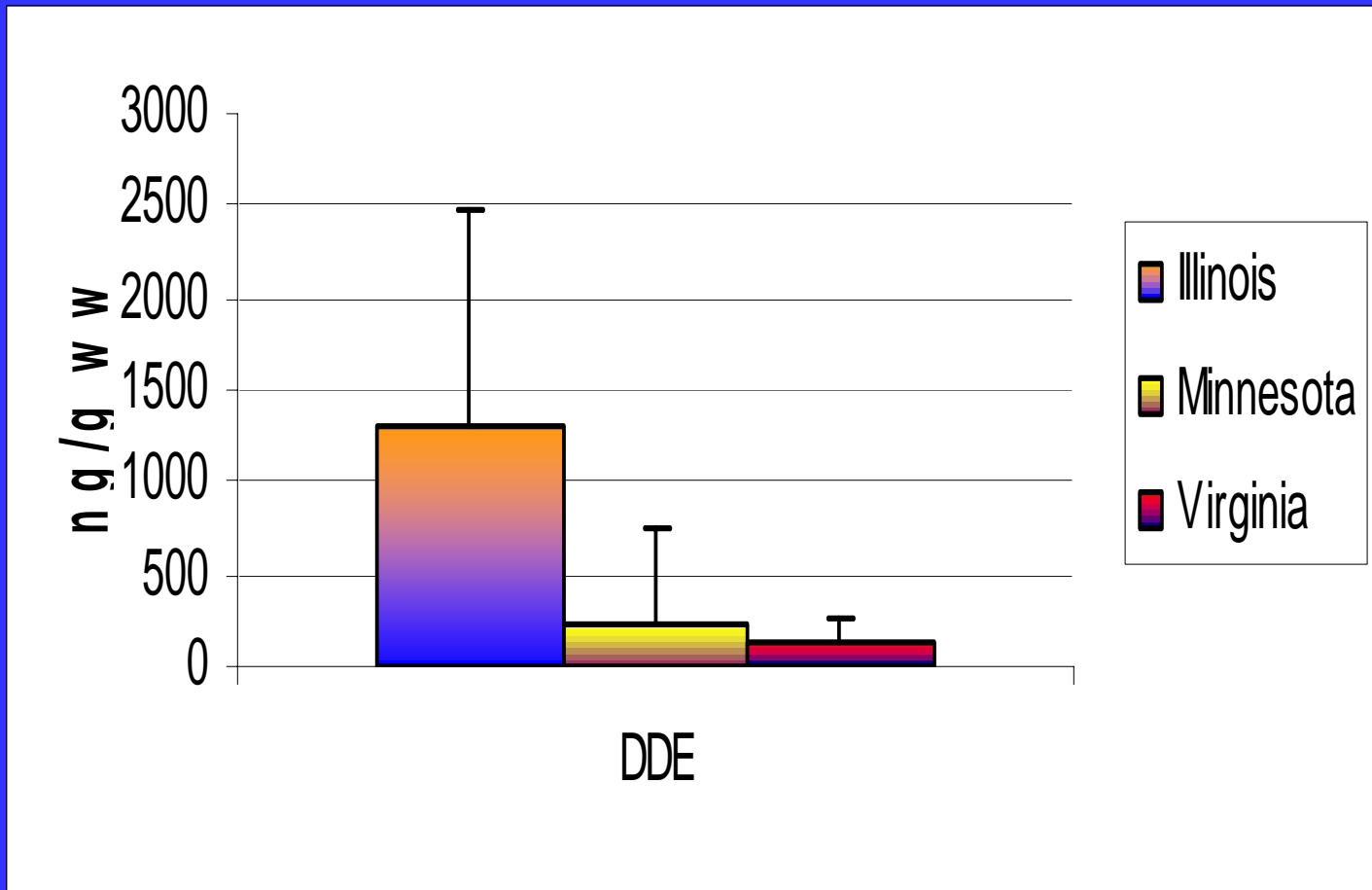
Note: sumOCs, PCBs, and PAHs= sum concentrations, respectively, of organochlorine pesticides, polychlorinated biphenyls, and polyaromatic hydrocarbons measured.

DskPnd= Deadstick Pond, IRMsh= Indian Ridge Marsh, BgMsh= Big Marsh, LkGC= Lake George Canal, LCalR= Little Calumet River (South Branch), JksnPk= Jackson Park Harbor, HrnPnd= Heron Pond (gun club), WfLk= Wolf Lake

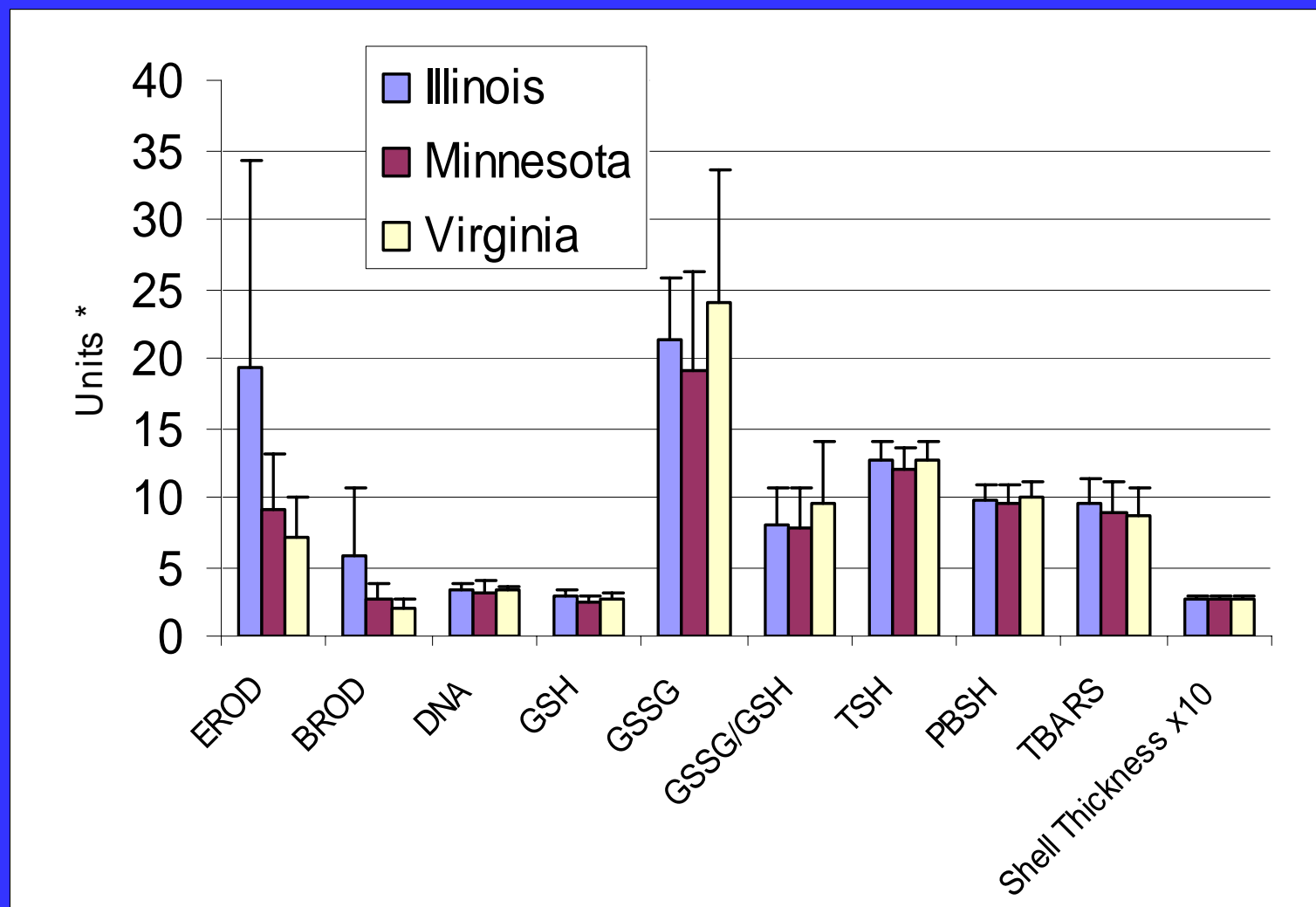
## Sum PCBs in BCNH Eggs From IL, MN, and VA



## DDE in BCNH Eggs from IL, MN, and VA

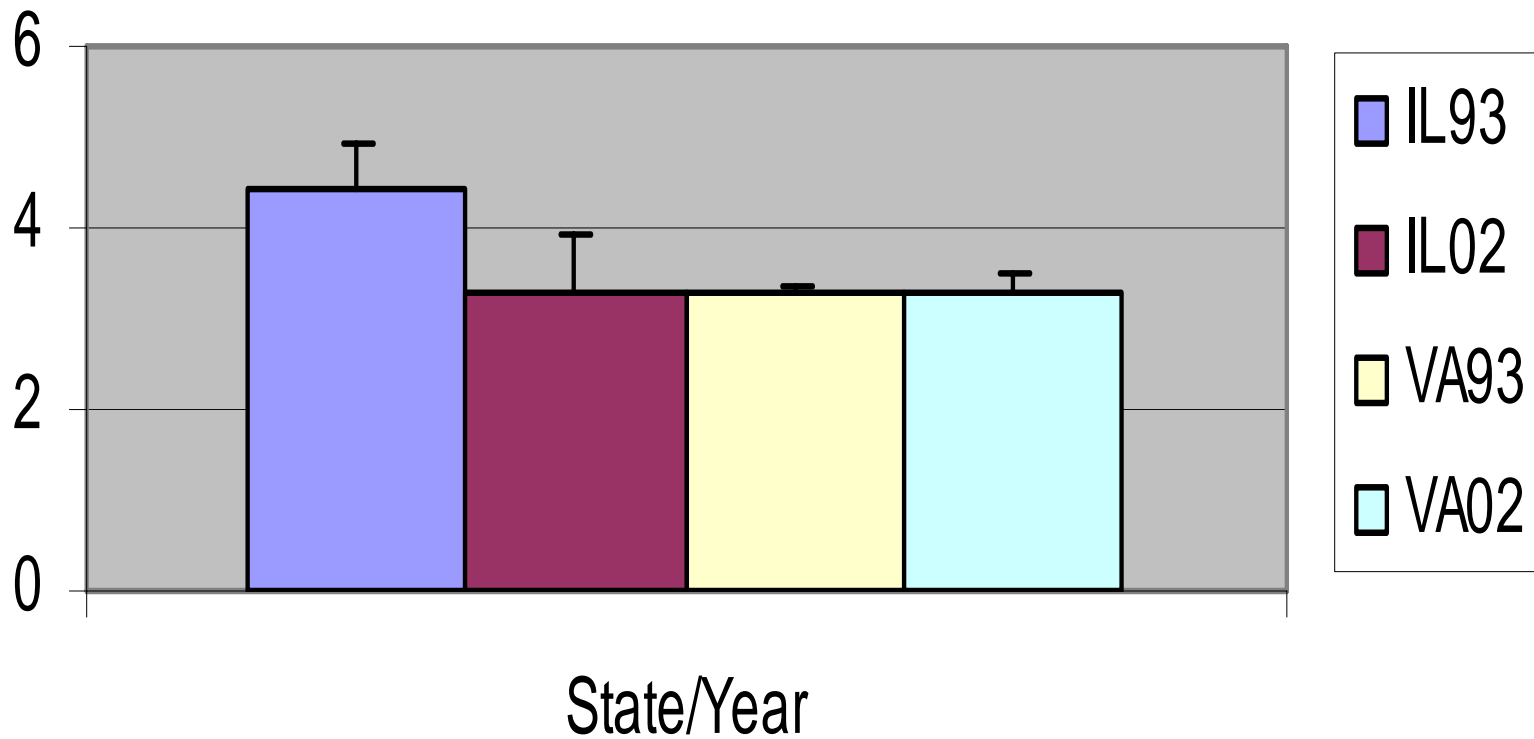


## Biomarkers of Exposure in BCNH Embryos from IL, MN, and VA



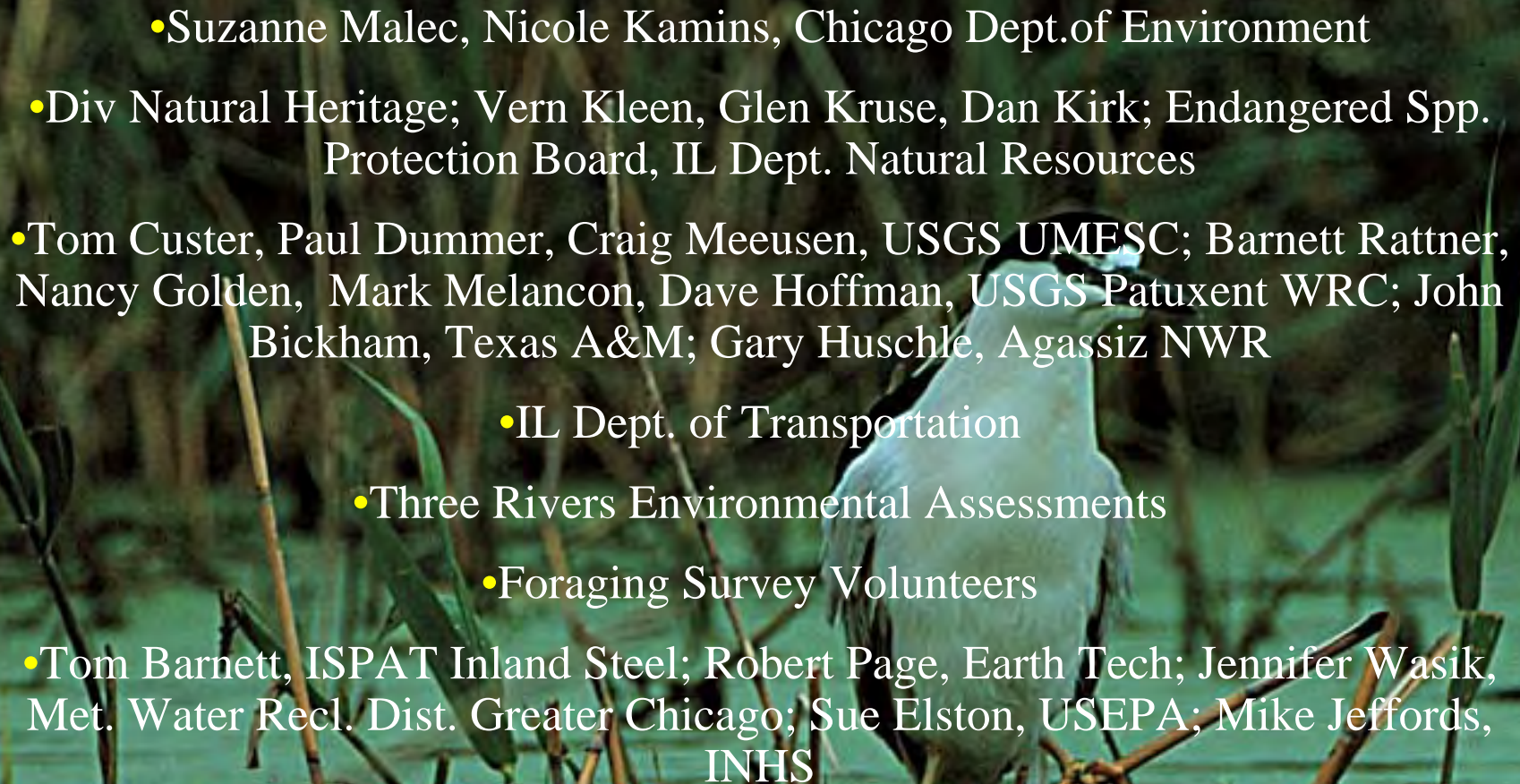
## Variation in Cellular DNA Content

### HPCV in BCNH embryos



Bickham et al



- 
- Suzanne Malec, Nicole Kamins, Chicago Dept. of Environment
  - Div Natural Heritage; Vern Kleen, Glen Kruse, Dan Kirk; Endangered Spp. Protection Board, IL Dept. Natural Resources
  - Tom Custer, Paul Dummer, Craig Meeusen, USGS UMESC; Barnett Rattner, Nancy Golden, Mark Melancon, Dave Hoffman, USGS Patuxent WRC; John Bickham, Texas A&M; Gary Huschle, Agassiz NWR
    - IL Dept. of Transportation
    - Three Rivers Environmental Assessments
    - Foraging Survey Volunteers
  - Tom Barnett, ISPAT Inland Steel; Robert Page, Earth Tech; Jennifer Wasik, Met. Water Recl. Dist. Greater Chicago; Sue Elston, USEPA; Mike Jeffords, INHS



## **Chicago Area Background Contaminants in Wetland Sediments and Surface Waters: Supporting the Calumet Wetlands Ecotoxicological Assessment**

Dr. Marvin Piwoni<sup>1</sup>, Dr. Teresa Chow<sup>2</sup>, Mr. Gary Bordson<sup>3</sup>, Dr. Jonathan Talbott<sup>4</sup>,  
Dr. Luann Wiedenmann<sup>5</sup>, Dr. Monte Wilcoxon<sup>6</sup>, Dr. William Bogner<sup>7</sup>

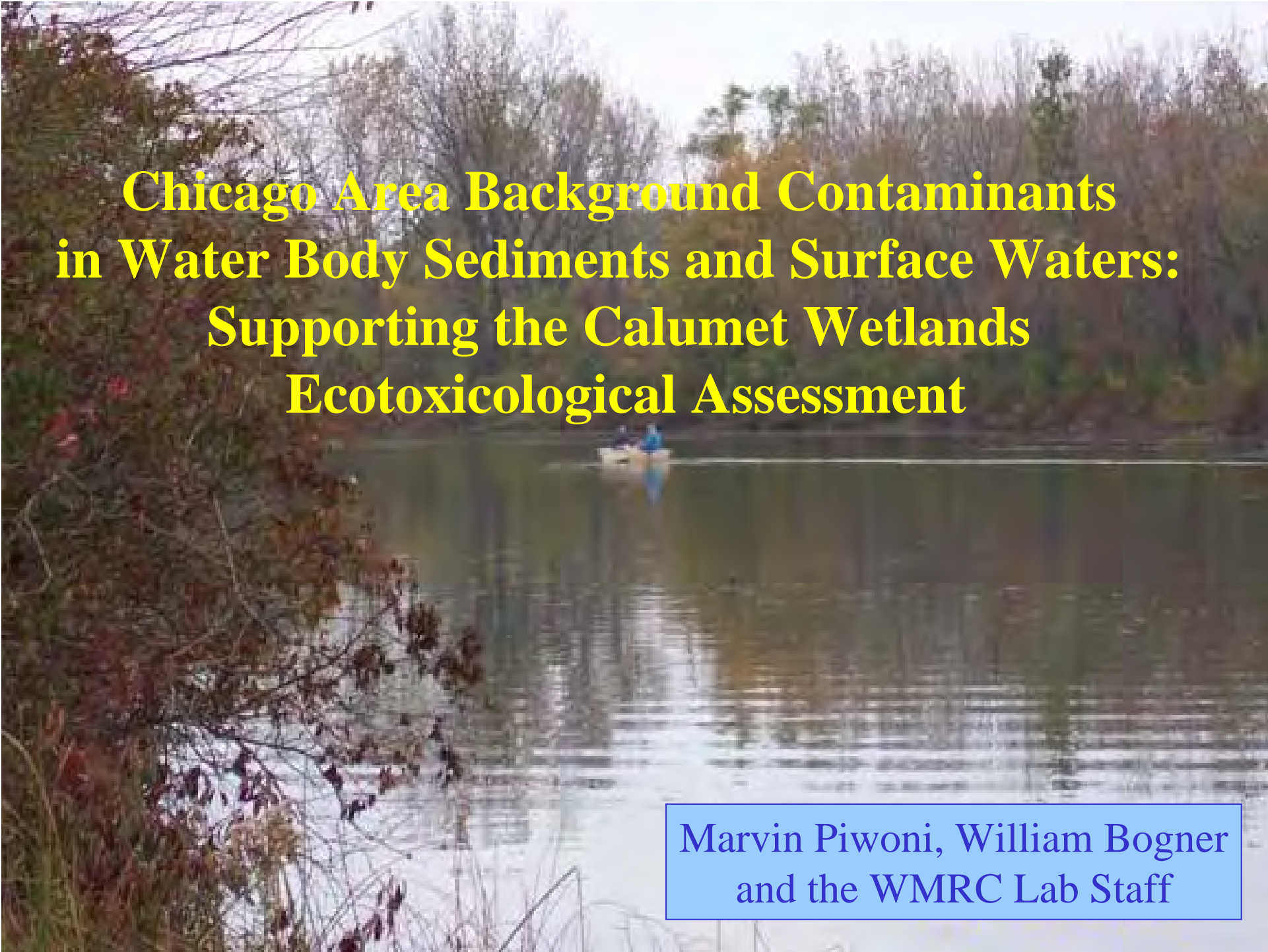
1, 2, 3, 4, 5, 6-IDNR Waste Management and Research Center, 7-IDNR Illinois State  
Water Survey

The Illinois Department of Natural Resources funded a study at the IDNR Illinois Waste Management and Research Center and the IDNR Illinois State Water Survey to investigate background concentrations of toxic environmental contaminants in the south Chicago area. The study, funded through the Environmental Protection Trust Fund, was undertaken to provide background information on environmental contaminants in support of Chicago Department of Environment's efforts to revitalize wetlands in the Calumet region of Southeast Chicago. An important component of the revitalization effort is defining ecotoxicological risks in these environments. Criteria to minimize such risks have been developed by the Calumet Ecotoxicology Protocol Technical Team (2005). Surface water and sediment background concentrations for the region's wetlands were identified as lacking.

Eight ponds and lakes were sampled for surface waters and sediments. These samples were analyzed for a variety of toxic metal and organic constituents as well as a number of major constituents and other system properties. The data was analyzed on a constituent basis; these data are offered for consideration in the development of regional background concentrations.

Contact Name: Marvin Piwoni, Ph.D., Program Manager, Research and Laboratory Services  
Address: IDNR Waste Management and Research Center, One Hazelwood Drive, Champaign, IL  
61820-7465  
Email: mpiwoni@wmrc.uiuc.edu  
Phone: (217) 244-8903





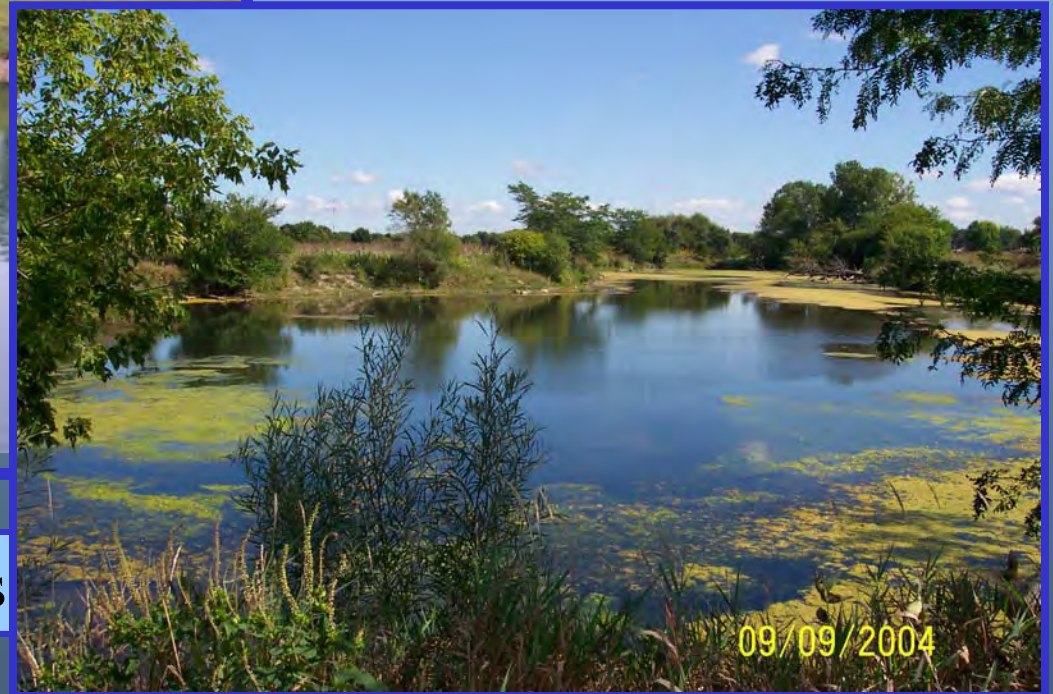
**Chicago Area Background Contaminants  
in Water Body Sediments and Surface Waters:  
Supporting the Calumet Wetlands  
Ecotoxicological Assessment**

Marvin Piwoni, William Bogner  
and the WMRC Lab Staff

IL Waste Management and Research Center  
One Hazelwood Drive  
Champaign, IL 61820



“Uncontaminated” Ponds  
And Lakes in the Region



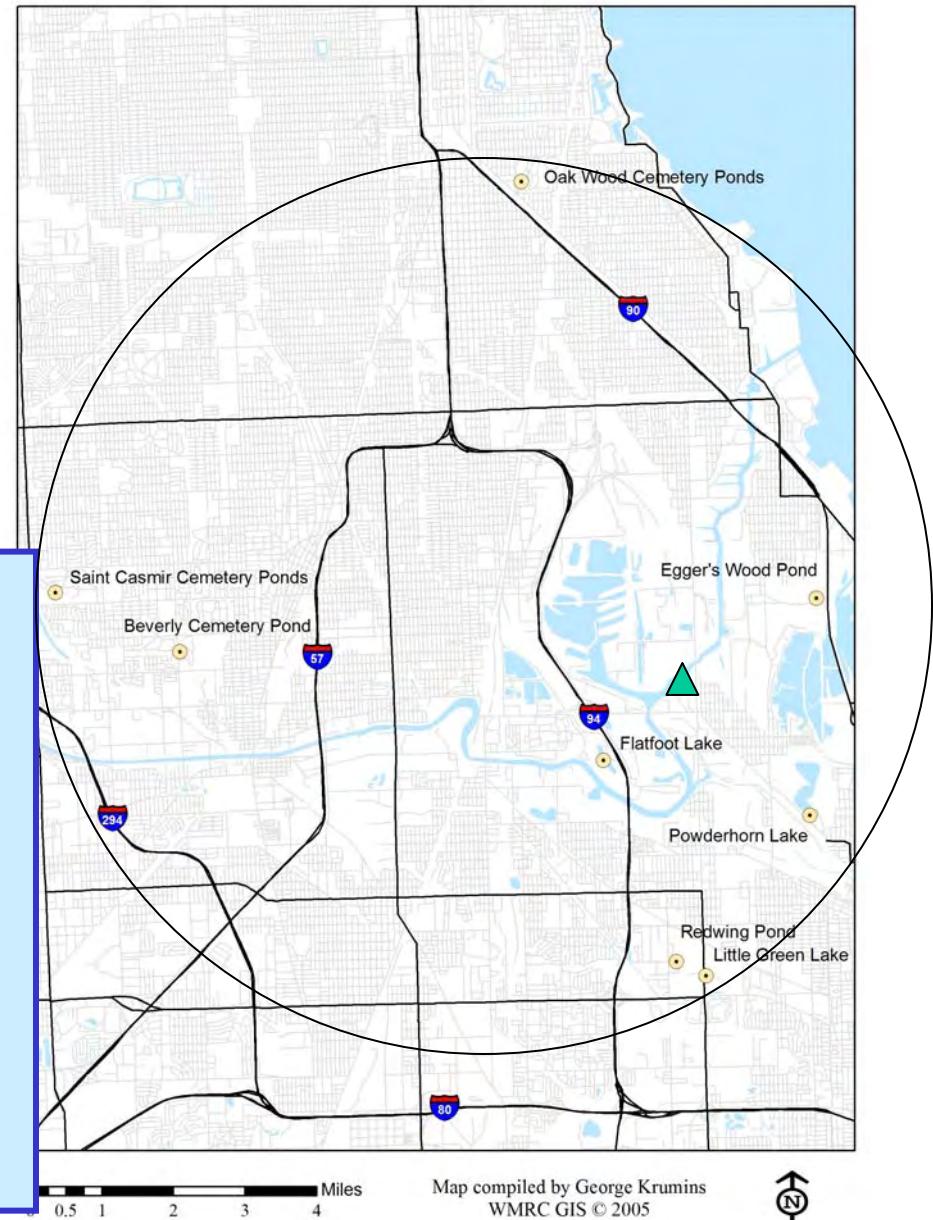
Parks, Preserves and Cemeteries

## Identifying Ponds and Lakes for Sampling

### Criteria for Pond Selection

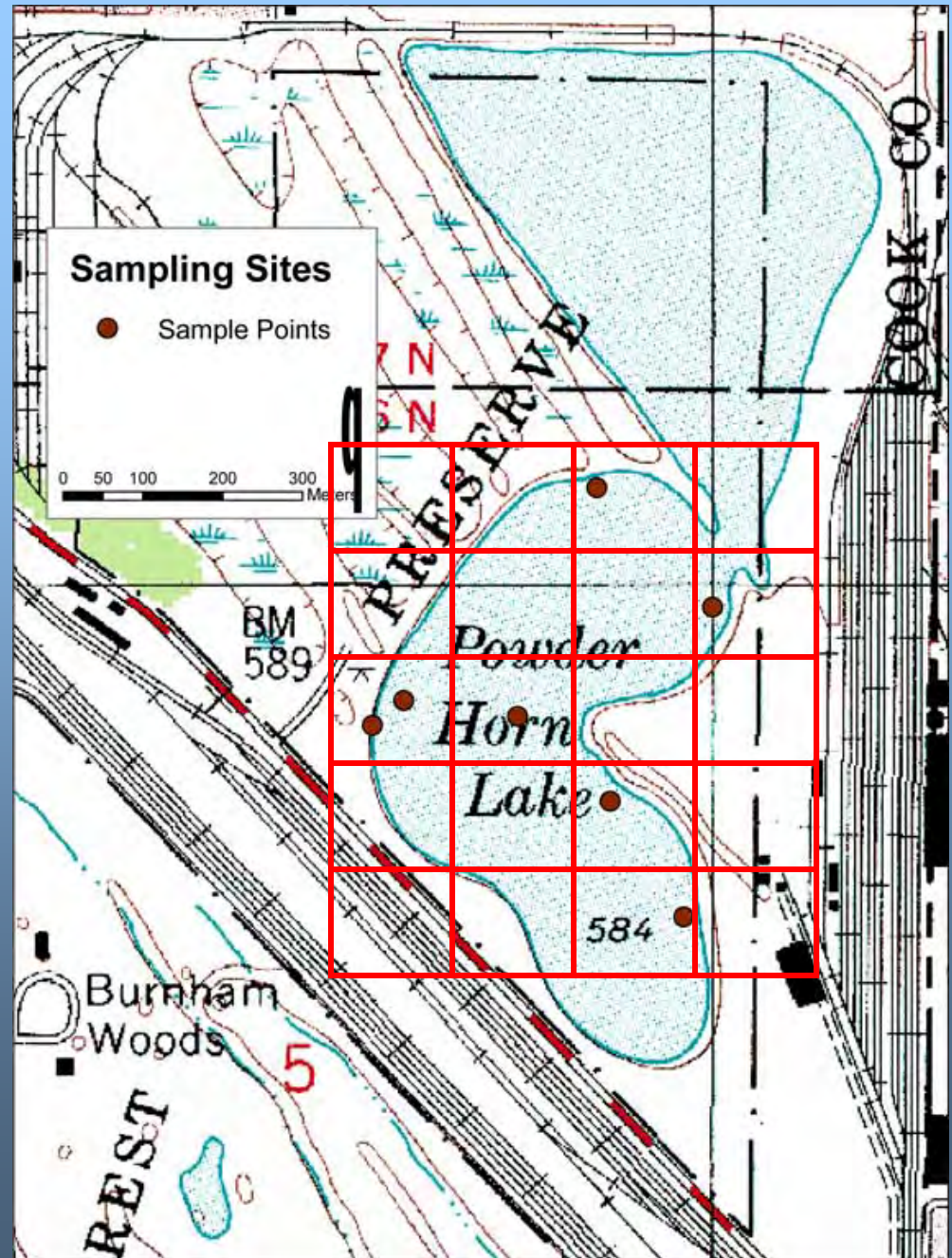
- Wetland appears on 1926-27 USGS quad maps – long exposure to area non-point source pollution.
- Not a “borrow” pit or left from recent mining operations.
- Within 12 miles of the center of Indian Ridge Marsh North.
- Accessible with small boat or canoe.

Figure 1: The Calumet Area and South Chicago: Water Bodies Sampled



## Sampling Location Selection

- Grid overlain on map of lake or pond
- Grid squares numbered.
- Random number table used to pick grid squares for sampling.
- Samples taken at about the center of the grid square using GPS for positioning



# Sediment Collection



## Sediment Collection

Five sediment cores from  
each of 8 ponds/lakes\*  
Top ~10 cm of sample core  
extruded into bottles.





## Water Collection

Two samples each pond; spring and fall samples for 5 ponds.



# Water Collection



# Analytes for Sediment Samples

## Bulk Parameters

## Toxic Organics

Total organic carbon	Chromium	Acenaphthene	Phenanthrene
Total sulfur	Cobalt	Acenaphthylene	Pyrene
Particle Size Distribution: sand, silt and clay	Copper	Anthracene	Total Measured PAH
Calcium	Iron	Benzo(a)anthracene	$\alpha$ -Chlordane
Magnesium	Lead	Benzo(b)fluoranthene	$\Gamma$ -Chlordane
Potassium	Manganese	Benzo(k)fluoranthene	Chlordane ( $\alpha + \Gamma$ )
Sodium	Mercury	Benzo(g,h,i)perylene	DDD
Aluminum	Nickel	Benzo(a)pyrene	DDE
Antimony	Selenium	Chrysene	DDT
Arsenic	Silver	Dibenzo(a,h)anthracene	Dieldrin
Barium	Thallium	Fluoranthene	Endrin
Beryllium	Vanadium	Fluorene	Heptachlor
Cadmium	Zinc	Indo(1,2,3-c,d)pyrene	Heptachlor epoxide
		Naphthalene	Total Measured PCBs

## Toxic Metals

## Analytes for Water Samples

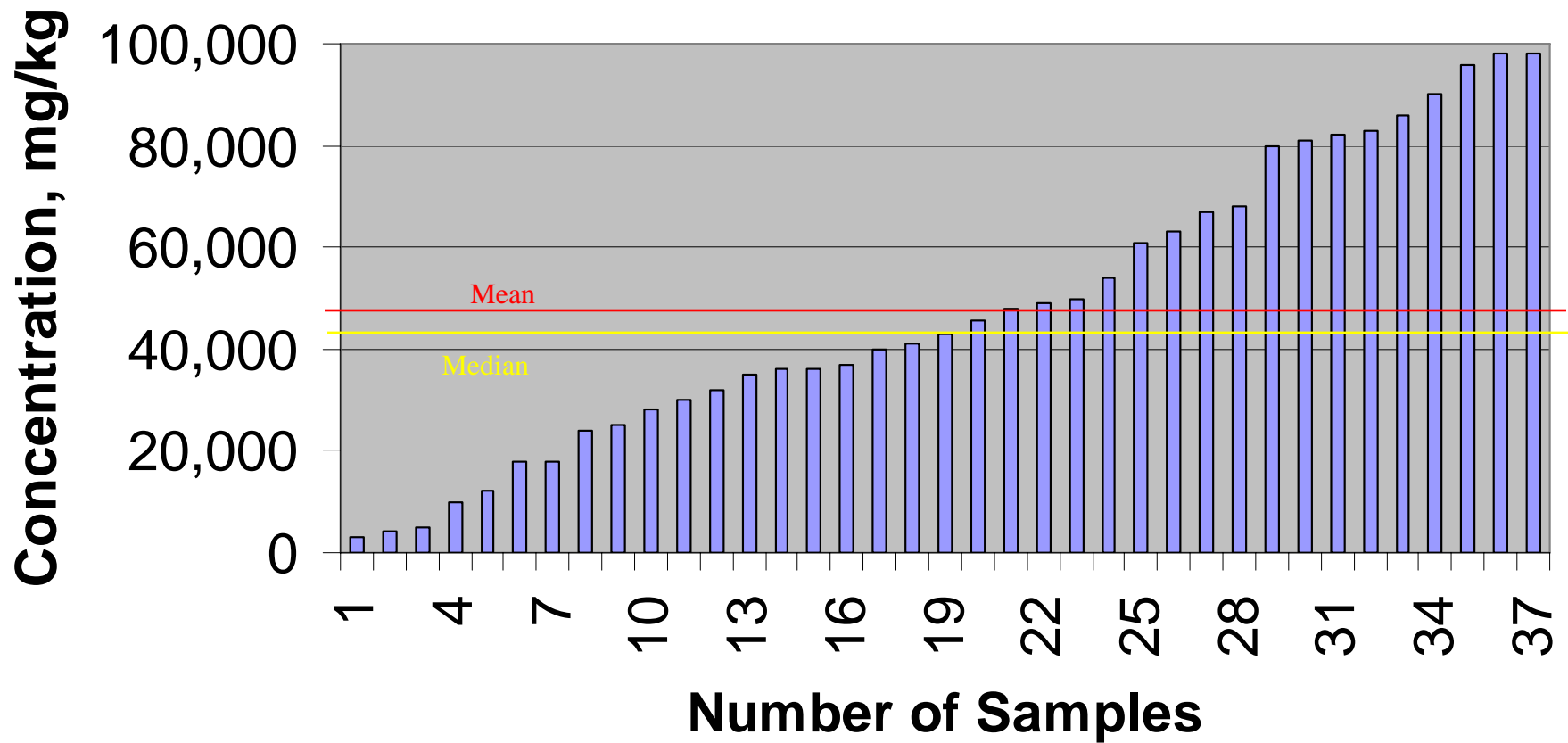
Add: Chloride  
Sulfate  
Nitrite-N  
Nitrate-N  
Ammonia-N  
Phosphate-P  
Cyanide

Delete: Particle Size  
Total Sulfur

We didn't find elevated levels of contaminants in the water column, so the remainder of the presentation focuses on the sediment results.

# Results:

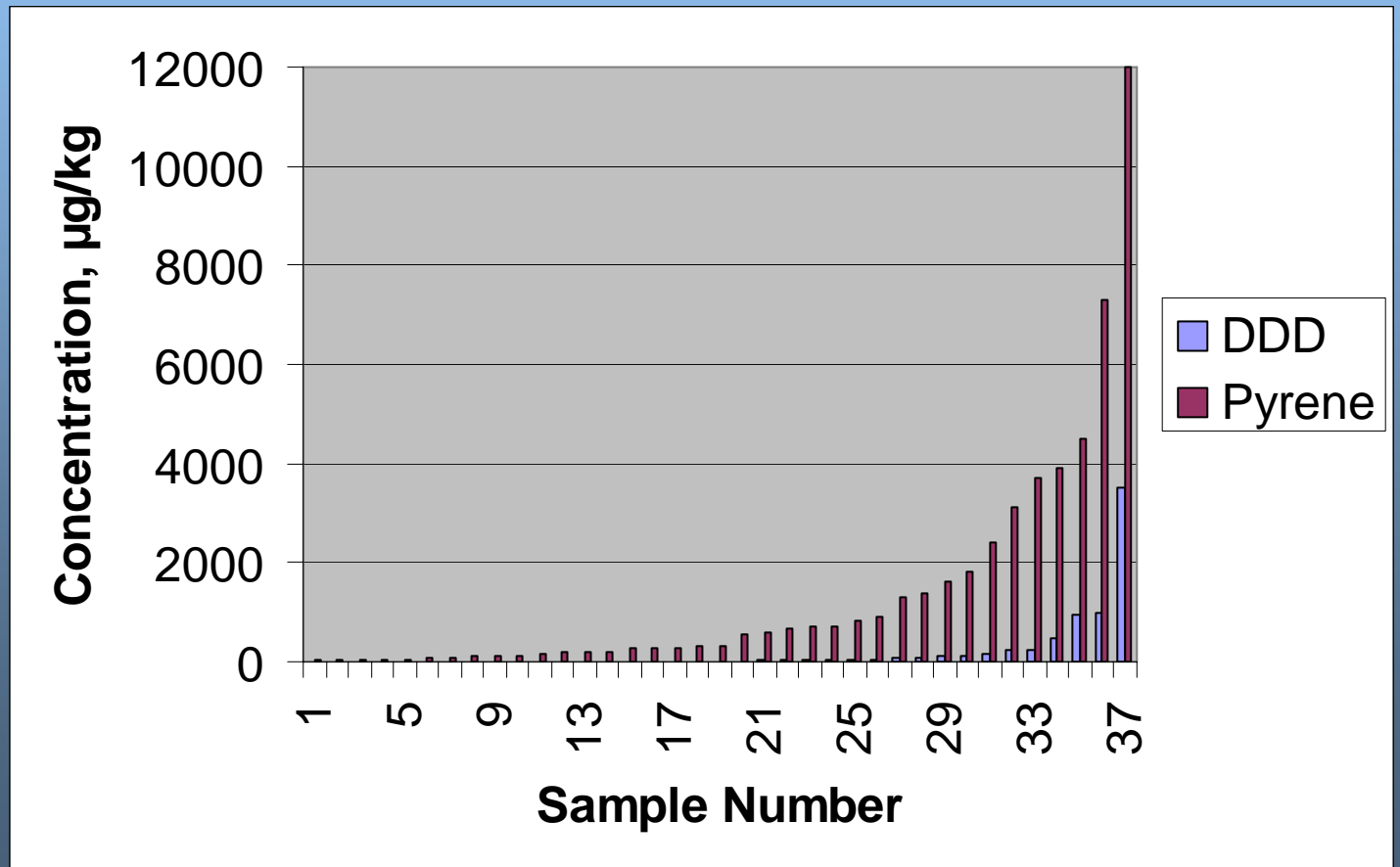
## Distribution of $\text{Ca}^{2+}$ Concentrations in South Chicago Lake and Pond Sediments



## Distribution of DDD and Pyrene Concentrations in South Chicago Sediments

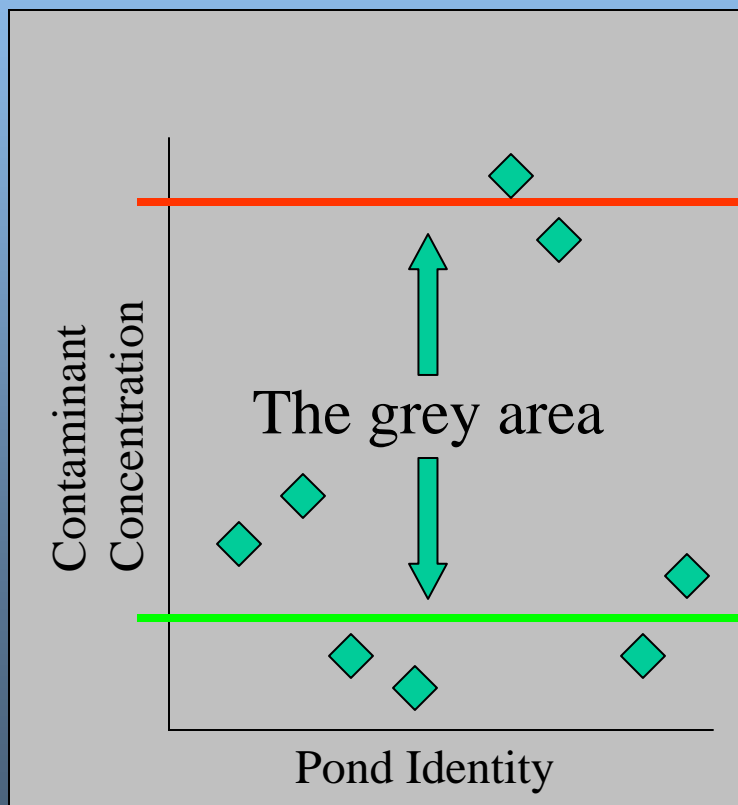
Pyrene  
Mean = 1400  
Median = 310

DDD:  
Mean = 200  
Median = 17



## Ecotox Definitions:

The gray area generally ranges from 1X to 10X in concentration.



### Benchmark:

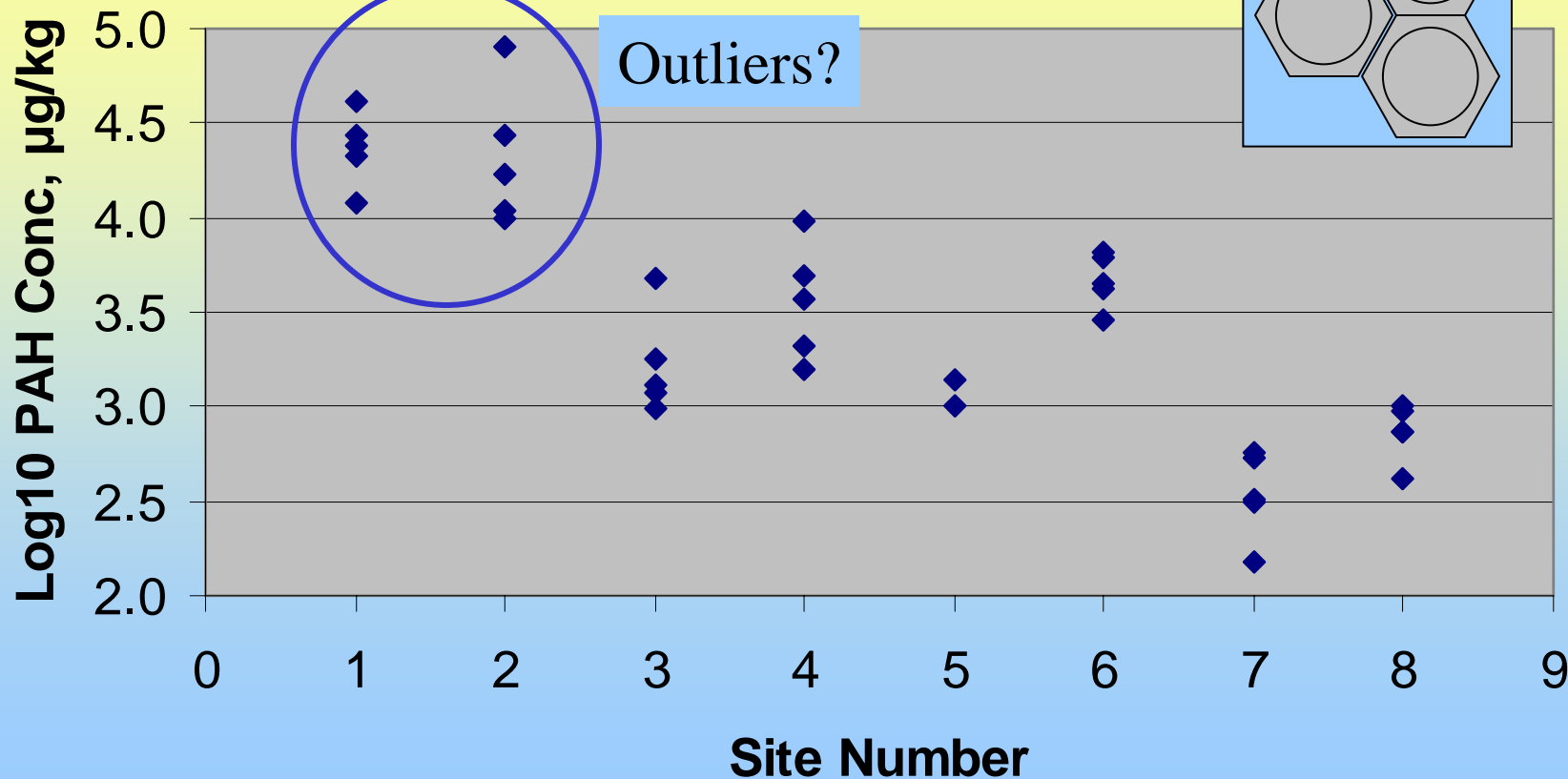
chemical concentration above which ecological receptors in the Calumet area are expected to be impacted.

### Threshold:

chemical concentration believed protective of ecological receptors in the Calumet area

# Results:

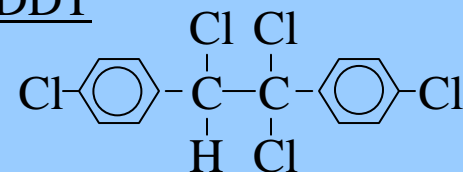
## Total PAH Distribution



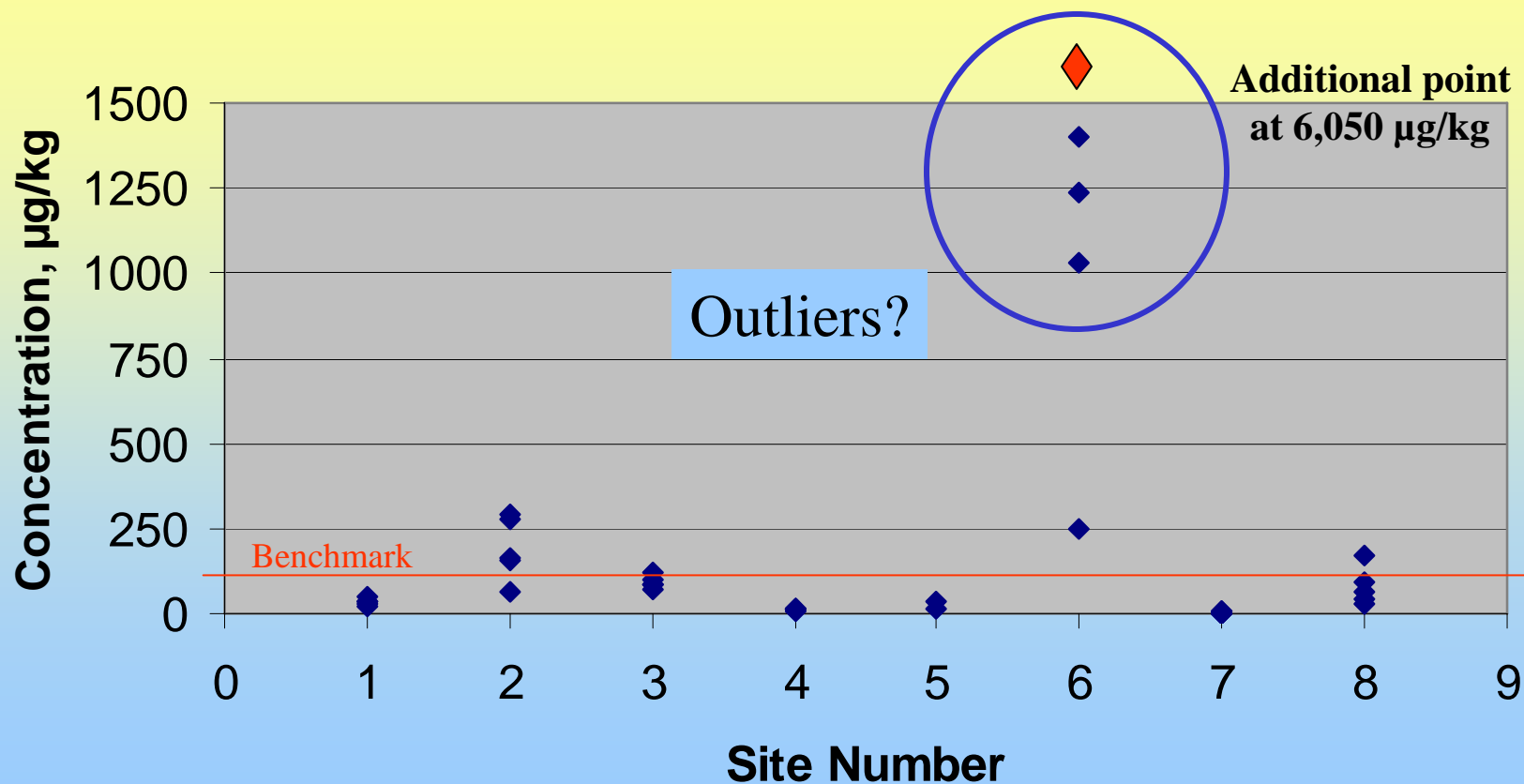


# Results:

DDT

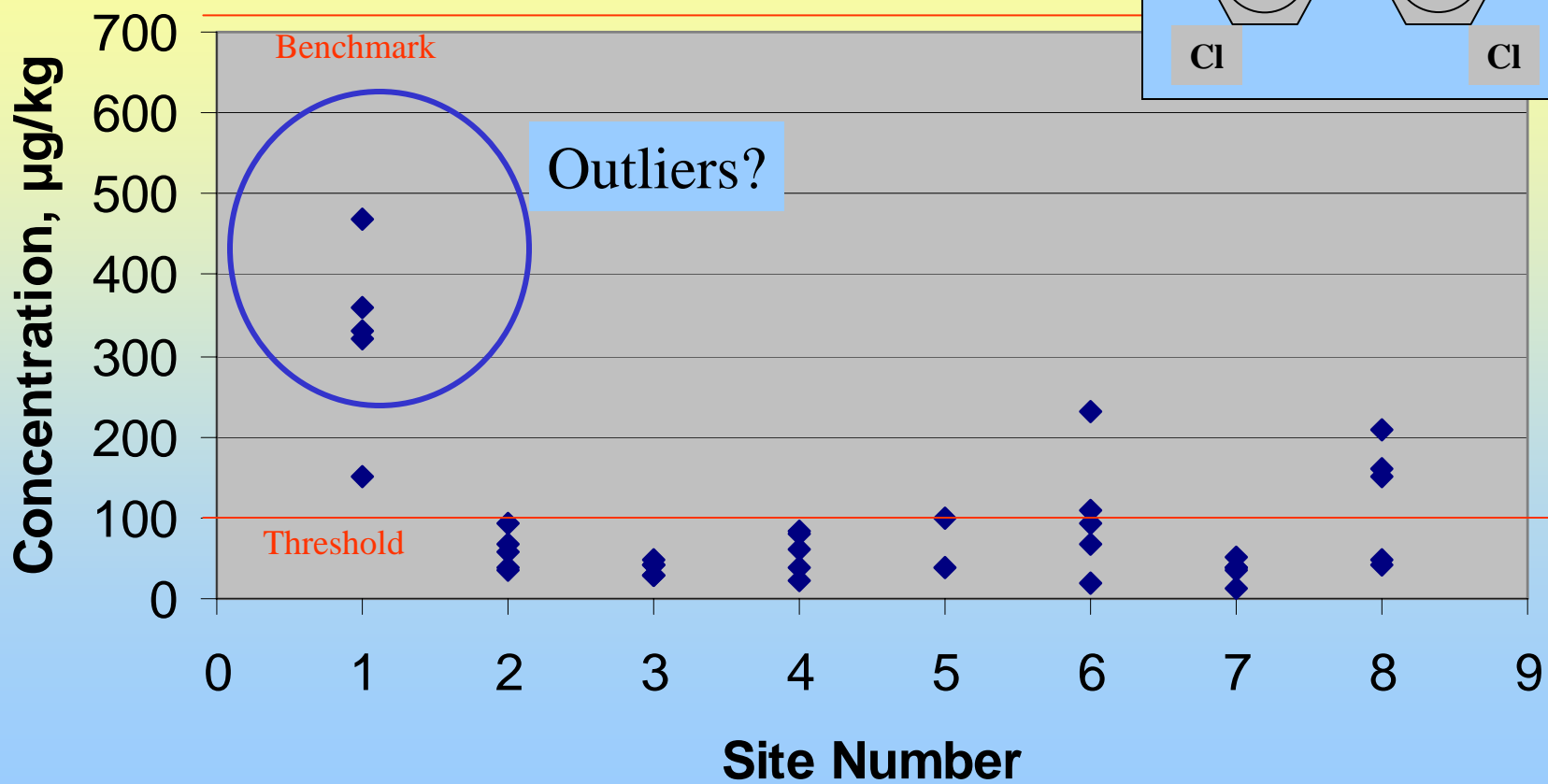
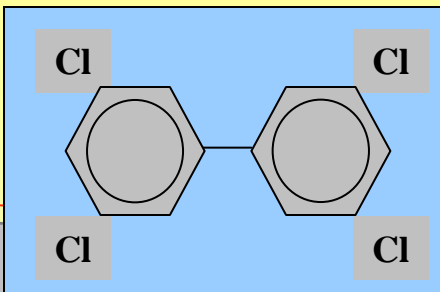


## Total DDT Compound Distribution



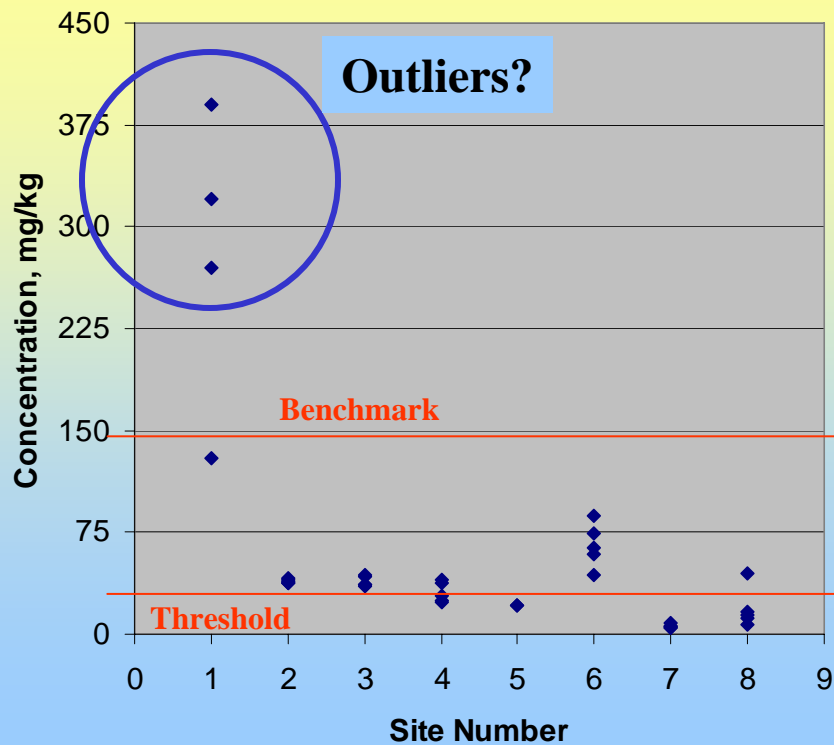
# Results:

## Total PCB Distribution

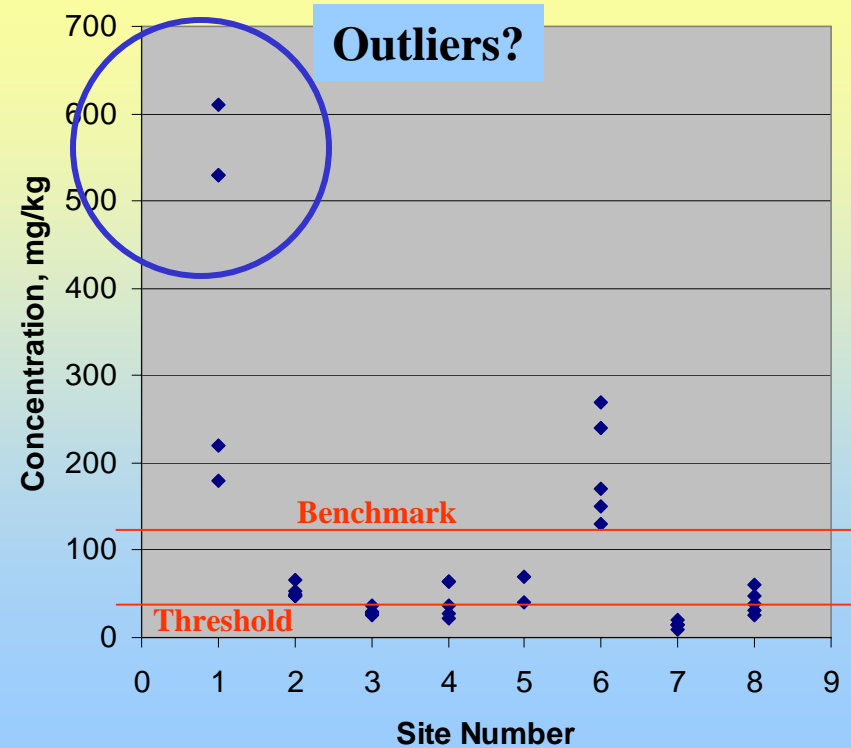


# Results:

### Copper Distribution



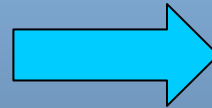
### Lead Distribution



## Preliminary Data Analysis –

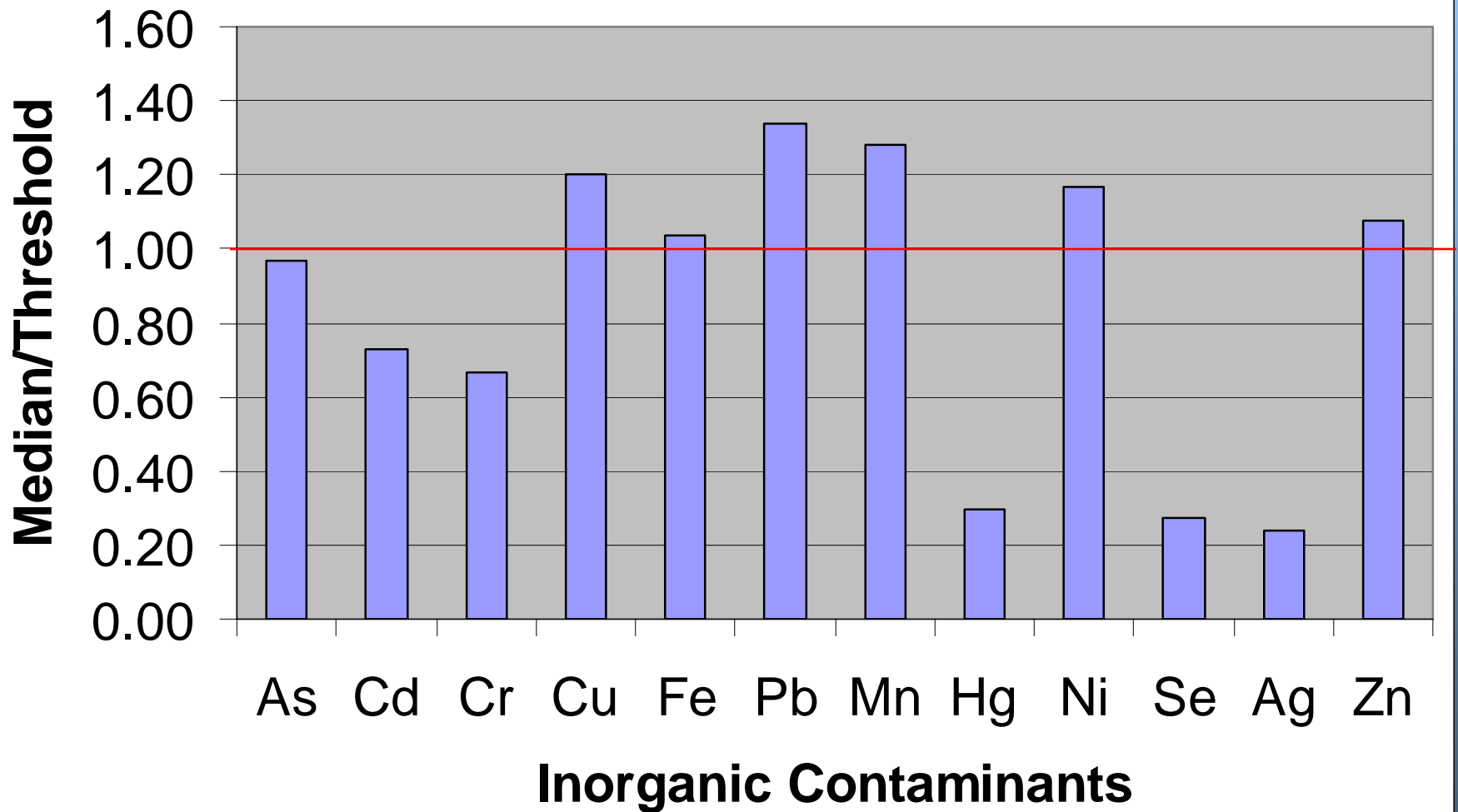
Define the Median Value  
in each Data Set as the  
Background Concentration

The Median Value for Total PAH  
Compound Concentrations  
is 2,900  $\mu\text{g}/\text{kg}$  (ppb).

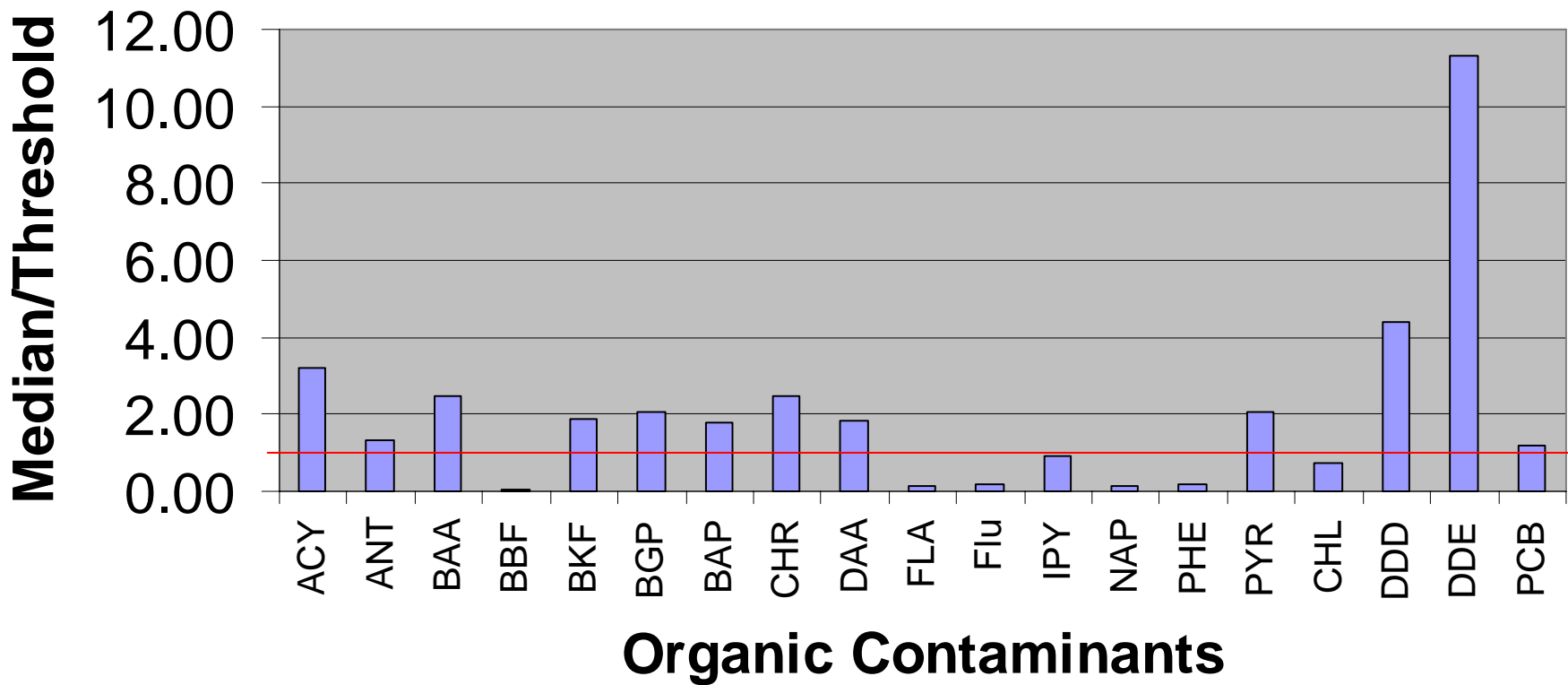


Site	Total PAH
2	81,000
1	41,000
1	27,000
2	27,000
1	24,000
1	21,000
2	17,000
1	12,000
2	11,000
2	10,000
4	9,600
6	6,600
6	6,100
4	5,000
3	4,700
6	4,500
6	4,200
4	3,700
6	2,900
4	2,100
3	1,800
4	1,600
5	1,400
3	1,300
3	1,200
5	1,000
8	1,000
3	980
8	950
8	740
8	730
7	580
7	530
8	410
7	320
7	310
7	150

Comparing Median Concentrations Measured to  
Calumet Area Ecotoxicological Thresholds  
- Inorganic Contaminants



Comparing Median Concentrations Measured to  
Calumet Area Ecotoxicological Thresholds  
- Organic Contaminants



## Concluding Remarks:

1. The draft report has been reviewed by the Calumet Ecotox Technical Team and others.
2. Several major issues were raised:
  - a. Rejection of specific data or of data from specific sources.
  - b. Statistical interpretation of the results.

These will be resolved through future discussions with the Technical Team.

3. Background sediment concentrations of some contaminants will likely exceed thresholds.
4. Final report in the early Spring? Incorporation?

# An Invertebrate Baseline for Calumet: Process and Potential

Dr. David Voegtlin

IDNR Illinois Natural History Survey

Over the past few years we have undertaken a baseline survey of invertebrates in six sites of the Calumet region in Illinois. Terrestrial and aquatic sampling was done using a wide variety of techniques and equipment. Of the six sites, only one, Powderhorn Forest Preserve, retains its historic physical structure and is assumed to have a relatively intact biotic component. Four of these sites are slated for some level of rehabilitation and subsequent changes in species composition cannot be detected without baseline data. Plant and vertebrate lists are available for these sites but limited information on invertebrates was previously available. In the first survey that included Indian Ridge Marsh, Hegewisch Marsh and Indian Creek, over 1,600 morphospecies were distinguished and this did not include the flies. Our collections indicate that there may be more flies than any other major order and this would most certainly push the total well past 2,000. Both Indian Ridge Marsh and Hegewisch Marsh have small sedge meadows that have developed or escaped destruction and these are the most diverse. The sedge meadow area at the south of Hegewisch Marsh had over 550 morphospecies and the sedge meadow at Indian Ridge Marsh had over 325. The majority of the taxa from Indian Ridge Marsh (626) and Hegewisch Marsh (615) were unique to the site. Many of these are represented by single specimens but the lack of taxa overlap on two degraded sites that are approximately 1 km apart is surprising. Indian Creek was virtually void of any invertebrates except in a very short stretch at the Wolf Lake. The section of this Creek north of 116th has been completely rebuilt since our survey and undoubtedly will show dramatic changes on future sampling. Hyde Lake and Van Vliissingen Prairie are surprisingly diverse. Dragonflies were particularly abundant at Van Vliissingen Prairie most likely due to the absence of fish in any of the standing water. Identification or sorting to morphospecies is dependent on taxonomic expertise that is available at a reasonable price. Two graduate students at the University of Illinois agreed to sort the Hymenoptera and the result was 926 morphospecies of this diverse order from IRM and Hegewisch Marsh. The Hymenoptera from Powderhorn and Van Vliissingen Prairie are now being sorted by another graduate student for comparative purposes. At present we do not know how many of the morphospecies from the first three sites (Indian Ridge Marsh, Hegewisch Marsh, and Indian Creek) are duplicated in the collections from Van Vliissingen Prairie, Hyde Lake and Powderhorn. A collection of morphospecies from all the sites will be kept at the Environmental Center at Hegewisch Marsh.

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Email: [dvoegtli@uiuc.edu](mailto:dvoegtli@uiuc.edu)

Phone: (217) 244-2152





# **An Invertebrate Baseline for Calumet: Process and Potential**



**David Voegtlin**  
**Center for Ecological Entomology**  
**Illinois Natural History Survey**  
**Champaign, Illinois**

**Chris Dietrich & Ed DeWalt**  
**Center for Biodiversity**  
**Illinois Natural History Survey**  
**Champaign, Illinois**

# Why an invertebrate baseline?

Given that:

- Most of the sites in the Calumet have vertebrate and plant lists.  
and

- With few exceptions there is little information on invertebrates for any of these locations.

and

- Invertebrates are far more speciose and provide the greatest potential for change in composition and abundance following major habitat modification.

then

- A baseline of invertebrate diversity and some indication of relative abundance is critical to documenting long term changes following rehabilitation efforts in the Calumet.



# Hegewisch Marsh

- Original fill with dredge spoils, some slag
- Heavy impact from off-road vehicles
- Deep rut areas developed in miniature wetlands. These were some of the most diverse areas on site.



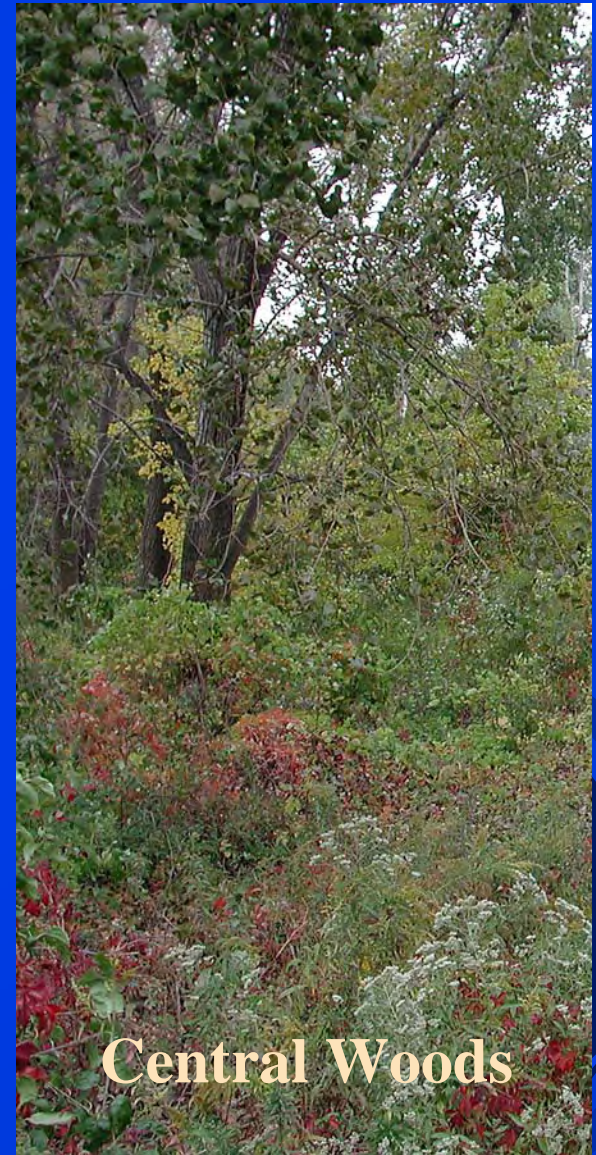
# Indian Ridge Marsh



**North Meadow**



**East Pond 2**



**Central Woods**

**Sampled 2001**



**Indian Creek - Hyde Lake section**

**Sampled 2001**

## **Indian Creek**

- **Connects Wolf Lake to the Calumet River.**
- **Except for very short section has been channeled.**
- **Filled with sediment eroded from adjacent brownfields and dumping areas on them.**
- **Limited vegetation except along the banks.**

# Marian R. Byrnes Natural Area

Dedicated and renamed, August 2003



Sampled 2004

# Hyde Lake Wetland



Sampled 2004

# Hyde Lake West Edge

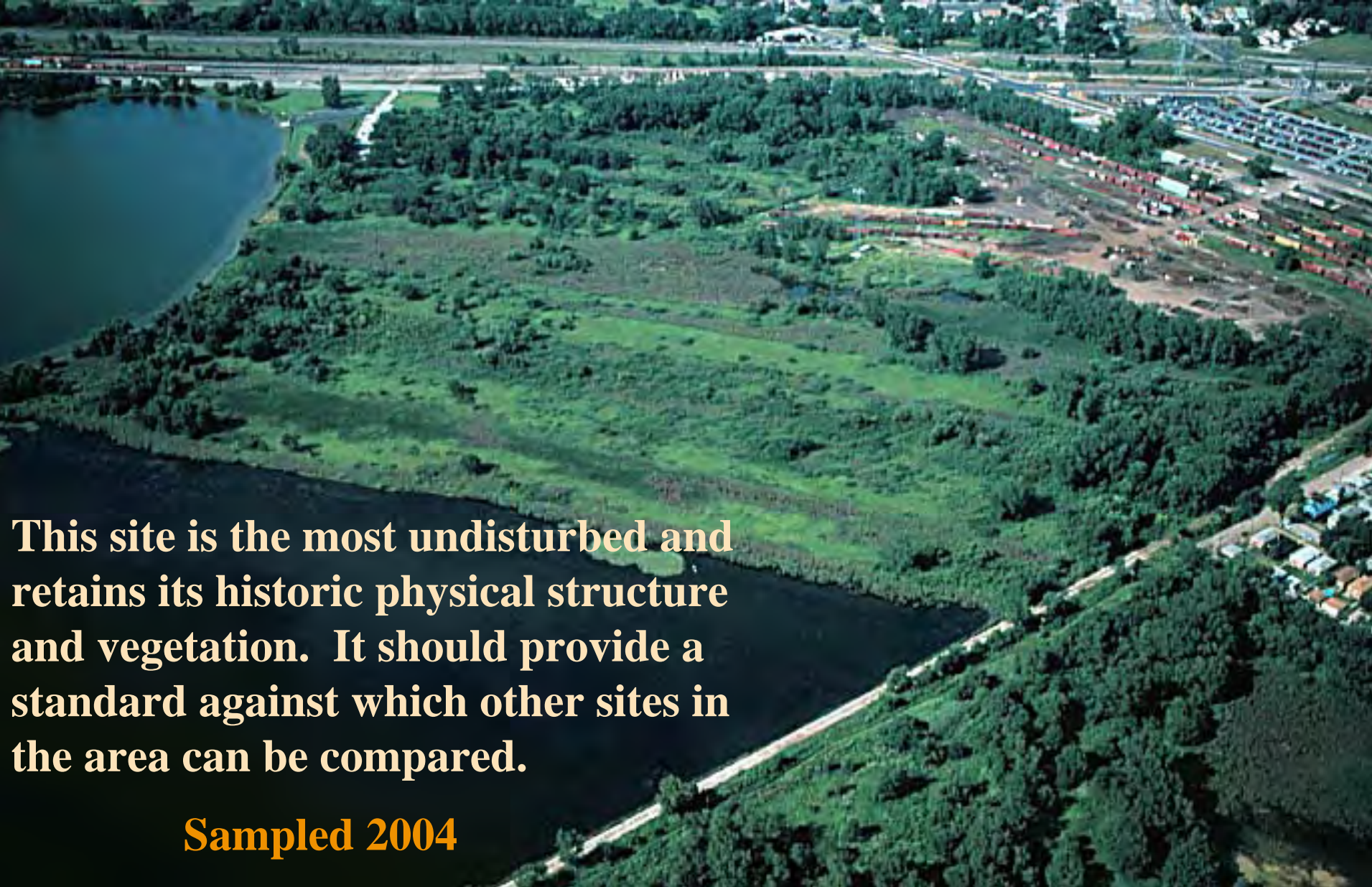
- Three openings on high ground with native prairie plants.
- A favorite area for local builders to dump materials.
- A great location for dragonflies. Here Ed and Dmitry stalk the elusive acrobats.
- This small area, about the size of a city lot, had a surprising diversity of insects in it.



**Sampled 2004**



# Powder Horn Lake Forest Preserve



**This site is the most undisturbed and retains its historic physical structure and vegetation. It should provide a standard against which other sites in the area can be compared.**

**Sampled 2004**

# Powder Horn Lake Forest Preserve

A 1992 plant survey found 279 native taxa, 23 exotics



# Sampling

## Terrestrial sampling

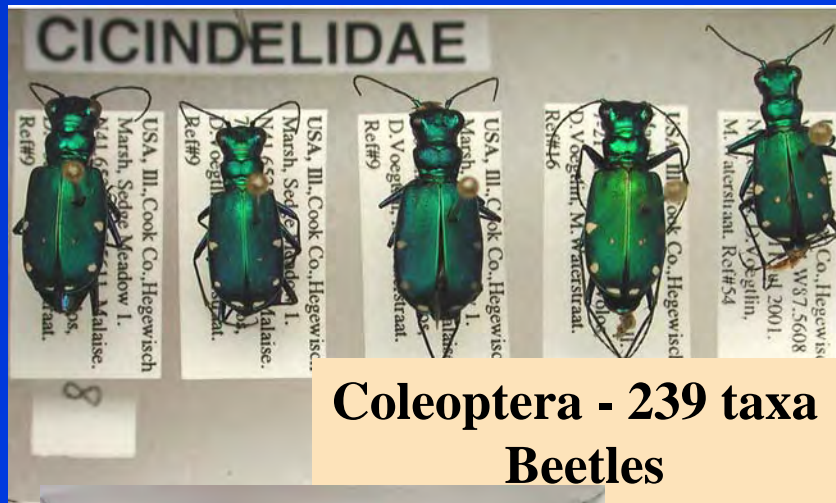
- sweep net
- malaise trap
- pitfall trap
- vacuum of vegetation
- hand collecting
- aerial net
- black light
- beating sheet

## Aquatic sampling

- dip net
- aquatic black light
- disc sampler
- dredge sampler



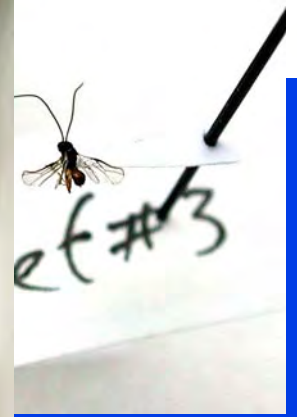
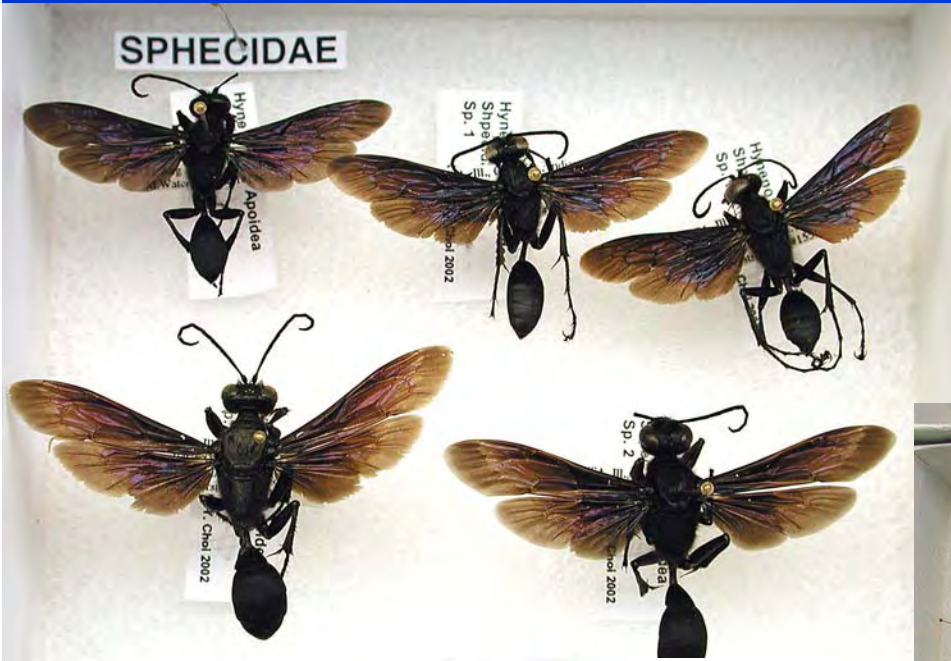
**There was far more diversity than might be expected, especially in sites that have been so drastically altered from their pre-settlement condition.**



# Hymenoptera - 926 taxa Bees & Wasps

# Diptera - # taxa undetermined Flies

1 large collection had an estimated 90 morphospecies much of it sorted to subfamily units.



**Although it may be an artifact of sampling intensity there is a surprising difference in species composition between these sites that are all a relatively short distance from one another.**

Indian Ridge Marsh - 996 taxa

**Shared taxa - 386**

Hegewisch Marsh - 1008 taxa

**Leafhoppers, planthoppers, spittlebugs, and treehoppers**

Powder Horn - 104 species - **35 exclusive**

Marian Byrnes Natural Area - 98 species - **29 exclusive**

Hyde Lake - 59 species - **7 exclusive**



**A relatively small area of habitat can contain a surprising number of taxa.**

The small sedge meadows within both Hegewisch Marsh and Indian Ridge Marsh are a fraction of the overall area. The species collected there were 48% of the total taxa collected.

Hegewisch Marsh - 550+ morphospecies

Indian Ridge Marsh - 325+ morphospecies.



## Host specialized native insects do not need a pristine natural area for survival.

“Several uncommon leafhoppers and planthoppers typical of dry/mesic prairie were found at MBNA. These include *Graminella aureovittata* and *Flexamia atlantica*, both of which specialize on switch grass; *Polyamia apicata*, a specialist on mat-forming *Panicum* grasses; and *Scolops pungens*, a planthopper associated with composites. *Lonatura catalina* and *Athysanella balli*, flightless leafhoppers associated with *Sporobolus vaginiflorus*, are recorded from only a few localities in Illinois.

Chris Dietrich



*Athysanella balli*



**Baseline studies can provide information useful to the process of determining where rehabilitation efforts should and should not be undertaken.**

**Indian Ridge Marsh - the small sedge meadow area should be left untouched during rehabilitation.**

**Marian Byrnes Natural Area - the flat slag filled area, at least a major part of the northern half should be left as is.**



## Potential

**Indian Creek has been completely rebuilt between 126th and the Calumet River. This stretch formerly filled with tires, appliances, and sediment, and lined with walls of Phragmites is now a meandering, gravel bottomed, stream with a flood plain and backwaters. Our samples in 2001 from this stretch contained no invertebrates.**



## Potential

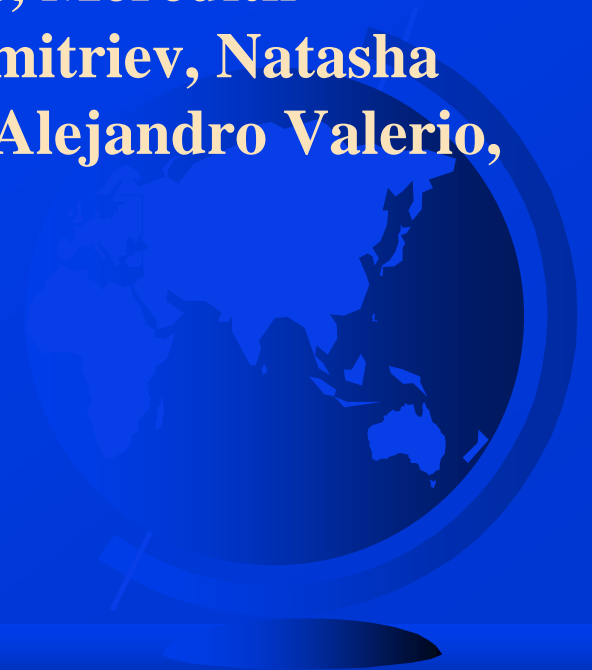
### What is going to happen in the Calumet?

- **Indian Ridge Marsh, Hegewisch Marsh and Marian C. Byrnes Natural Area are all slated for rehabilitation work.**
- **An education, outreach, research center will be built at the south end of Hegewisch Marsh. A synoptic collection of all morphospecies from these surveys will be deposited at the Ford Environmental Center for reference.**
- **As rehabilitation efforts proceed there will be increasing opportunity to document species composition and abundance changes in the invertebrate community.**



## **Acknowledgements**

**Funding for these surveys from Chicago Wilderness, Waste Management and Research Center-IDNR, Corlands. Thanks also to Nick Tzovolos, Meredith Waterstraat, Nicole Kamins, Dmitry Dimitriev, Natasha Novikova, Doris Lagos, Vanessa Block, Alejandro Valerio, Won Young Choi, Terry Harrison**



## The Calumet Bioblitz

Dr. Michael R. Jeffords

IDNR Illinois Natural History Survey

A bioblitz is a 24-hour, rapid assessment of what is living in a particular area at a given point in time. Biologists come together for a marathon of biological skill and intellectual endurance with a goal of finding and identifying as many species of plants, animals, and microbes as possible. Bioblitzes provide windows into the overall diversity of a site. This presentation will review results from the 2002 Bioblitz in Calumet.

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Email: [jeffords@uiuc.edu](mailto:jeffords@uiuc.edu)

Phone: (217) 333-5986





# Calumet Biodiversity

## Blitz—2002

August 23-24, 2002

# Goal

Find and identify as many species as possible in a 24 hour period.

## Why do we conduct bioblitzes????

- provides a window into the biodiversity of a site
- allows scientists to showcase their talents and for citizens to observe how science is conducted
- can be a valuable educational tool for helping individuals to understand “biodiversity”



## Charismatic Megafauna



Arthropods and below or  
E.O. Wilson's "the little  
things that run the world."





# Details of the Calumet Bioblitz

**Blitz Headquarters:**

**William W. Powers State Conservation Area**

**Areas Surveyed:**

**Eggers Woods Forest Preserve, Powderhorn  
Lake Forest Preserve, W.H. Powers Conservation  
Area**



Participants/organizers:

The Field Museum

Chicago Department of Environment

Illinois Department of Natural Resources

Illinois Natural History Survey

Chicago Wilderness

Forest Preserve District of Cook County

Chicago Park District

More than 130 scientists from the Chicago area and from Champaign participated.



What were the results? How many species??

2,257 species!!

Algae—83

Amphibians & Reptiles—9

Aphids—20

Bees, ants, & wasps—122

Beetles—350

Birds—110

Book and bark lice—3

Bryophytes, ferns, & allies—44

Butterflies & moths—163

Caddisflies—10

Crustacea—44

Dragonflies & damselflies—9

Ectoparasites—5

Flies—7

Fish—33

Fungi—152

Grasshoppers & crickets—7

Homoptera—72

Lichens—25

Mammals—20

Mantid—1

Mayflies—4

Mites—84

Mollusks—42

Protozoa—18

Sac fungi—18

Soil invertebrates—35

Spiders—40

Thrips—1

True bugs—39

Vascular plants—709

Zooplankton—8



# What was the ultimate purpose of the Calumet Bioblitz?

- data to provide a baseline for management
- data to help spearhead conservation decisions
- data to further research initiatives in the region



## Population Dynamics of Yellow-headed Blackbirds in Calumet

Mr. Michael Ward

IDNR Illinois Natural History Survey

Yellow-headed Blackbirds were once considered an abundant species in the Calumet wetlands. However, over the last century the species has precipitously declined in the area. In 1996, I began a study of the population dynamics of Yellow-headed Blackbirds at Egger's Woods Marsh and Hegewisch Marsh. I determined the reproductive success, site fidelity, natal philopatry, and adult survival of individuals at both sites. In order to determine how Yellow-headed Blackbirds select habitats I also quantified insect emergence in particularly odonate emergence. The average number of young produced per nest in the Calumet wetlands was 1.57, the same as the number of young produced per nest in Lake and McHenry Counties in Northeastern Illinois (1.60). Eighty-five percent of males that were known to be alive returned to the Calumet wetlands, while 71% of females returned. Only 7.4% of young birds banded in Illinois were seen again. As compared to the rest of the Illinois population, the Calumet population has been relatively stable over the last few years, but is being maintained at very low levels. Over the last eight years there have been between 17 – 31 adults present. Although the population is at very low levels, insect emergence, reproductive success, and adult survival are all within the range of a healthy population. The factors most limiting the growth of the population is the invasion of exotic wetland plants and the overall lack of appropriate habitat.

Contact Name: Michael Ward, Avian Ecologist

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Email: [mpward@uiuc.edu](mailto:mpward@uiuc.edu)

Phone: (217) 333-0305



# Population Dynamics of Yellow-headed Blackbirds in Calumet

**Michael Ward**

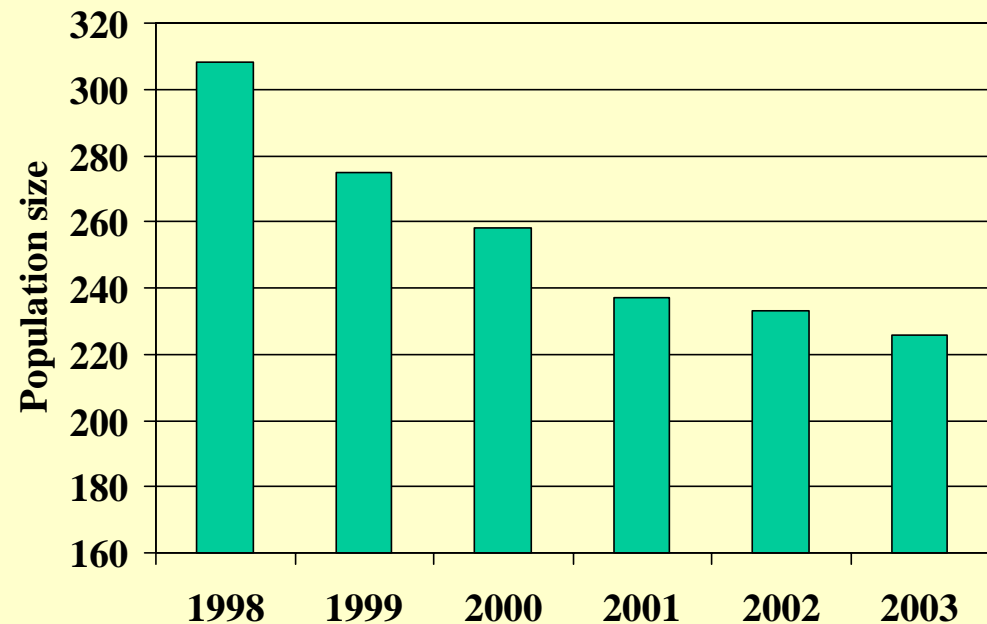
**Illinois Natural History Survey**

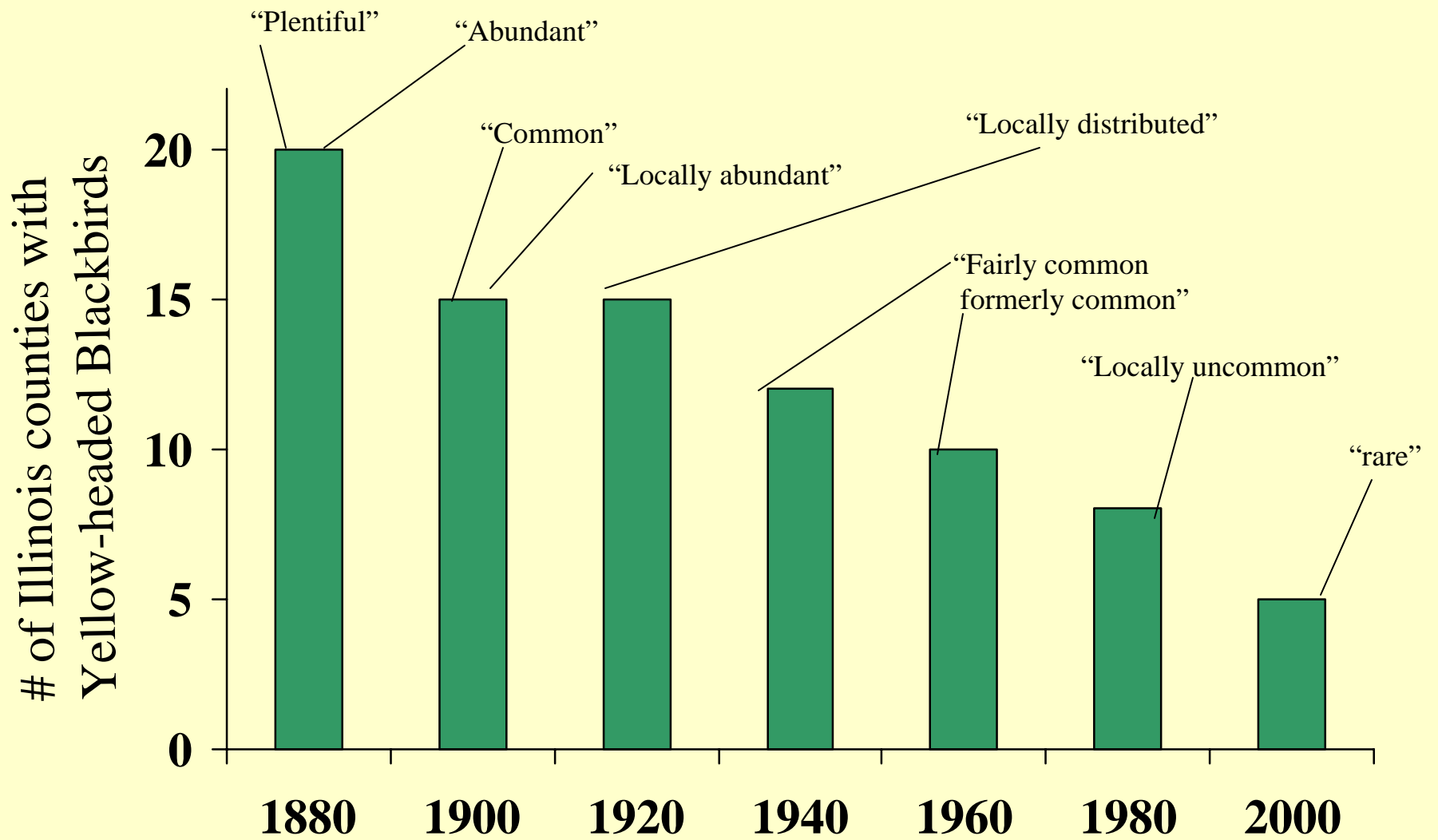


# Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*)



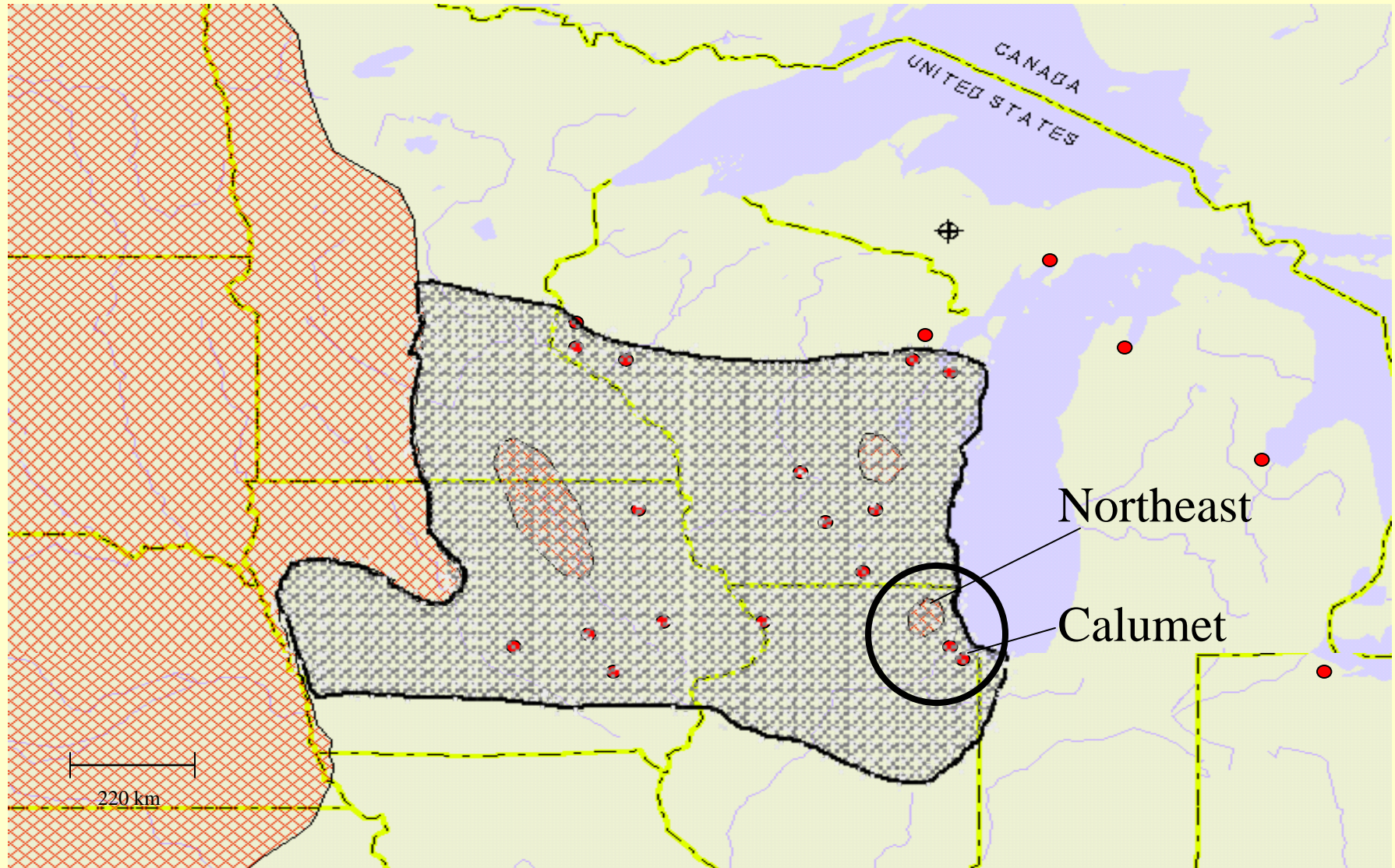
- \*State endangered
- \*Wetland dependent
- \*IL population has been monitored since 1980
- \*IL population is declining





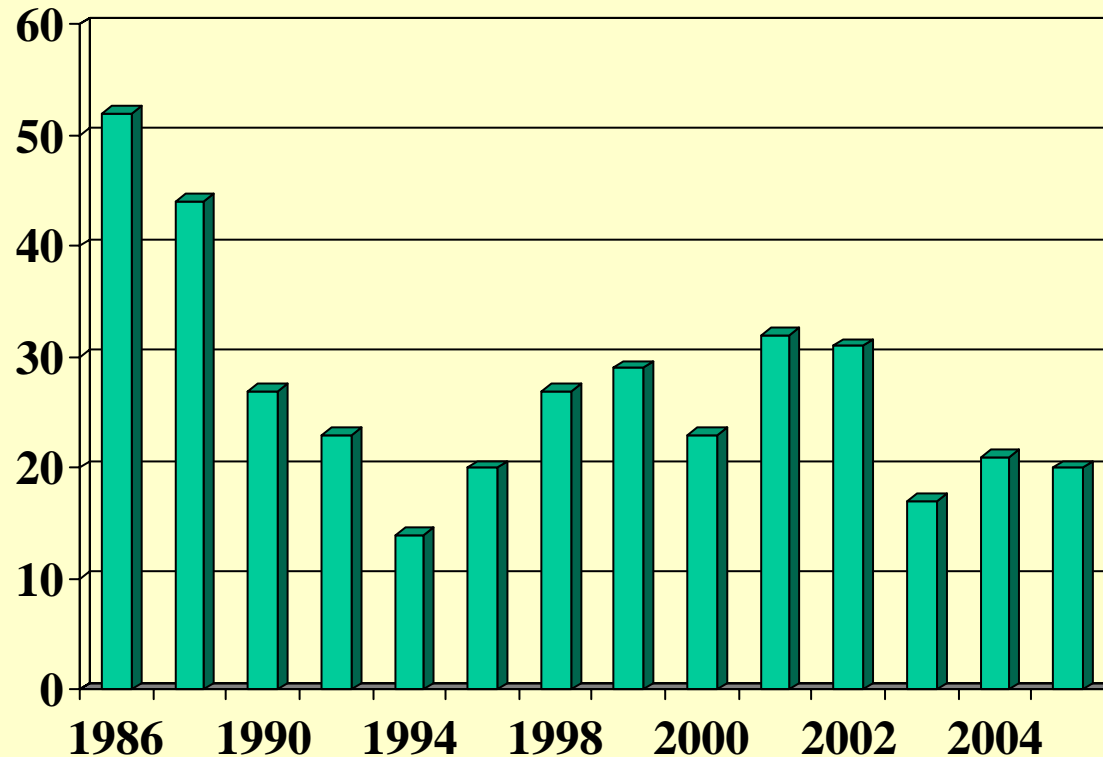
# Why is the population declining?

- Habitat (??)
- Reproductive success (??)
- Survival / Site fidelity (??)
- Recruitment (??)





# History at Calumet



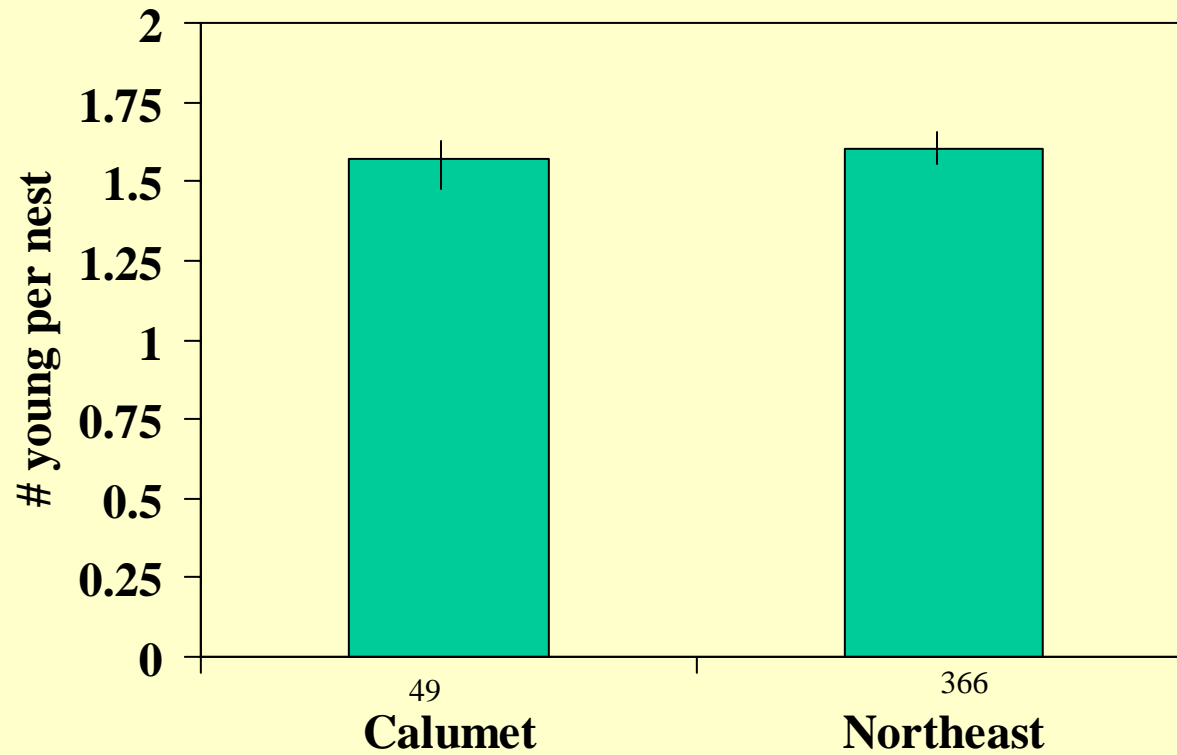
\* 2.6% per year decline over the last 26 years

\* Considered “abundant” in the calumet wetlands in 1900’s

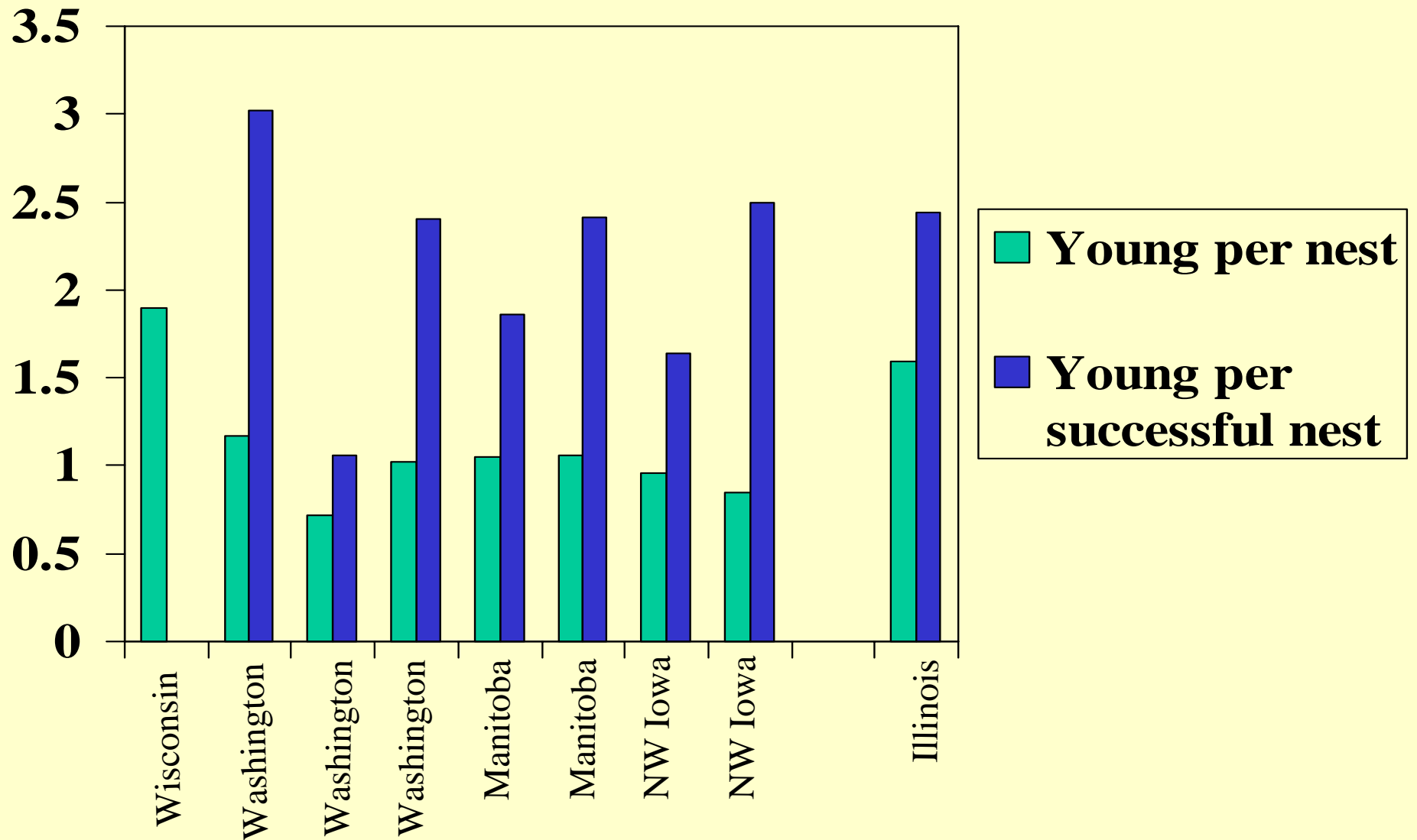
# Methods



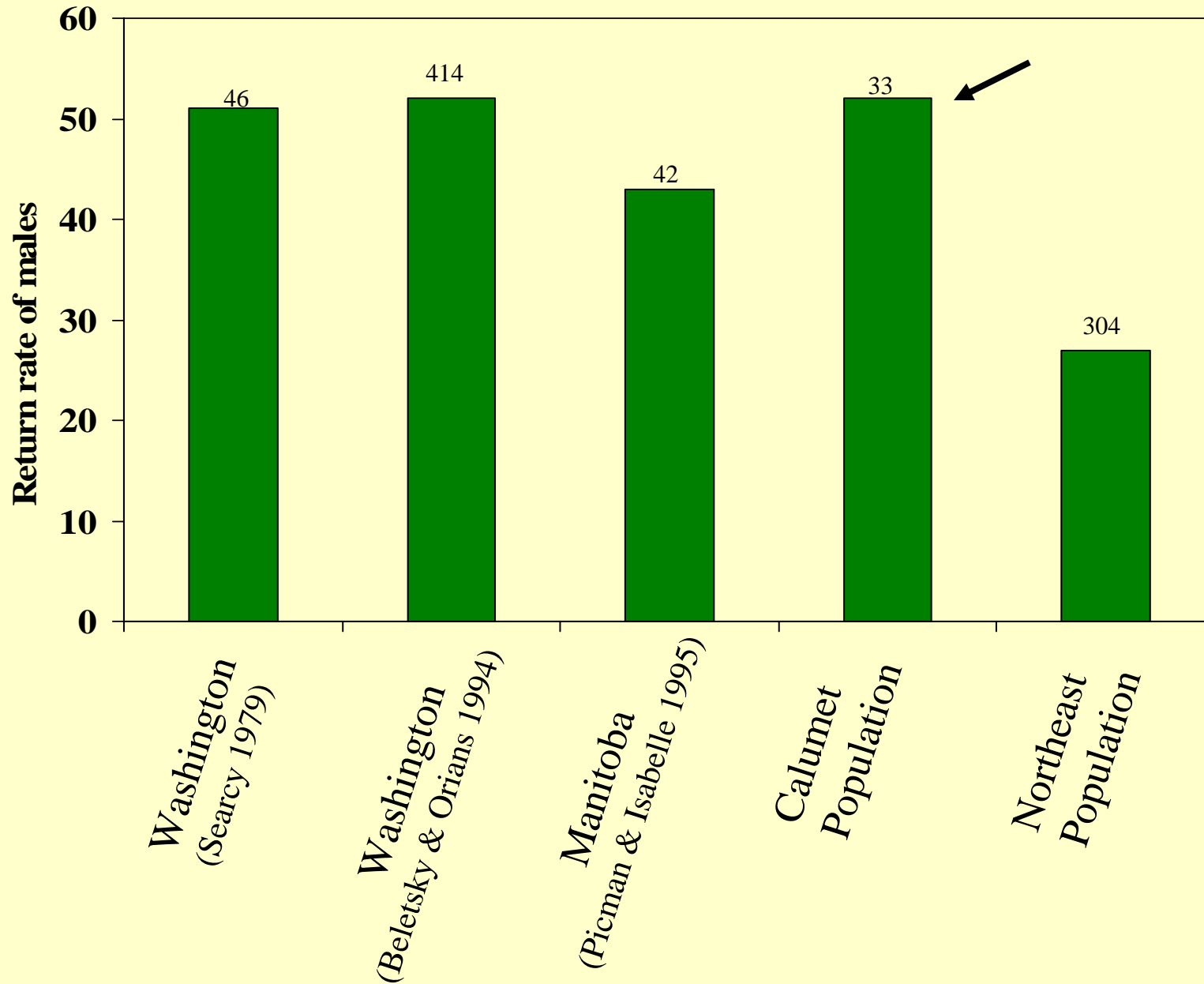
# Reproductive Success



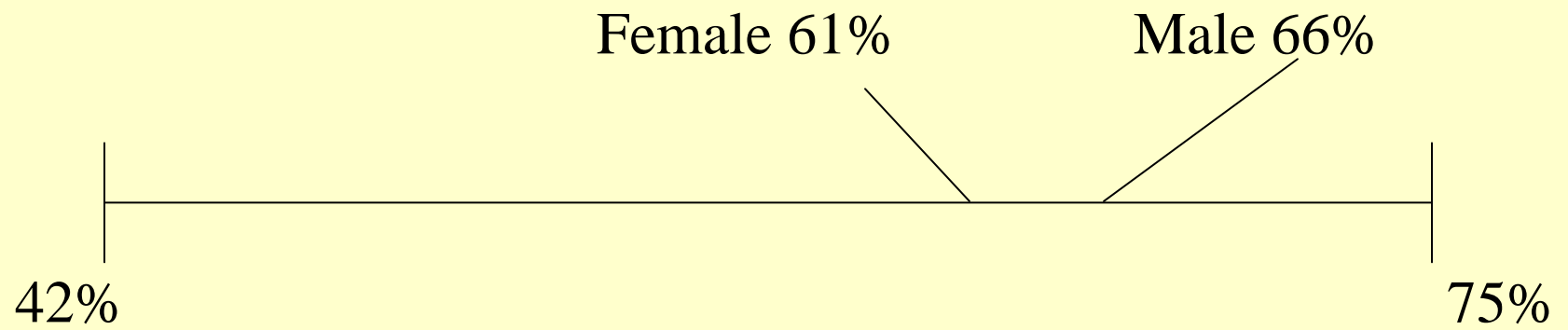
# Reproductive Success



# Are Yellow-headed Blackbirds in Illinois site faithful?



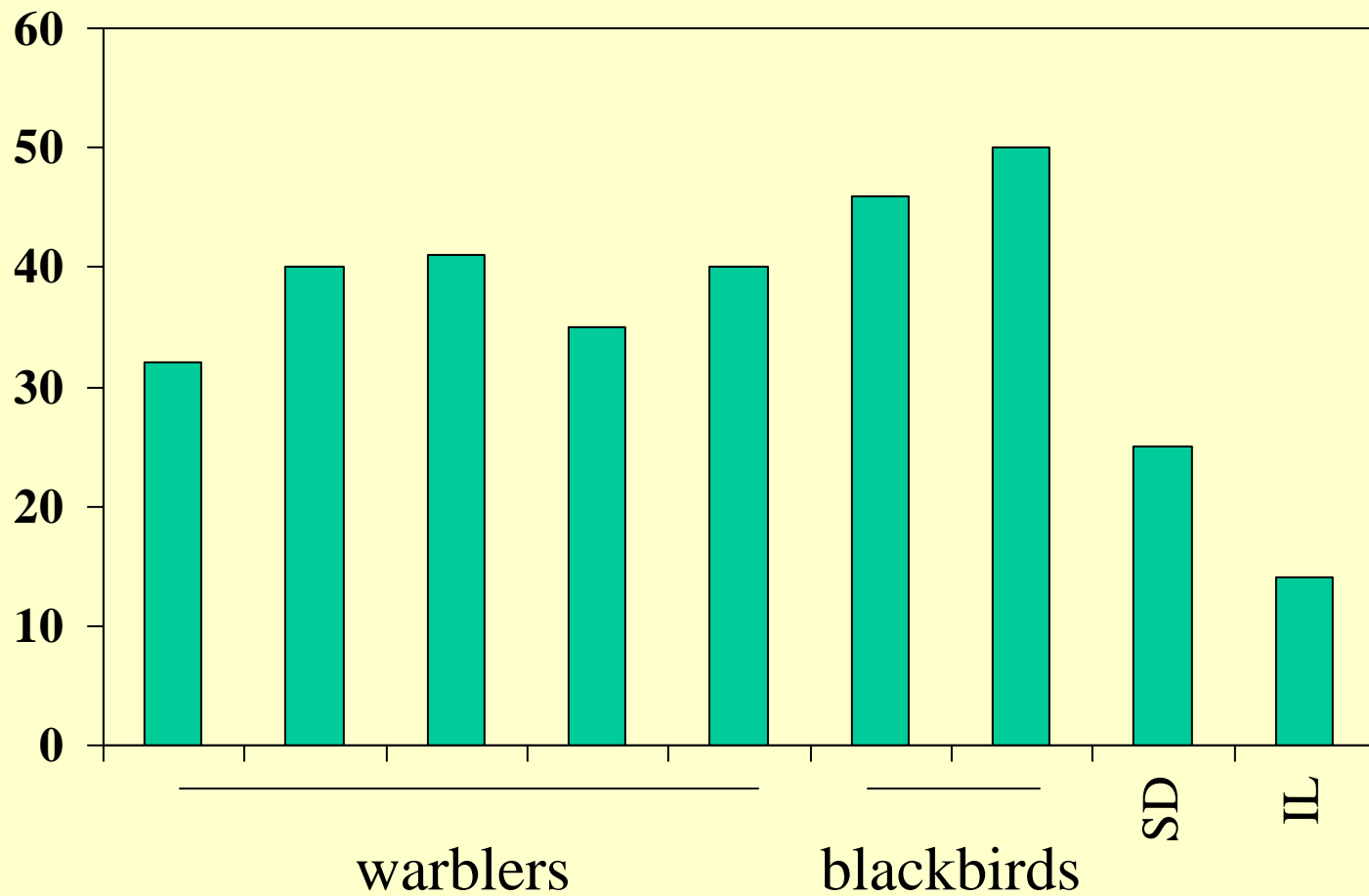
# Survival



The range of adult survival estimates for Blackbirds

# Recruitment

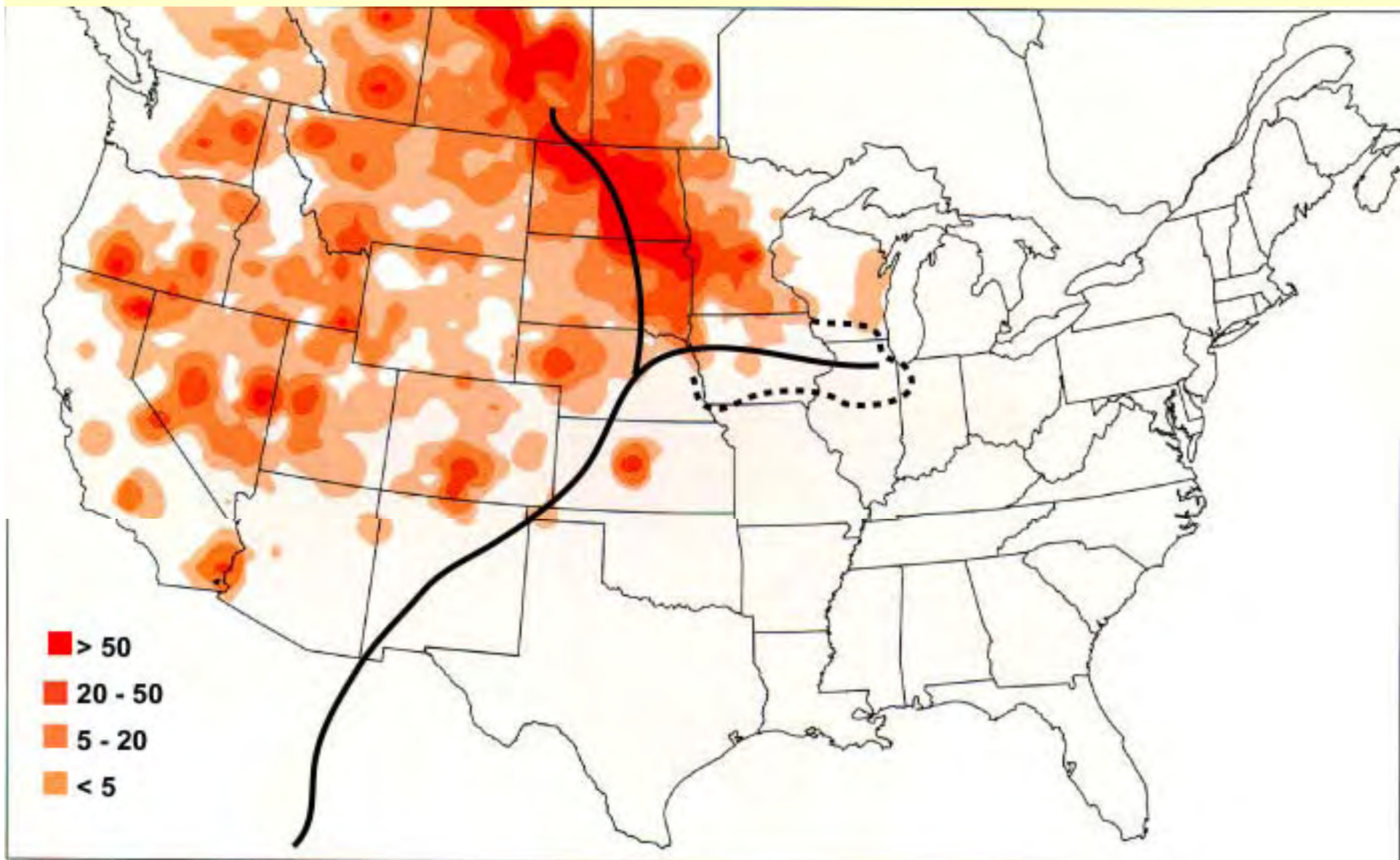
Percentage of yearling males in the male population



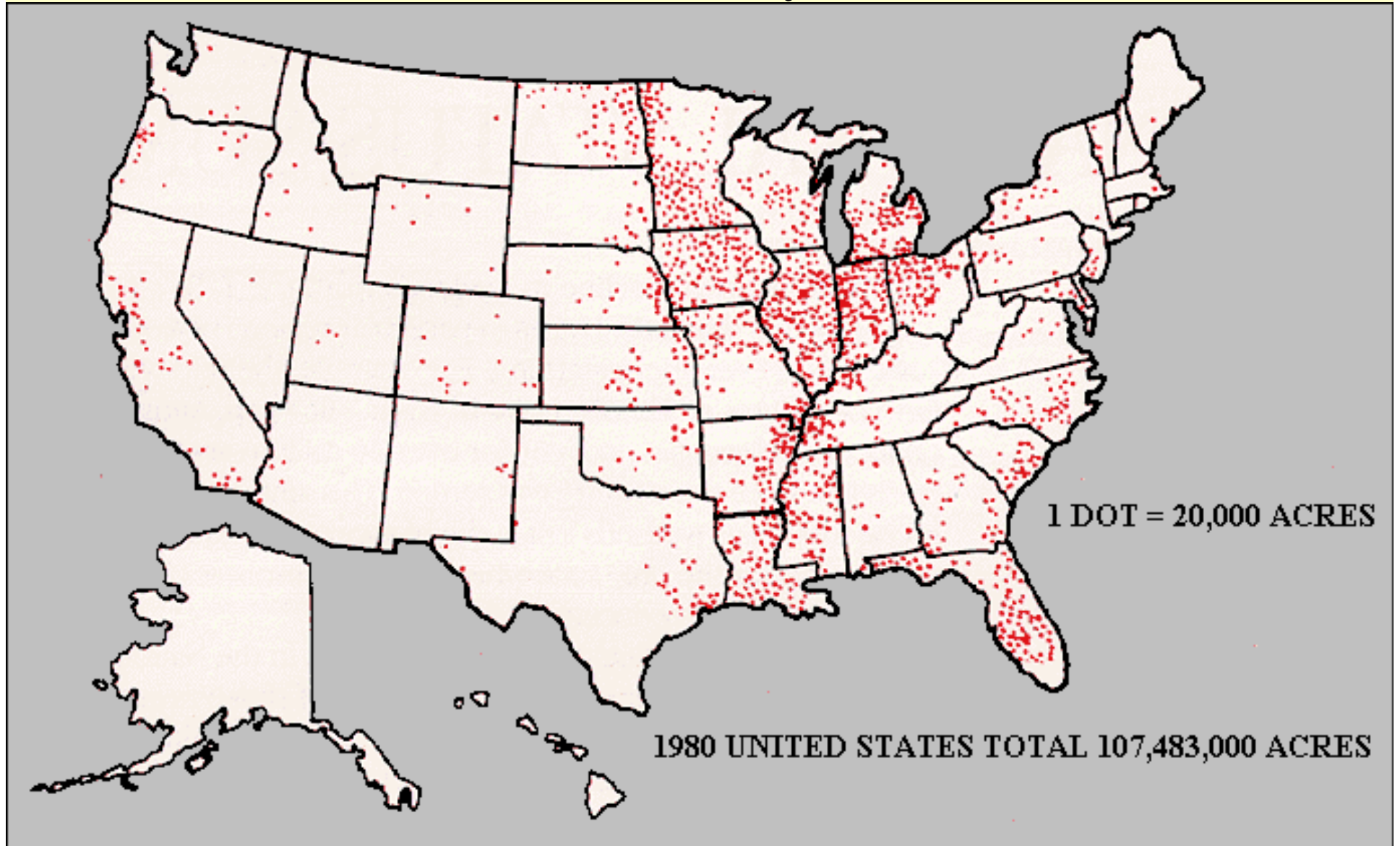
Why is the population declining?

- Habitat (No)
- Reproductive success (No)
- Survival (No)
- Recruitment (Yes)





# Connectivity



# How to conserve the species?

(conspecific attraction??)

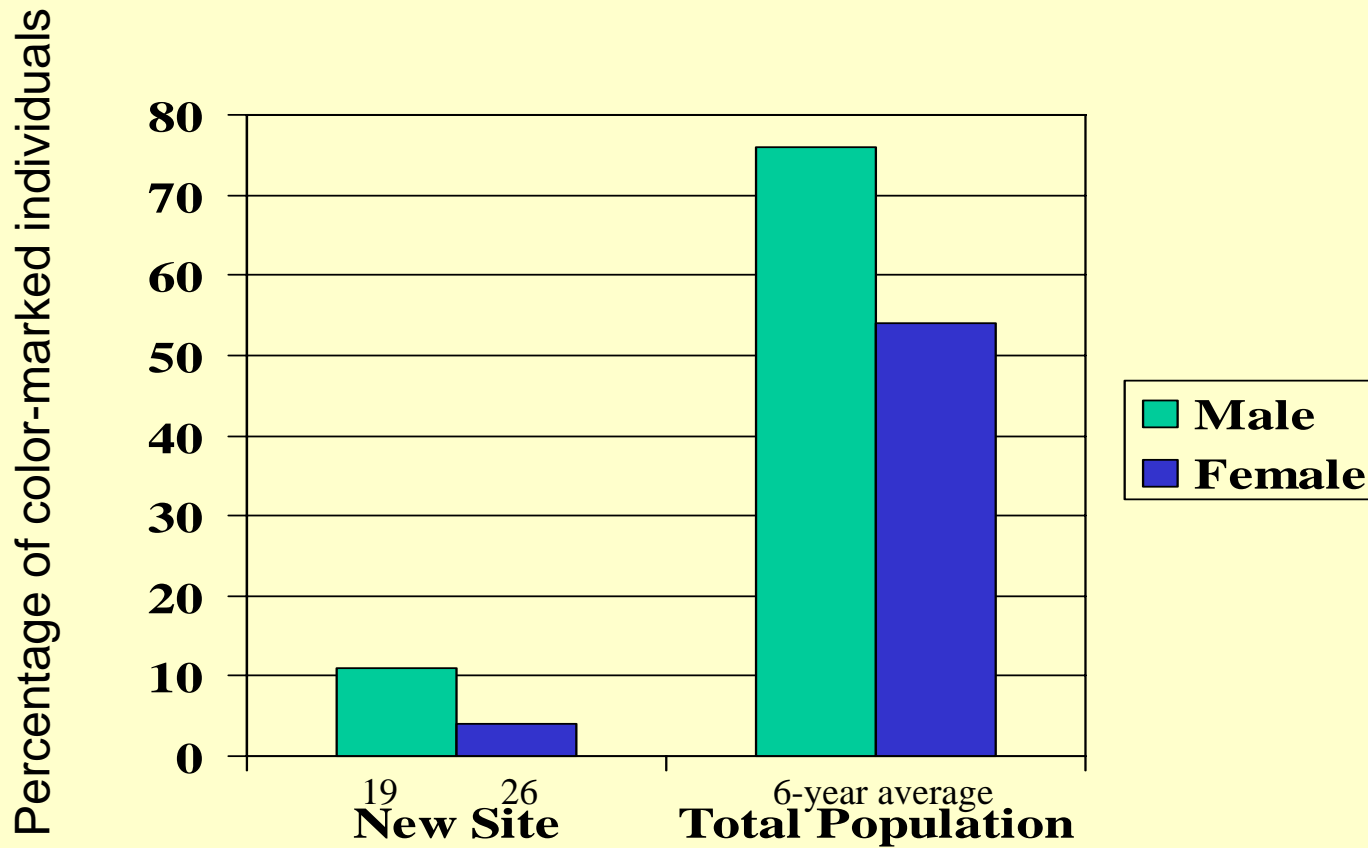
Attracting more birds to Illinois



Calumet may be  
in a lucky place.



# How are new sites colonized?



Bottom line: naïve birds settle in appropriate habitat

# Restoration is the future



# Acknowledgments

## Funding

IL Natural History Survey  
Chicago Wilderness  
US Fish & Wildlife Service  
IL Dept. of Natural Resources  
IL Dept. of Natural Resources C-2000  
CERL Army Corps of Engineers  
Department of Defense  
Brookfield Zoo  
IL. Department of Transportation  
Lincoln Park Zoo  
McHenry Co. Conservation Foundation  
Kendiegh Grant  
Sigma Xi  
Max McGraw Wildlife Foundation  
IL. Endangered Species Protection Board  
University of Illinois Clark Research Grant

## Many Field Assistants

**Dave Enstrom**  
**Brad Semel**  
**Pat Weatherhead**  
**Jim Herkert**  
**Scott Robinson**  
**Jeff Brawn**



# **Impacts of Recreation on Calumet's Nesting Black-crowned Night Herons: Research Findings and a Simulation Tool for Comparing Alternative Recreation Scenarios**

Dr. Pat Zollner

U.S.D.A Forest Service, North Central Research Station

Working with the Black-crowned Night Herons that nest annually in Calumet, we assessed the effects of recreational activities (disturbance presence and frequency, distance to disturbance, etc.) on different behavioral indicators. Preliminary analysis of video tapes from the 2004 field season suggests that chicks increased the time spent vigilant and moving, but reduced time spent grooming and sleeping, when a boat was present near the nest; however, this response did not vary with frequency of and distance to disturbance. The presence of a boat also increased the probability of birds fleeing from the nest. Overall, human disturbance increased the proportion of short-term alarm behaviors, but these effects do not appear to have been cumulative with the frequency of disturbance over the course of the breeding season. This information will be incorporated into a spatially explicit simulation model of bird responses to human activities in order to compare alternative recreation scenarios and to validate this new simulation tool.

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Email: pzollner@fs.fed.us

Phone: (715) 362-1150





**Impacts of Recreation  
on Calumet's  
Nesting Black-  
crowned  
Night Herons:  
Research Findings  
and a Simulation  
Tool for Comparing  
Alternative Recreation Scenarios**



# Simulation of Disturbance Activities (SODA)

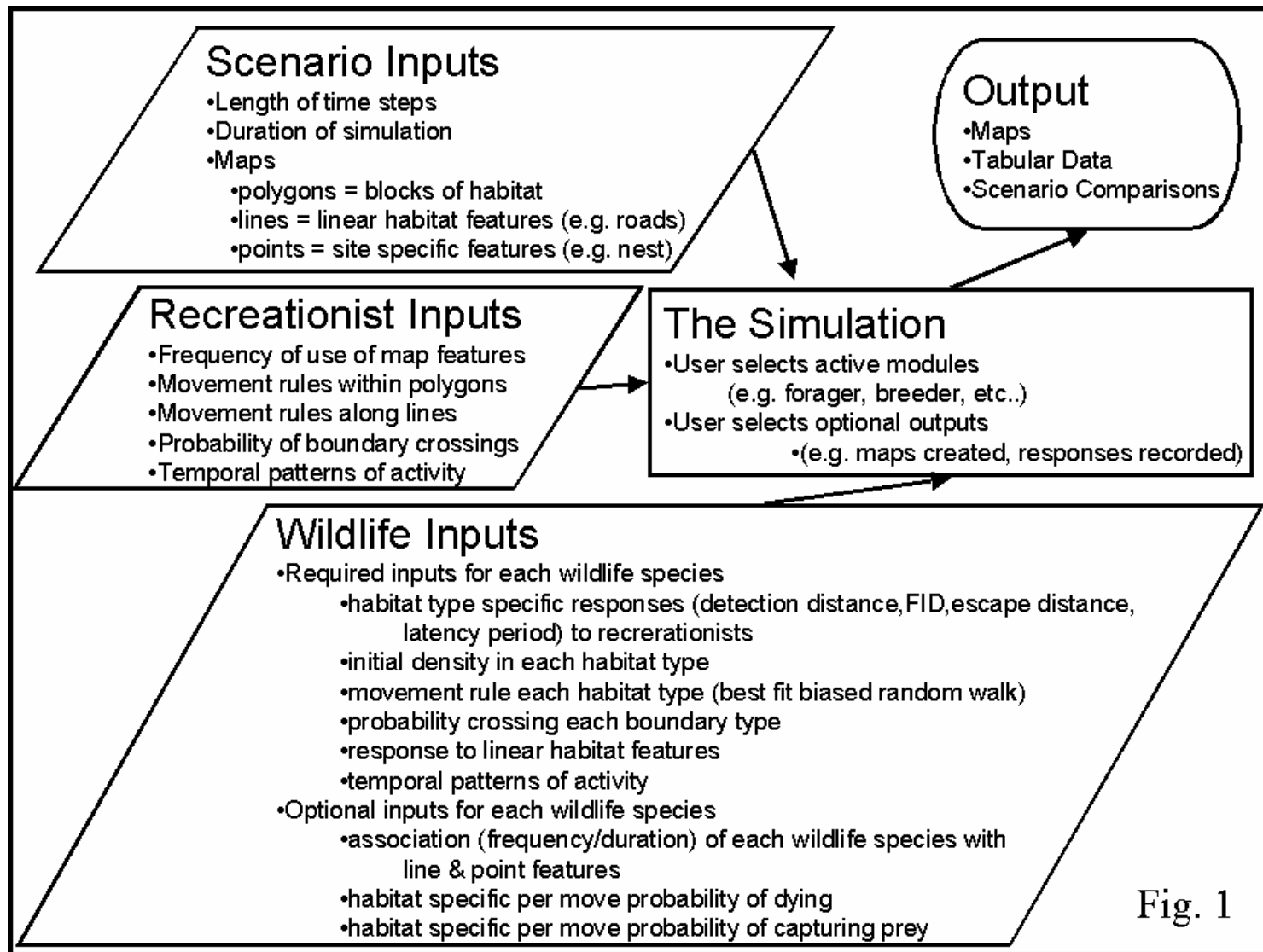
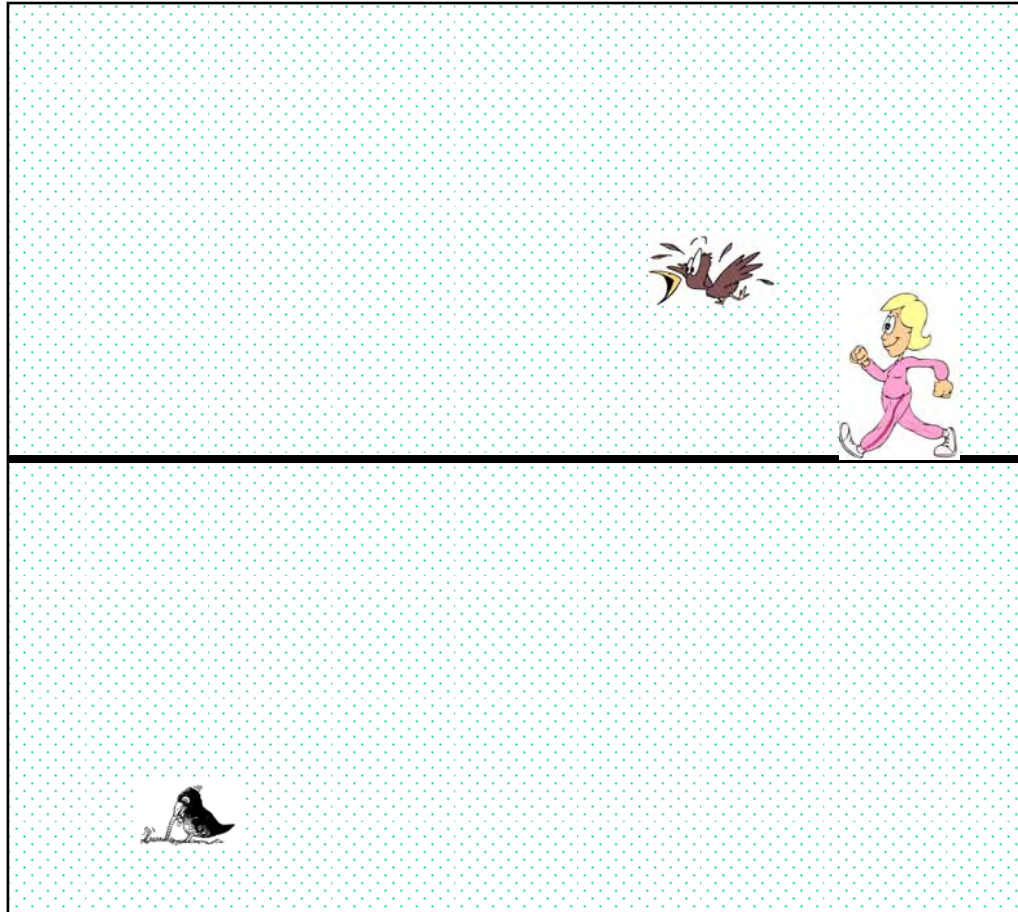


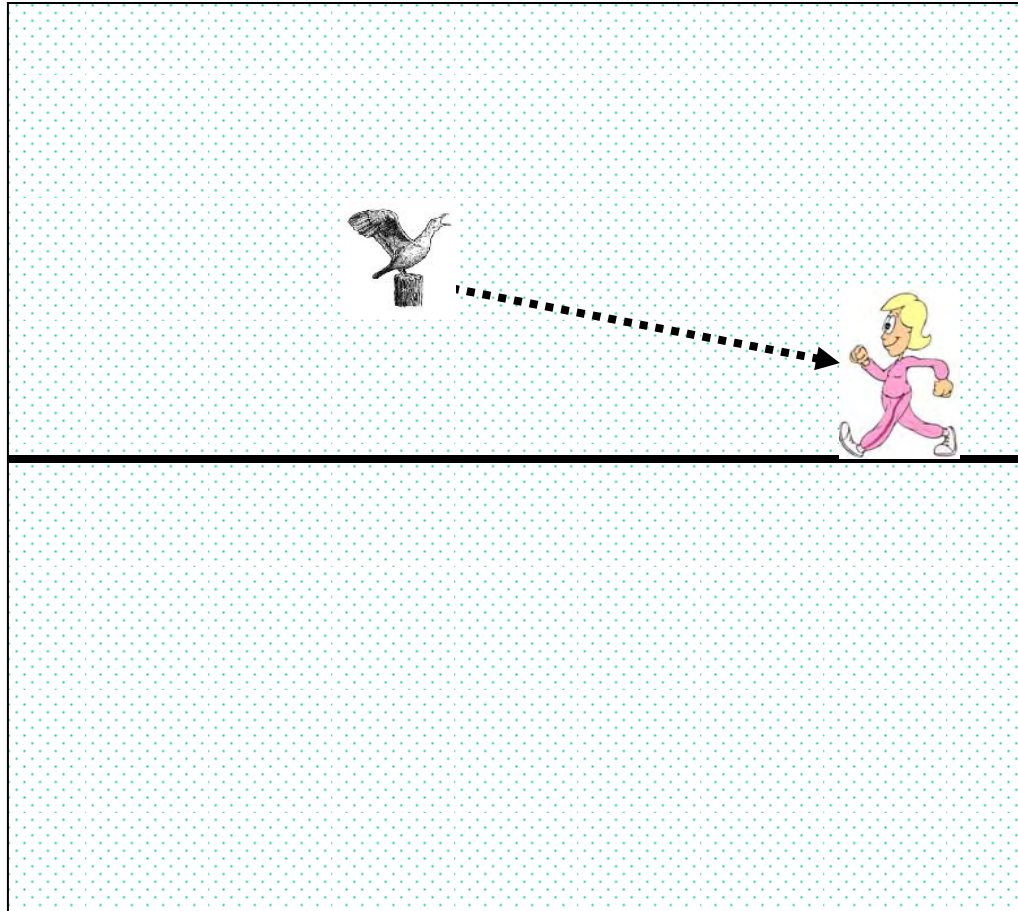
Fig. 1

# SODA Light: First Application

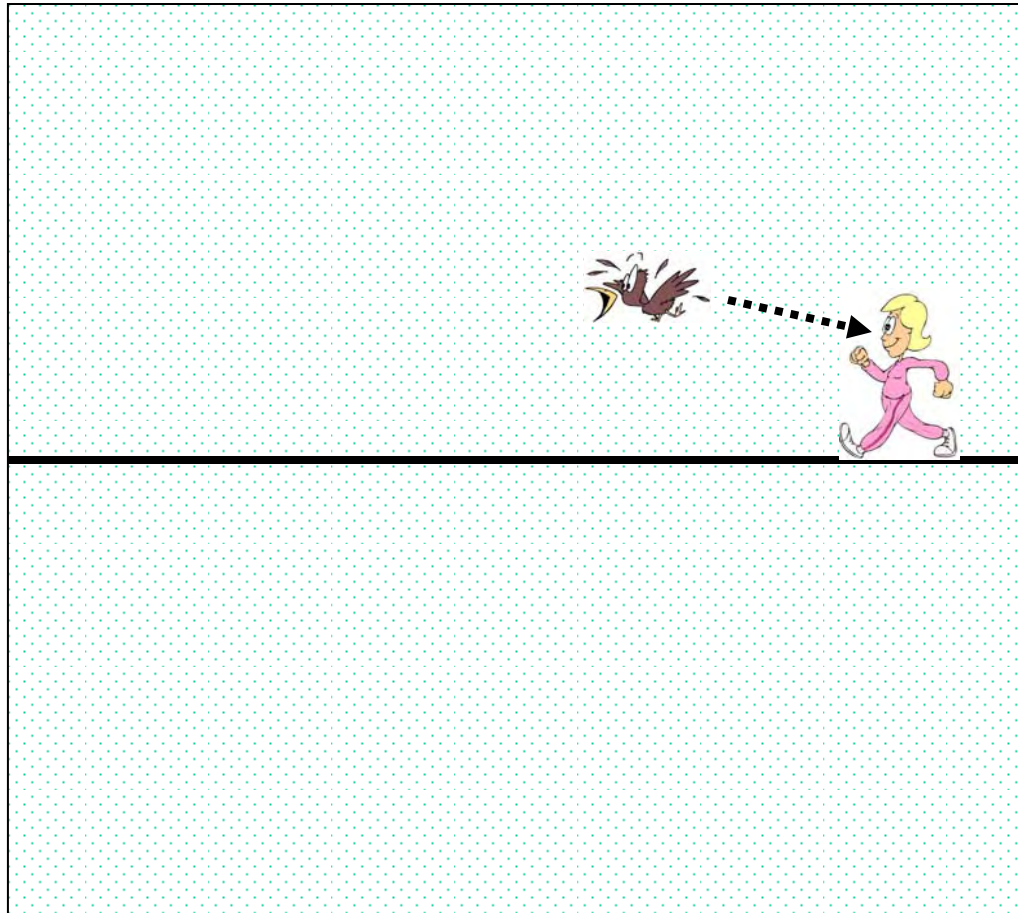


Blumstein et al. 2005 Journal of Applied Ecology 42:943-953

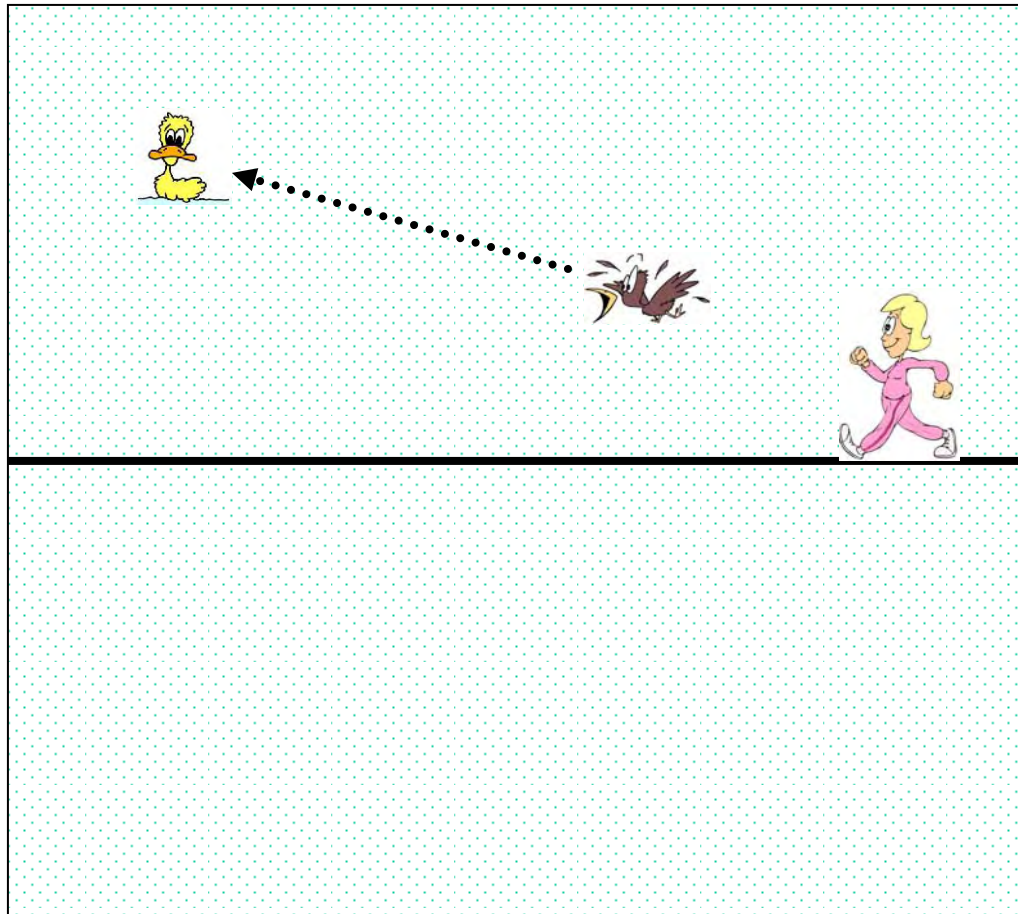
# Detection Distance



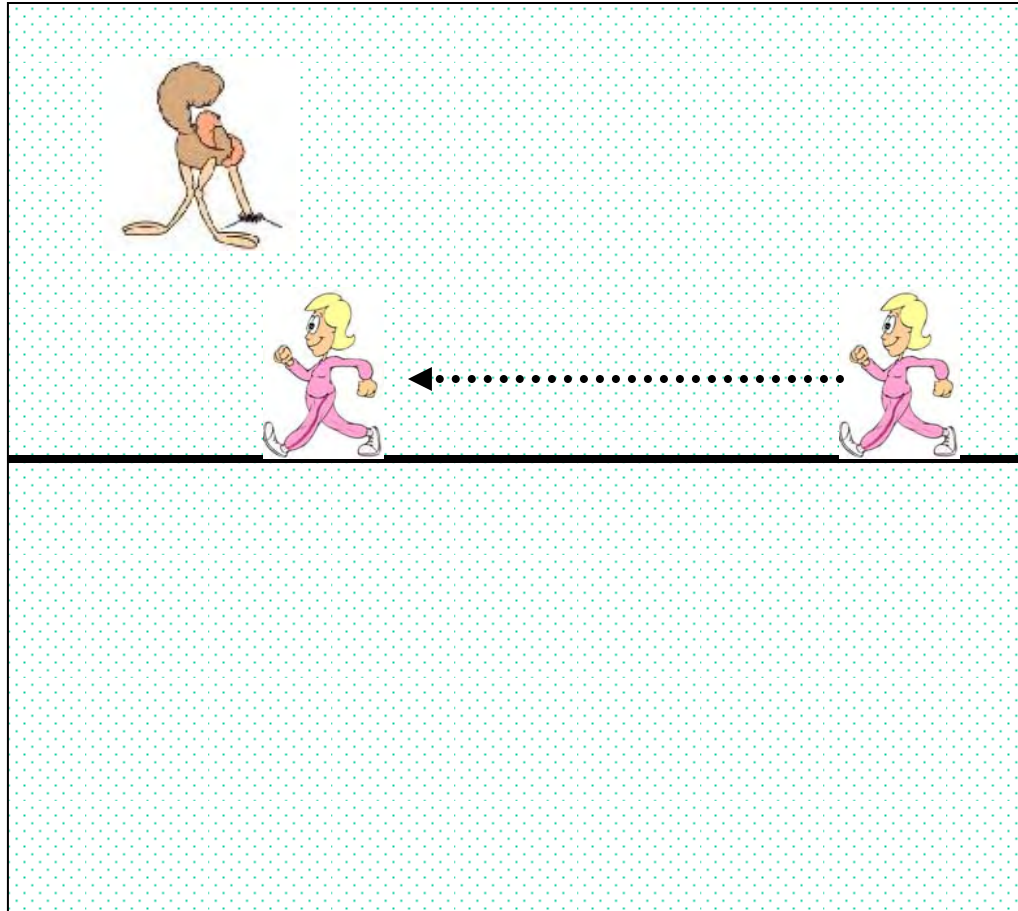
# Flight Initiation Distance



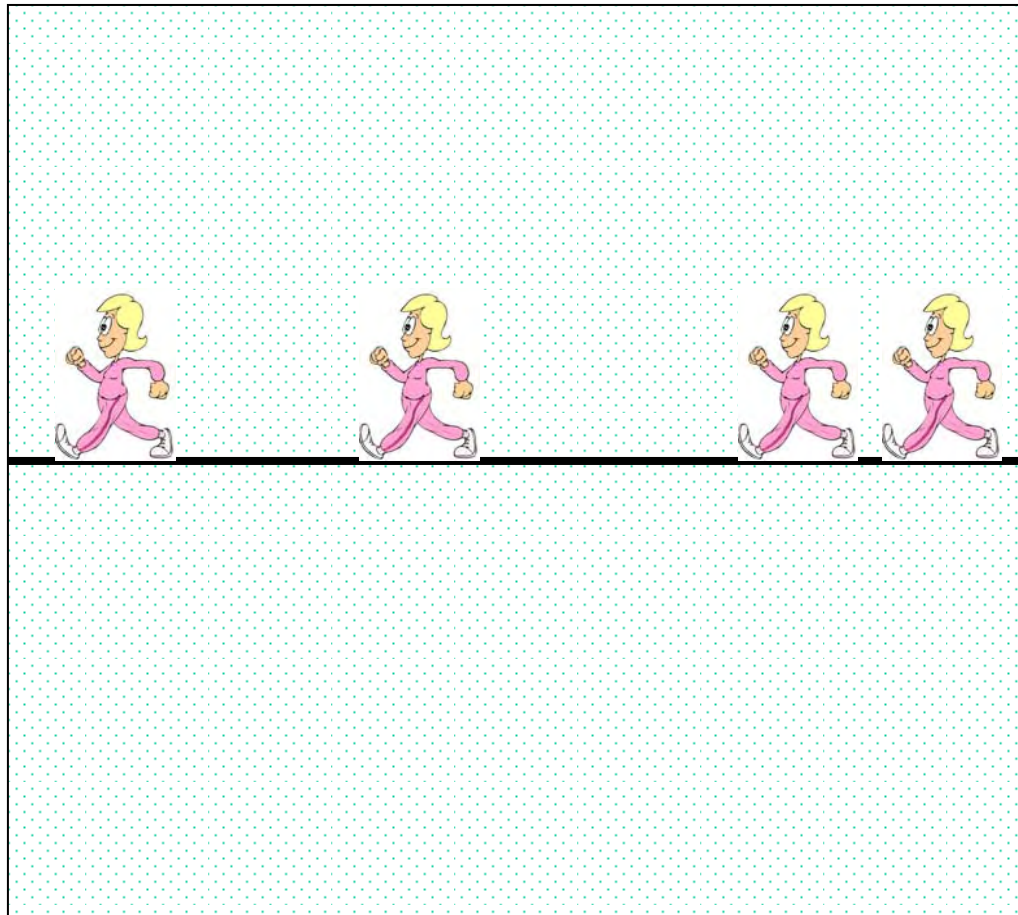
# Landing Distance



# Latency Period



# Frequency of Disturbance





# SODA Light Take Homes

- Detection Distance Very Important
- Frequency of Disturbance Very Important
- Interaction of Above Very Important
- Latency Period Least Important

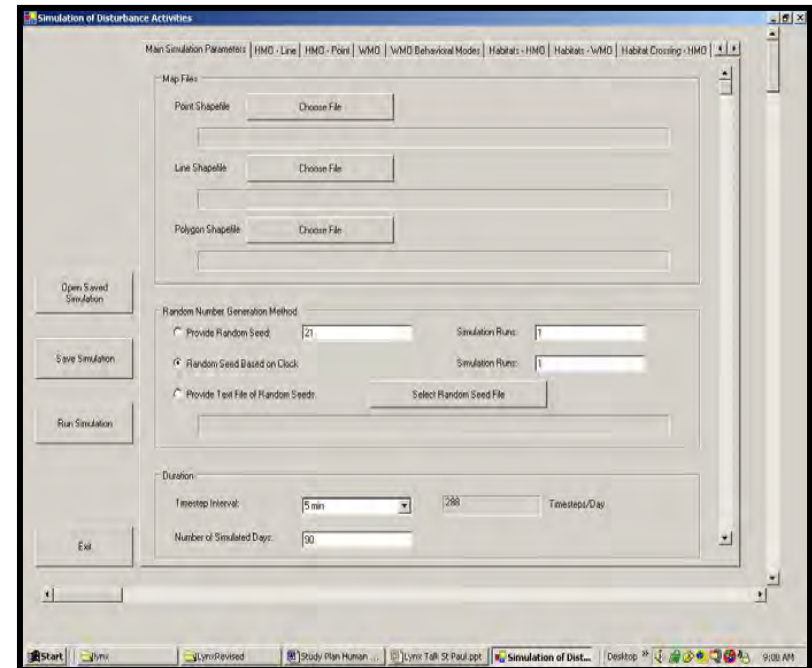
Blumstein et al. 2005 Journal of Applied Ecology 42:943-953

# Applying SODA To Calumet BCNH

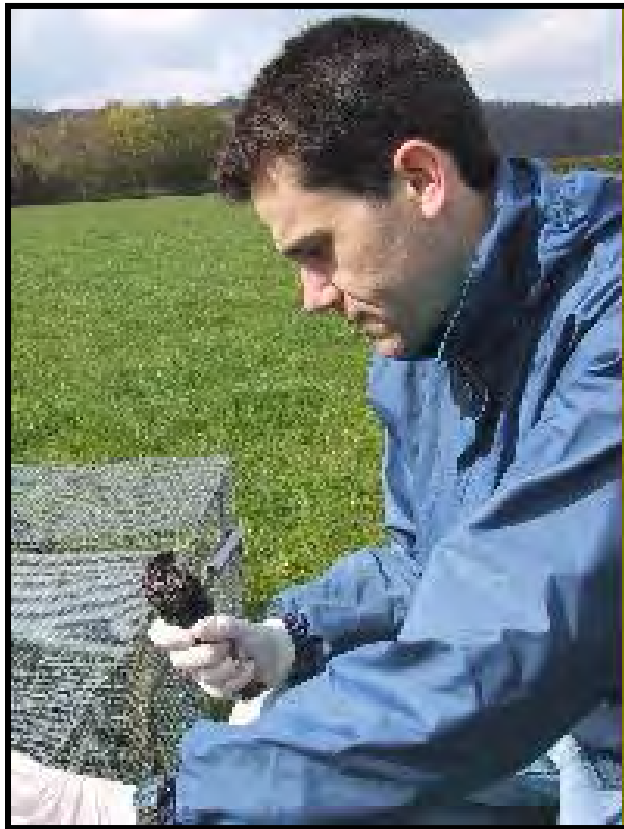
## Empirical Observations



## SODA Simulation



# Collaboration with Cal. State – Long Beach (Dr. Esteban Fernandez-Juricic)



[www.csulb.edu/~efernand/index.htm](http://www.csulb.edu/~efernand/index.htm)

- Extensive research on birds' responses to human activity
  - Studies on three continents
  - >12 model species
  - >10 peer reviewed publications
- Insights into experimental design
- Analysis of collected video data
- Statistical analysis of final results

# Response of Nestlings to Aquatic Human Activity



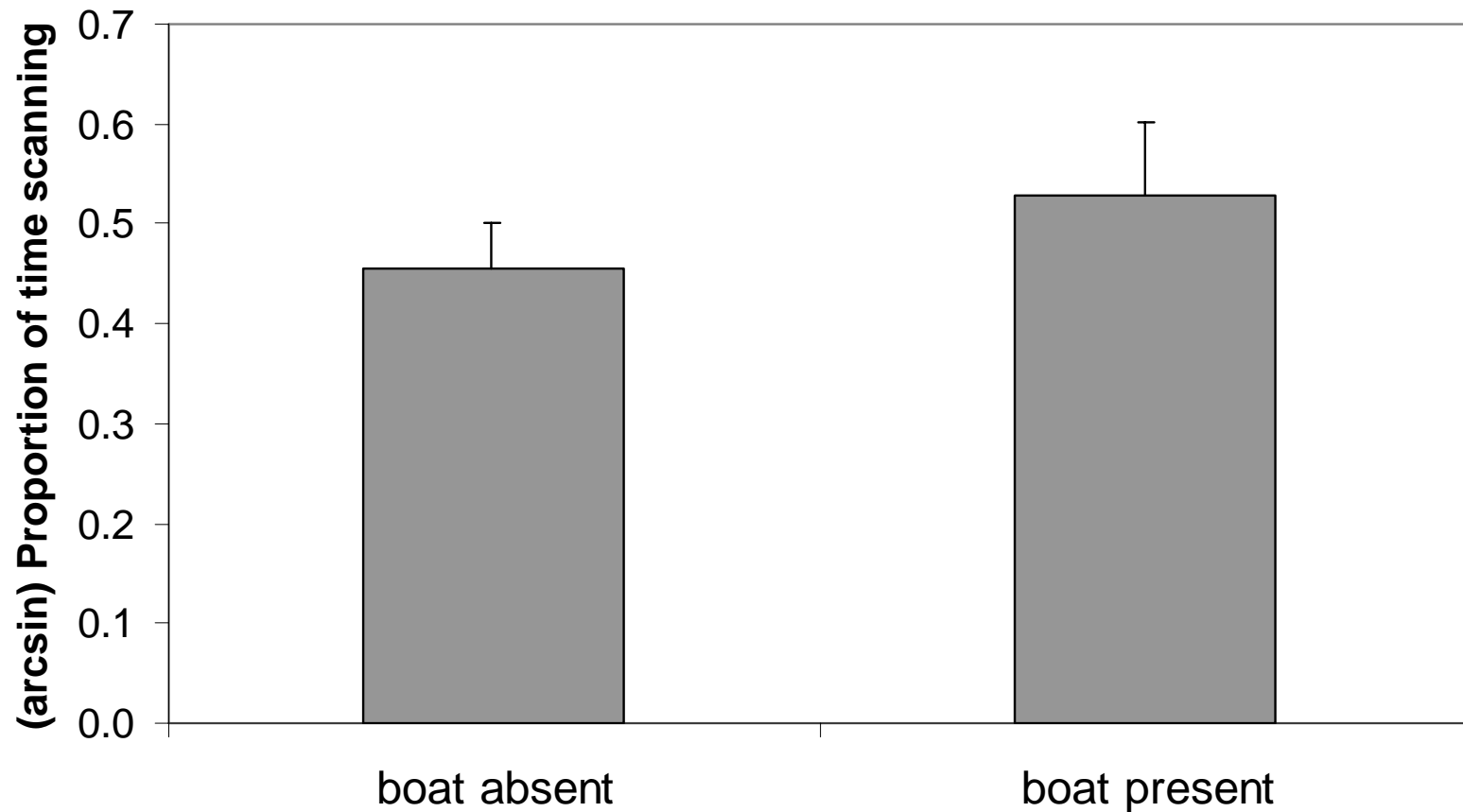
# Technical Challenges to Data Collection



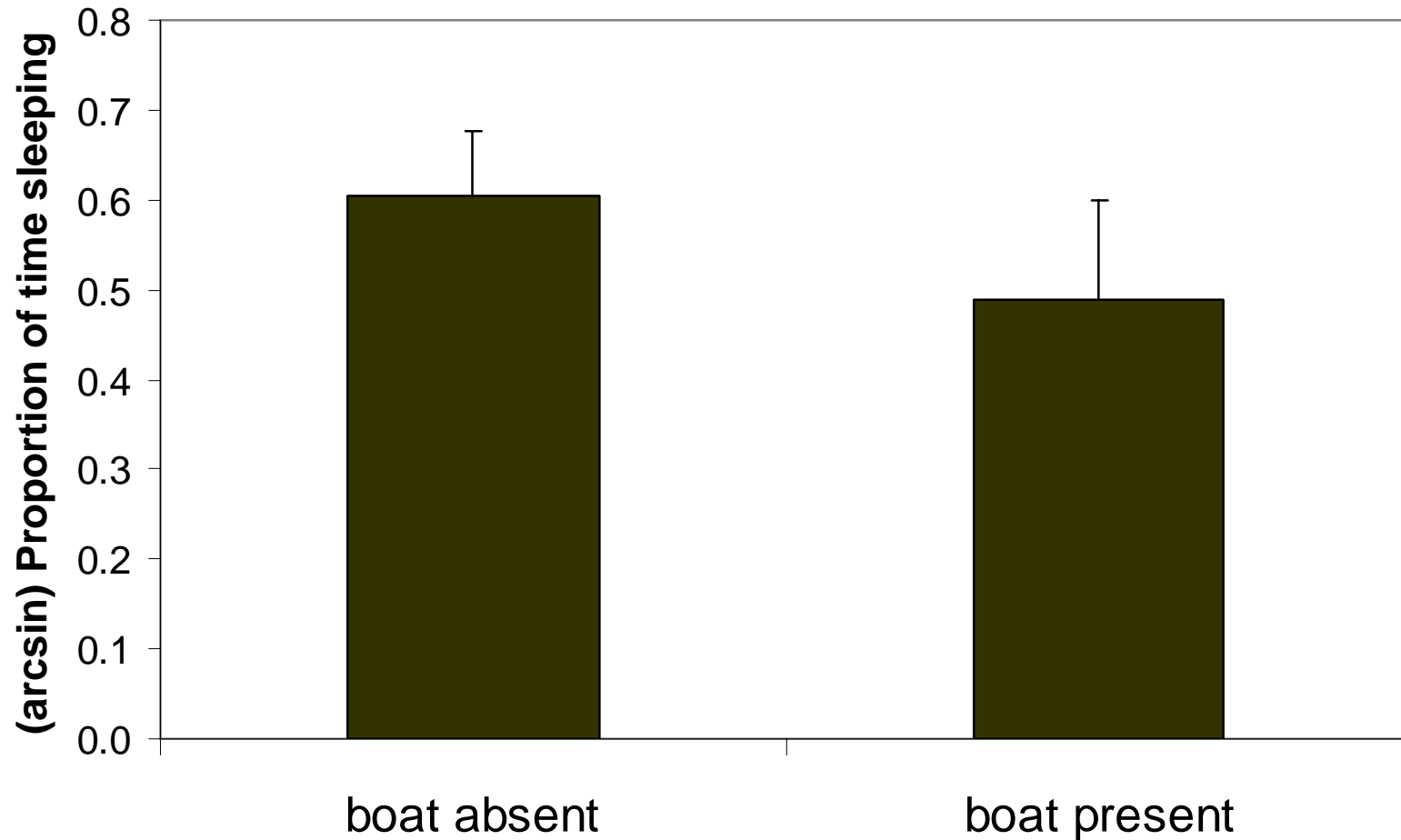
# Study Design: Nestlings Response To Aquatic Human Activity

- Three Sections of Marsh
  - A. Control No Disturbance
  - B. Infrequent Disturbance
  - C. Frequent Disturbance
- Approach B & C along transect
- At stations on transect, make different levels of noise
- Use video at nests to assess chick response

# First Result: Nestlings' Response to Aquatic Human Activity



# Second Result: Nestlings' Response to Aquatic Human Activity





# **Non-significant Factors in Response to Aquatic Human Activity**

- Volume of human noise
- Distance between boat & nest
- Calendar Date
- Interaction Terms



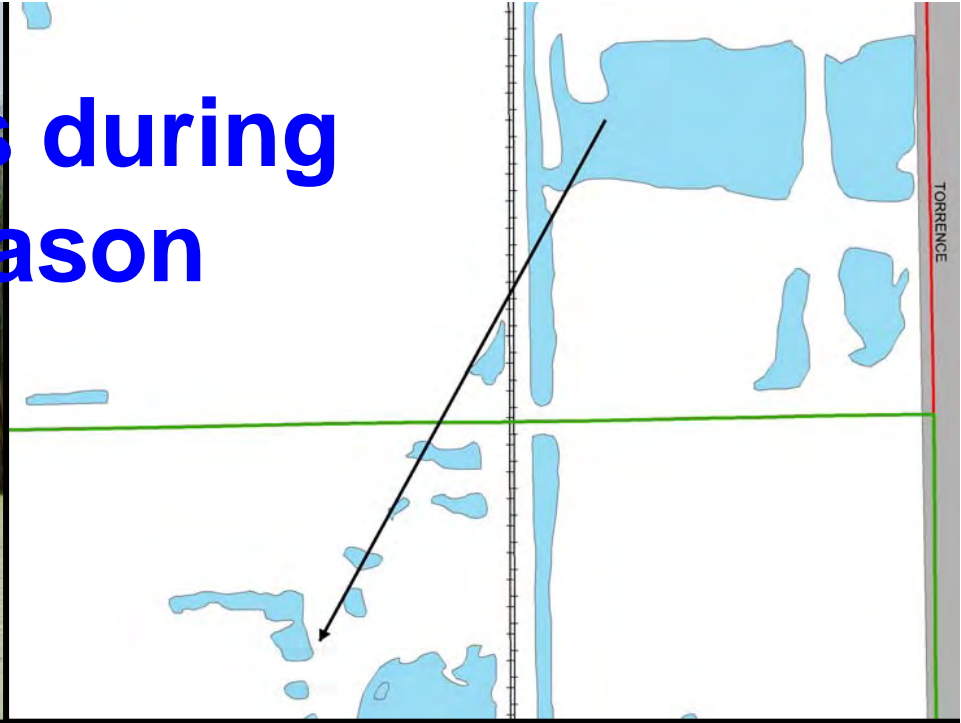
# **BP Leader Award to Southeast Environmental Task Force made 2005 research possible**



# Response of Nestlings to Terrestrial Human Activity



# Logistic Challenges during Second Field Season



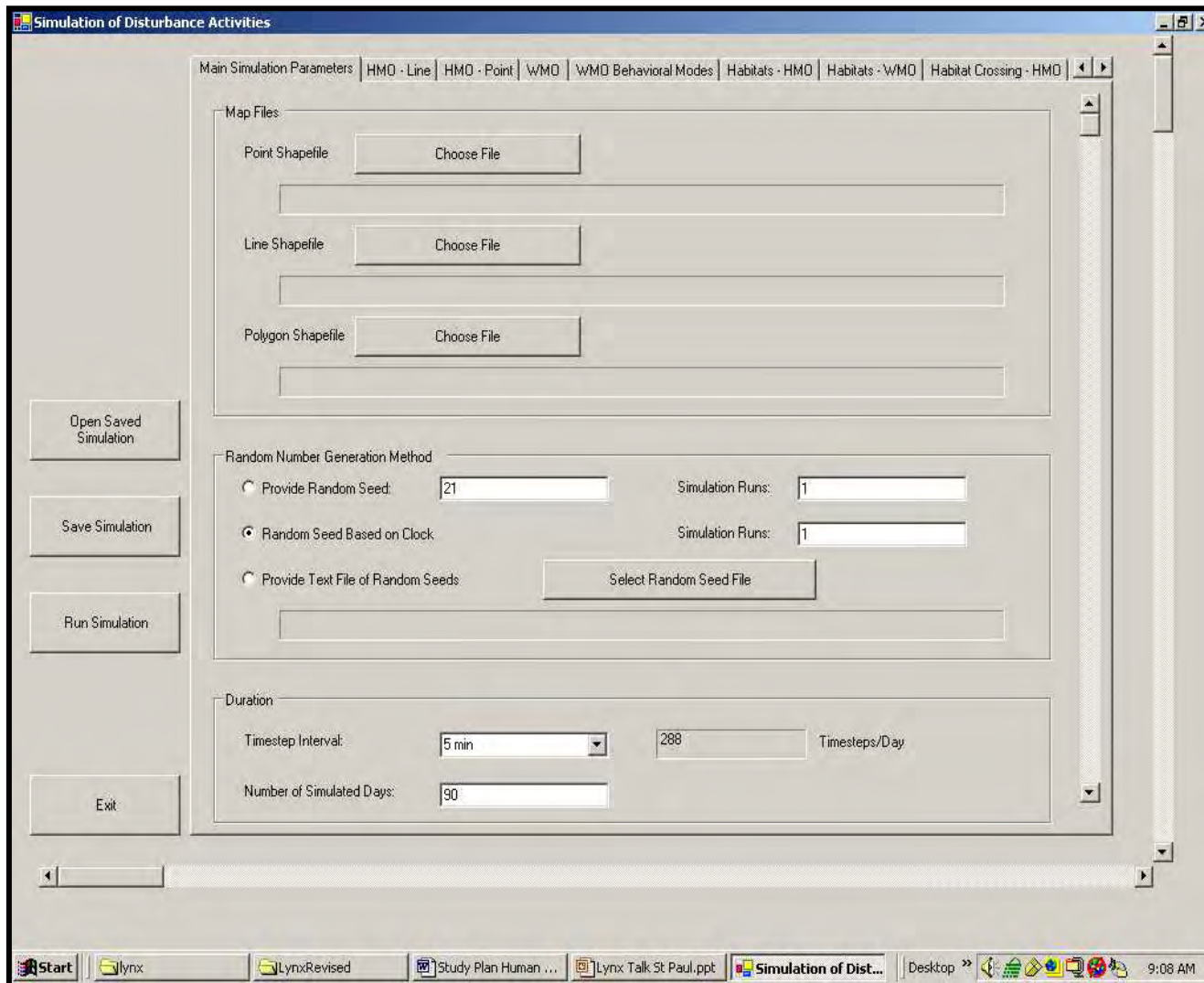
# Study Design: Nestlings' Response to Terrestrial Human Activity

- Three Ponds in Heron Pond Complex
  - A. Control No Disturbance
  - B. Infrequent Disturbance
  - C. Frequent Disturbance
  
- Approach B & C three ways
  - Strolling
  - Slow Inquisitive Walk
  - Fast Direct Walk
  
- Use video at nests to assess chick response

**Video Tapes of Nestlings' Response  
to Terrestrial Human Activity  
Are Presently Being Analyzed –  
Results Forthcoming Soon**

# **Applying Empirical Research to SODA Simulation**

# Expanding SODA



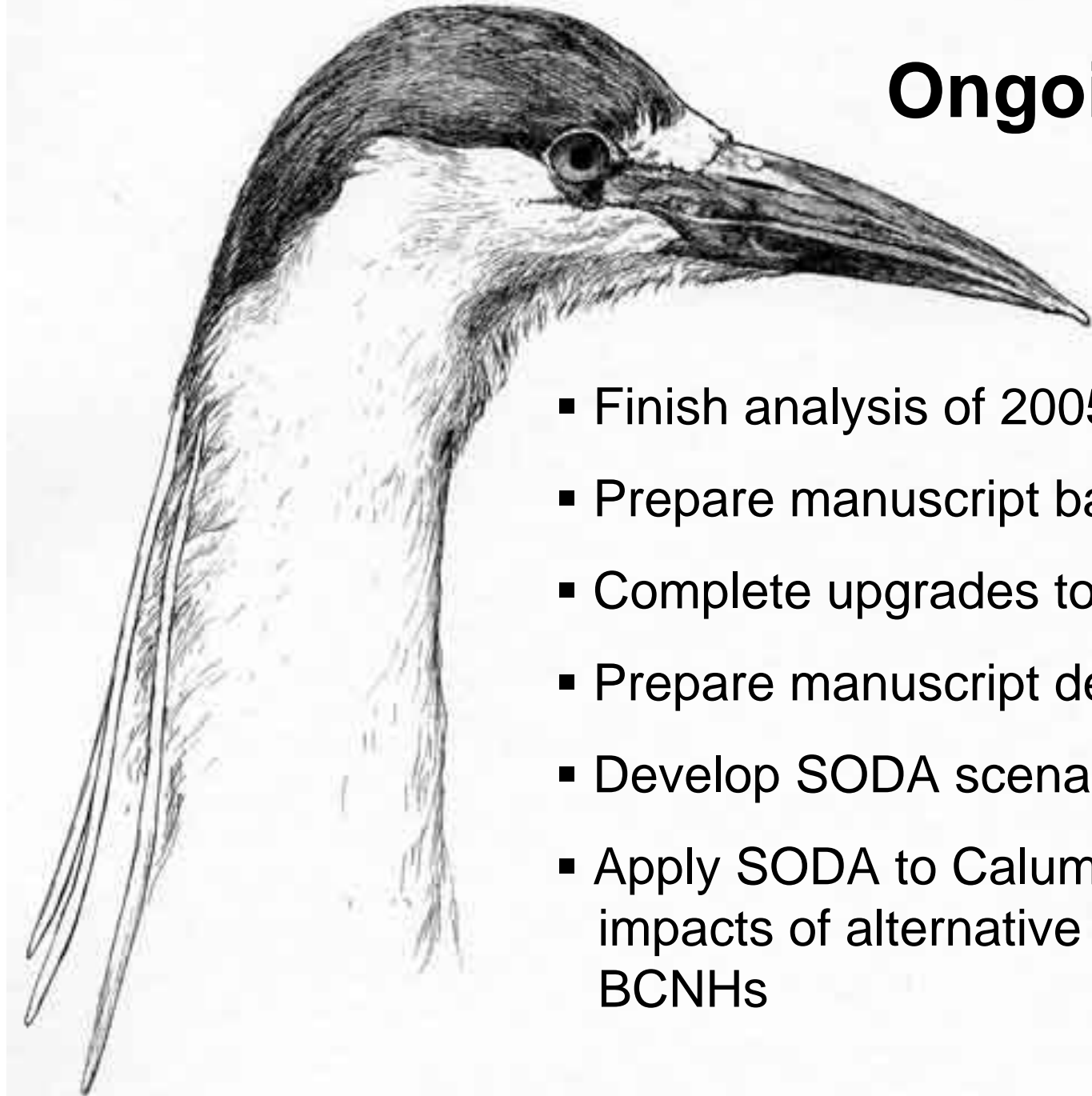


# SODA's New Capabilities

- Shape Files for Study Site Maps
  - Linear Features Focus Human Movements
  - Polygon Features Determine Wildlife Movement
  - Point Features Wildlife Nesting/Denning Spots
- Additional Ecological Realism
  - Predation Risk
  - Energetic Costs and Gains
  - Food Delivery to Young
  - Simultaneous Response to Diverse Human Activity

# Ongoing Work

- Finish analysis of 2005 field data
- Prepare manuscript based on field data
- Complete upgrades to SODA
- Prepare manuscript describing SODA
- Develop SODA scenarios for Calumet
- Apply SODA to Calumet comparing impacts of alternative scenarios on BCNHs



# Acknowledgments

USDA Forest Service N.C.R.S.  
California State University,  
Long Beach  
Southeast Environmental  
Task Force  
BP Leader Awards  
Walter Marcisz  
Jeff Levengood  
All Dedicated Student Workers  
The Birds Themselves



## Species Reintroductions: Karner Blue Case Study

Mr. Paul Labus

The Nature Conservancy - Indiana Chapter

Karner blue butterfly (Kbb) was once a locally common species ranging from New England across the Great Lakes Region, extending as far west as Wisconsin and portions of eastern Minnesota. The U.S. Fish and Wildlife Service (USFWS) estimates that populations have dropped by 99% over the past 100 years, with 90 % of that loss occurring in the past 15 years. Habitat destruction, degradation and fragmentation are thought to be the leading causes of the decline. Kbb was placed on the endangered species list in 1992. As a result USFWS prepared a recovery plan that identifies areas that offer the best opportunities to establish and maintain viable populations of Kbb throughout its current range. A series of natural area fragments in Gary, Hammond and East Chicago, Indiana - called The West Gary Recovery Unit – is identified as potentially supporting a viable metapopulation. This presentation will discuss the rationale and procedures for re-establishing Kbb in the West Gary Recovery Unit.

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Address: 2400 New York Ave., Room 269, Whiting, IN 46394

Email: [plabus@tnc.org](mailto:plabus@tnc.org)

Phone: (219) 473-4312





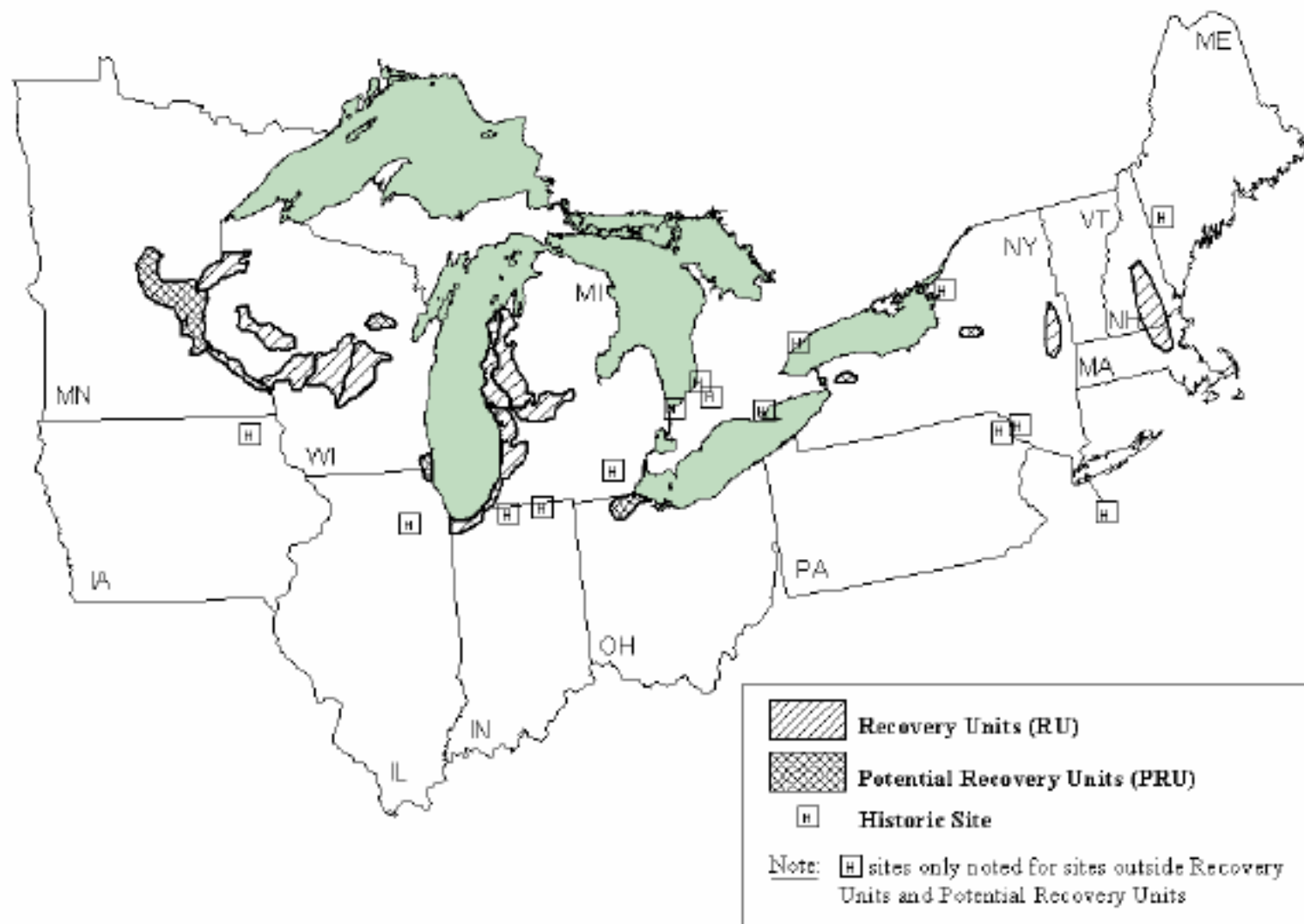
*Lycaeides melissa samuelis*



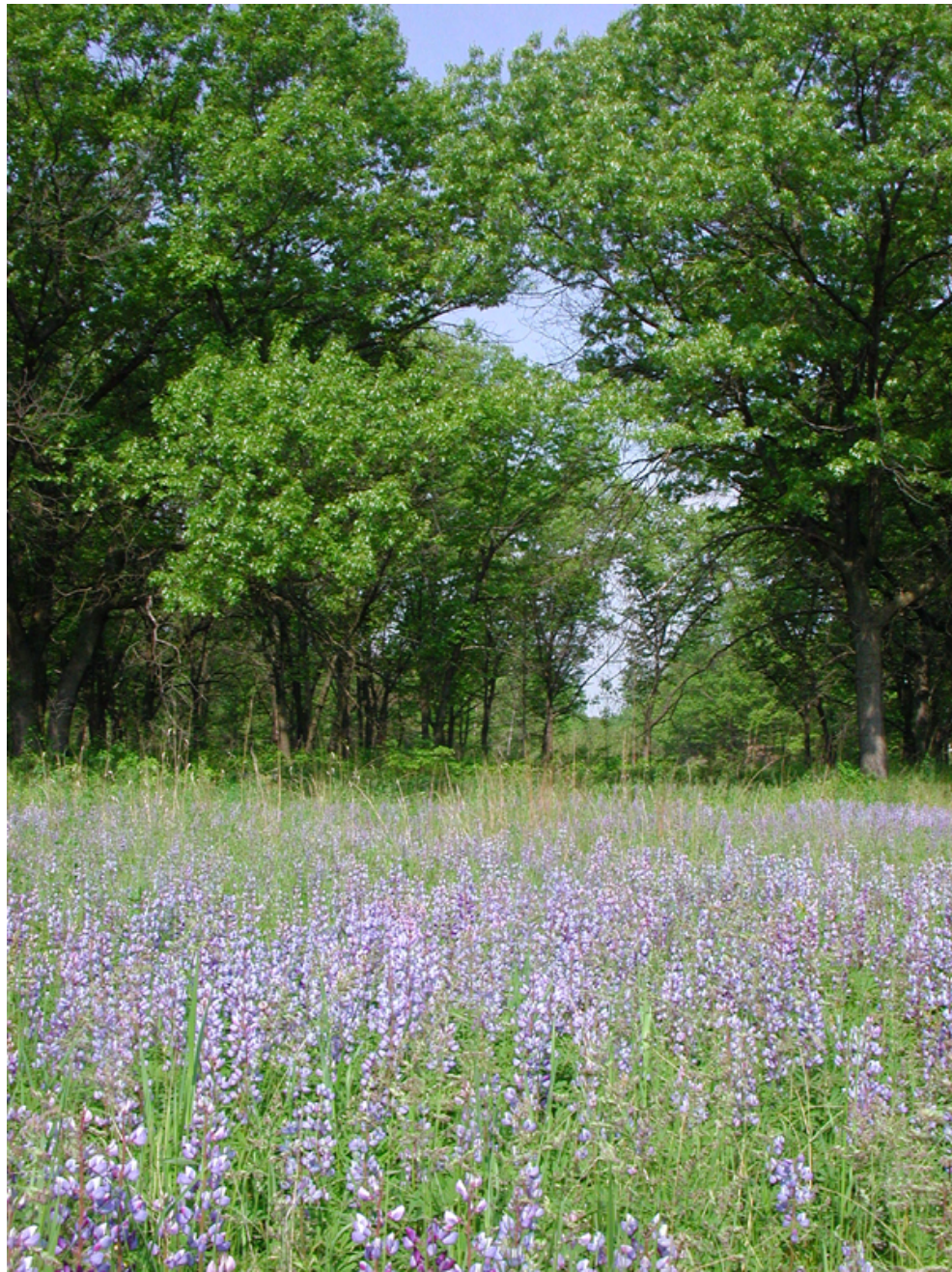




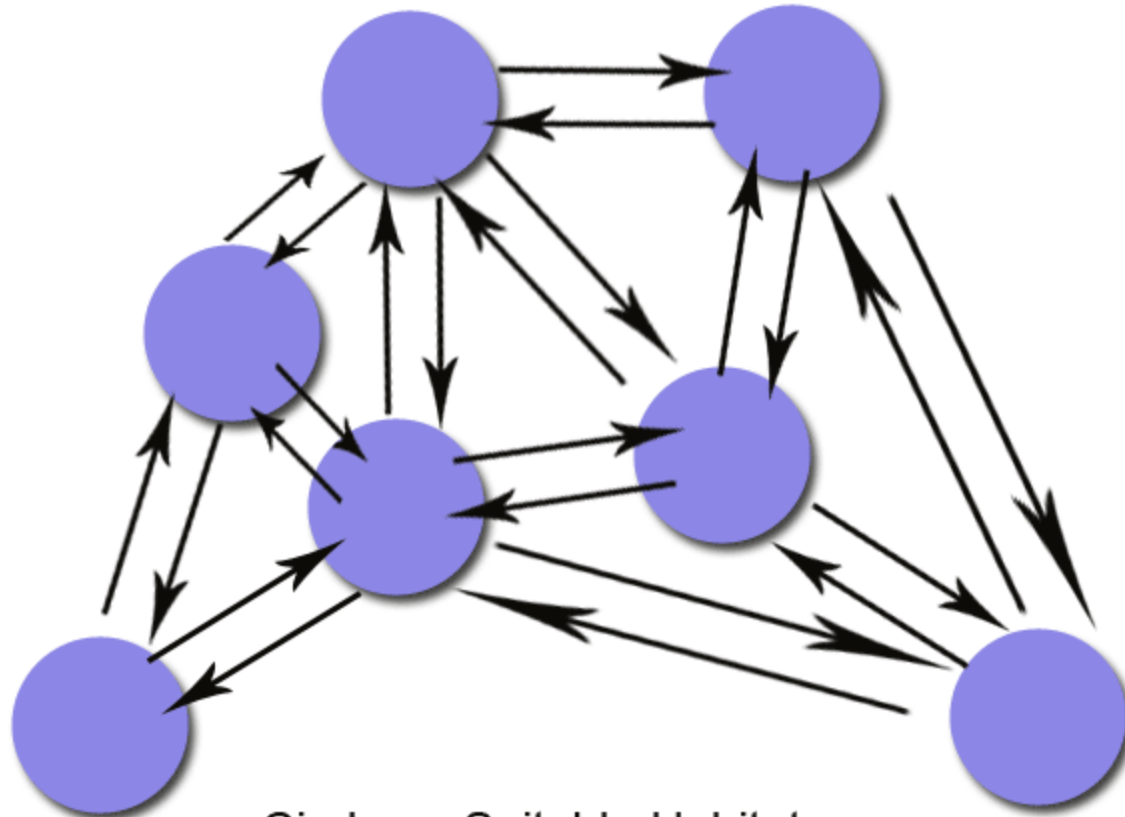








## True Metapopulation Structure



Circles = Suitable Habitat  
Lines = Dispersal of Butterflies





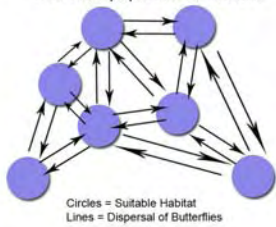








True Metapopulation Structure

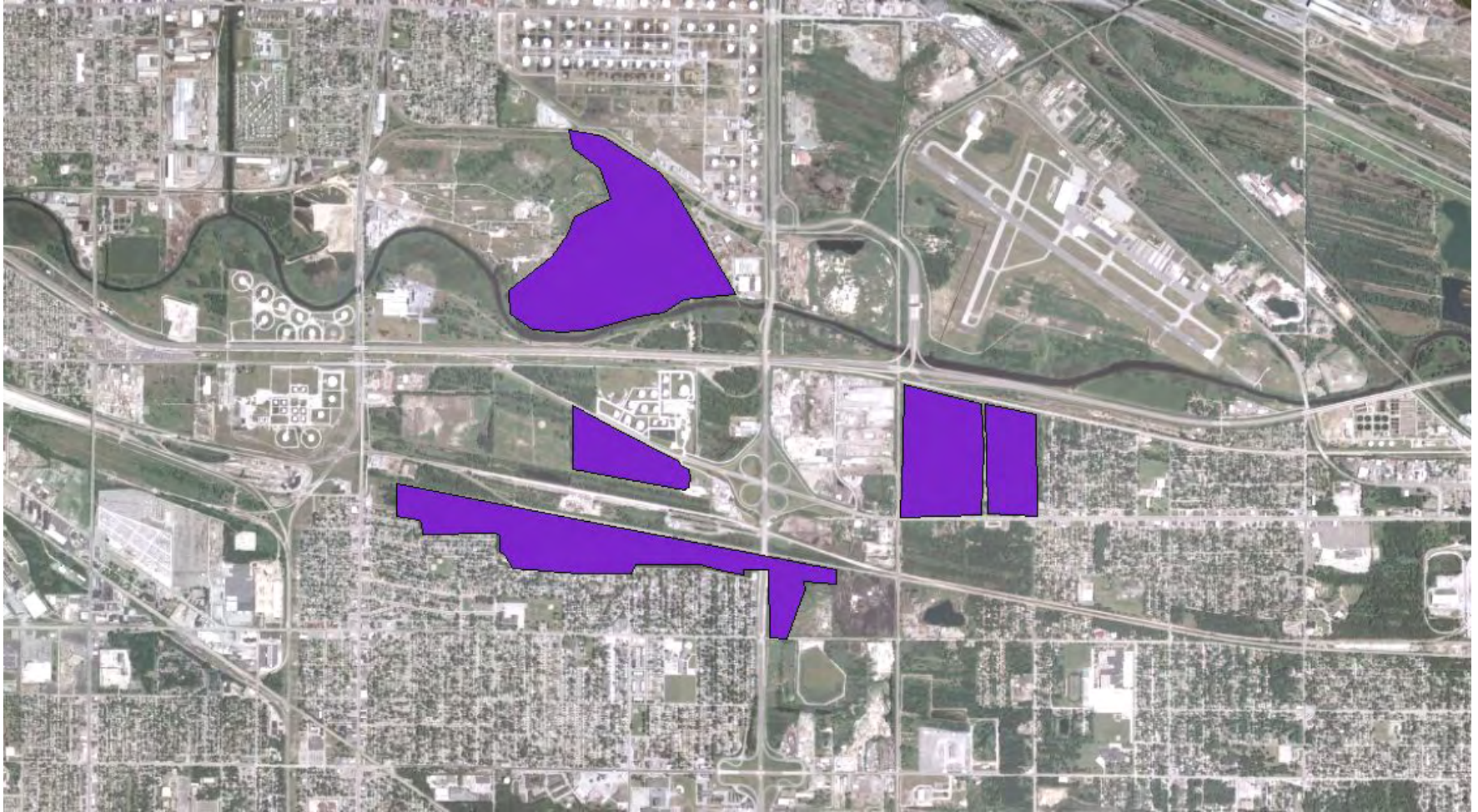


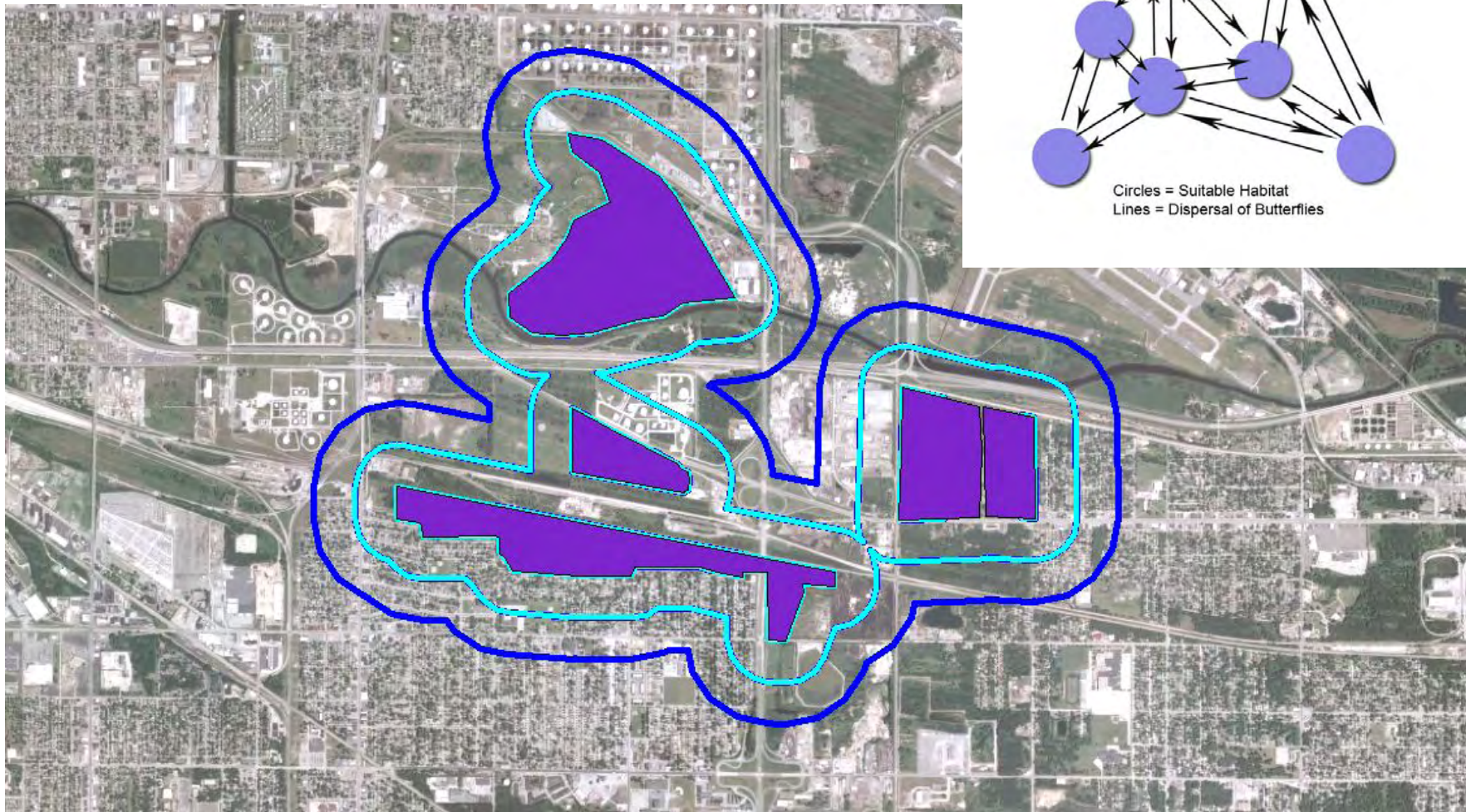
Circles = Suitable Habitat  
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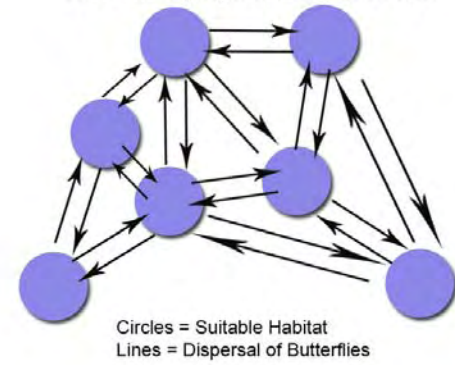




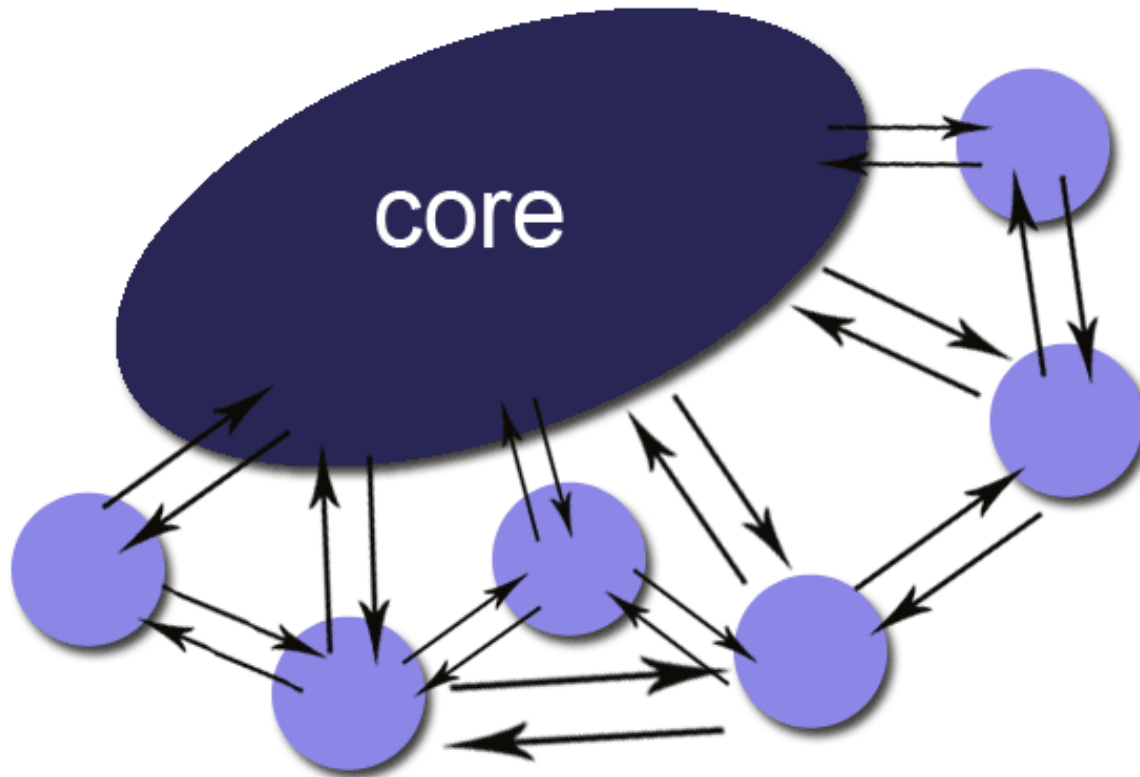




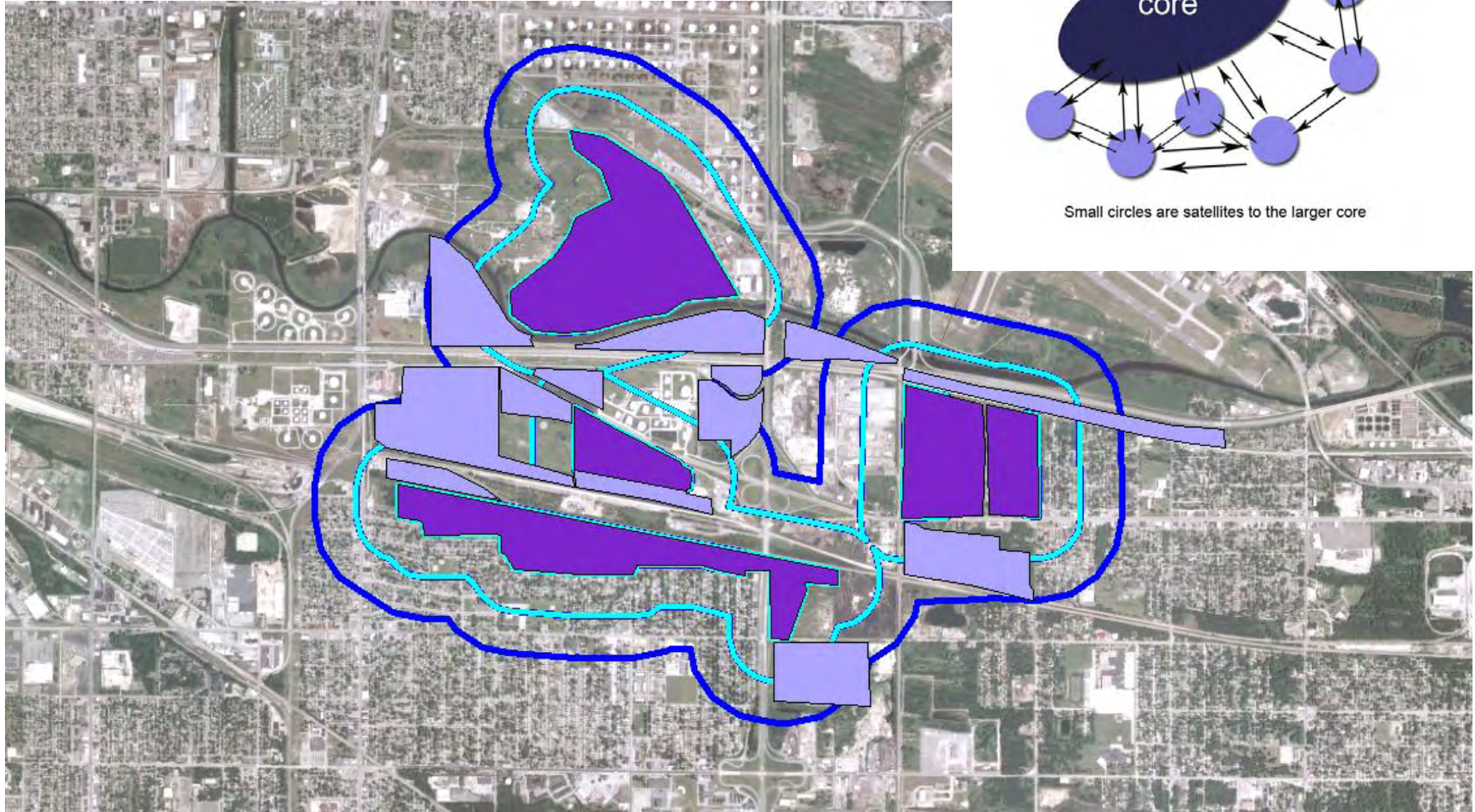
True Metapopulation Structure



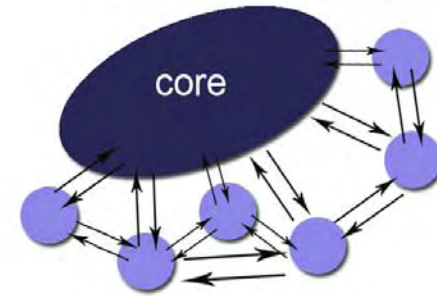
## Core-Satellite Structure



Small circles are satellites to the larger core

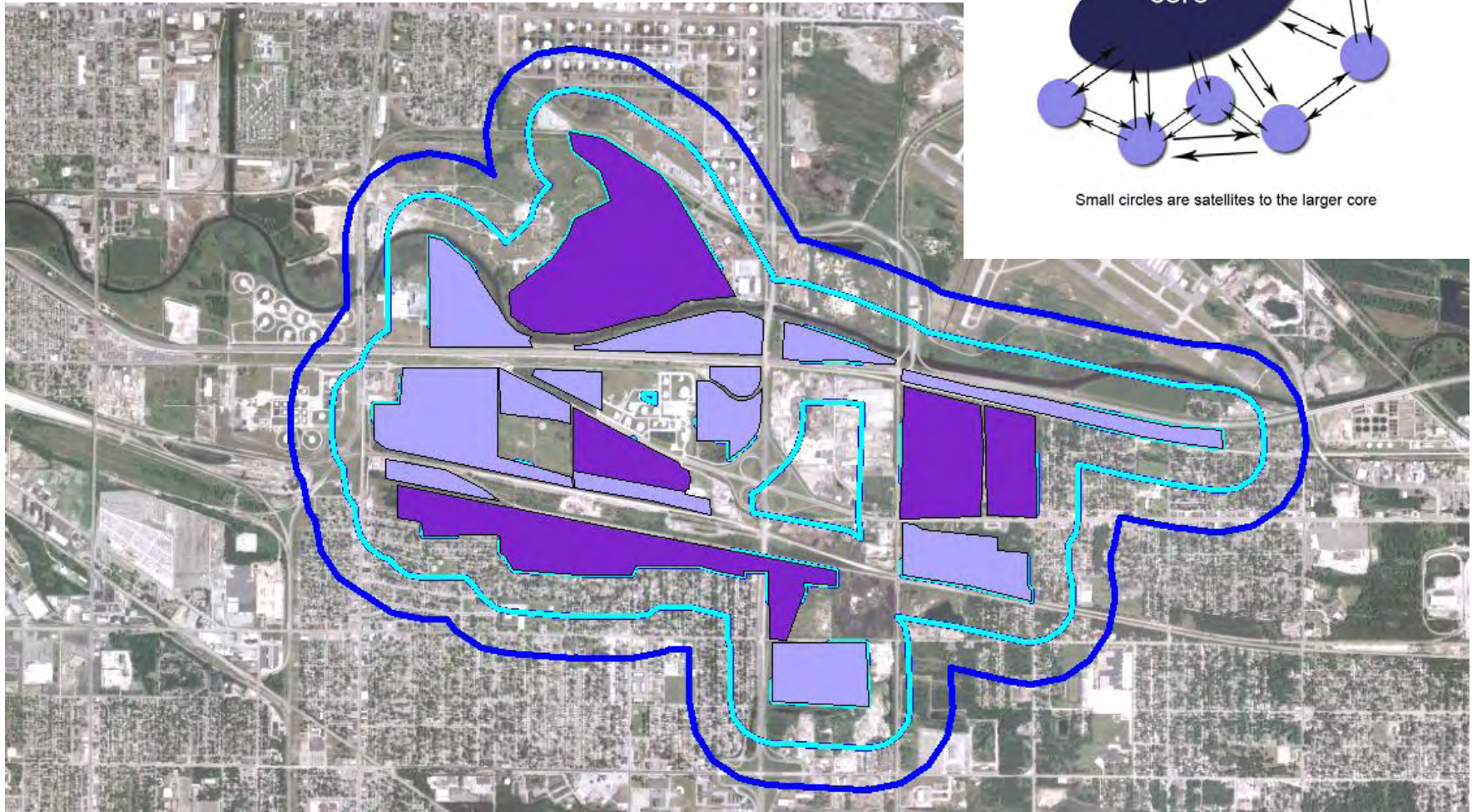


Core-Satellite Structure

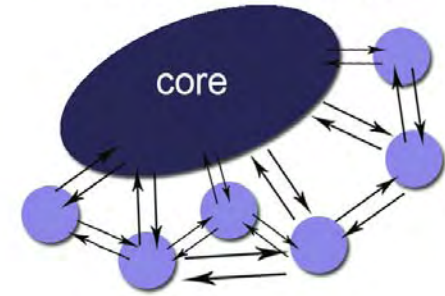


Small circles are satellites to the larger core





Core-Satellite Structure

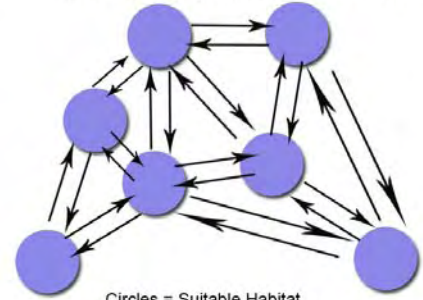


Small circles are satellites to the larger core



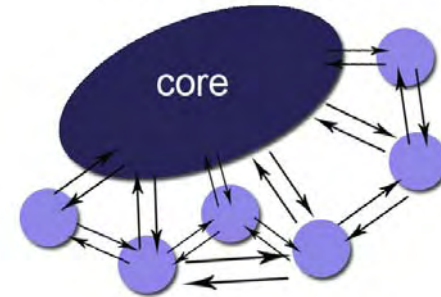


True Metapopulation Structure

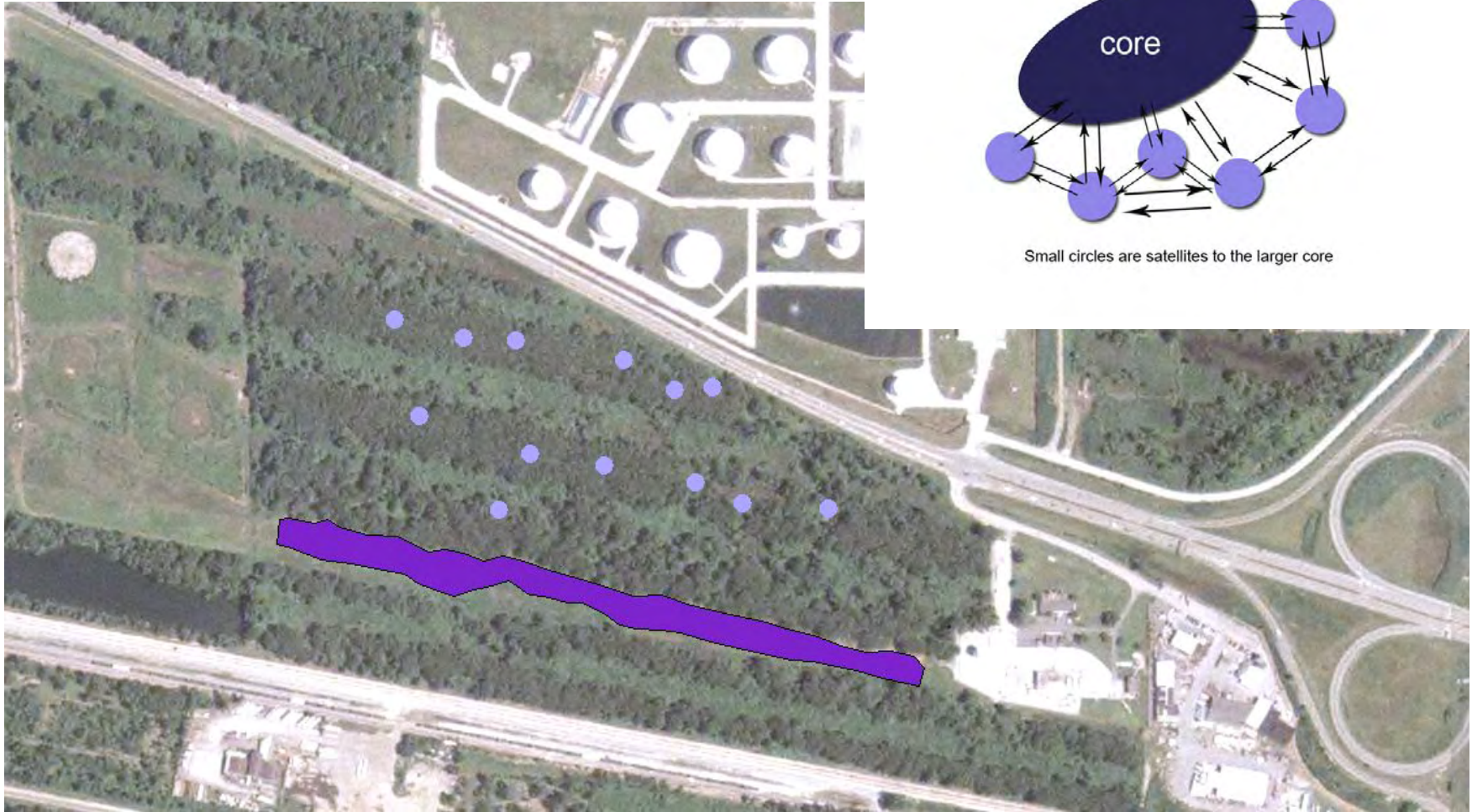


Circles = Suitable Habitat  
Lines = Dispersal of Butterflies

Core-Satellite Structure



Small circles are satellites to the larger core





## Calumet Hydrologic Master Plan

V3 Companies of Illinois, Chicago Department of Environment, with guidance from IDNR Illinois State Water Survey, and IDNR Illinois State Geological Survey <sup>4</sup>

The Hydrologic Master Plan began in 2001, and is coordinated by the Chicago Department of Environment and the Illinois Department of Natural Resources along with consulting firm V3 Companies of Illinois. Funding was provided by Illinois Department of Natural Resources C2000 Program, City of Chicago, U.S. Department of Housing and Urban Development, and a Supplemental Environmental Project from Chicago Specialties. George Roadcap of the IDNR Illinois State Water Survey and Michael Miller of the IDNR Illinois State Geological Survey served as advisors for the project.

The goal of the project was to address hydrologic and hydraulic improvements for roughly 1,300 acres of key open space parcels within the Calumet area. The three main objectives included (1) establishing a period of record of water levels and basic aquatic information through data collection; (2) establishing control surveys and structures to tie the region into the same datum; and (3) conducting a preliminary engineering evaluation of existing water control structures and providing recommendations for new structures or modifications to existing structures.

This presentation will outline the data collected, data gaps, recommendations and next steps for the project.

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Email: [nkamins@cityofchicago.org](mailto:nkamins@cityofchicago.org)

Phone: (312) 744-5917



# Lake Calumet Hydrologic Master Plan



*Stuart Dykstra*

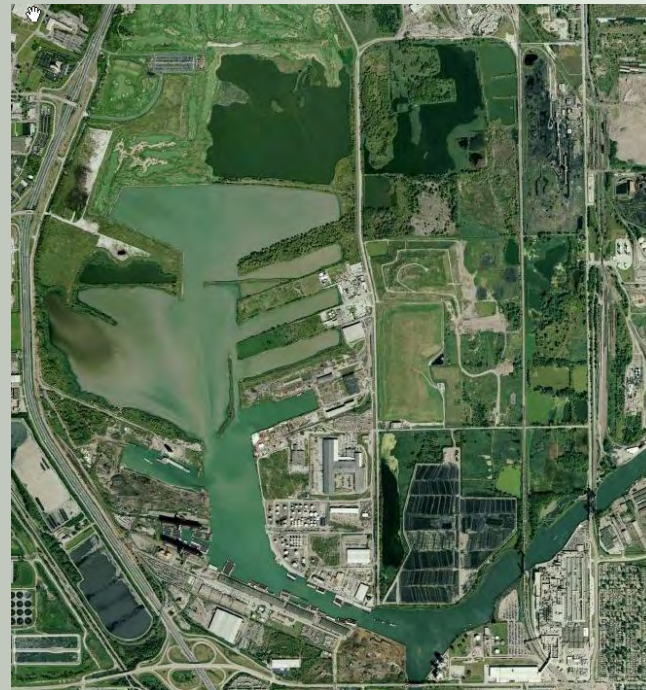
*Principal / Director  
Natural Resources Division*

*Keith Oswald*

*Director*

*Environmental Assessment & Redevelopment Group*

*Calumet Research Summit – January 2006*



# What We Set Out To Do



- Continuation of the Ecological Management Strategy (EMS)
- Identified data gaps in our understanding of the area's hydrology, hydraulics and water quality
- Assist future investigators, planners and designers working to enhance and restore key ecological areas





# PROJECT OBJECTIVES



Supporting Future Restoration & Naturalization Projects in the Area Through.....

## ■ Collect and Database Data

- ◆ Watershed Data – Hydrologic and Survey
- ◆ Water Control Structures - Inventory & Assessment
- ◆ Doty Ditch – IDOT Pump Station Characteristics
- ◆ Water Levels and Water Quality Data Over a Year's Time



# PROJECT OBJECTIVES



Supporting Future Restoration & Naturalization Projects in the Area Through.....

## Analyze & Survey

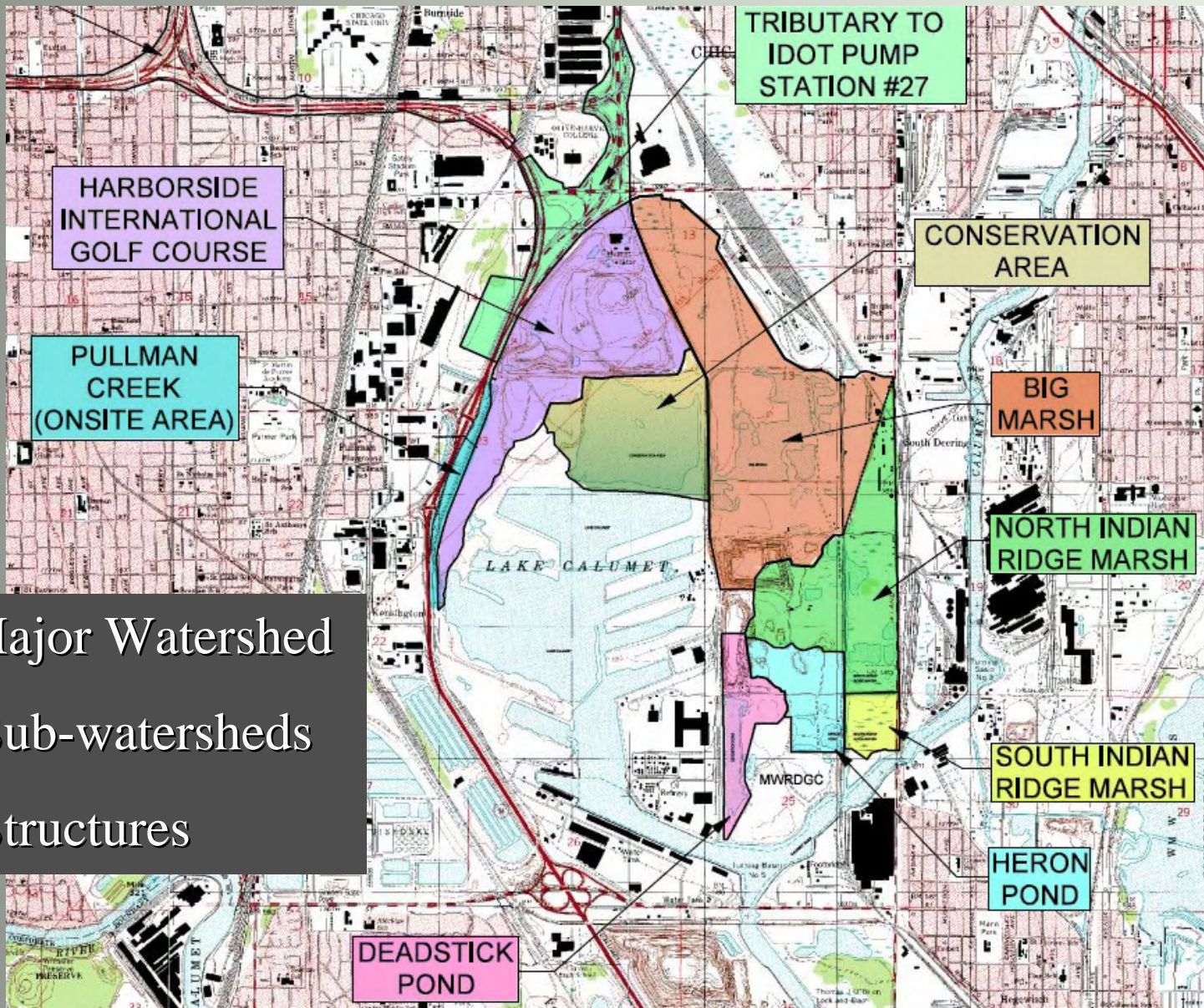
- ◆ Hydraulic Flow Characteristics of Water Structures and Doty Ditch
- ◆ Bathymetric Surveys
- ◆ Survey Verification of the LIDAR Topographic Map
- ◆ Established New Survey Benchmarks

## Recommend

- ◆ Improvements to Control Structures to Create Better Ecological Conditions
- ◆ Continued and Additional Monitoring of Select Sites
- ◆ Areas of Focused Investigation



# Watersheds



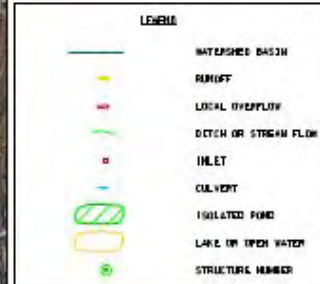
- 9 Major Watershed
- 17 Sub-watersheds
- 17 Structures

Calumet Research Summit – January 2006



# Structures

## 17 Structures Within and at the Outlet of Watersheds



**STRUCTURE NOTES**

- 1 DROP INLET DRAINS DEAD STICK POND TO CALUMET RIVER. ABANDONED WEIR STRUCTURE IN HERON POND'S OUTFALL DITCH.
- 2 24" CMP CULVERT UNDER 122ND STREET.
- 3 STORM SEWER OUTFALL IDENTIFIED BY ROSS (1988) (HAS NOT BEEN VERIFIED IN THE FIELD).
- 4 DROP INLET DRAINS BIG MARSH TO LAKE CALUMET.
- 5 THREE CULVERTS UNDER RAILROAD, IDENTIFIED BY ROADCAP (1999) (HAS NOT BEEN VERIFIED IN THE FIELD).
- 6 CMP CULVERT UNDER 116TH STREET.
- 7 CULVERT UNDER RAILROAD.
- 8 DOUBLE CMPA CULVERT IN PULLMAN CREEK.
- 9 BOX CULVERT UNDER DOTY AVENUE.
- 10 DOUBLE CMPA CULVERT IN PULLMAN CREEK.
- 11 BOX CULVERT UNDER 1-94.
- 12 BOX CULVERT UNDER ACCESS ROAD TO GOLF CLUB HOUSE.
- 13 CULVERT 12" CMP FROM COKE PLANT TO BIG MARSH.
- 14 DROP INLET DRAINS CONSERVATION AREAS TO LAKE CALUMET.
- 15 42" FES FROM HARBORSIDE INTERNATIONAL GOLF COURSE.
- 16 OUTLET CHANNEL FROM SOUTH INDIAN RIDGE MARSH TO CALUMET RIVER.

STRUCTURE IDENTIFIER	THIRTIETH AEC
1	300 AC
2	310 AC
3	170 AC
4	15 AC
5	420 AC
6	310 AC
7	92 AC
8	270 AC
9	470 AC
10	415 AC
11	374 AC
12	374 AC
13	310 AC
14	92 AC
15	270 AC
16	220 AC
17	220 AC

STRUCTURE LOCATION	COMPLEX ELEVATION
122ND STREET TO 800TH POND	309.0
NORTH INDIAN RIDGE MARSH TO SOUTH INDIAN RIDGE MARSH	309.0
CONSERVATION AREA TO LAKE CALUMET	309.0
STRUCTURE 1	309.0
STRUCTURE 2	309.0
STRUCTURE 3	309.0
STRUCTURE 4	309.0
STRUCTURE 5	309.0
STRUCTURE 6	309.0
STRUCTURE 7	309.0
STRUCTURE 8	309.0
STRUCTURE 14	307.0
STRUCTURE 15	309.0
STRUCTURE 17	309.0

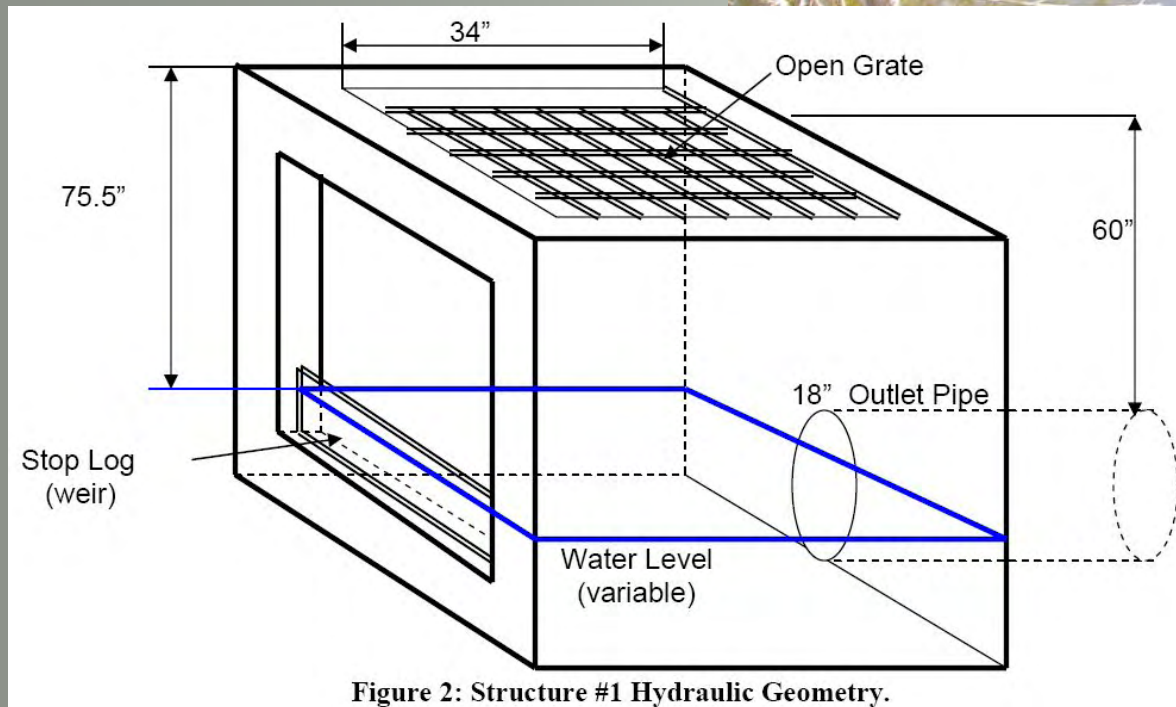


- STRUCTURE NOTES
- 1 DROP INLET DRAINS DEAD STICK POND TO CALUMET RIVER.
  - 2 ABANDONED WEIR STRUCTURE IN HERON POND'S OUTFALL DITCH.
  - 3 24" CMP CULVERT UNDER 122ND STREET.
  - 4 STORM SEWER OUTFALL IDENTIFIED BY ROSS (1988) (HAS NOT BEEN VERIFIED IN THE FIELD).
  - 5 DROP INLET DRAINS BIG MARSH TO LAKE CALUMET.
  - 6 THREE CULVERTS UNDER RAILROAD, IDENTIFIED BY ROADCAP (1999) (HAS NOT BEEN VERIFIED IN THE FIELD).
  - 7 CMP CULVERT UNDER 116TH STREET.
  - 8 CULVERT UNDER RAILROAD.
  - 9 DOUBLE CMPA CULVERT IN PULLMAN CREEK.
  - 10 DOUBLE CMPA CULVERT IN PULLMAN CREEK.
  - 11 BOX CULVERT UNDER DOTY AVENUE.
  - 12 BOX CULVERT UNDER 1-94.
  - 13 CMP CULVERT UNDER ACCESS ROAD TO GOLF CLUB HOUSE.
  - 14 CULVERT 12" CMP FROM COKE PLANT TO BIG MARSH.
  - 15 DROP INLET DRAINS CONSERVATION AREAS TO LAKE CALUMET.
  - 16 42" FES FROM HARBORSIDE INTERNATIONAL GOLF COURSE.
  - 17 OUTLET CHANNEL FROM SOUTH INDIAN RIDGE MARSH TO CALUMET RIVER.

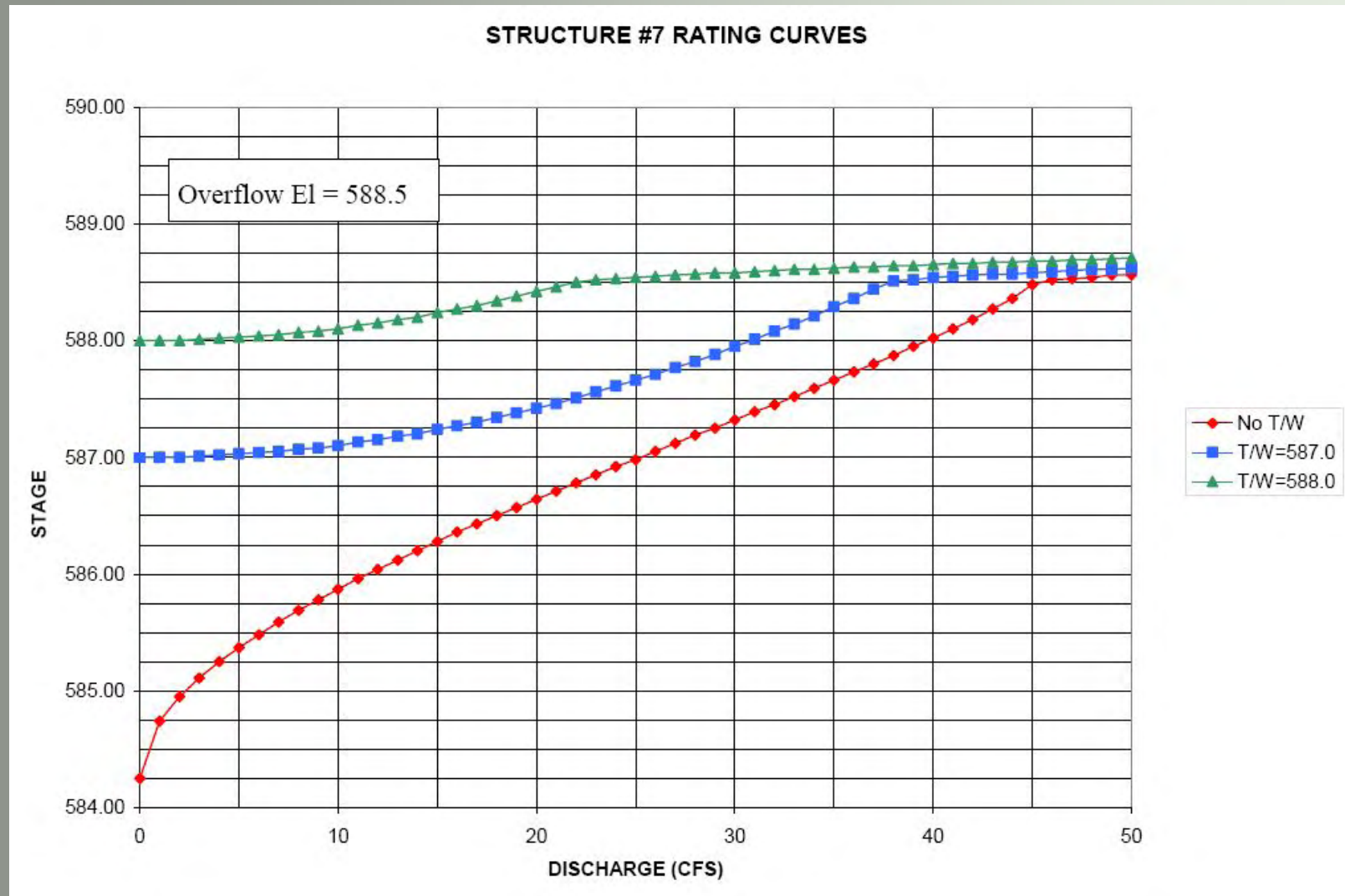


# Structures

- Inventory
- Assessment



# Structures: Stage-Discharge Rating Curves



# Structures: Drawdown Times

Structure #	100yr Q (cfs)	100yr HWL	Overflow El.	Drawdown Time <sup>1</sup>
#1 – Deadstick Pond Outlet	7	586.9	588.5	7 days
#2 – Heron Pond Outlet	57	585.6	N/A	3 days
#3 – North IRM Outlet	16	584.0	586.0	5 days
#5 – Big Marsh Outlet	6	584.9	588.9	> 28 days
#7 – Coke Plant to IRM	54	587.6	588.5	7 days
#8 – Railroad Marsh to Big Marsh	33	587.8	590.0	> 28 days <sup>2</sup>
#14 – Coke Plant to Big Marsh	16	587.6	587.5	7 days
#15 - Conservation Area Outlet	12	582.6	585.5	> 28 days
#17 – South IRM Outlet	34	581.5	N/A	2 days

**Table 1: Hydrologic Assessment Summary.**



# Structures: Recommendations

Structure #	Functional?	Adjustable?	Adequate Discharge Capacity?	Blockage Potential	Improvement Recommendations
#1 – Deadstick Pond Outlet	Y	Y	Y	Low	Clear outfall channel and stabilize with rip-rap
#2 – Heron Pond Outlet	N/A	N/A	Y	Low	Construct concrete weir
#3 – North IRM Outlet	Y	N	Y	High	Rehabilitate 24” culvert
					Replace manhole with water level control structure
					Install beaver leveler
#5 – Big Marsh Outlet	Y	Y	N	High	Construct secondary outlet
#7 – Coke Plant to IRM	Y	N	Y	Low	None
#8 – Railroad Marsh to Big Marsh	Y	N	Y	Low	None
#14 – Coke Plant to Big Marsh	Y	N	Y	Low	None
#15 - Conservation Area Outlet	Y	Y	N	Low	Rip-rap stabilization
					Construct secondary outlet
#17 – South IRM Outlet	N/A	N/A	Y	Low	Construct concrete weir

**Table: Control Structure Assessment Summary.**





# Doty Ditch

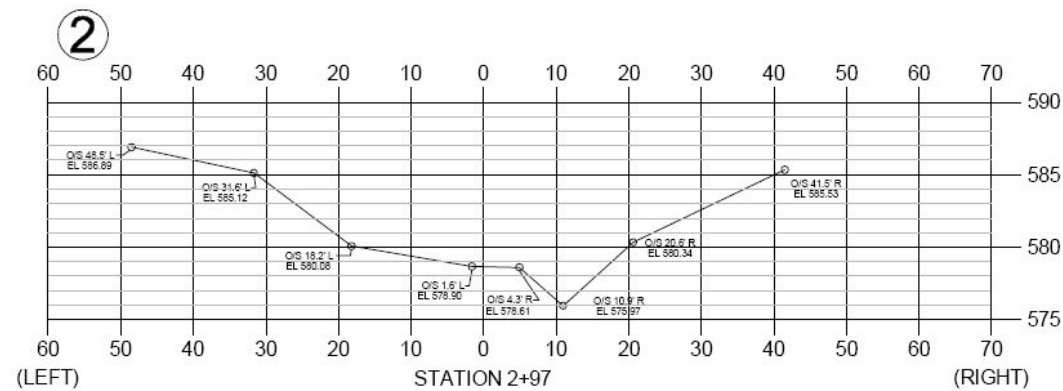
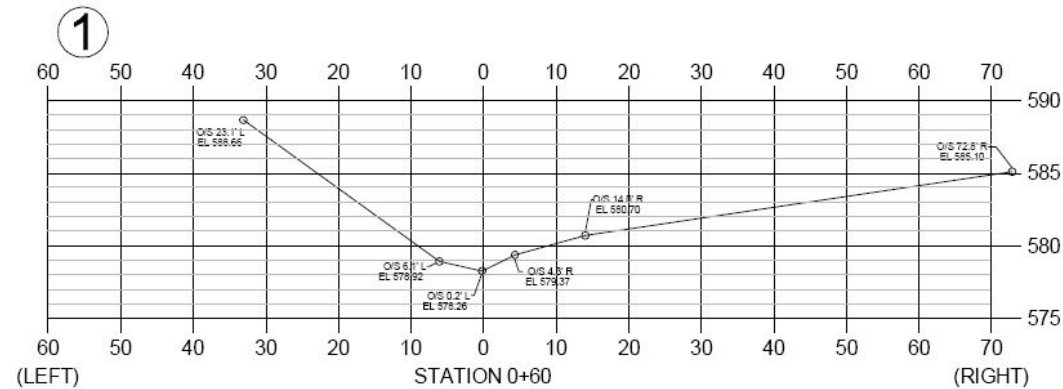
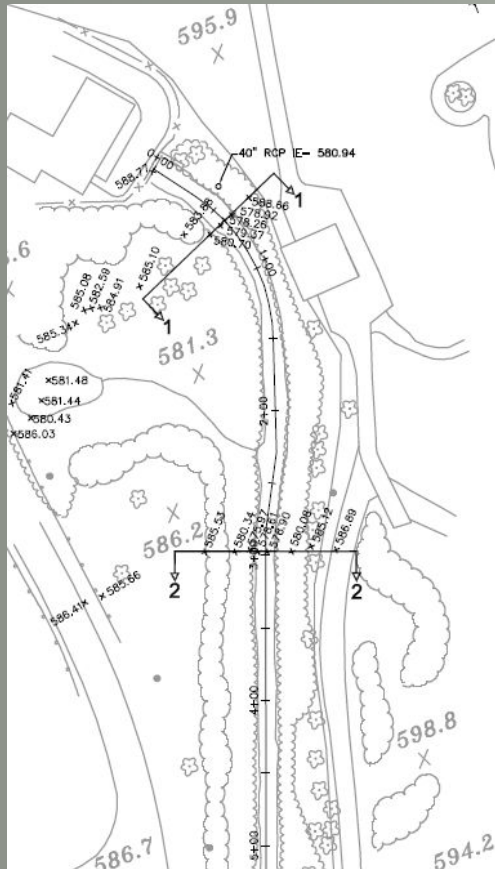


- Possible Naturalization Area
- Contributes Water to Lake Calumet
- Challenged by:
  - ◆ Flooding
  - ◆ Stagnant Water
  - ◆ Water Quality
  - ◆ Sedimentation

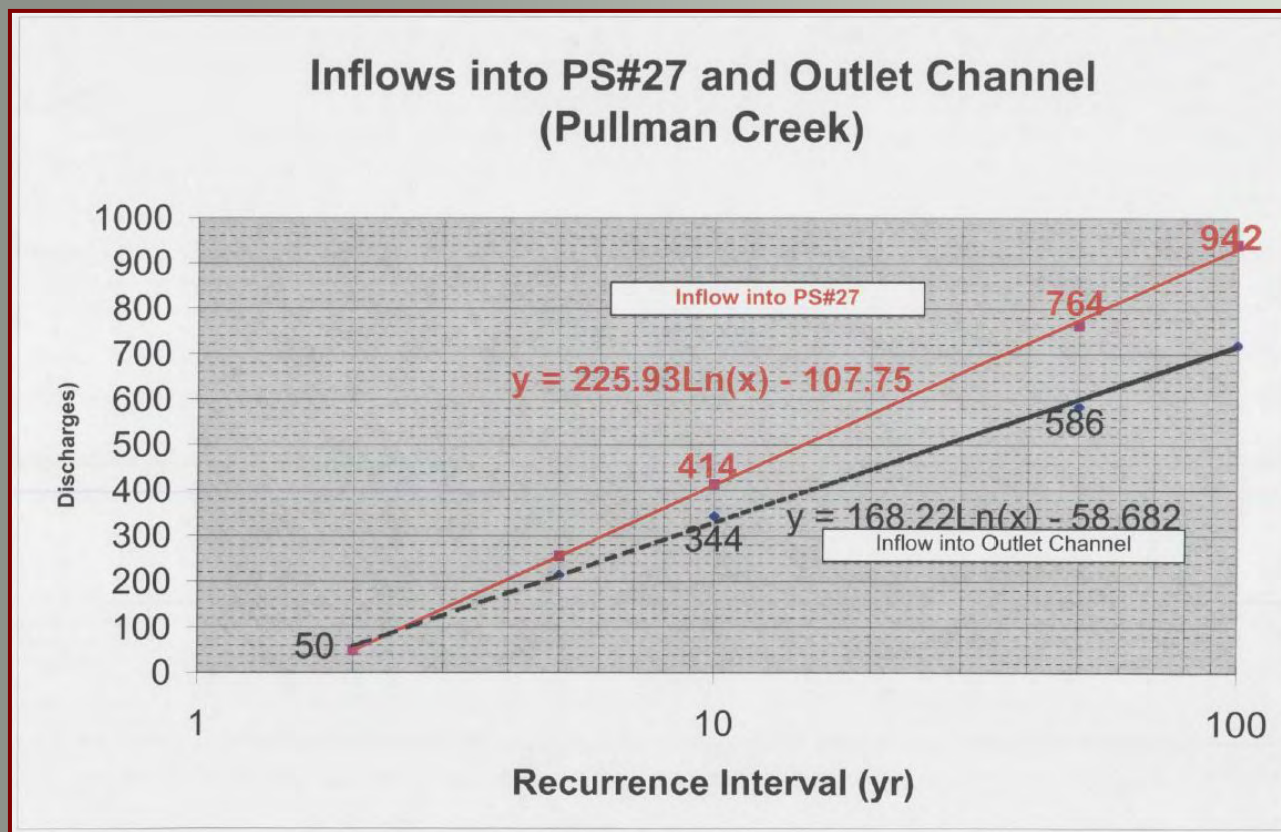


# Doty Ditch Hydraulics

- 20 Surveyed Cross Sections
- IDOT Pump Station Hydrology and Hydraulics Summarized



# Doty Ditch Hydraulics



- 80% of Channel Bottom Below Lake Calumet Level
- Low Velocities During Even Extreme Events - < 3.5 ft/sec.
- Can Not Convey 50-yr Event
- Somewhat Improved Conditions Planned – New IDOT Pumps



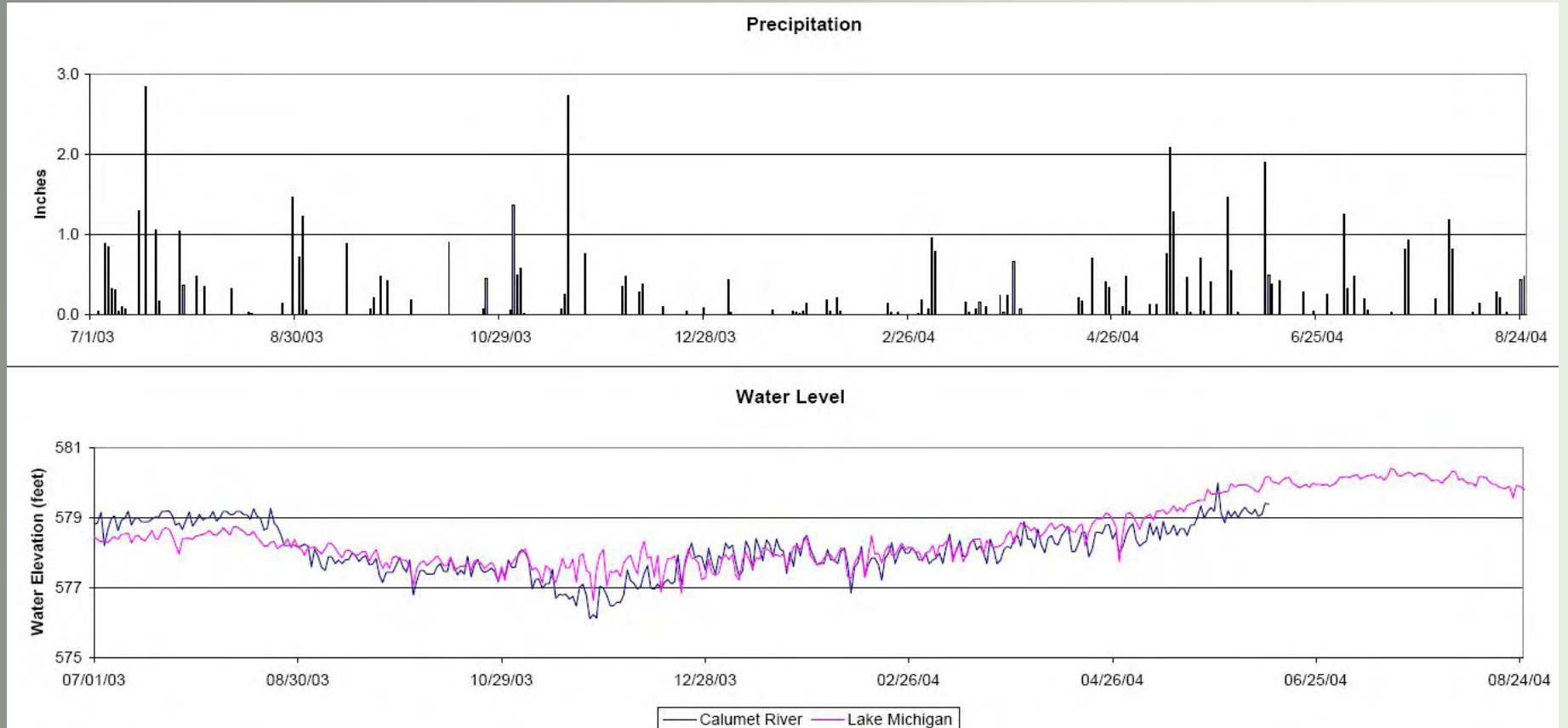
# Water Levels & Water Quality Stations

---

- 8 Auto-Recording Staff Gage Stations
- 9 Manual Measured Staff Gage Stations
- 2 Manual Measured Piezometers Wells
- 2 Auto-Recording GW Wells
- 3 Seeps



# Precipitation & Water Levels

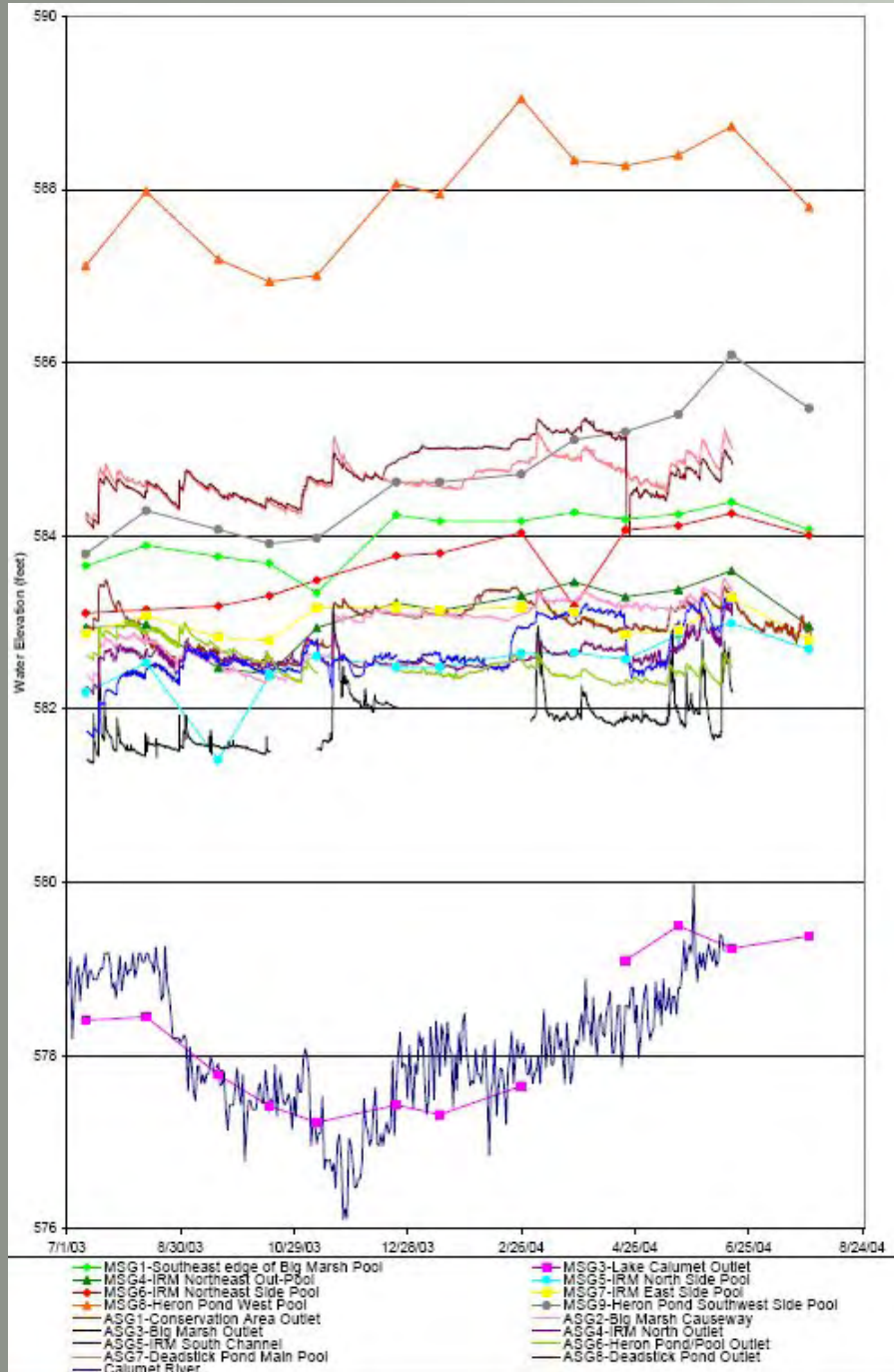


- Precipitation
- Lake Michigan / Calumet River WL

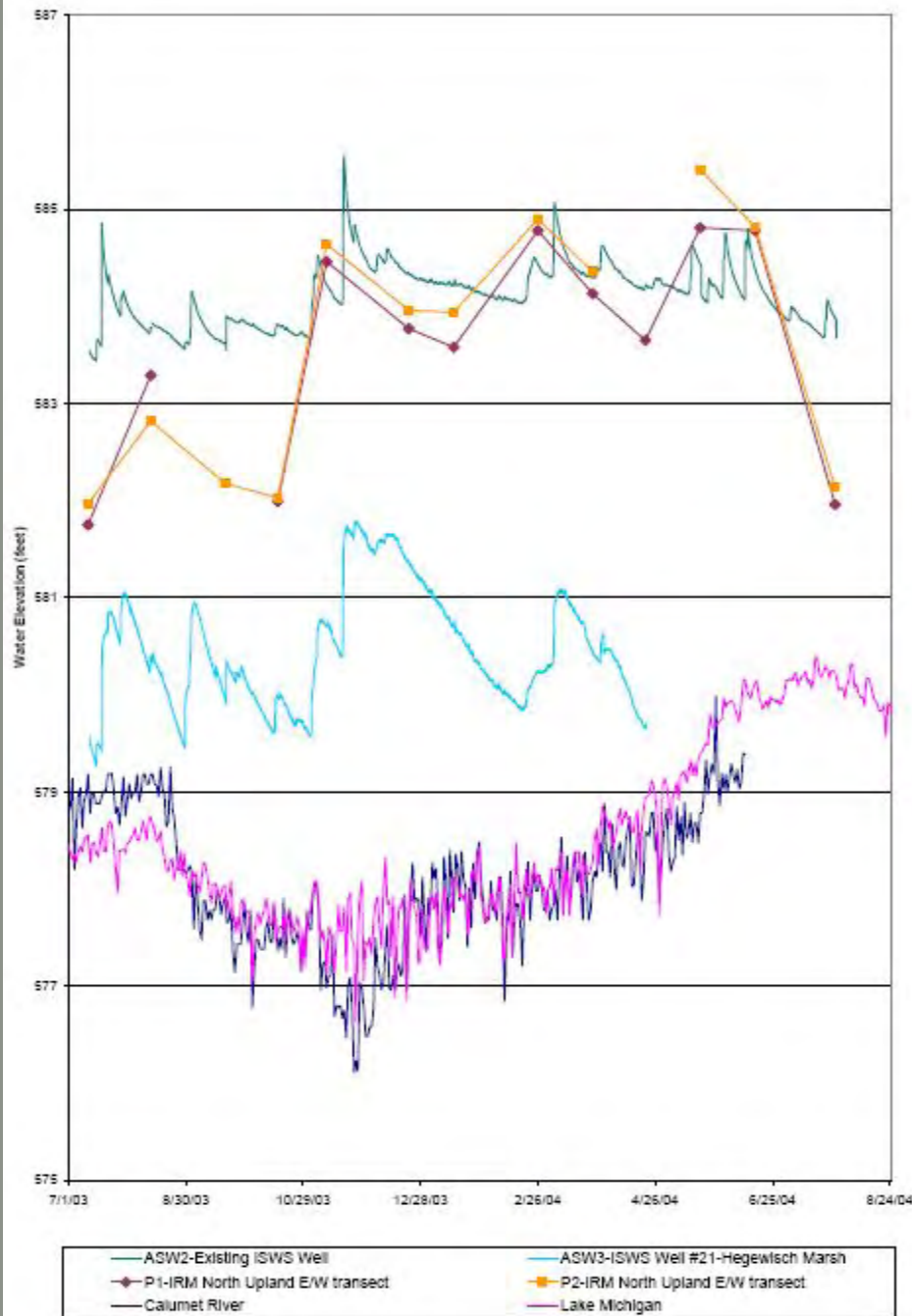


# Water Body Levels

- From July 2003 to August 2004
- Generally Small Elevation Bounces of ~ 0.6' to 2.0'



# Groundwater vs. Little Calumet and Lake Michigan



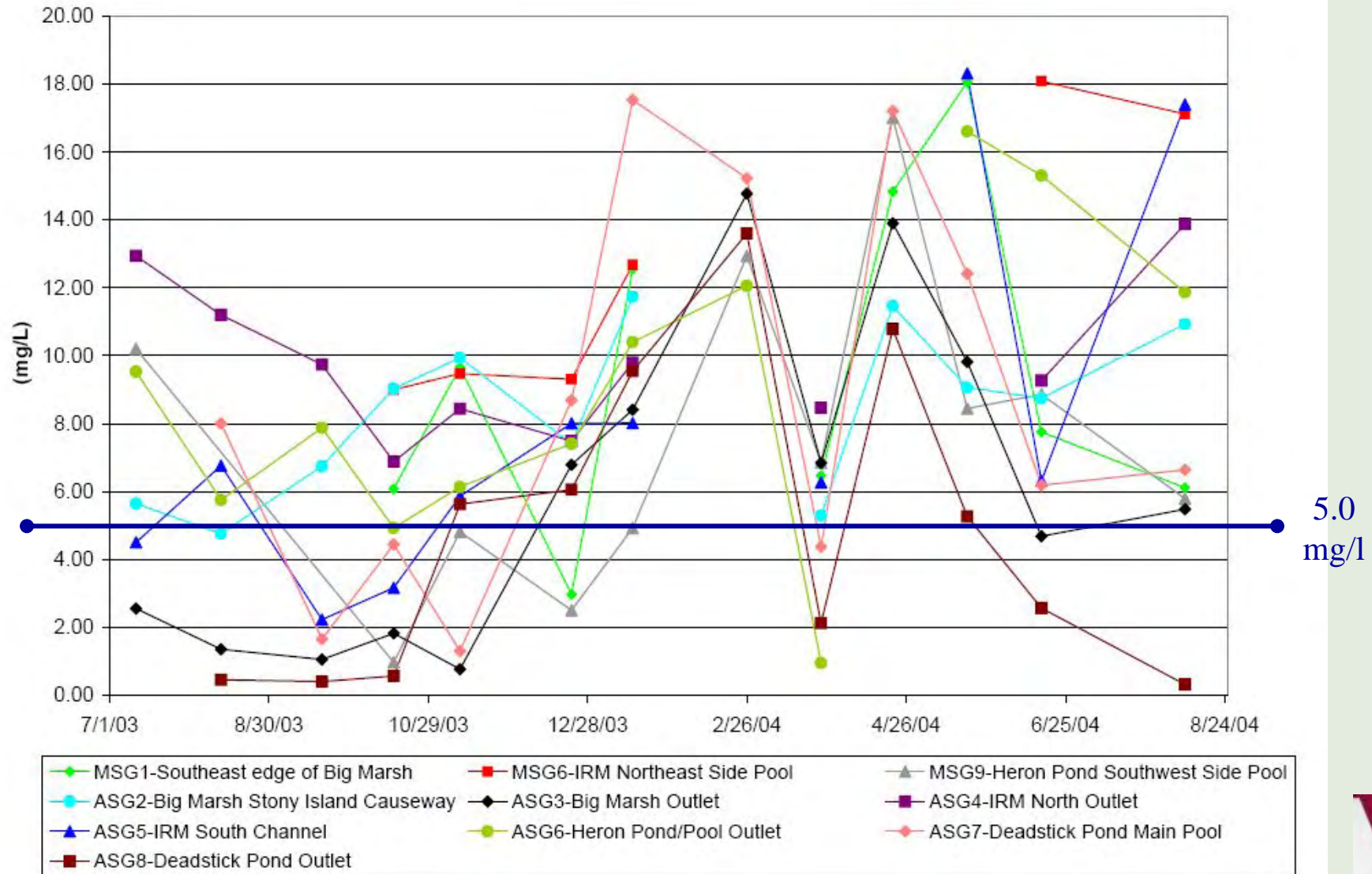
★ WL & WQ Taken  
At Same Time



# Water Quality

## D.O.

Lower Levels in Deadstick and Big Marsh



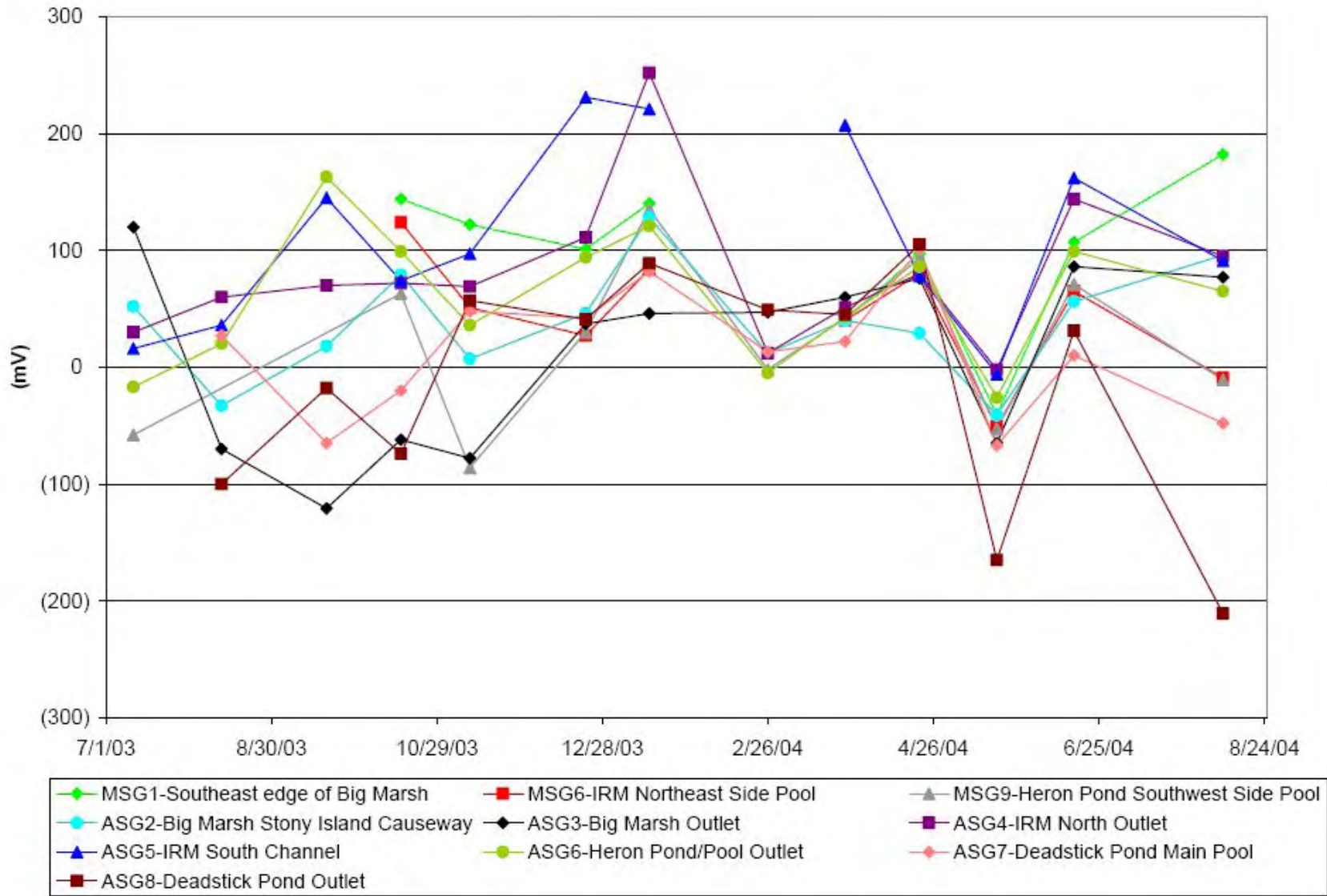
5.0  
mg/l





# Water Quality

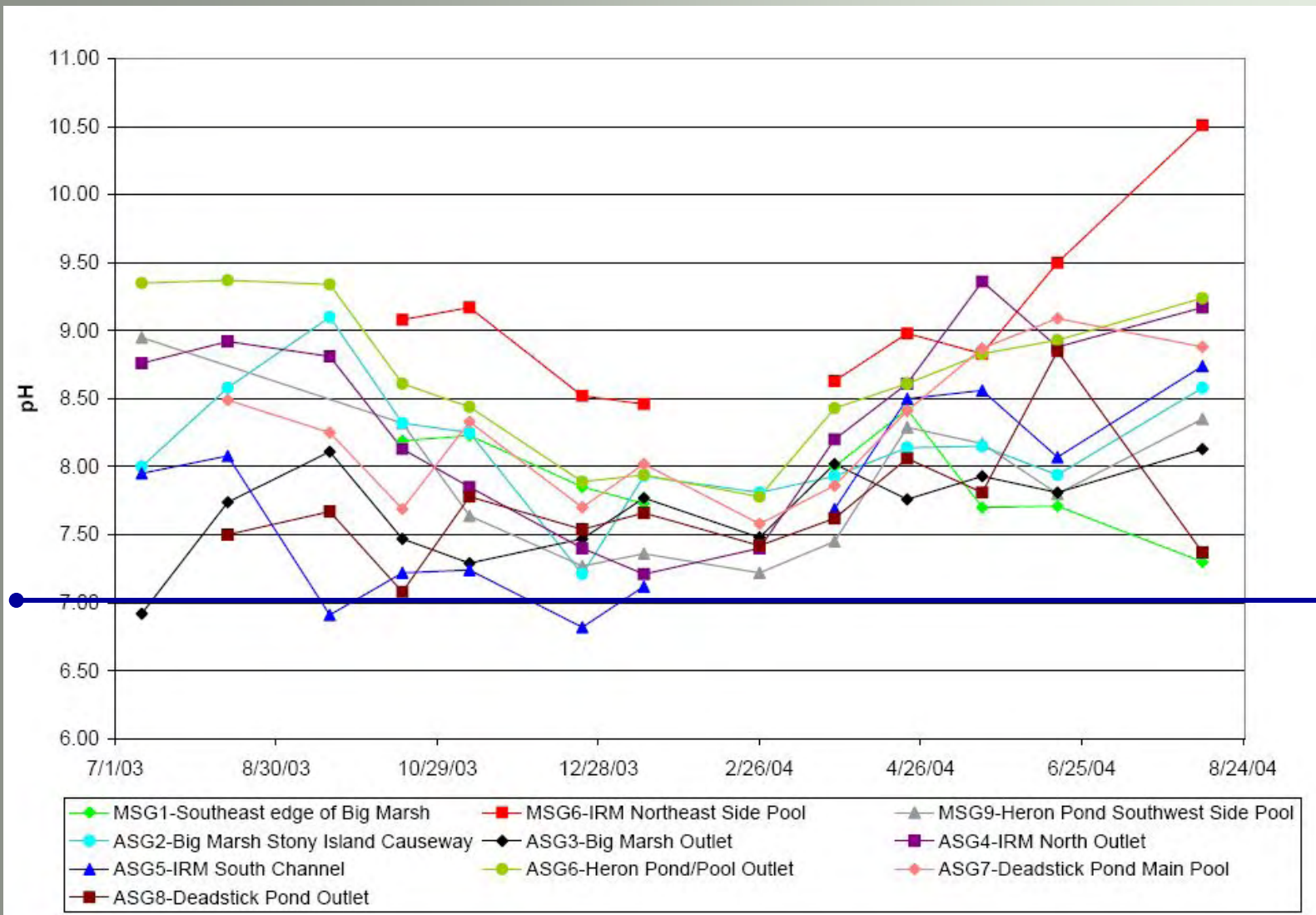
- ORP – Oxidation / Reduction Potential



# Water Levels & Quality

pH

Basic – Most Levels B/W  
7 and 10.5

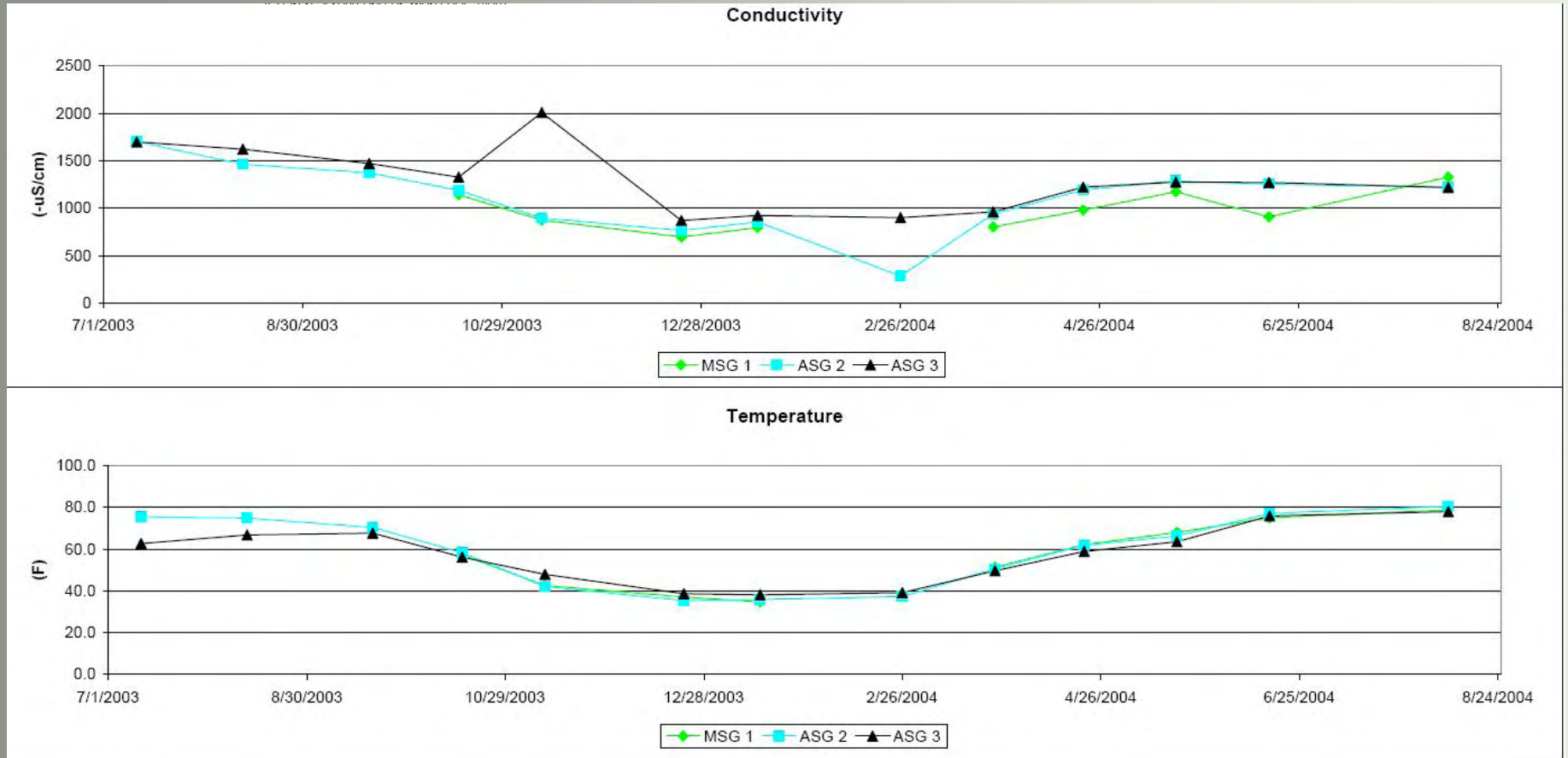


7.0



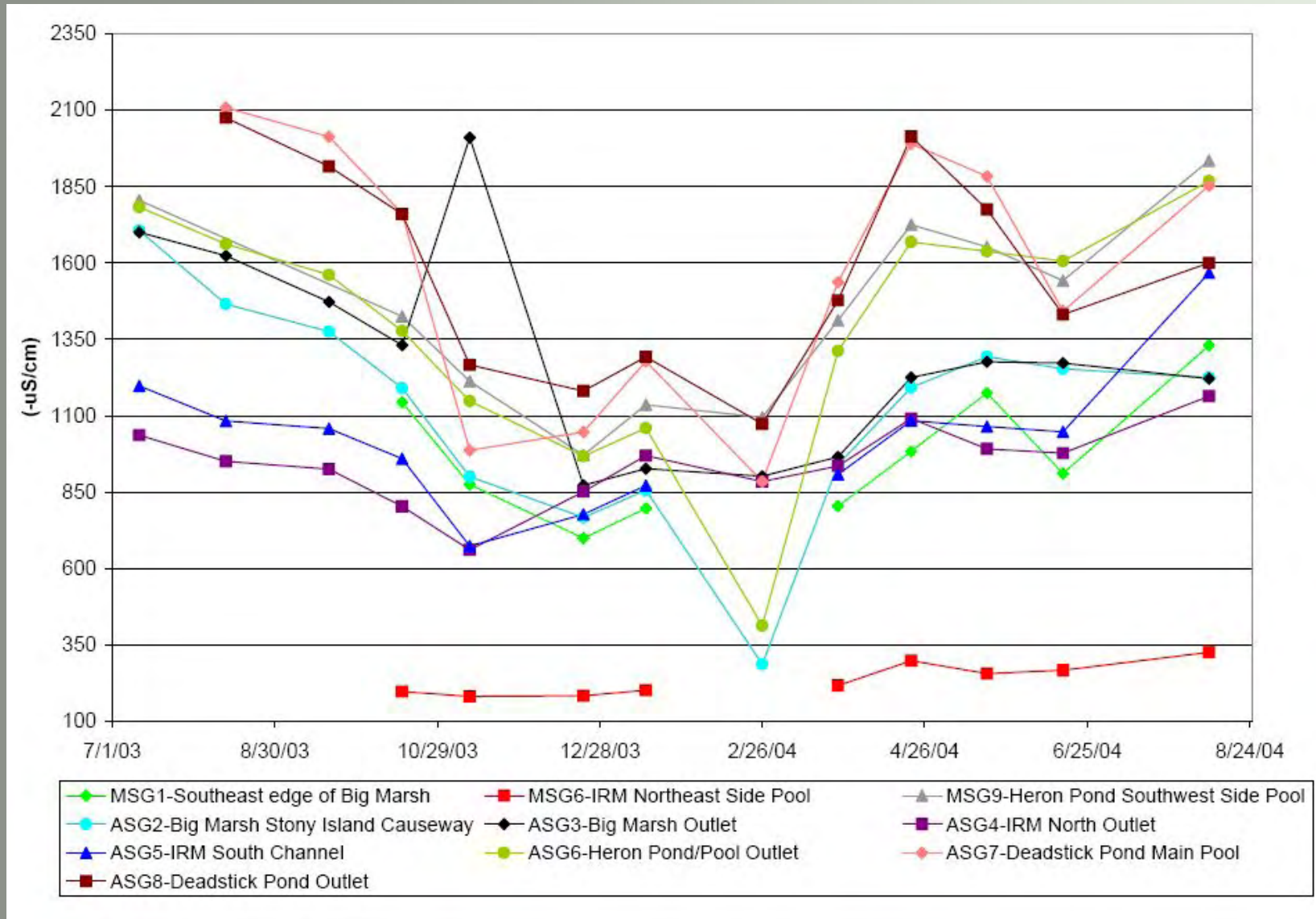
# Water Quality

- Conductivity
- Temperature



# Water Levels & Quality

Conductivity  
Generally High

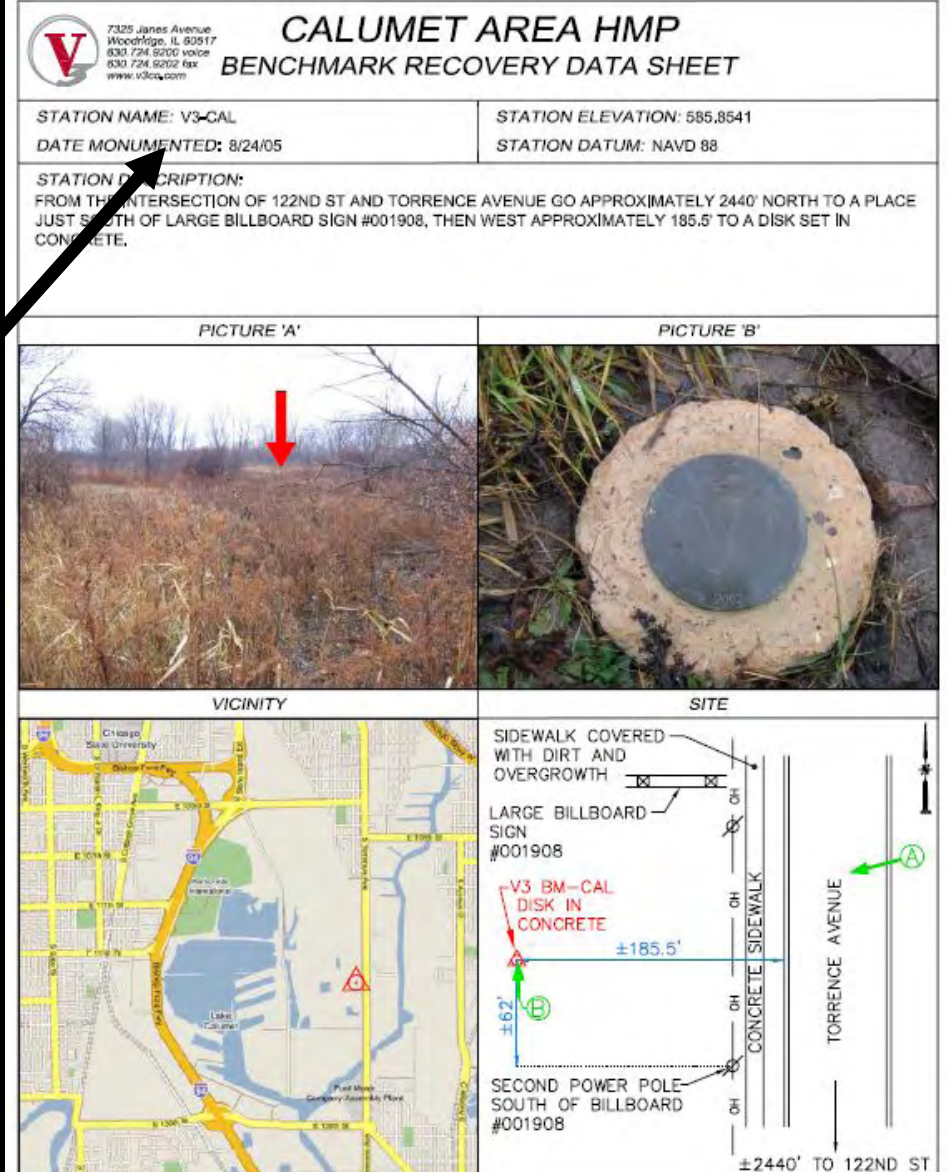


# Survey Control: 10 Benchmarks



V3 PROJECT NUMBER: 98216HMP - TASK 101 - BENCHMARKS

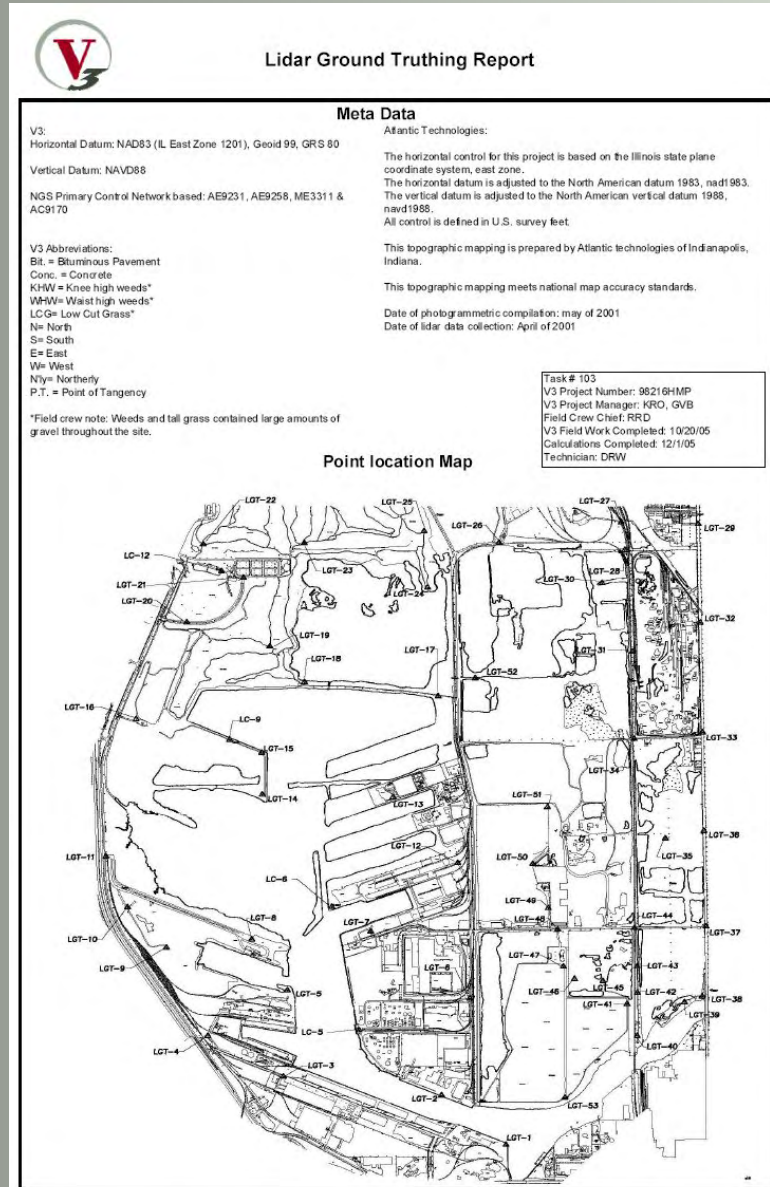
SHEET NO. 1 OF 12



V3 PROJECT NUMBER: 98216HMP - TASK 101 - BENCHMARKS

SHEET NO. 12 OF 12

# Survey: Topographic Map Ground-Truthing

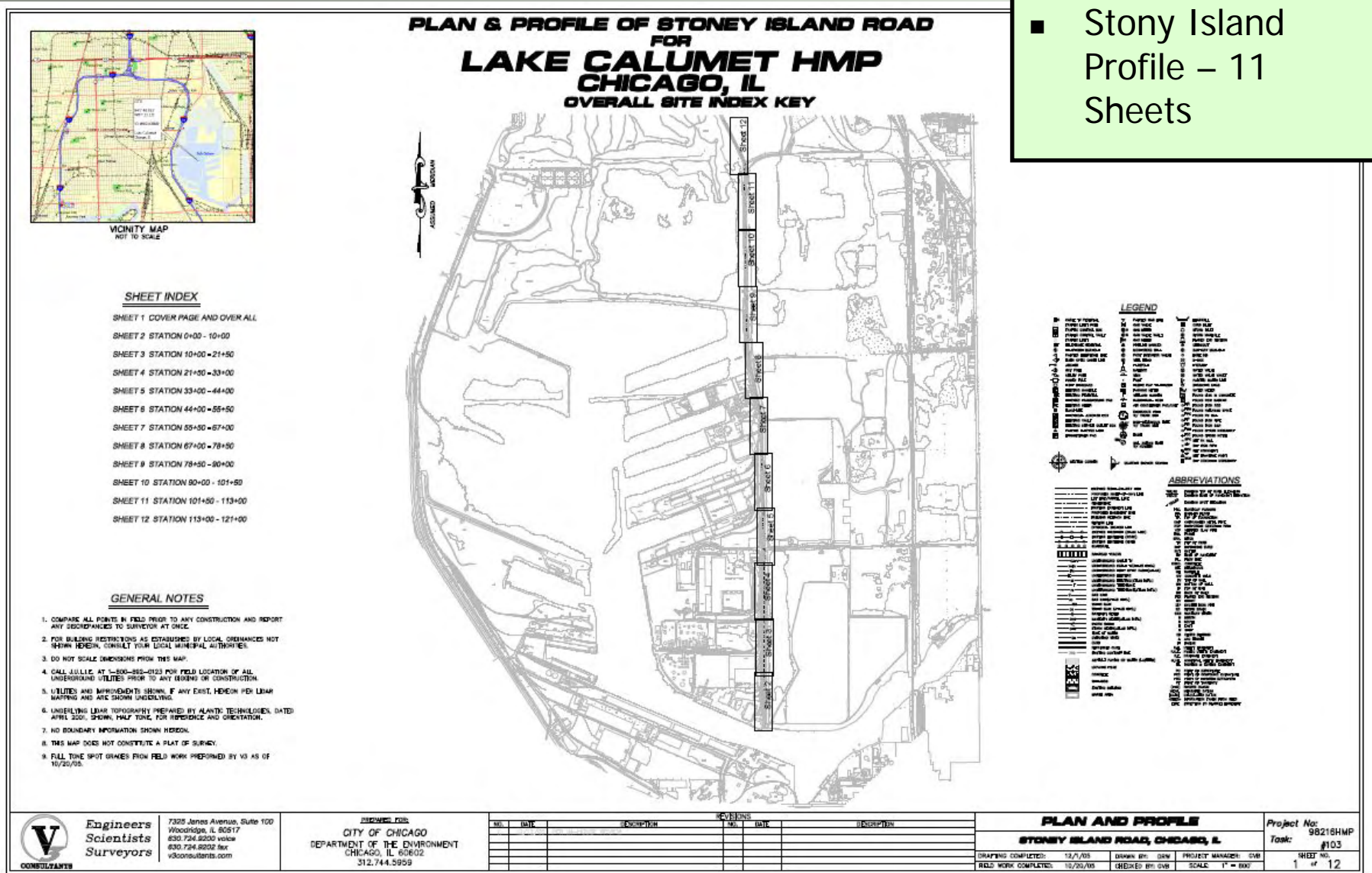


- 7 LIDAR Control Benchmarks Surveyed
- ~50 Ground Shots
- Profile of Stony Island



# Survey: Topographic Map Verification

Stony Island Profile – 11 Sheets



**Engineers  
Scientists  
Surveyors**

7325 Janna Avenue, Suite 100  
 Woodridge, IL 60517  
 830.724.8200 voice  
 830.724.8202 fax  
 vs@consultants.com

DESIGNED FOR:  
**CITY OF CHICAGO**  
 DEPARTMENT OF THE ENVIRONMENT  
 CHICAGO, IL 60602  
 312.744.5959

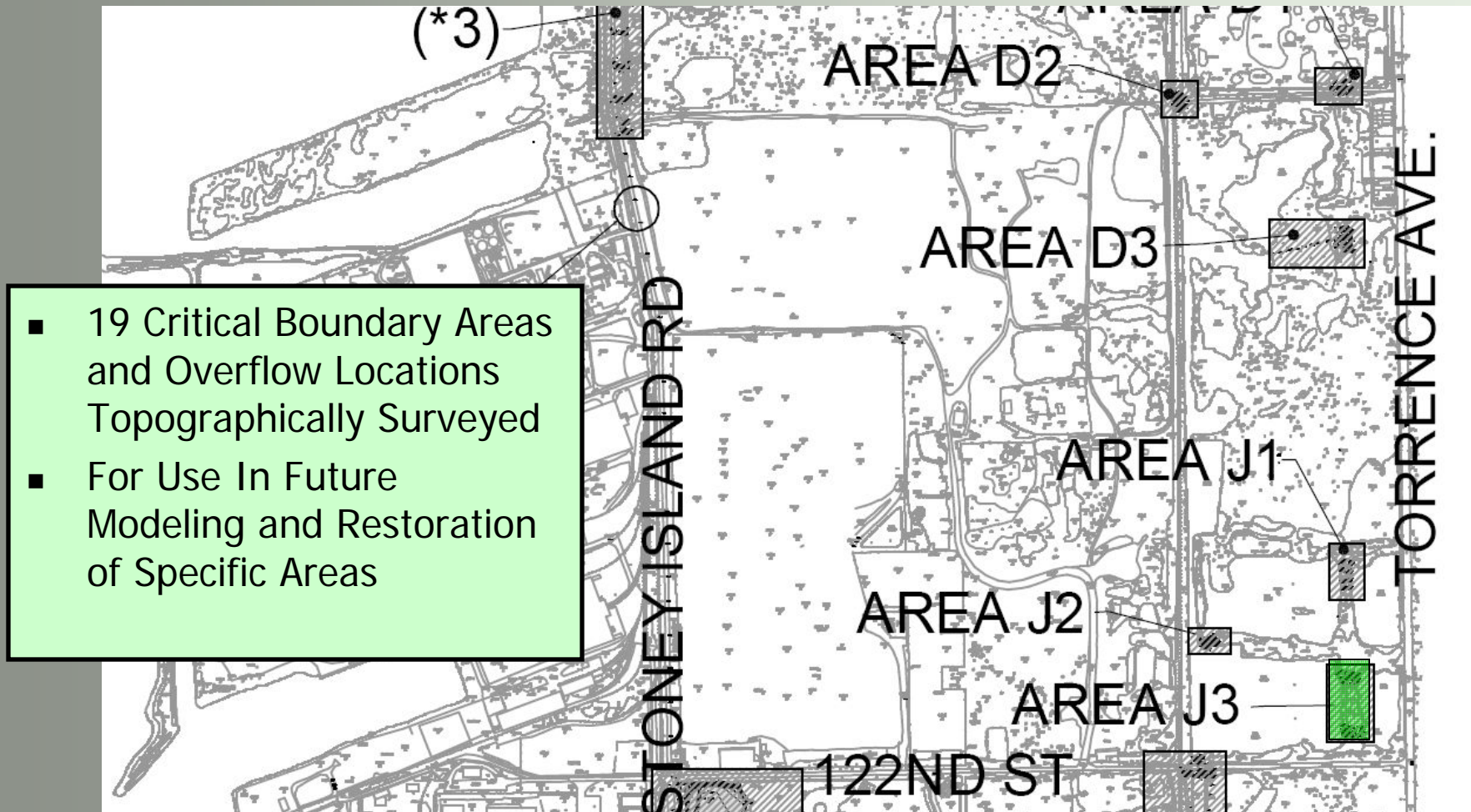
REVISIONS		REVISIONS	
NO.	DATE	NO.	DATE







# Survey: Watershed Boundaries and Overflow



- 19 Critical Boundary Areas and Overflow Locations Topographically Surveyed
- For Use In Future Modeling and Restoration of Specific Areas





# Recommendations



- Structure Modifications - Improve Hydrology, Function and Maintenance
  - ◆ #2 – Heron Pond, Construct Outlet Weir – Better Water Control
  - ◆ #3 – North Indian Ridge Marsh, Refurbish/Reconstruct Outlet – Repair, Increase Capacity, Control Beaver Activity
  - ◆ #17 – South Indian Ridge Marsh, Construct Outlet Weir – Better Water Control
  - ◆ #5 – Big Marsh, Reconstruct Outlet – Increase Capacity, Decrease Maintenance Issues
  - ◆ #1 – Deadstick Pond, Stabilize Outlet – Decrease Erosion at Outlet
  - ◆ #15 – Conservation Area, Stabilize Outlet, Construct Additional Outlet -Increase Capacity, Decrease Erosion
  
- Additional Monitoring
  - ◆ Doty Ditch
  - ◆ Continued Monitoring at Key Areas
  
- Evaluate Indian Ridge and Cluster Site Groundwater and Surface Water Hydrology for Optimum Hydrologic Restoration Configuration
  
- Investigate Possible Sources at Low DO Areas

## **Journey Through Calumet: Communities in Motion in Southeast Chicago and Northwest Indiana Website Presentation – Connecting Social and Environmental Assets in the Calumet Region**

Dr. Madeleine Tudor

The Field Museum, Center for Cultural Understanding and Change

The Center for Cultural Understanding and Change at The Field Museum, with funding from the U.S.D.A Forest Service, conducted ethnographic research in the Lake Calumet region from 2001-2003, and created a website to disseminate the findings. The goal of the research was to discover how community strengths – or social assets – could better connect with local and external environmental efforts. A key finding was that Calumet region residents take an integrated approach to the environment by participating in a wide array of activities, such as festivals, neighborhood beautification, and historical preservation. But how do these activities connect with environmental stewardship? How can stewardship efforts become more effective by partnering with a range of community interests? This presentation will provide an introduction to the website and will focus on a case study to illustrate how residents and community groups can use the research findings to support their environmental stewardship efforts.

Contact Name: Madeleine Tudor, Ph.D., Communications Manager, Center for Cultural Understanding and Change

Address: The Field Museum, 1400 S. Lake Shore Drive, Chicago, IL 60605-2496

Email: [mtudor@fieldmuseum.org](mailto:mtudor@fieldmuseum.org)

Phone: (312) 665-7471

Website for *Journey through Calumet*: [www.fieldmuseum.org/calumet](http://www.fieldmuseum.org/calumet)



# *Journey through Calumet*

*Communities in Motion*  
in Southeast Chicago and Northwest Indiana

[www.fieldmuseum.org/calumet](http://www.fieldmuseum.org/calumet)

**Connecting Social and Environmental  
Asset in the Calumet Region**

**Madeleine Tudor, The Field Museum  
Calumet Research Summit  
January 11, 2006**

# Field Museum Research: Mapping Social Assets

- From 2001 – 2003, Field Museum’s Center for Cultural Understanding and Change (CCUC) conducted research to map the Calumet Region’s ***social assets*** and show how they connect with local conservation efforts.
- The research was conducted with the generous support of the USDA Forest Service.
- We developed a website to disseminate the findings and showcase the assets for use toward environmental and economic efforts.
- Roundtables were held in 2004, with funding from the Woods Fund of Chicago. We presented the website in the communities, invited discussion, and got feedback.

# What are social assets?

## Deficit Model vs Asset-based Approach:



(Kretzmann and McKnight 1993)

- An assets-based approach starts with understanding a community's gifts and capacities.
- Social assets are the building blocks of community – the relationships that people create to address the needs of everyday life.
- Visible indicators of assets are buildings, gatherings, schools, etc. These assets exist because of the many social relationships that went into creating them.
- Categories of assets:
  - Visible indicators
  - Ways that people organize (networks and relationships)
  - Values and beliefs that underlie strategies



# Some Key Findings

- Environment is important to residents of Lake Calumet.
- Assets abound in Calumet: garden clubs, block clubs, faith institutions, civic groups, family networks, friendship networks.
- Informal activism matters.
- Environment is integrated into activities and concerns of everyday life. Economic security, health and safety, recreation, history, and biodiversity are linked.
- Residents demonstrate their concern for the environment through a variety of activities such as gardening, festivals, and participating in organizations.

# Key Findings (cont'd)

- The last two findings are particularly important because they tell us that residents have a broad view of what environment means to them.
- These findings also tell us that the way to engage residents in environmental activities is to start with related concerns and assets and work through those connections to broaden involvement in stewardship efforts.

# [www.fieldmuseum.org/calumet](http://www.fieldmuseum.org/calumet)

- The Journey Through Calumet website has a lot of information on the communities and the richness of the Calumet area.
- The rest of the presentation will focus on networks and how to tap into the area's connections.



# Geographic Asset Maps

- In the Geographic Asset Maps section of the site, six types of assets are displayed, with an example for each one.
- These maps show a variety of types of networks: institutional, organizational, kinship, ethnic, etc.



H. Anderson, The Field Museum

[Gardens](#)  
[Greenspace](#)  
[Community Organization](#)  
[Business](#)  
[Festivals](#)  
[Bridging Ethnic Divides](#)

# Festivals are Assets

- The Calumet area holds many festivals, parades, and fairs, organized by a variety of groups and institutions.
- Festivals, such as Pierogi Fest in Whiting, IN, and Hobo Fest in Pullman, are centered around historical, ethnic, and community-based themes.
- Arts connects with business in the Arts Inside Out festival in downtown Hammond.

- Festivals and other community celebrations are widespread throughout the region.
- They are generally held outside in the summer months, in blocked-off city streets, parks, and forest preserves – a clear environmental connection.



# Pierogi Fest – Connecting Community

- Pierogi Fest brings together people from many different backgrounds together around the common issue of having fun!
- The festival celebrates ethnic heritage: the Slavic heritage of the region and the growing Latino population, who are invited to perform and have vending stalls.
- The connection is significant in two ways:
  - The groups can connect around the common issue of immigrant history.
  - It connects longtime residents, whose families may have been here for generations, with newer residents who more recently call the Calumet region home.

## Pierogi Fest – Longtime and New Residents

- Our research showed that people tend to see the Calumet region through the lenses of length of residence.
- Many longtime residents come from families who worked in the steel mills – or they themselves worked in the mills – and see the region through the lens of the mills.
- Newer Latino residents don't see their history and relationships embedded in the region, but rather look at it as a new home with new opportunities.
- Both groups share common concerns, activities, and interests – which they can connect with over pierogis!



# Pierogi Fest – Regional Connections

- This map shows the kinds of regional connections to Pierogi Fest.
  - Popular throughout the region and wider Chicagoland.
  - Gets TV coverage from major stations.
  - Local businesses and vendors participate.
  - Slavic dancers come from as far as Montreal and as close as Whiting to participate.



# Recommendation: Connect with Networks

- Pierogi Fest is one example of a network to connect with, possibly to highlight environment as part of heritage and new homelands.
- Think strategically about entry points when making connection with other networks:
  - Talk with organizers about participating (beyond just posting flyers).
  - Identify the grass roots organizations and partner with them.
  - Tailor efforts to the participants, such as Latino families.

For additional ideas for finding connections with history, recreation, beautification, and more, go to the “Community, Action, and Everyday Life” section of the website <http://www.fieldmuseum.org/calumet/everyday.html>. You’ll find detailed information and photos about a variety of social assets. Use these to think about where you may have common ground with your projects.



H. Anderson, The Field Museum

# Environmental Factors Influencing Recreation Choice in Post-Industrial Landscapes

Dr. David B. Klenosky

Purdue University at West Lafayette

While considerable research has examined how recreation activity can impact the environment, relatively little is known about the impact that the environment itself can have on recreation behavior. This research addresses this issue by examining how recreation site selection decisions can be affected by the negative environmental conditions often found in post-industrial urban areas like the Calumet region. Using a conjoint analysis approach, samples of birders, anglers, and golfers were asked to evaluate potential sites that varied in terms of six factors: travel time, activity quality, residential development, industrial activity, air quality/odors, and noise. The relative importance of the study factors was examined across the three activity groups and among selected respondent subgroups (novice versus expert birders). The findings provide insight into how environmental factors can influence site choice behavior. The implications may be useful for those involved in managing and restoring natural resources in post-industrial and urban settings.

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Phone: (765) 494-0865



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# Environmental Factors Impacting Recreation Choice in Post-Industrial Landscapes

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David B. Klenosky  
*Purdue University -- West Lafayette, IN*



*January 2006*

# Background

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- Efforts are underway to restore/rehabilitate post-industrial areas like the Calumet region for a variety of recreation uses
  - *Bird watching, fishing, biking/hiking, picnicking, golf*
- Interest in identifying activities appealing to
  - *Area residents*
  - *Outside resource users*
- Major environmental problems/challenges
  - *Litter, soil contamination, water pollution*
  - *Large factories/industrial structures*
  - *Poor air quality/a variety of strong odors*
  - *Highway/manmade noises*

\* *Little is known about how these types of environmental conditions affect recreation/tourism decision making*

# Study Objectives

---

- *Examine impact of “degraded/negative” environmental factors on site choice for three key outdoor recreation activities:*
  - *Golf*
  - *Fishing*
  - *Birdwatching*
- *Examine subgroup differences based on:*
  - *Level of activity specialization*

# Research Approach

---

- Conjoint/tradeoff analysis
- Self-Administered Survey (4 sections):
  - *Activity behavior/interests*
  - *Conjoint ratings of hypothetical site options*
  - *Perceptions of activity & environment quality*
  - *Demographic characteristics*



# Factors & Factor Levels Examined

---

## 1. Travel Time (one way, by car)

- *15 minutes*
- *45 minutes*
- *90 minutes*

## 2. Activity Quality (Quality of golf/fishing/birding in the area)

- *Excellent*
- *Good*
- *Fair*

# Factors & Factor Levels Examined

---

## 3. Residential Development

- *No houses/residential development visible in area*
- *Some houses/residential development visible...*
- *Heavy residential development visible...*

## 4. Industrial Activity

- *No industrial activity visible in the area*
- *Factory/industrial structures visible...*
- *Landfill or waste treatment facility visible...*

# Factors & Factor Levels Examined

---

## 5. Air Quality

- *Good, no noticeable smells or odors in the air*
- *Moderate, some noticeable manmade smells/odors...*
- *Bad, strong/annoying manmade smells or odors...*

## 6. Noise in the Area

- *Quiet, hear only natural sounds*
- *Hear some manmade/highway noises in the distance*
- *Noisy, hear loud manmade/highway noises nearby*

# Study Design

---

- Orthogonal, main-effects-only design  
( $3^6$  fractional-factorial)
  - *Required 18 conjoint profiles to be evaluated*

# Conjoint Rating Task

## **SECTION 2**

*In this section are descriptions of options that might be available when selecting an area to go fishing. Imagine that you were planning an outing to go fishing. For each option shown below, we'd like you to select the number on the scale that best reflects how likely you would be to choose that option given the particular conditions described. Note that you should answer each based on your own personal desires, rather than the desires of the others that might fish or travel with you. (Select one for each option)*

### **Option #1**

Travel time (each way, by car): 90 minutes

Quality of fishing in the area: Good

Residential development: No houses or residential development visible in the area

Industrial activity: Factory/industrial structures visible in the area

Air quality: Bad, strong/annoying manmade smells or odors in the air

Noise in the area: Noisy, hear loud manmade or highway noises nearby

**Extremely  
UNLIKELY  
to choose**

1



2



3



4



5



6



7



8



9



**Extremely  
LIKELY  
to choose**

### Option #17

Travel time (each way, by car):	45 minutes
Quality of fishing in the area:	Fair
Residential development:	Heavy residential development visible in the area
Industrial activity:	No industrial activity visible in the area
Air quality:	Bad, strong/annoying manmade smells or odors in the air
Noise in the area:	Noisy, hear loud manmade or highway noises nearby

<b>Extremely UNLIKELY to choose</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>Extremely LIKELY to choose</b>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

### Option #18

Travel time (each way, by car):	90 minutes
Quality of fishing in the area:	Excellent
Residential development:	Heavy residential development visible in the area
Industrial activity:	No industrial activity visible in the area
Air quality:	Good, no noticeable smells or odors in the air
Noise in the area:	Noisy, hear loud manmade or highway noises nearby

<b>Extremely UNLIKELY to choose</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>Extremely LIKELY to choose</b>
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# Methodology

---

- Golfer Sample:
  - Mail-back survey
    - *Distributed at Midwest golf courses, driving ranges, and at "off-season" golf shows (n=306, 40% response rate)*

# Methodology

---

- Angler Sample:
  - Mail survey
    - *Administered to a sample derived from lists of licensed Midwest anglers and fishing show attendees*  
*(n=911, 41% response rate)*
  - On-line survey
    - *Posted on Midwest fishing forums*  
*(n=356)*



# Methodology

---

- Birder Sample:
  - Mail-back survey
    - *Distributed at meetings of Midwest birder groups (n=87, 62% response rate)*
  - On-line survey
    - *Posted on birding listservs in Midwest & nationally (n=728)*

# Methodology

---

- Final “Pooled” Sample Sizes:

<i>Golfers</i>	<i>306</i>
<i>Anglers</i>	<i>1,267</i>
<i>Birders</i>	<i>815</i>
<hr/>	
<i>Total</i>	<i>2,388</i>

# Conjoint Findings

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- Factor Importance Weights
- Factor-Level “Part-Worth” Utilities

*1<sup>st</sup> by Activity Group*

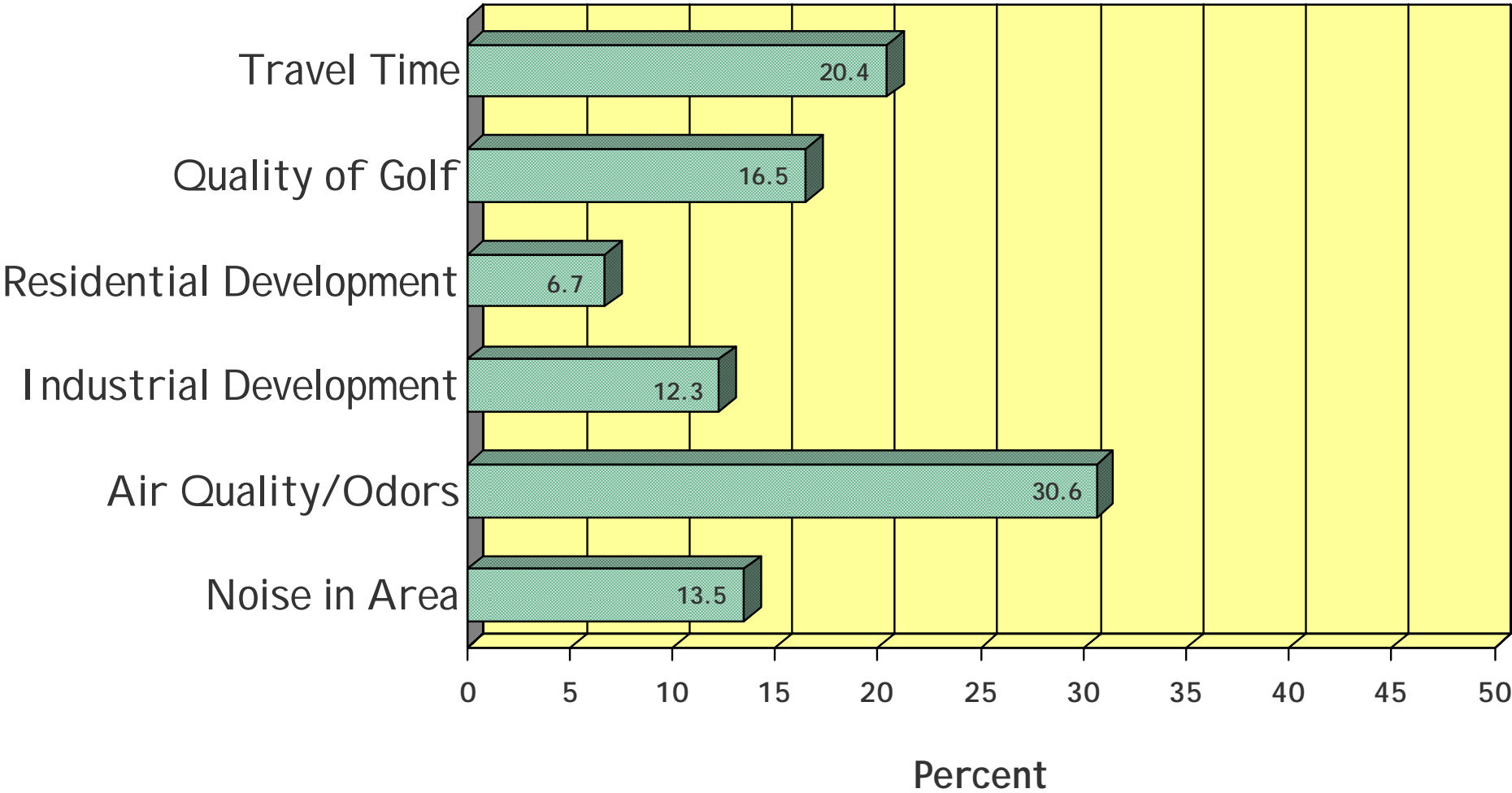
- *Golfers, Anglers, & Birders*

*2<sup>nd</sup> by Level of Specialization (Ability Level)  
w/in Activity Group*

- *Anglers & Birders*

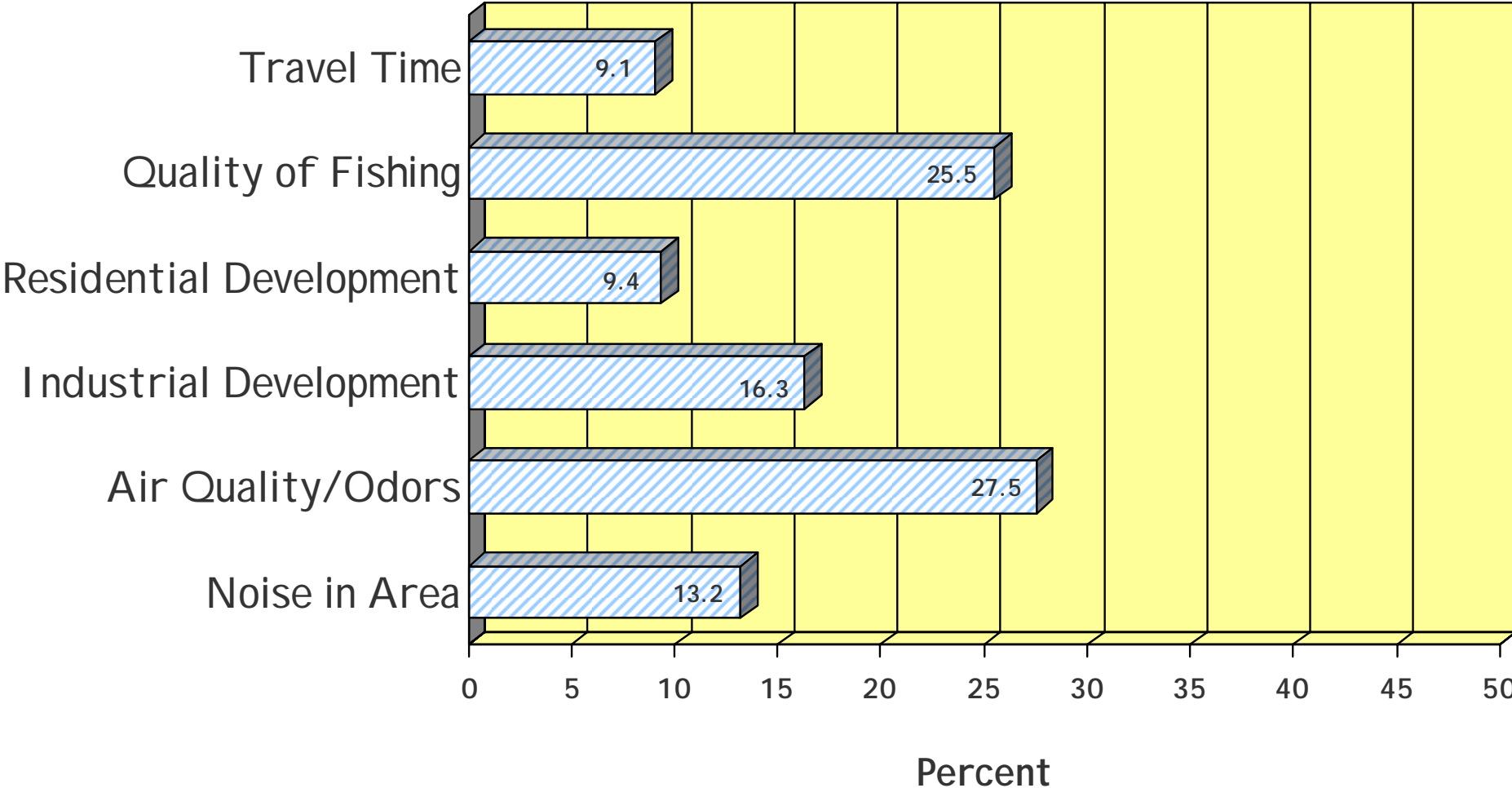
# Factor Importance Weights

*Golfers: All Respondents (n=296)*



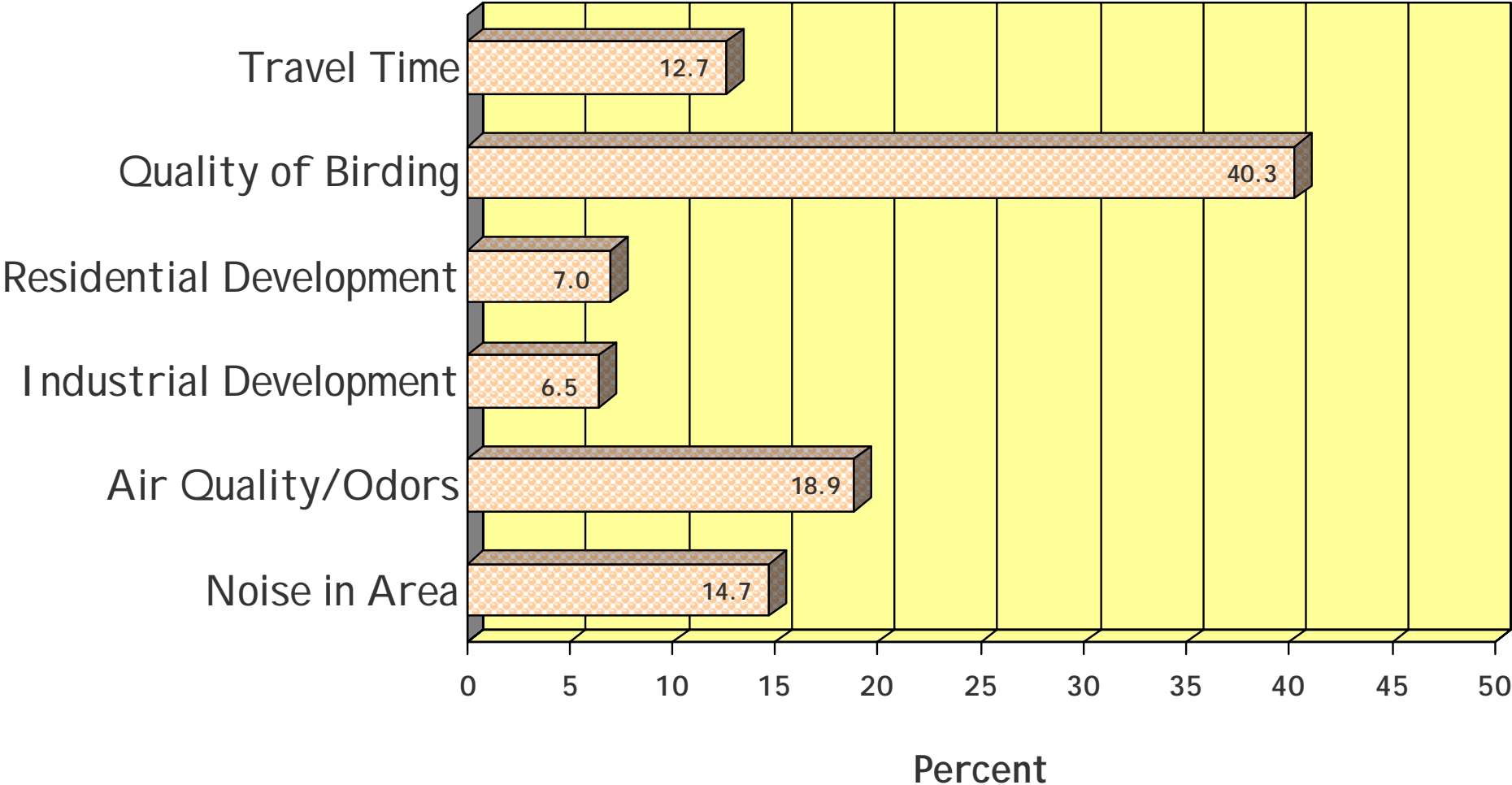
# Factor Importance Weights

*Anglers: All Respondents (n=1170)*



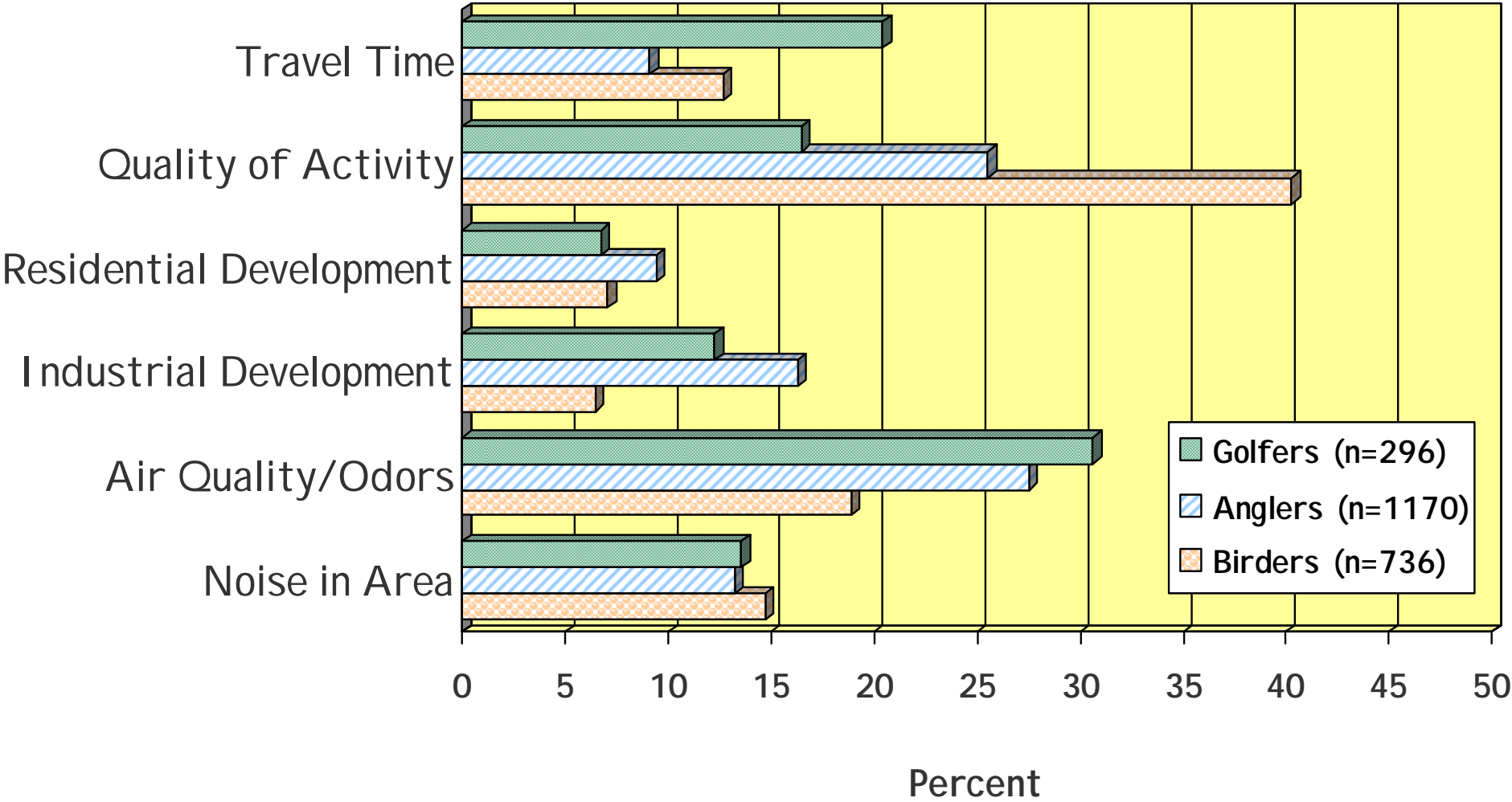
# Factor Importance Weights

*Birders: All Respondents (n=736)*

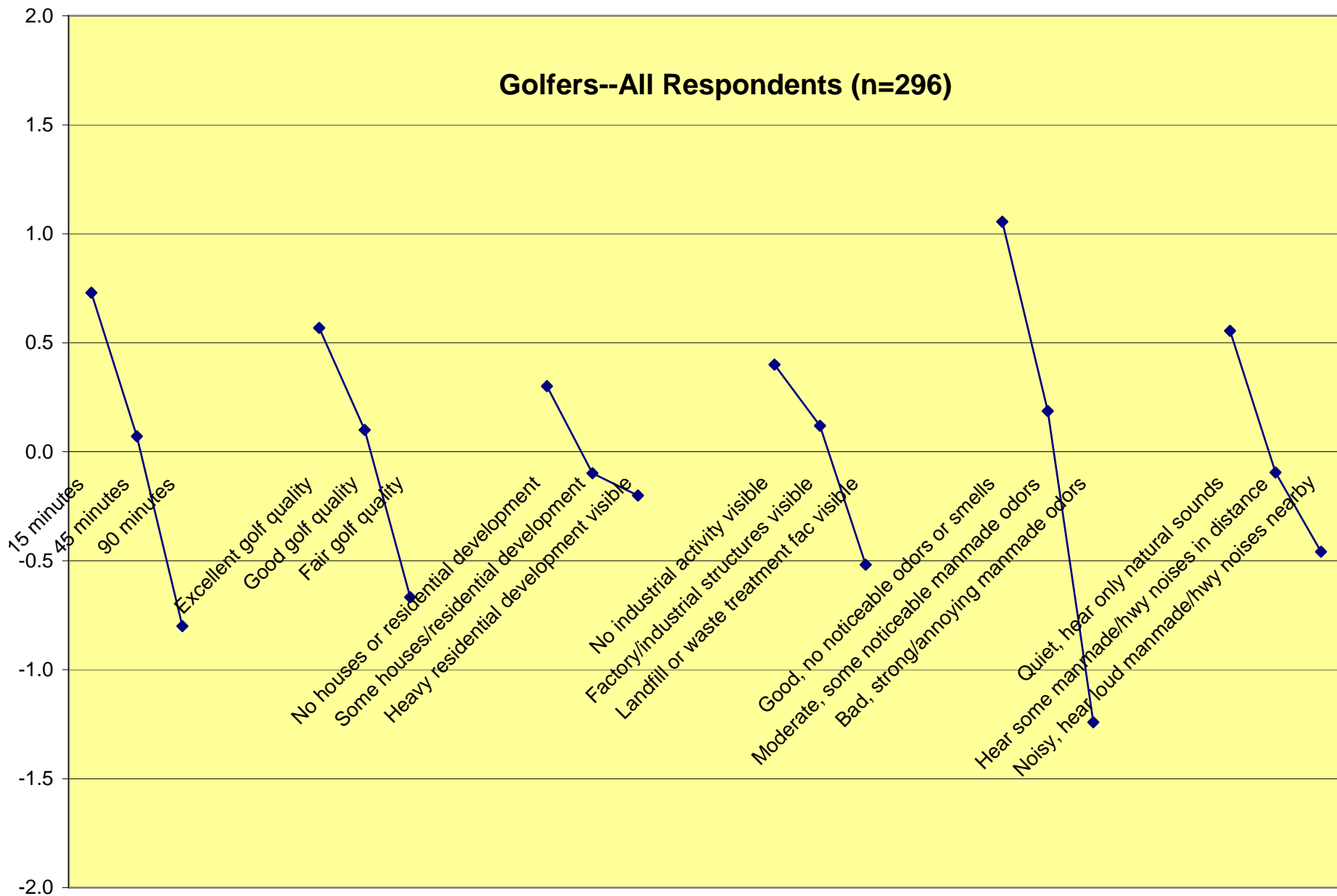


# Factor Importance Weights

*by Activity Group*

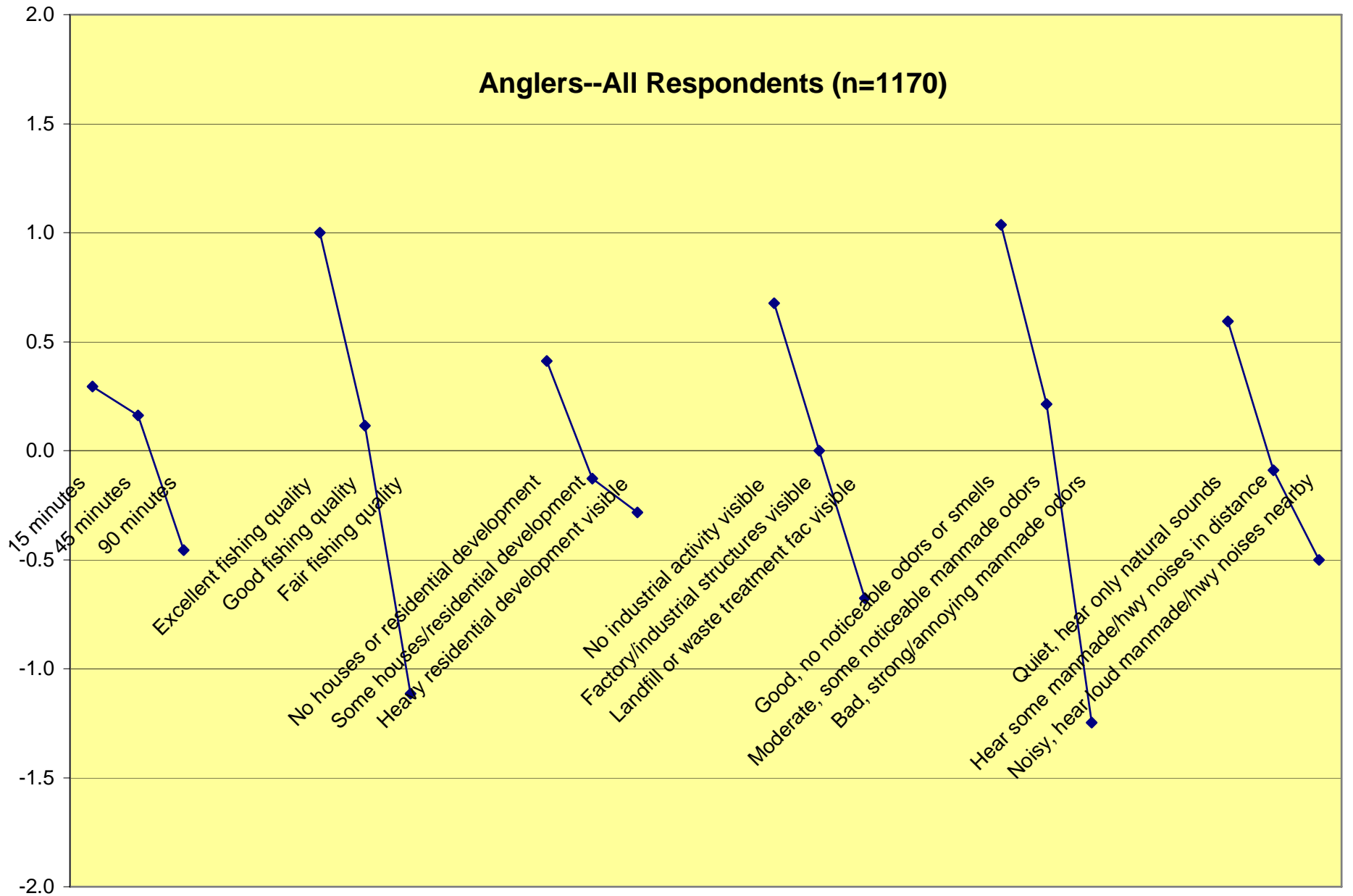


### Golfers--All Respondents (n=296)

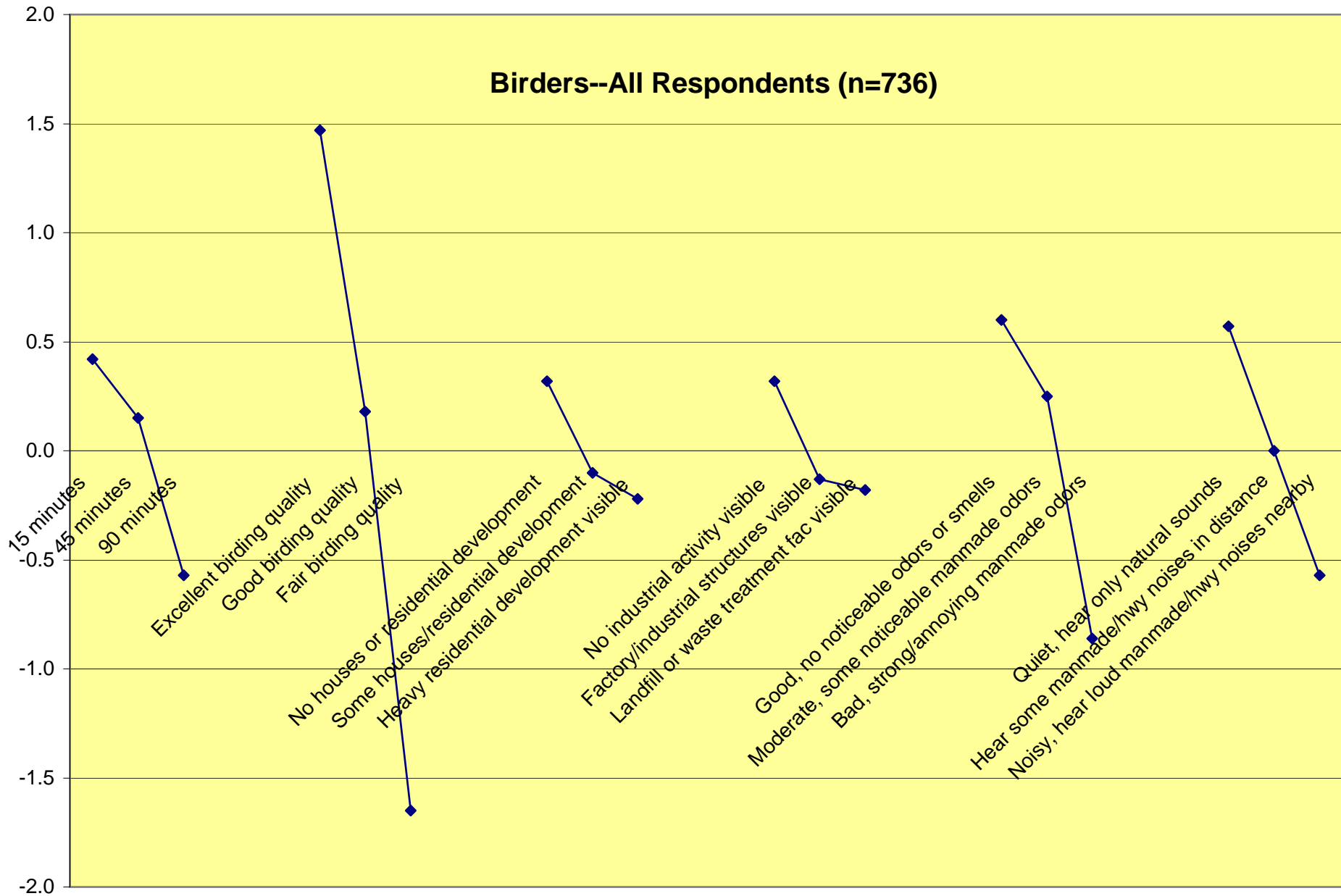




### Anglers--All Respondents (n=1170)



**Birders--All Respondents (n=736)**

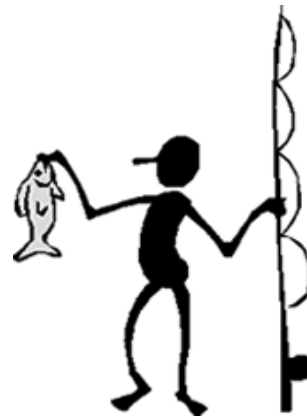


# Conjoint Utilities by Level of Activity Specialization

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- Using as a proxy "*Self-Rated Ability as an Angler/ Birder*":
  - Beginner
  - Intermediate
  - Advanced
  - Expert

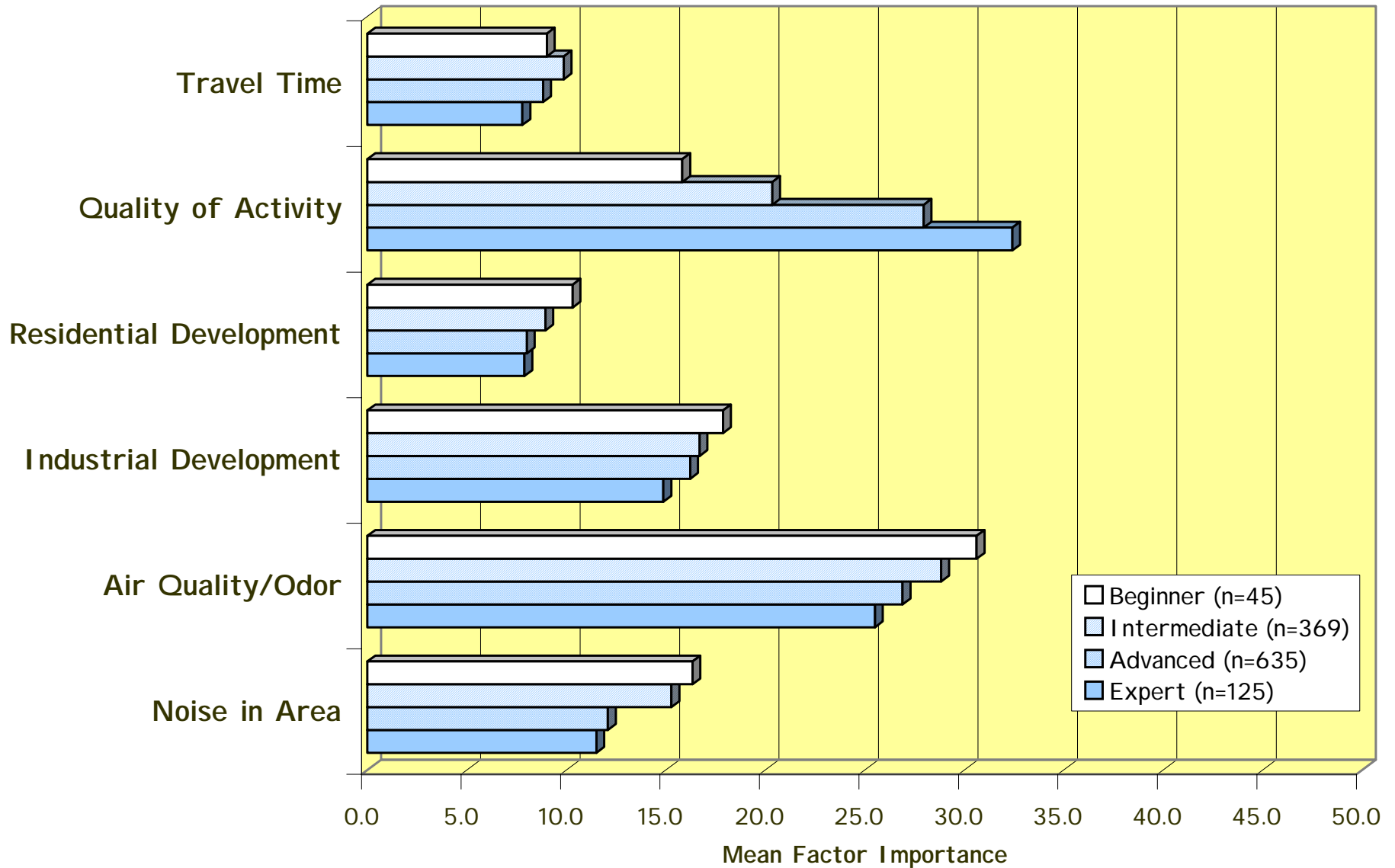
– 1<sup>st</sup> for Anglers



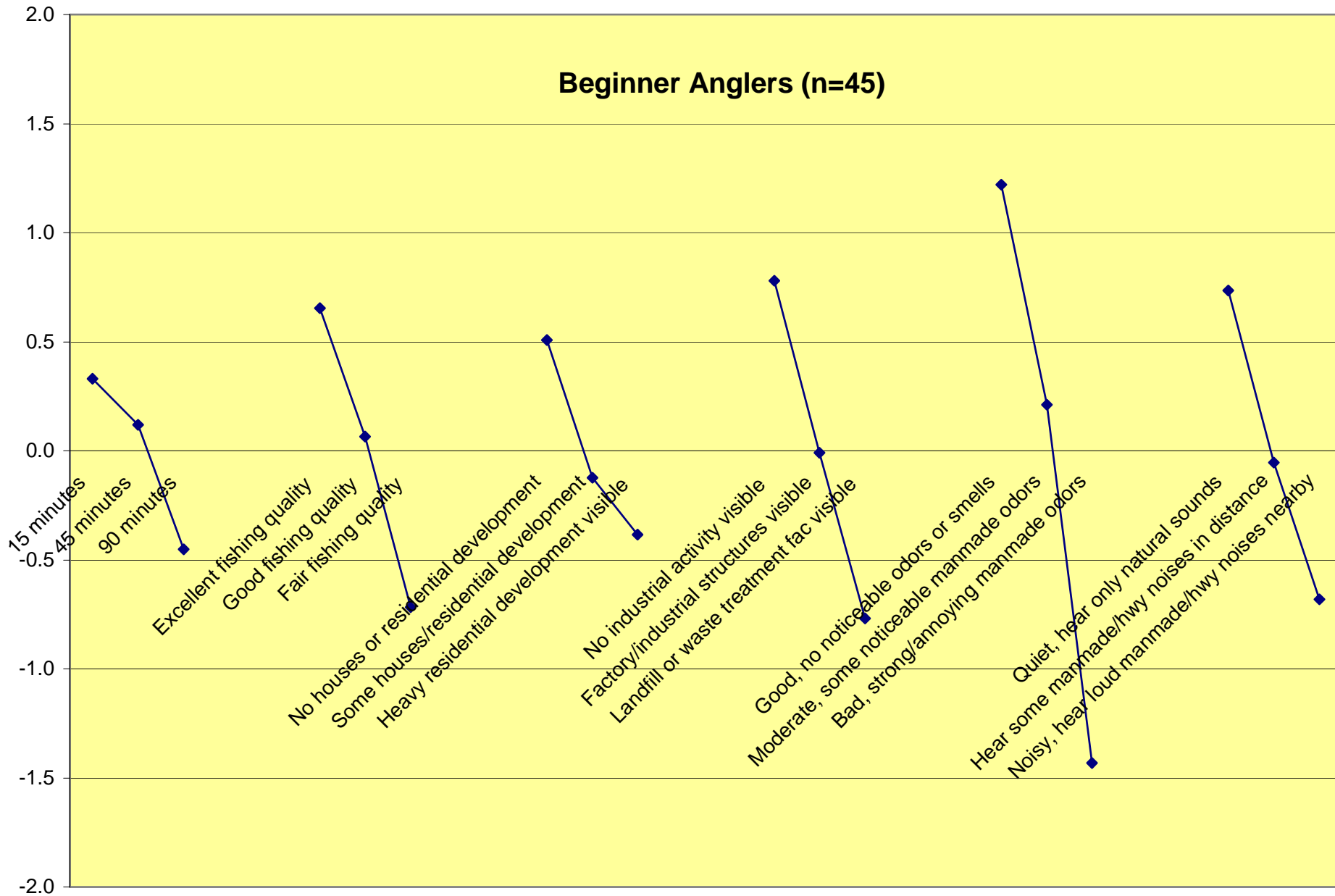
# Investment in Equipment & Fishing Frequency by Self-Stated Fishing Ability

	Total (n=1260)	Beginner (n=45)	Intermediate (n=400)	Advanced (n=683)	Expert (n=132)
<u>Mean Replacement Value:</u>					
Rods & Reels	\$ 1,357	\$ 360	\$ 498	\$ 1,398	\$ 3,905
Tackle (hooks, lures, line, etc.)	\$ 1,031	\$ 115	\$ 362	\$ 1,058	\$ 3,075
Elec equip (depth/fish finder)	\$ 534	\$ 70	\$ 254	\$ 558	\$ 1,340
Other	\$ 394	\$ 46	\$ 254	\$ 373	\$ 1,001
Total all equipt	\$ 3,316	\$ 591	\$ 1,368	\$ 3,387	\$ 9,321
% Owning a boat	61%	29%	51%	68%	68%
Boat(s), motor(s), trailer(s)	\$12,109	\$ 9,244	\$ 9,203	\$ 11,989	\$ 19,028
<u>Mean Days Fish:</u>					
In home state	33.3	15.1	16.4	37.7	67.6
In other states	12.7	2.8	7.2	14.4	23.6
Outside US	0.9	0.4	0.4	1.1	1.5

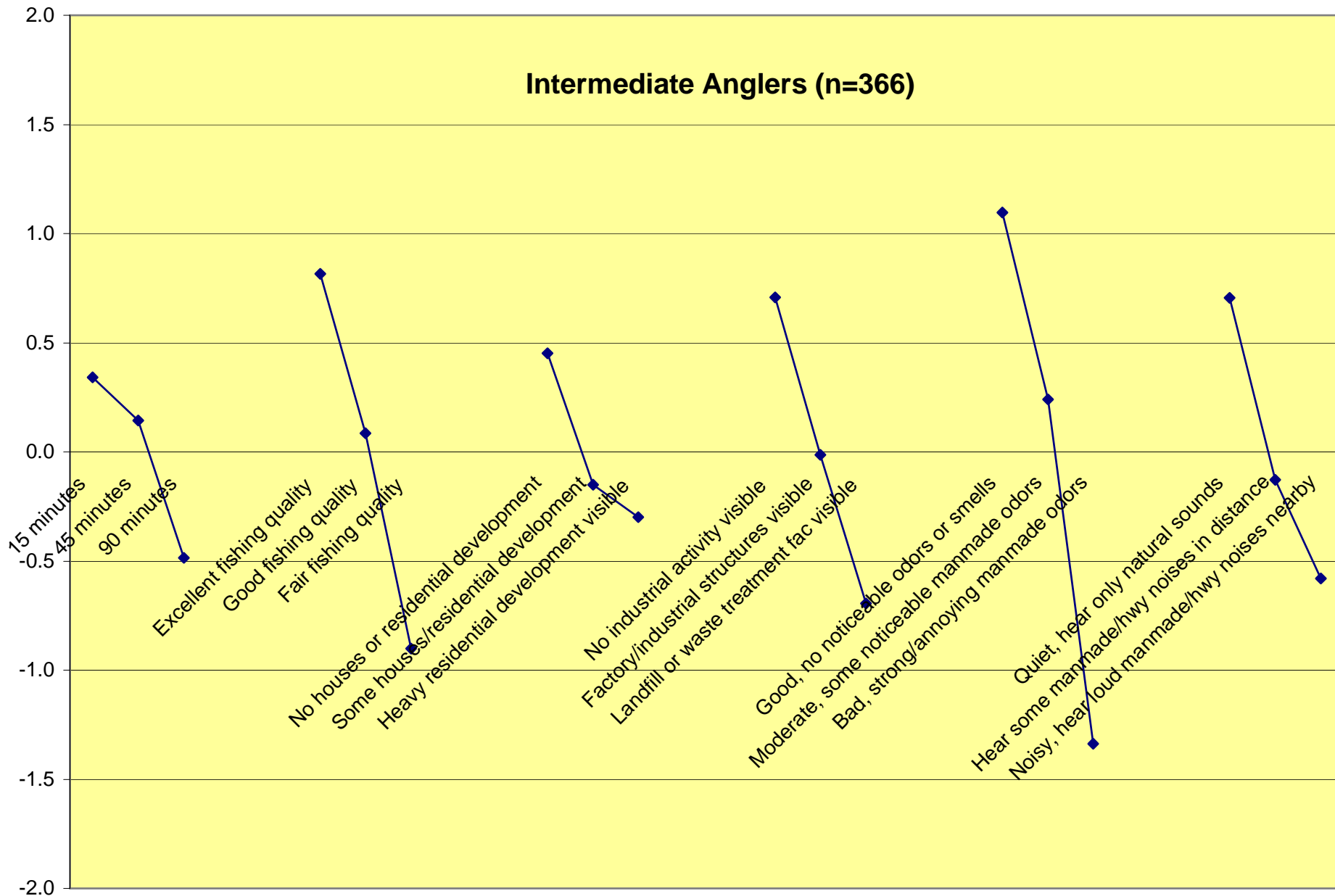
# Factor Importance Weights *by Self-Rated Fishing Ability*



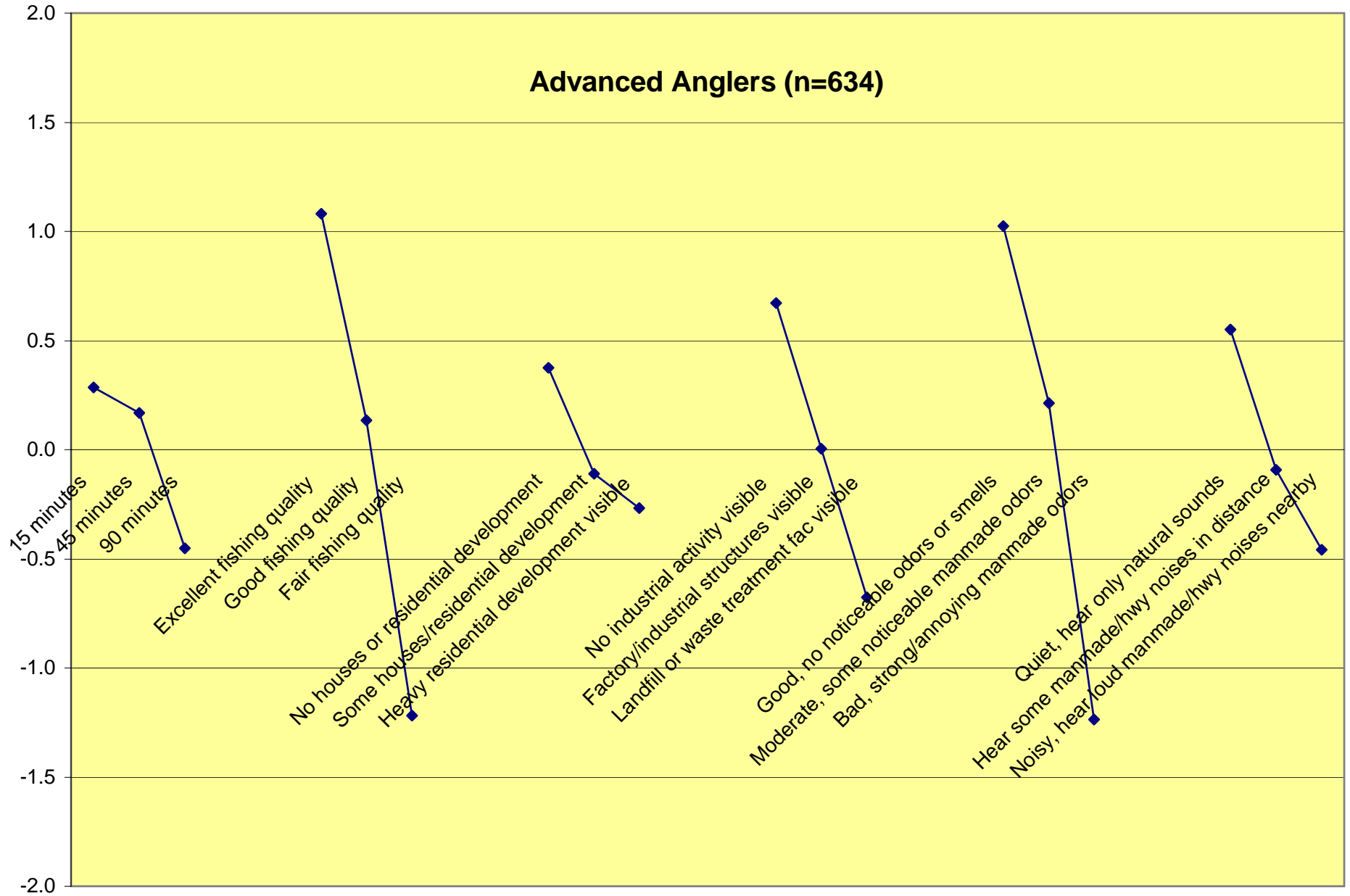
### Beginner Anglers (n=45)



### Intermediate Anglers (n=366)

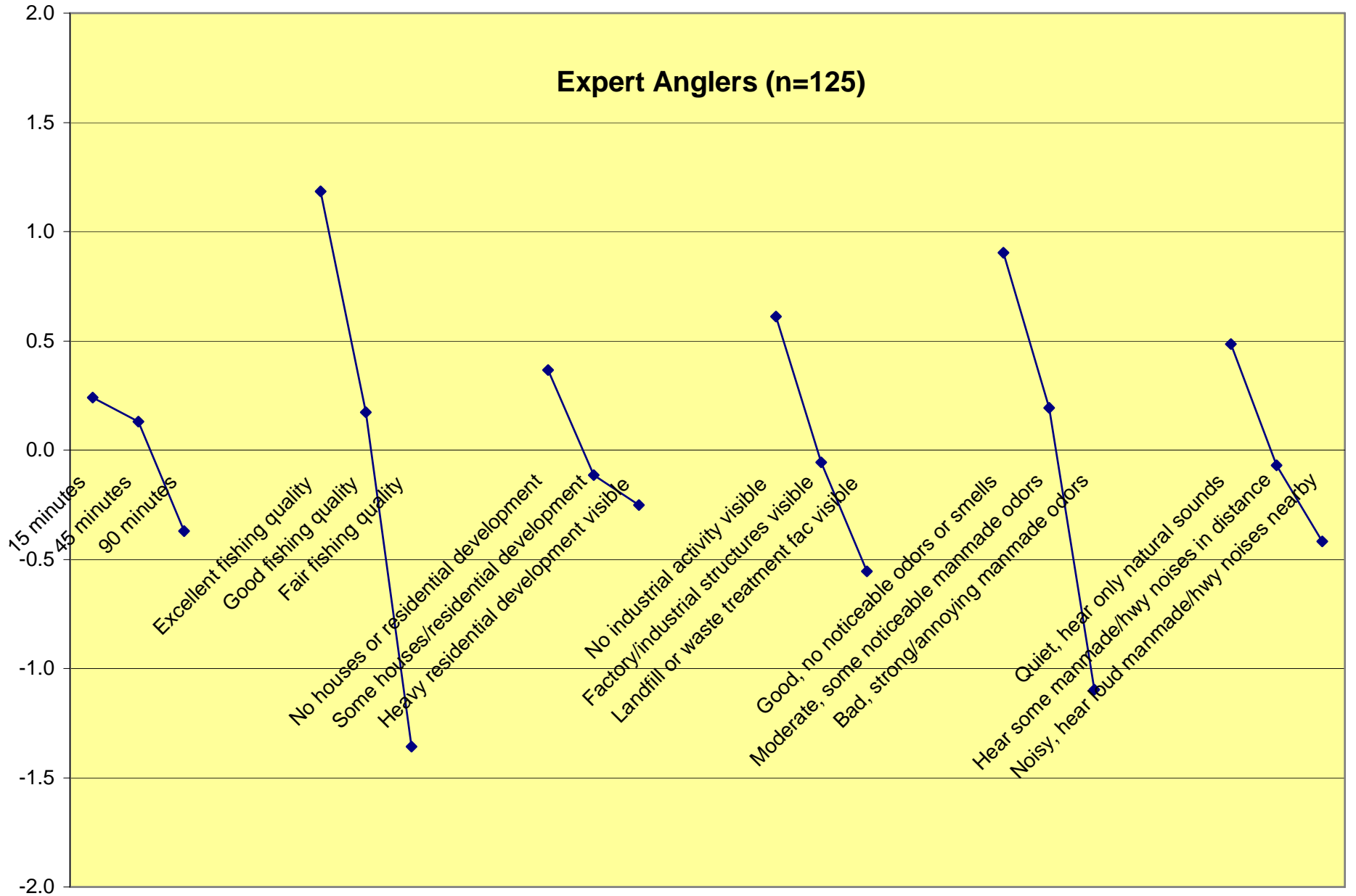


### Advanced Anglers (n=634)





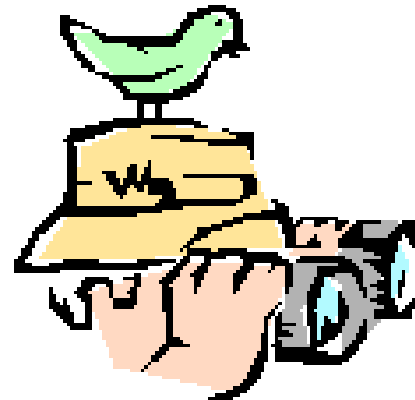
### Expert Anglers (n=125)



# Conjoint Utilities by Level of Activity Specialization

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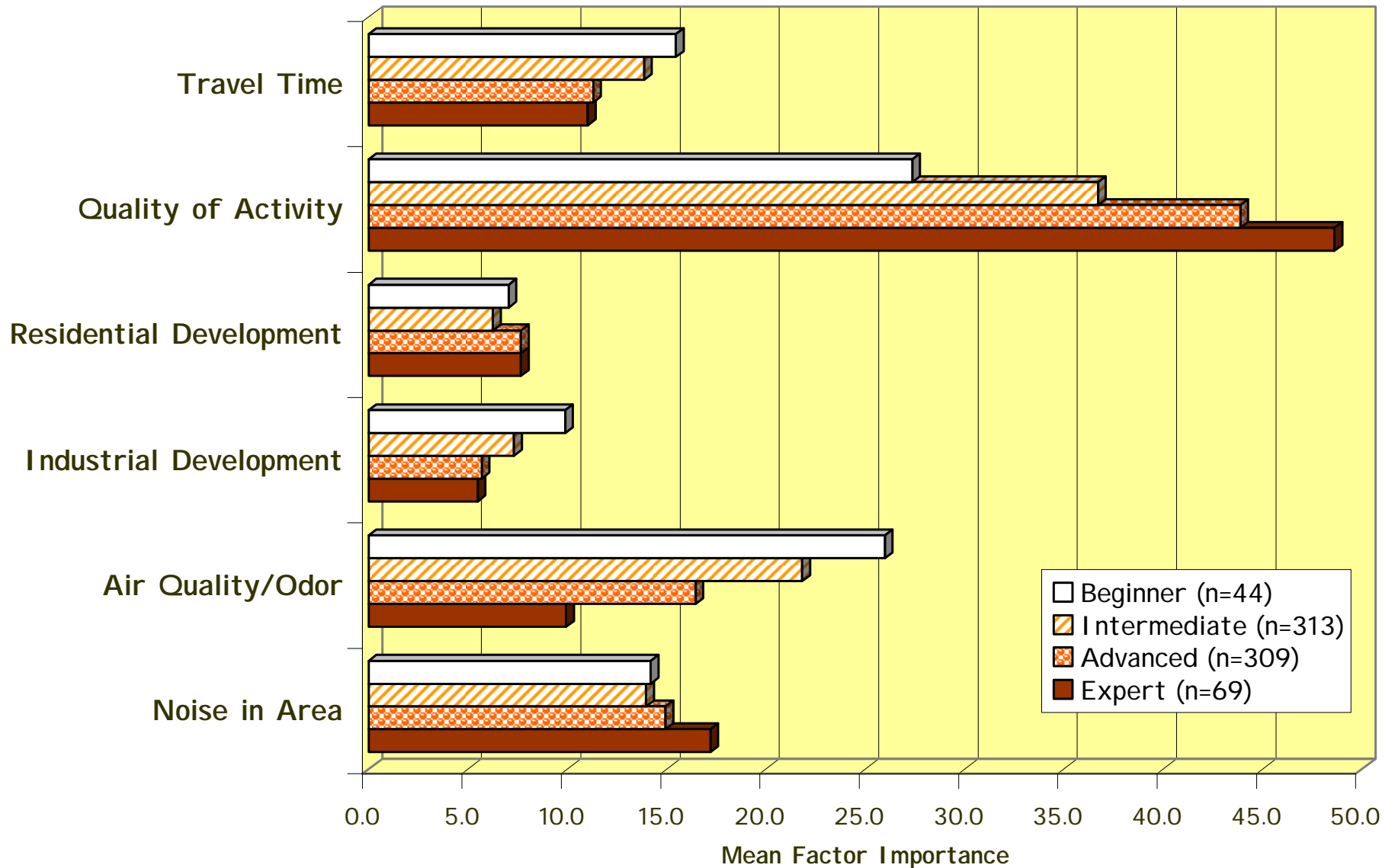
- Now for Birders



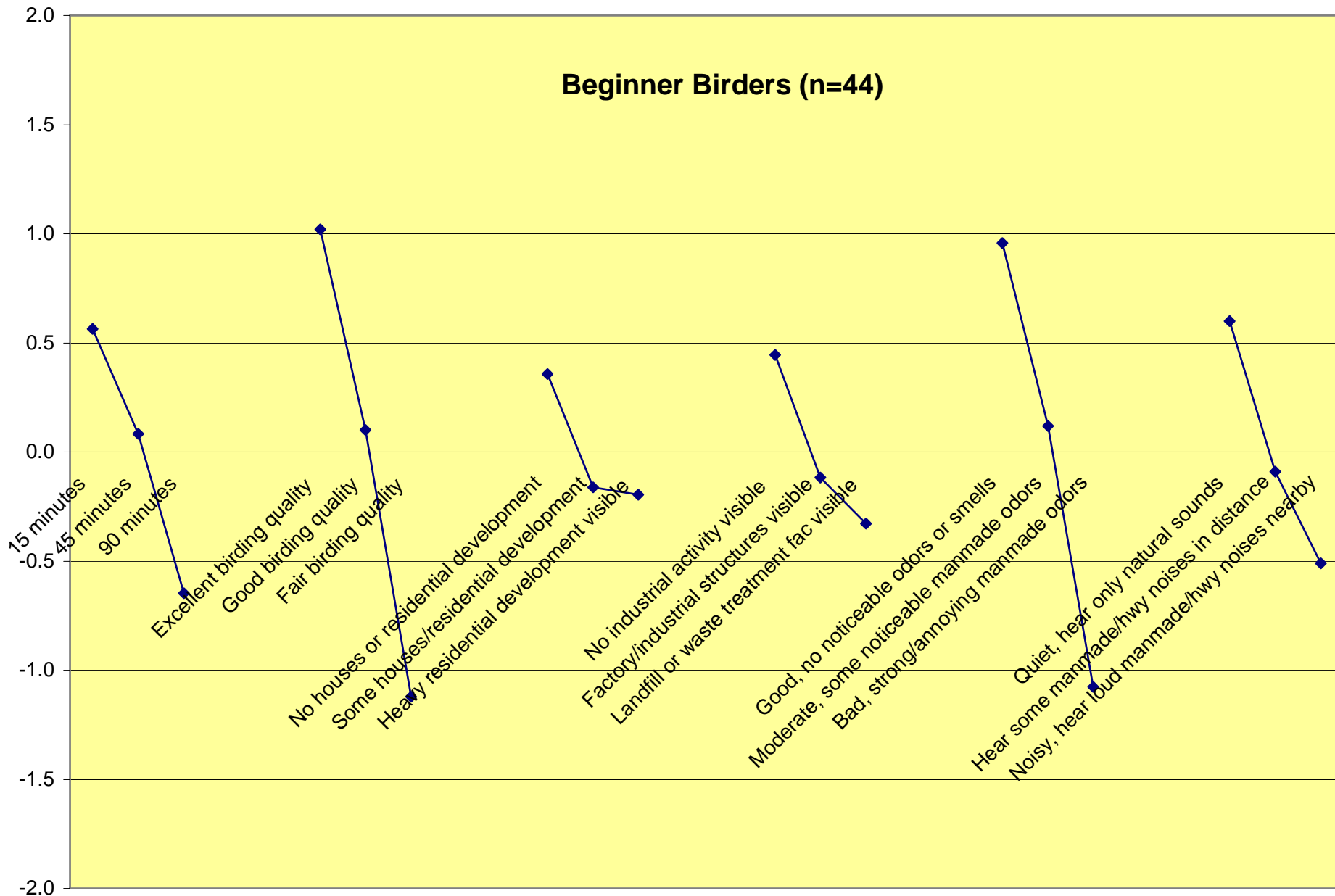
# Investment in Equipment & Birding Frequency *by Self-Stated Birding Ability*

	Total (n=806)	Beginner (n=49)	Intermediate (n=336)	Advanced (n=341)	Expert (n=80)
<i><u>Mean Replacement Value :</u></i>					
Binoculars/scopes	\$ 1,672	\$ 519	\$ 1,359	\$ 1,934	\$ 2,604
Books/fieldguides	\$ 1,000	\$ 155	\$ 465	\$ 1,141	\$ 3,184
Cameras/lenses	\$ 1,005	\$ 988	\$ 763	\$ 1,041	\$ 1,875
Other equipment	\$ 148	\$ 85	\$ 89	\$ 173	\$ 332
Total all equipt	\$ 3,825	\$ 1,747	\$ 2,676	\$ 4,290	\$ 7,996
<i><u>Mean Days Bird :</u></i>					
In home state	78.3	32.6	64.9	95.3	91.0
In other states	12.9	3.7	9.8	15.8	19.4
Outside US	5.2	1.4	3.3	6.1	12.5

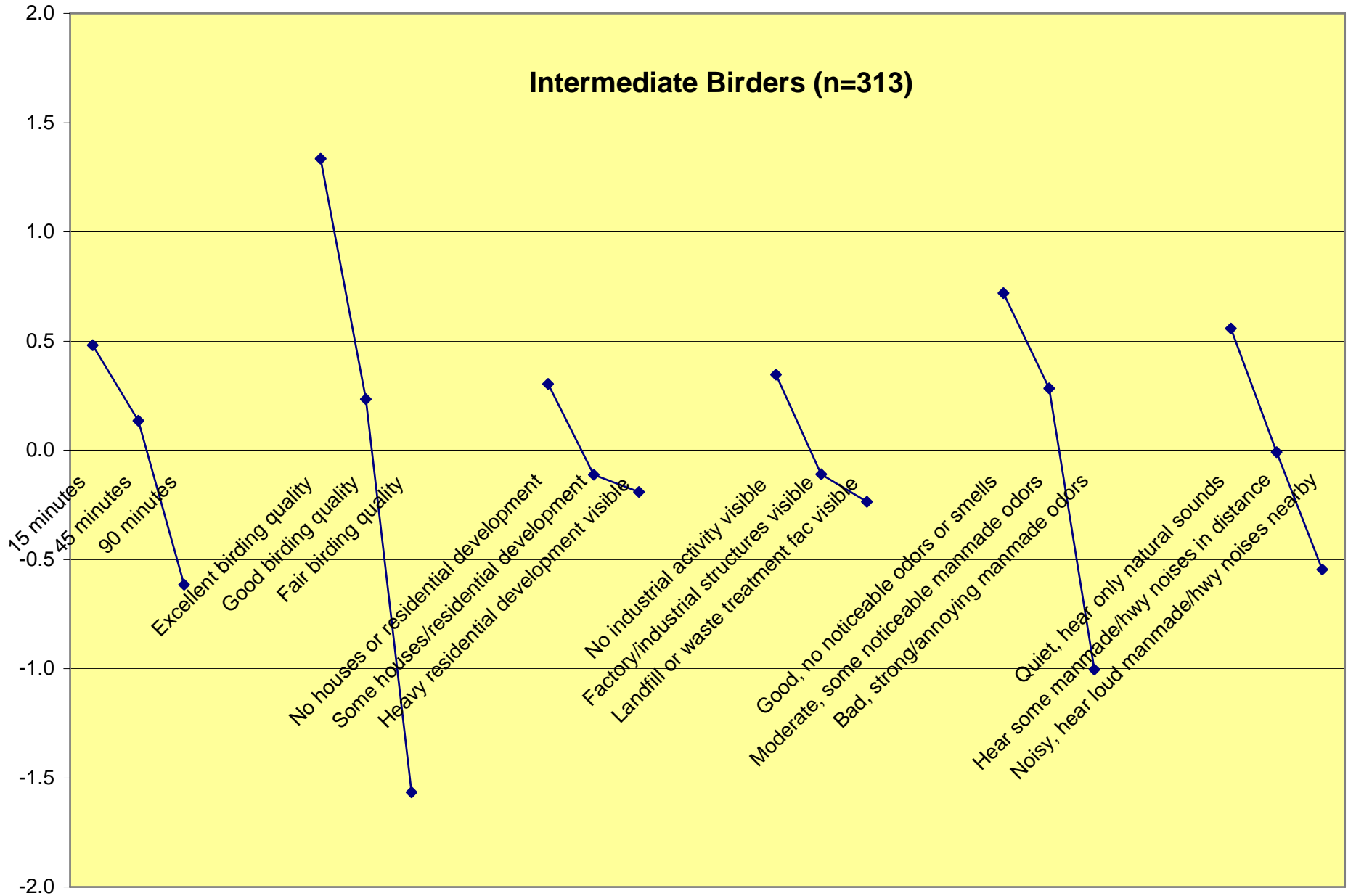
# Factor Importance Weights *by Self-Rated Birding Ability*

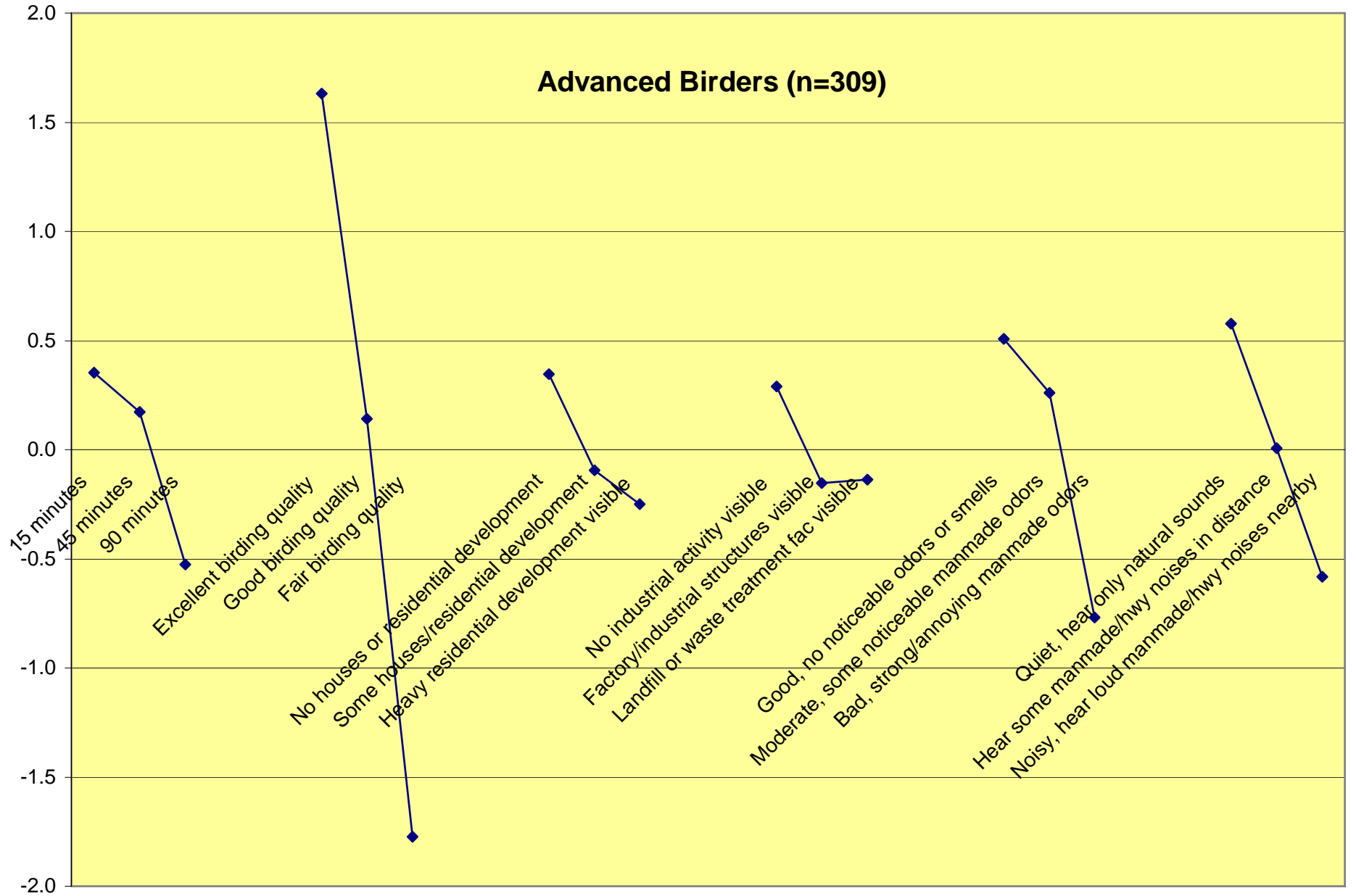


### Beginner Birders (n=44)

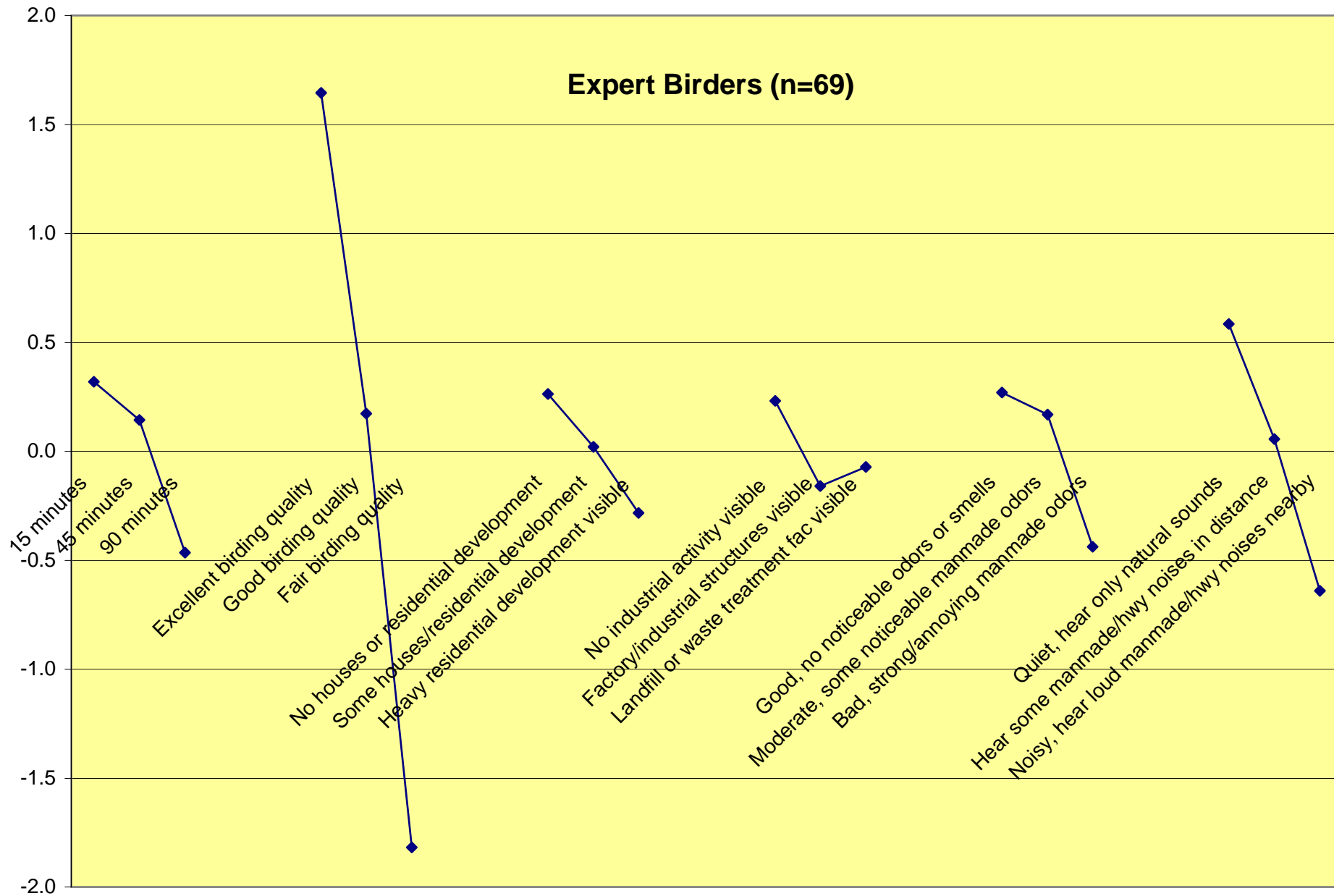


### Intermediate Birders (n=313)





### Expert Birders (n=69)





# Conclusions

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- Impact of negative environmental factors on site selection decisions varies:
  - For different activities
  - For people w/different levels of ability
    - *e.g., as birding ability increases, importance of these factors becomes secondary to quality of birding in area*
      - *Some factors become ↓important (more tolerable) with ↑ability*
        - » *Presence of factories/industrial structures*
        - » *Air quality/odors in the air*
      - *Other factors become ↑important (less tolerable) with ↑ability*
        - » *Noise in area*

# Implications

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- Nature-based recreationists & tourists can be attracted to post-industrial urban areas...

## IF:

- *They are knowledgeable/experienced, &/or highly activity-focused*

## AND:

- *The quality of the focal activity is good/excellent*

## BUT BEWARE:

- *They may not stay very long*
- *They may not return again & again*
- *They may not show up at all if accessibility and safety/security concerns are not addressed*

# Acknowledgments

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- This research is based on a cooperative research agreement between:

- USDA Forest Service  
*North Central Research Station  
Evanston, Illinois*



- Purdue University  
*West Lafayette, Indiana*



# Acknowledgments

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- With special thanks to:
  - *Matt Burlingame, Indiana DNR*
  - *Craig Miller, INHS*
  - *Judy Pollock, Chicago Audubon Society*
  - *Barney Dunning, Purdue University*
  - *Sycamore Audubon Society*
  - *Ken Wysocki, COS*
  - *Libby Hill, Evanston North Shore Birding Club*
  - *Sand Ridge Audubon Society*
  - *Rich Komar*
  - *Ken Crowne*
  - *Walter Marcisz*
  - *Alan Anderson*
  - *Jeff Sanders*
  - *Rod Sellers*



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## Anglers' Perceptions in Calumet

Mario Longhoni<sup>1</sup>, Lynne Westphal<sup>2</sup>

1-The Field Museum, Center for Cultural Understanding and Change, 2-U.S.D.A. Forest Service North Central Research Station

Fishing is popular in Calumet's numerous lakes, rivers, and wetlands, and local managers and policy makers wanted more information on the habits of local anglers and their knowledge of the risks of consuming locally caught fish. Through an ethnographic study, we found that Calumet anglers often eat their catch, and their perception of risk combines both a sophisticated understanding of pollution and habitat with questionable practices and glaring gaps in understanding. Information about risks matches some of the advisory information, while much the detail of advisories is lost.

Contact Name: Lynne Westphal, Ph.D., Research Social Scientist and Project Leader

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Email: lwestphal@fs.fed.us

Phone: (847) 866-9311



# Angler's Perceptions in Calumet

Mario Longoni, The Field Museum of Natural History

Lynne M. Westphal, US Forest Service

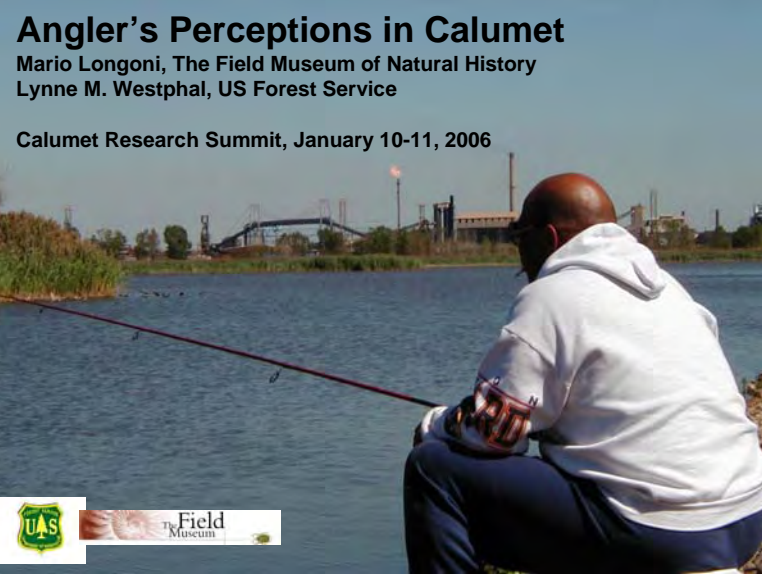
Calumet Research Summit, January 10-11, 2006



## Angler's Perceptions in Calumet

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Lynne M. Westphal, US Forest Service

Calumet Research Summit, January 10-11, 2006



# Why do this study?

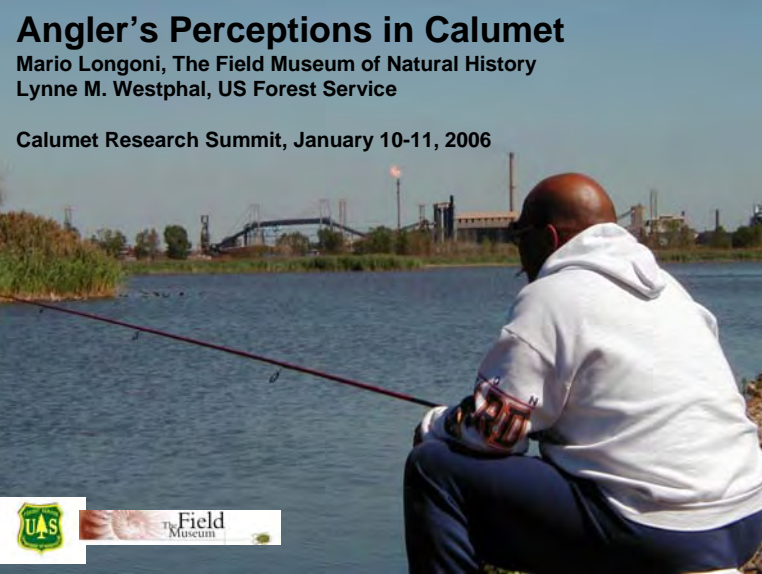
- Managers and policy makers concerned about health risk of eating locally caught fish;
- They needed information about the number and type of fish caught for eating and
- How anglers understand risk of eating fish.



## Angler's Perceptions in Calumet

Mario Longoni, The Field Museum of Natural History  
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# What was the study format?

- Participant observation and interviews of people fishing from the shore at sanctioned (e.g. Harrison Park Pond) and unsanctioned (e.g. Big Marsh) sites.
- Interviews with anglers at over 17 sites (e.g., Wolf Lake, Wolf Lake Channel; Flatfoot Lake).

## Angler's Perceptions in Calumet

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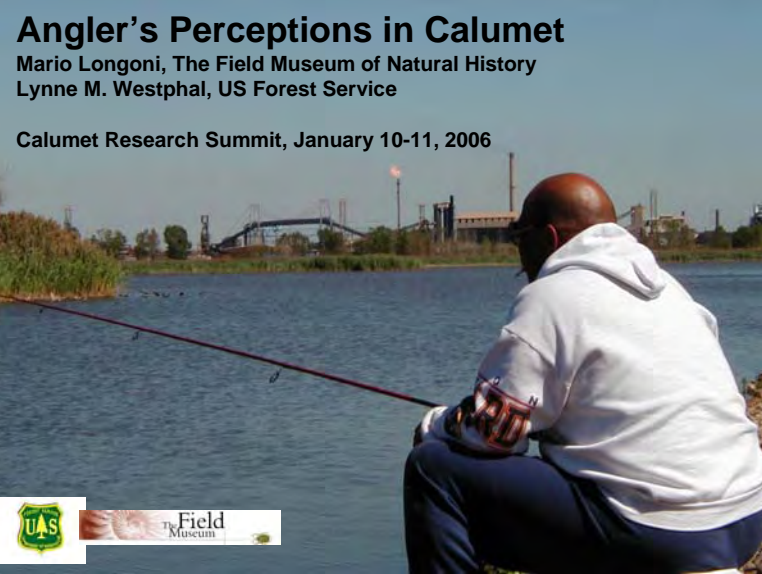
# How many anglers were eating their catch?

- 66% reported eating their catch at least once over the summer.
- 34% reported eating their catch regularly

## Angler's Perceptions in Calumet

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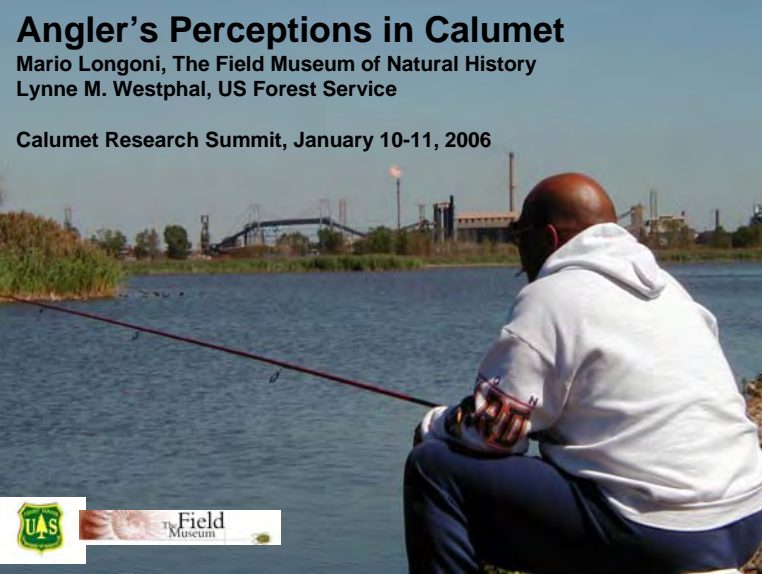
# Were there differences in who ate their catch?

- African American and Hispanic Anglers reported being more likely to eat their catch:
- 65% African Americans, 53% Hispanics, and 20% Anglos were at least occasional consumers.
- Methods do not allow exact numbers, but the proportions hold true for regular consumption.

## Angler's Perceptions in Calumet

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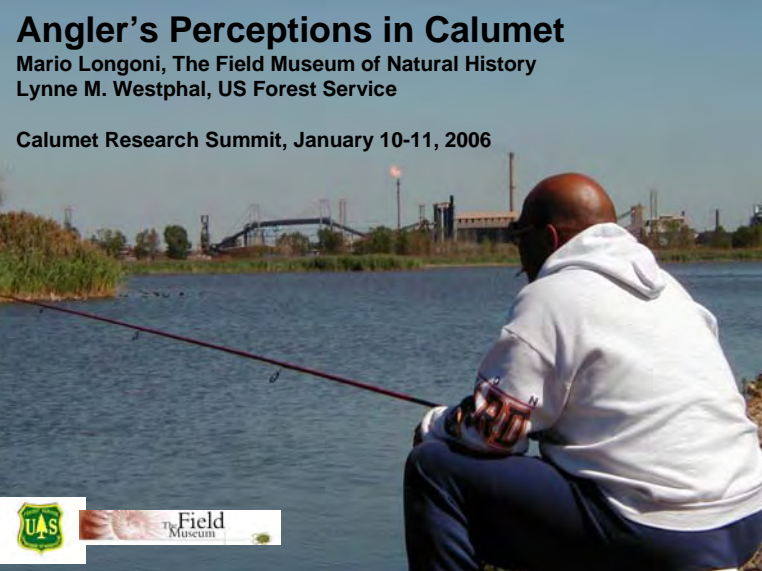
# Were anglers aware of the advisories for where they fished?

- Few, if any, anglers had recently read or knew the advisories in detail.
- They were usually aware of some basic information that matched the advisories (i.e. size, belly fat).
- Info originates from a variety of sources – bait shops, other anglers, friends and family, and media.

## Angler's Perceptions in Calumet

Mario Longoni, The Field Museum of Natural History  
Lynne M. Westphal, US Forest Service

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# How did they manage their risk?

- Most anglers reported practicing some risk reduction, like not eating large fish, or eating stocked fish.
- But some of these practices were questionable, like going out of town to fish – assuming rural waters were safer than urban when in fact some have stricter advisories than Calumet waters.

## Angler's Perceptions in Calumet

Mario Longoni, The Field Museum of Natural History  
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# Risk perception was complex

- Involving assessment of the water, the surrounding environment, the fish themselves, and human health impacts.
- Perceptions of pollution and its impacts indicated a range of understanding, from sophisticated to mistaken.

## Angler's Perceptions in Calumet

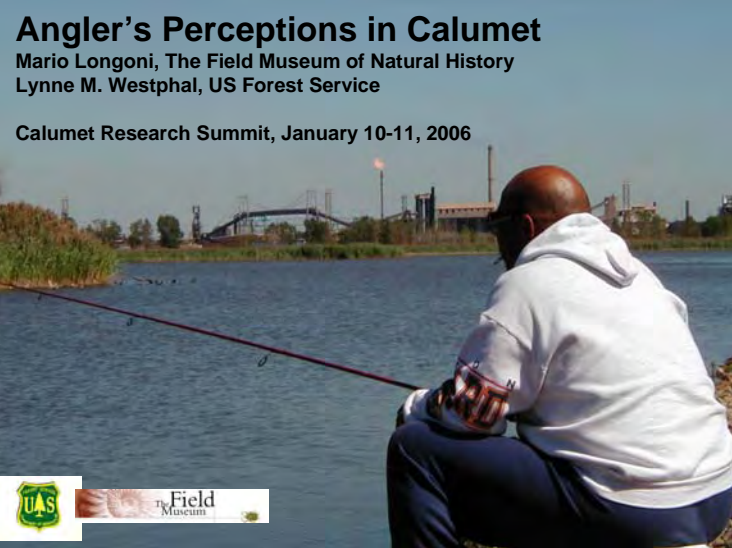
Mario Longoni, The Field Museum of Natural History  
Lynne M. Westphal, US Forest Service

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# Assessing the water, anglers...

- Understood dilution important; moving water & more water is thought to be cleaner
- Saw spring fed as indicator of clean water
- Thought that clear water = clean water
- Missed importance of food chains, effects of contaminated sediments, potential groundwater pollution.



## Angler's Perceptions in Calumet

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# Assessing the immediate environment, anglers...

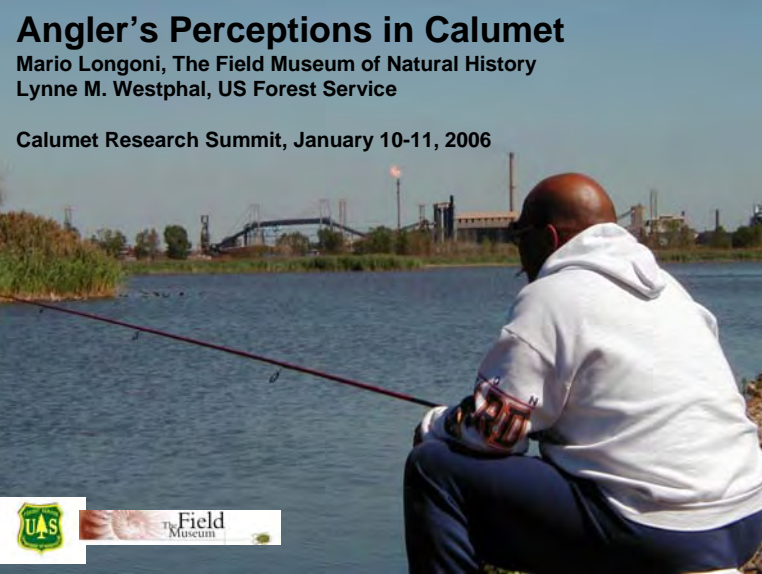
- Felt that nearby industry/urban = polluted; rural = clean
- Felt that many & diverse fish = cleaner habitat, safer fish
- Some thought debris indicated pollution, to others seeing debris through water indicated clarity & therefore cleanliness.
- Perceived well maintained areas (i.e., mown grass) as clean, mitigating potential pollution sources



## Angler's Perceptions in Calumet

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# Assessing the fish, anglers...

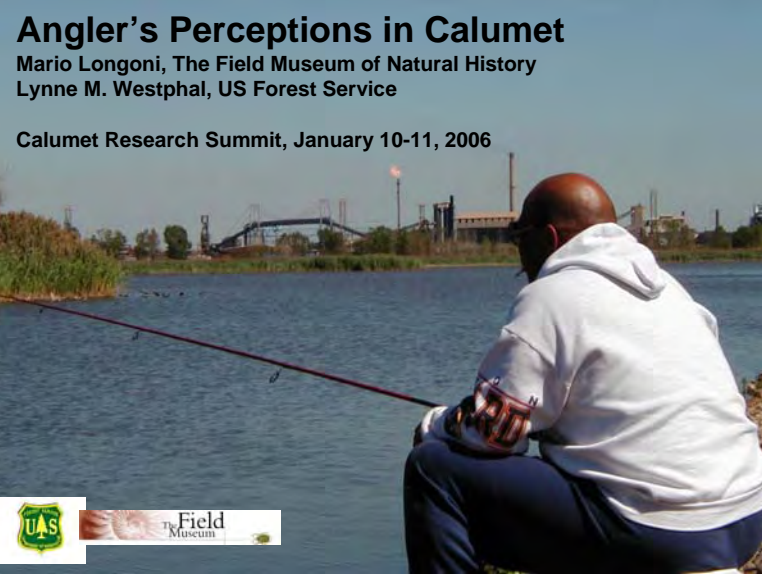
Sometimes looked beyond obvious deformities for...

- Fish's exterior: eye location, correct color or pattern by species
- Fish's interior: color of meat, color of fat, presence of layer of yellow fat

## Angler's Perceptions in Calumet

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# Assessing human health impacts, anglers...

- Look for observable impacts on their own & family's health
- Look at observable impacts on other anglers (He's 80 and fished here for years)
- Take people swimming & fishing to indicate healthy, clean water.

## Angler's Perceptions in Calumet

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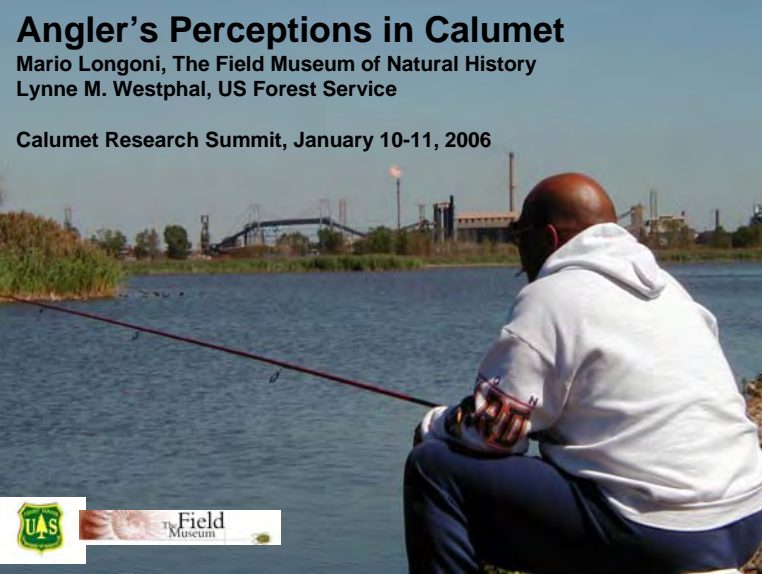
Risk perception is weakened by these assumptions:

- Pollution can be seen, smelled, tasted.
- Pollution has an immediate and/or direct impact.
- Any site improvement = a clean site that is safe to fish.

## Angler's Perceptions in Calumet

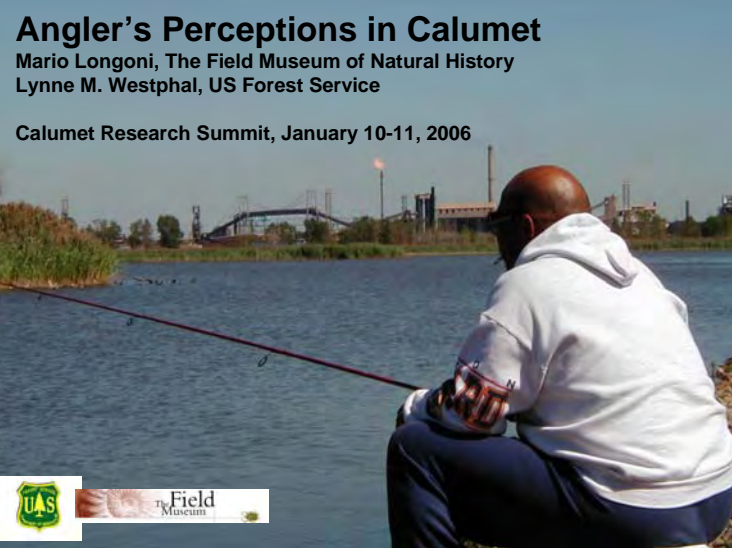
Mario Longoni, The Field Museum of Natural History  
Lynne M. Westphal, US Forest Service

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# Risk perception is also weakened by:

- Missing details of advisories
  - types of fish
  - women and children as higher risk
  - frequency
  - preparation techniques matter
  - location differences within Calumet.



## Angler's Perceptions in Calumet

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# Risk perception is strengthened by:

- Sophisticated understanding of fish species
- Understanding importance of dilution
- First hand knowledge of local industrial practices
- Knowledge of some fundamental aspects of fish safety – i.e. size matters
- Weighed against health benefits of eating fish



# What to do?

- This is complex information, advisory book too difficult and cumbersome to communicate effectively (alternatives exist, see Jardine, Cynthia G. 2003. "Development of a Public Participation and Communication Protocol for Establishing Fish Consumption Advisories." Risk Analysis 23(3), 461-471).
- Convey in person as often as possible; go to non-fishing groups (e.g., churches) to present to African American and Hispanics.
- Present to those who cook the fish.
- Info moves from angler to angler; use this network.

# Angler's Perceptions in Calumet

Mario Longoni, The Field Museum of Natural History

Lynne M. Westphal, US Forest Service

Calumet Research Summit, January 10-11, 2006



## Measuring Consumer Welfare from Restored Urban Natural Areas

Laura Goddeeris<sup>1</sup>, Dr. Daniel T. McGrath<sup>2</sup>

1, 2-Institute for Environmental Science and Policy, University of Illinois at Chicago

The research aims to produce non-market welfare valuation information of restored ecosystems within urban areas that can contribute to the relevant, existing decision-making frameworks. Methodologically, the estimation of these non-market benefits is accomplished by a zonal travel cost valuation approach of two existing natural areas within the Chicago metropolitan region: The North Park Village Nature Center in Chicago, Illinois and the Sand Ridge Nature Center in South Holland, Illinois. In a travel cost study, site visitation data is gathered through the survey instrument. This collected data is used to estimate statistically a trip-generating function and expresses the number of trips to the nature center based on trip costs and other demographic information. Once a trip-generating function is determined, it is used to define a demand curve for the site, which can provide a measure of the aggregate consumer surplus accruing to users of the site.

Contact Name: Daniel T. McGrath, Ph.D., Associate Director, Institute for Environmental Science and Policy

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Email: [dmcgrath@uic.edu](mailto:dmcgrath@uic.edu)

Phone: (312) 996-5723







# IISG Research Presentation

## The Calumet Area Ecological Management Strategy: Measuring the Non-Market Economic Benefits

Daniel T. McGrath, PhD  
Associate Director  
UIC Institute for Environmental  
Science and Policy

Laura Goddeeris, MS Candidate  
Urban Planning and Policy Program



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# Acknowledgements

- Project funded by the Illinois-Indiana Sea Grant College Program
- By permission of...
- The City of Chicago Park District
- Special thanks to NPVNC Director Claudia Regojo
- The Forest Preserve District of Cook County
- Special Thanks to SRNC Director Jim Carpenter



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# Research Background

- This public investment in the Calumet is of intellectual interest
- It represents significant public investment towards preservation of functioning ecosystem fragments within the urban core.
- The FCEC is only the beginning of a larger initiative at many levels within the Region's political economy
- The goal: conserving and restoring the remaining existing natural capital stocks of metropolitan Chicago to make a positive impact on both human quality-of-life and bio-diversity.



# Research Question

- What are the benefits to the region of...
  - This specific investment – the FCEC, and..
  - The broader strategy of restoring ecosystem fragments to improve the quality of life for the region?
- Research: Measuring the Use Value of an Restored Urban Natural Site



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# Research Project

- Funded by Illinois-Indiana Sea Grant
- Calculation of the Non-consumptive use value associated with recreational use of an urban natural area within the City of Chicago
- Travel Cost Study of the North Park Village Nature Center (City of Chicago Park District) and the Sand Ridge Nature Center (Cook County Forest Preserve)
- Goal: Empirical determination of the economic welfare associated with an urban natural area designed for site access.



# The North Park Village Nature Center

- An ideal comparison site
- Reconstructed wetland site on Chicago's North side in 1994
- 48 acres of wetland, virgin oak savannah and prairie.
- City of Chicago invested about \$1 Million.
- Site of former Chicago TB Sanitarium
- The Interpretive Center was the TB Clinic



# The North Park Village Nature Center

- The Wetland was completely re-engineered and restored.
- The dredged material was used to construct the berms that currently maintain the wetland.
- Contract work was by wetland restoration advisors that provided the basis for significant volunteer stewardship work that is ongoing
- The ecosystem restoration created local controversy
- Approximately 45K adult visitors to the site annually.



# Sand Ridge Nature Center

- Developed in the early 70s from a reclaimed asparagus farm
- 240 acres of wetland, fragments of the dune-swale system
- Large fragment of Large primordial lake ridge
- Interpretive Nature Center w/ # live species
- Interpret Settler Living





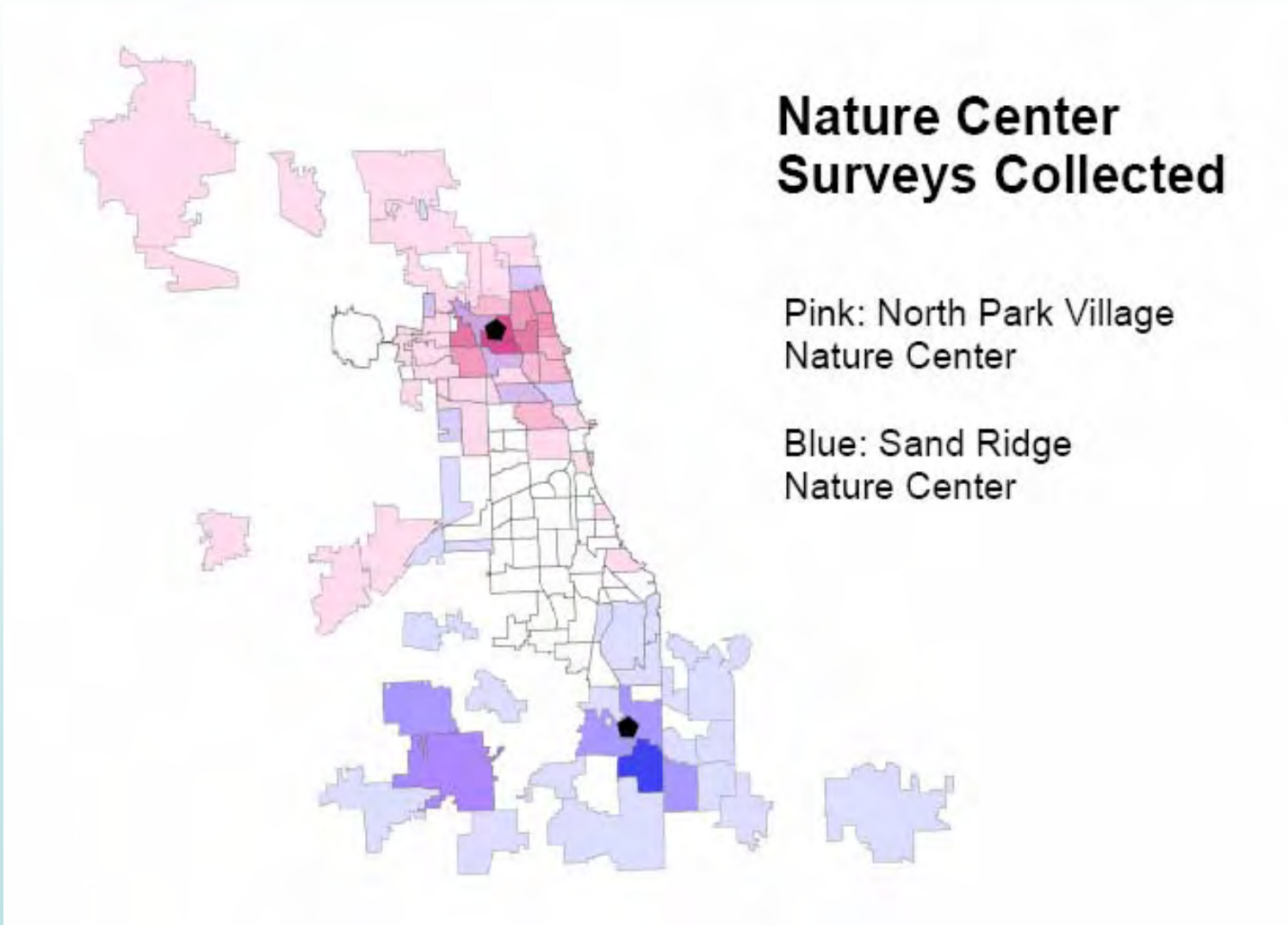
# On-site Surveys

- Convenience sampling method, summer through fall
- Strong support from nature center staff
- Refined instrument after initial testing
- 24 questions regarding demographics and usage patterns
- Responses collected and entered on-site
- Approximately 350 eligible responses



# Interim Survey Results

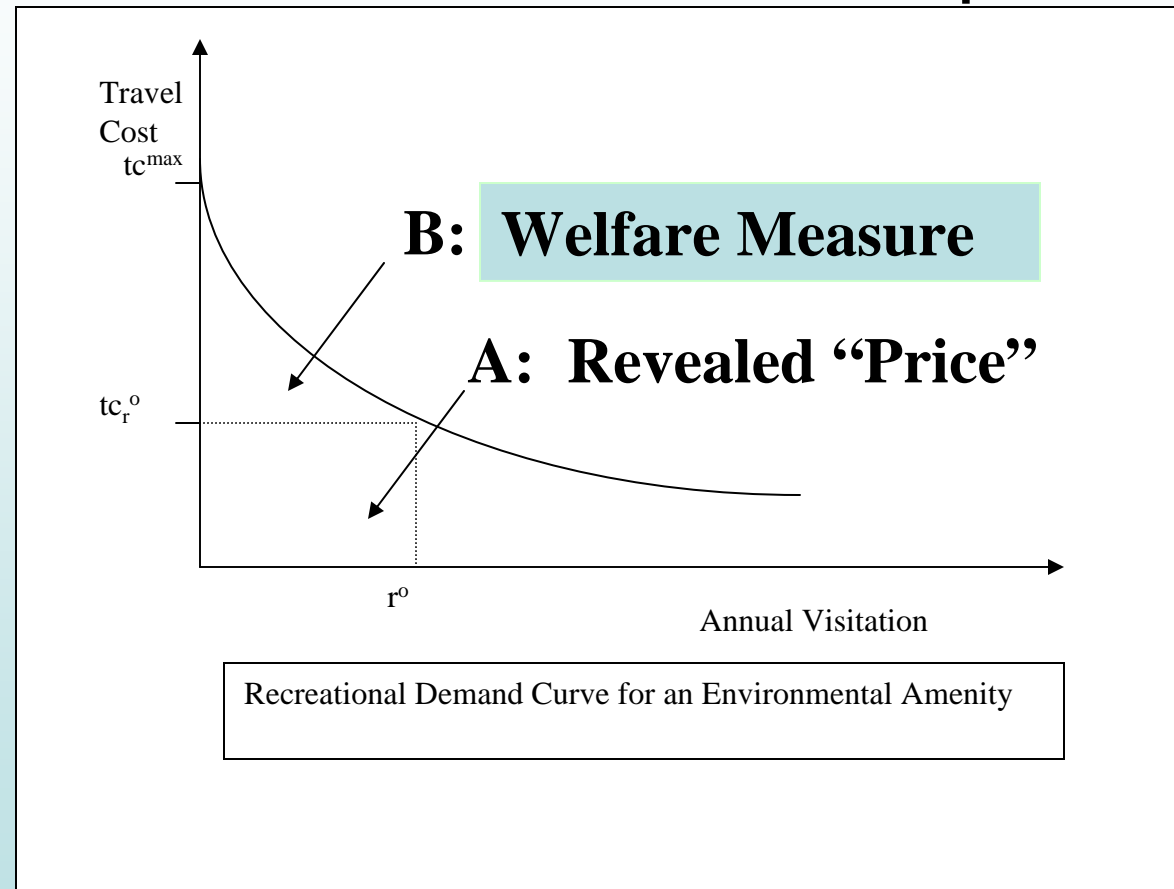
- On-site survey work underway through Summer and Fall '05 – 350 observations so far
- Typical Visitor:
  - Female, age between 35 - 44
  - College or Graduate Degree
  - Visits more than 10 times a season
  - Spends 1 hour hiking the site
  - Full-time wage earner – income between \$50K - \$75K
  - Drives in own car about 3.7 miles from home



# Travel Cost Model

- The TCM is the standard method to value recreational use of the environment
- Demand-based model
  - “Quantity Demanded” is number of trips
  - “Price” is the cost of reaching the site
- Variation in price is generated by observing visitors living at different distances from the site
- Price is low for people living near and high for those living far away

# Welfare associated with Use Value of Natural Capital



# Interim Welfare Measure

- Equation to be estimated:

$$r = f(tc_r, tc_s, y, z)$$

- The number of trips taken by a person is assumed to be generated by a Poisson process:

$$\Pr(r_n | r_n > 1) = \frac{\exp(-\lambda_n) \lambda_n^{r_n-1}}{(r_n - 1)!}$$

$$\ln(\lambda) = \beta_{tc_r} tc_r + \beta_{tc_s} tc_s + \beta_y y + \beta_z z$$

# Interim Welfare Measure

- So, the welfare,  $S_n$ , (in dollars) for each person in the dataset is...

$$S_n = \lambda_n / -\beta_{n_r}$$

- The average welfare per adult visitor per season in the dataset is: **\$700**
- The NPV/NC contributes about \$21.5 million in consu **\$650,000 per acre** region per season.



## The Ford Calumet Environmental Center

- What might be the consumer surplus generated by the New FCEC to the City of Chicago?
- Benefits transfer is a complicated exercise, but..
- If the FCEC only generates half the welfare **\$40 million per year** contribution to regional livability is large...





# Broader Research Scope

- The NPVNC is just one of many natural sites throughout the Chicago region that contribute to the livability of the region
- A broader research question is...
- Can this value help guide policy towards the restoration and reconstruction of additional sites within the region.
- How might the accrued welfare be capitalized into Chicago residential land values?
- How does this value compare to the Producer Surplus generated by such sites?

## **130th Street/Torrence Avenue/Brainard Avenue Relocation and Grade Separation: Greening the Project**

Dr. Soliman Khudeira, PE

Chicago Department of Transportation, Division of Engineering

The objectives of the infrastructure project are (a) to eliminate two at-grade crossings of the Norfolk Southern railroad tracks with 130th Street and Torrence Avenue, and (b) to realign 130th Street, Brainard Avenue, and Torrence Avenue to form a continuous roadway. The civil and structural components include: realigned and lowered roadways, lowered or relocated utility lines, six bridges; retaining walls; detention chamber and pump station; street lighting; and traffic signals.

The project has various environmental components which include: wetland mitigation, pedestrian and bicyclist path, landscaping, environmental wall, and on site storm water treatment. Soil management practices included: classifying the excavated materials into different categories, transferring excavated soil from one project to another, creating on-site berms, using special waste on-site as backfill, and coordinating with the adjacent private developer to take delivery of some soil. Discussions are being held with the Chicago Department of Environment to explore the potential use of some of the excavated soil in the nearby Calumet sites.

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Address: Chicago Department of Transportation, Division of Engineering, 30 N. LaSalle St. #400, Chicago, IL 60602

Email: [skhudeira@cityofchicago.org](mailto:skhudeira@cityofchicago.org)

Phone: (312) 744-9605



**Infrastructure Improvement at  
130<sup>th</sup> St./126<sup>th</sup> Pl. / Torrence Ave. / Brainard Ave.  
Environmental Elements**

**Chicago Department of Transportation (CDOT)**

Soliman Khudeira, PhD, PE  
Program Manager

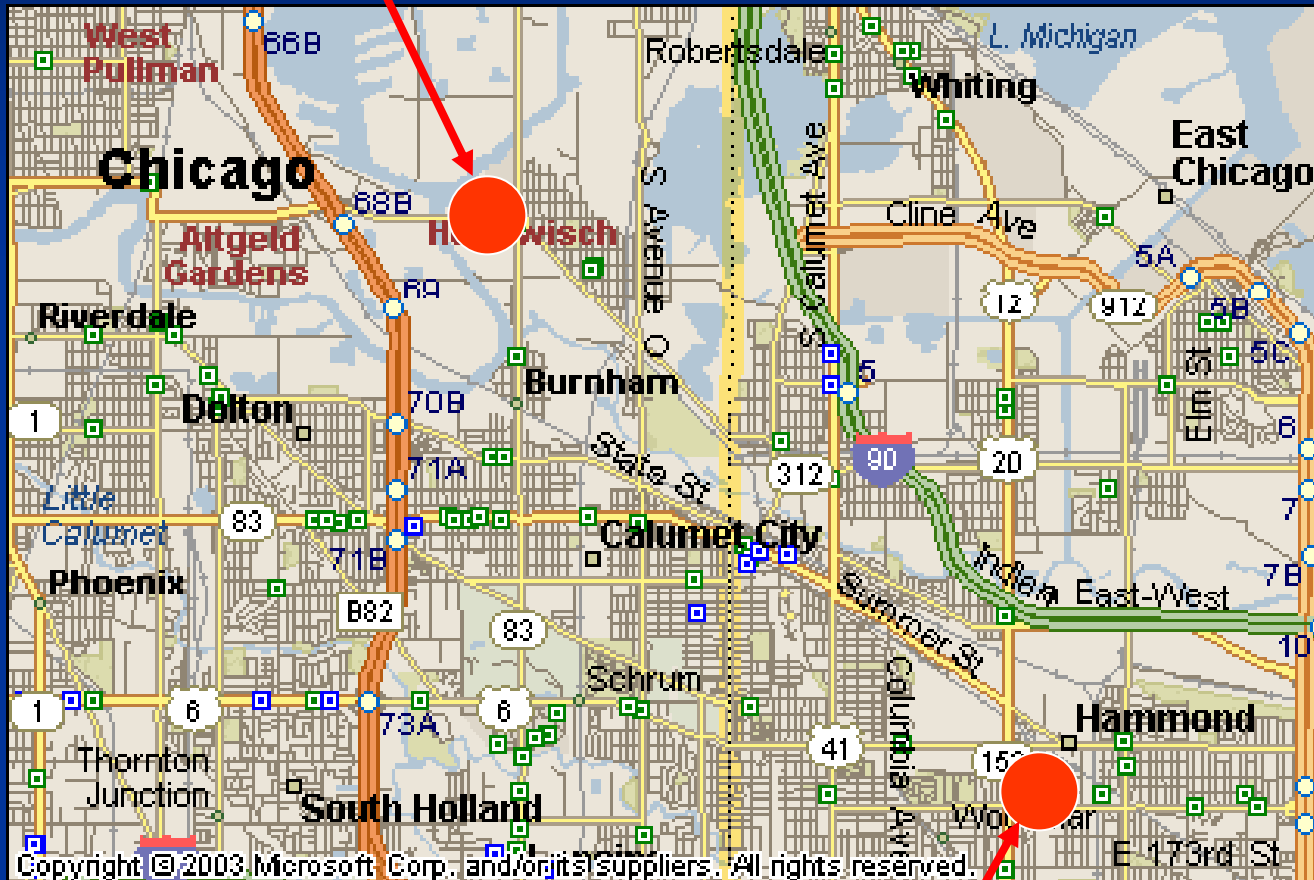
Calumet Research Summit  
Purdue University Calumet  
January 11<sup>th</sup> , 2006

# Presentation Outline

- Projects Overview
- Projects Environmental Elements

# Projects Overview

## Location of Projects

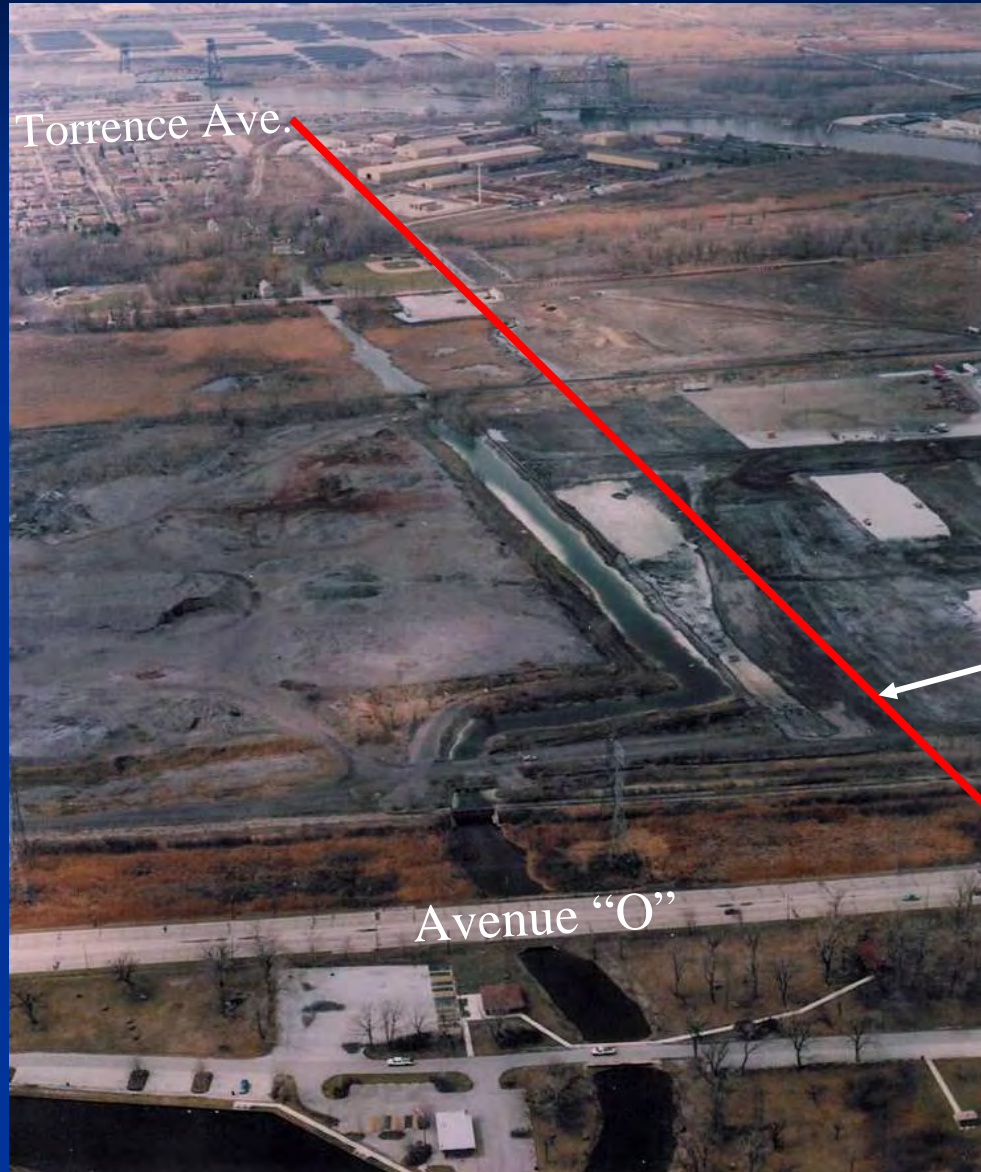


We are here

# Program Scope



# 126<sup>th</sup> Place



Torrence Ave.

126<sup>th</sup> Place

Avenue "O"



# 126<sup>th</sup> Place / CMC

## Chicago Manufacturing Campus



130th St. Torrence Ave. (Ford Development B-9-369)  
North end of N-S Road looking south  
Proposed

# Existing and Proposed Roadway Alignment



Existing Roadway Alignment

Proposed Roadway Alignment

# Existing and New Alignment



# Environmental Elements

# On-site Storm Water Management

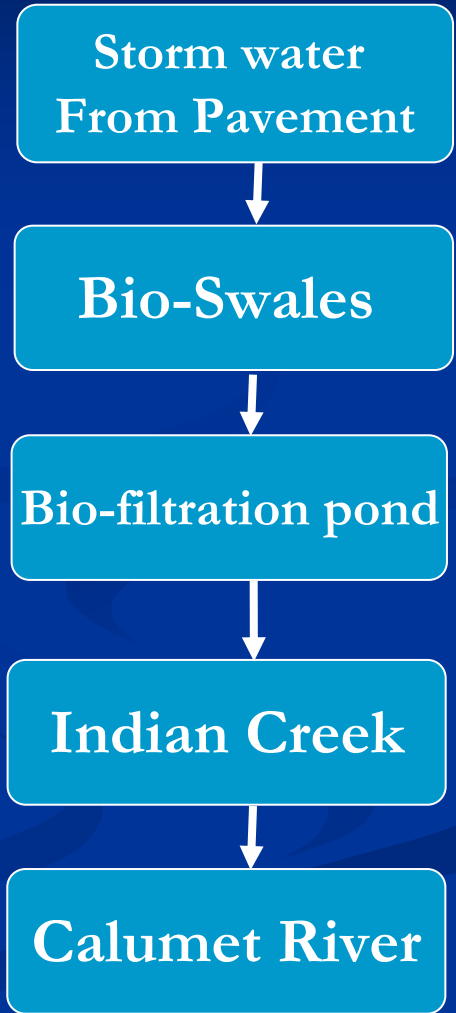
## Mechanism

- Particulates settle and water infiltrate the ground
- Aeration, plants, and bacteria will remove pollutant

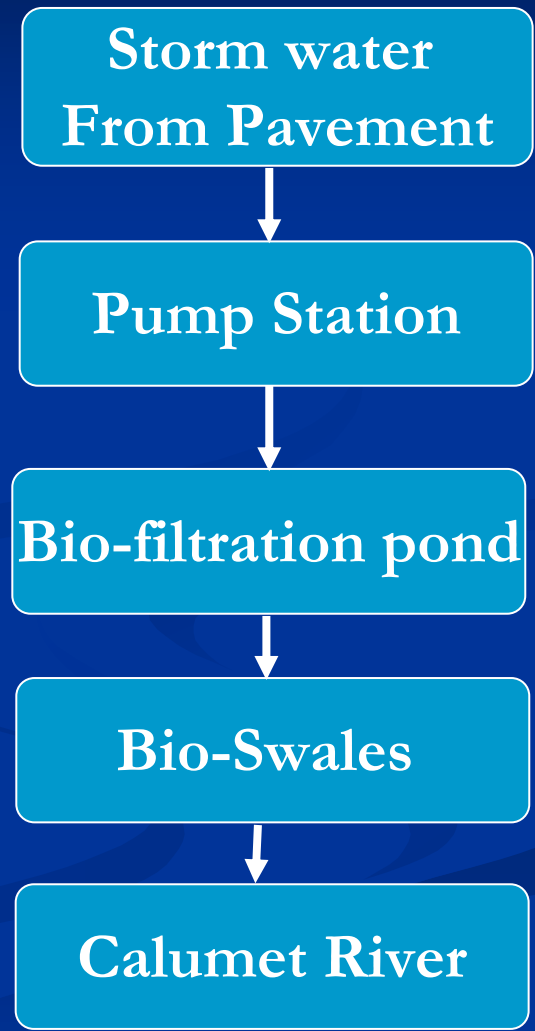
## Benefits

- Reduces polluted water in to the sewer system
- Does not rely on hard infrastructure
- Take advantage of natural areas
- Possible grants

# 126<sup>th</sup> Place Storm Water Management



# 130<sup>th</sup> Street Bio-Filtration Pond







# Pedestrian/Bicyclist Path

- Bicycle lane/mixed-use
- Over 6,500 feet in path length

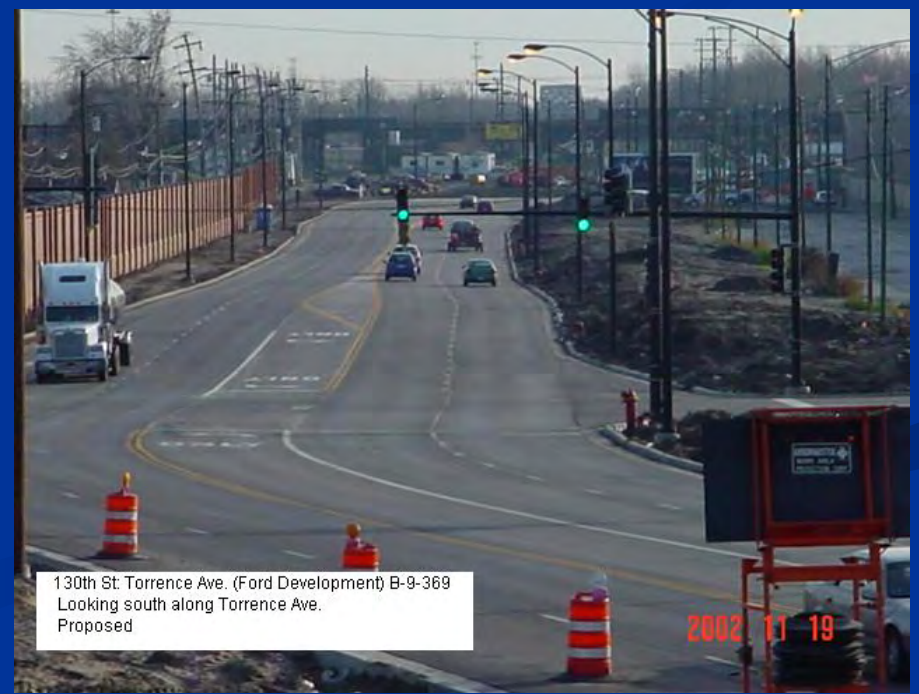


# Wetland Mitigation

- Wetland Bank (stage 1)
- By Chicago DOE (stage 2)



# Environmental (Noise) Wall



130th St. Torrence Ave. (Ford Development) B-9-369  
Looking south along Torrence Ave.  
Proposed

2002 11 19

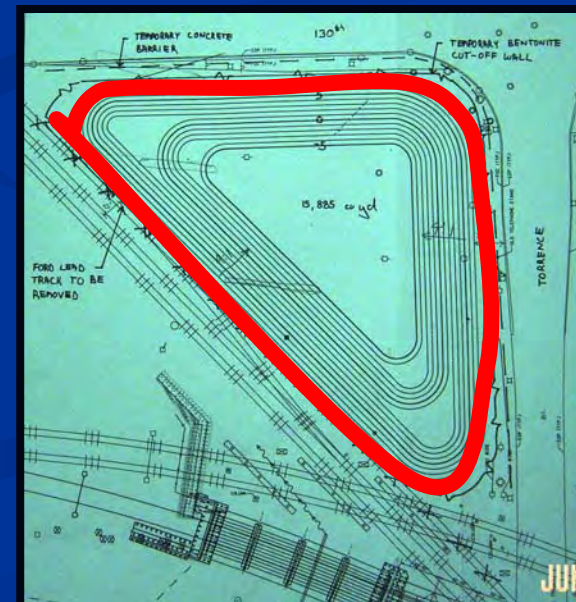
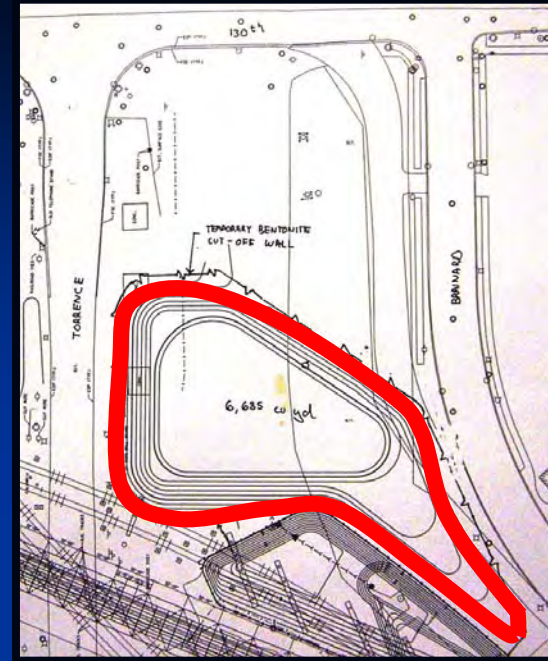
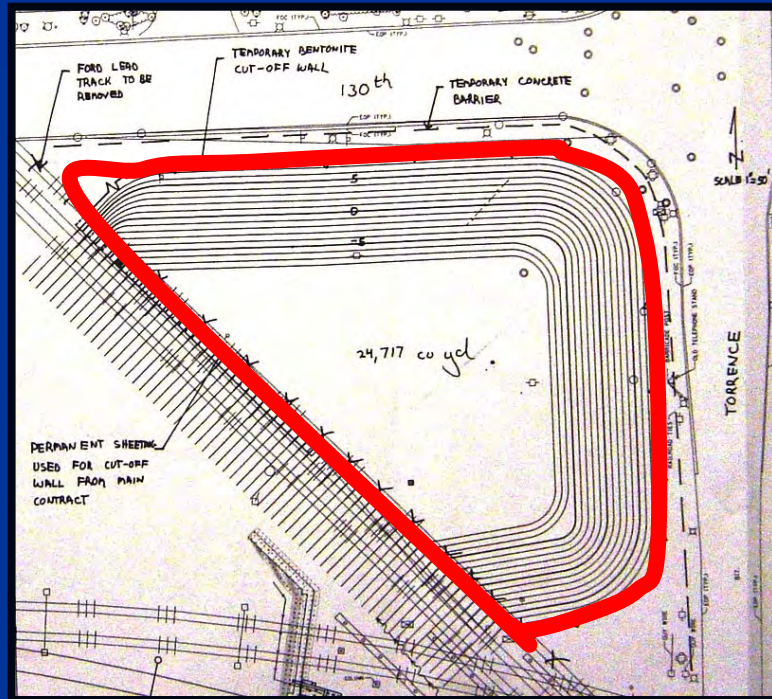
# Soil Management

- "special waste" vs. "daily cover"
- Use excavated materials from contract I for embankment in contract II.
- Create berms capped with geofabric and topsoil and seeding.
- Use soil as backfill for sewer pipes and as embankment under the roadway.
- Coordinate with the adjacent private developer to take soil for their use.
- Coordinating with CDOE to identify nearby sites.



# Soil Management

- Borrow Pit



JUN

# Landscaping

- Trees
- Vines
- Shrubs
- Native grasses
- Landscaped medians

Per the Calumet  
Landscaping Palette



**Thank You**

## Use of Peoria Lake Sediment as Topsoil

Dr. John C. Marlin

IDNR Waste Management and Research Center

Sediment from the Illinois River in Peoria is basically derived from eroded farmland and stream channels. It was excavated and taken to several areas by barge including two locations in Chicago and one in East Peoria where it was spread on old industrial sites to provide topsoil. This benefited the river ecosystem by restoring some depth and the land by providing soil. An additional benefit is that thousands of truckloads of soil from other areas did not travel over the highways and through neighborhoods. The mud dried rapidly and supported lush plant growth after about six weeks. The plant species in the mud's seed bank were already in the Chicago area. Inspection a year after placement shows that the material is developing typical soil structure. A greenhouse study found that a mixture of about 25% biosolids to 75% sediment makes a good soil. Additional testing is underway to better define the chemical and physical properties of other areas in Peoria Lakes and other backwaters. Millions of cubic yards of mud is available for use as soil and can be barged to along the Chicago waterways and to Northwest Indiana.

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# USE OF PEORIA LAKE SEDIMENT AS TOPSOIL

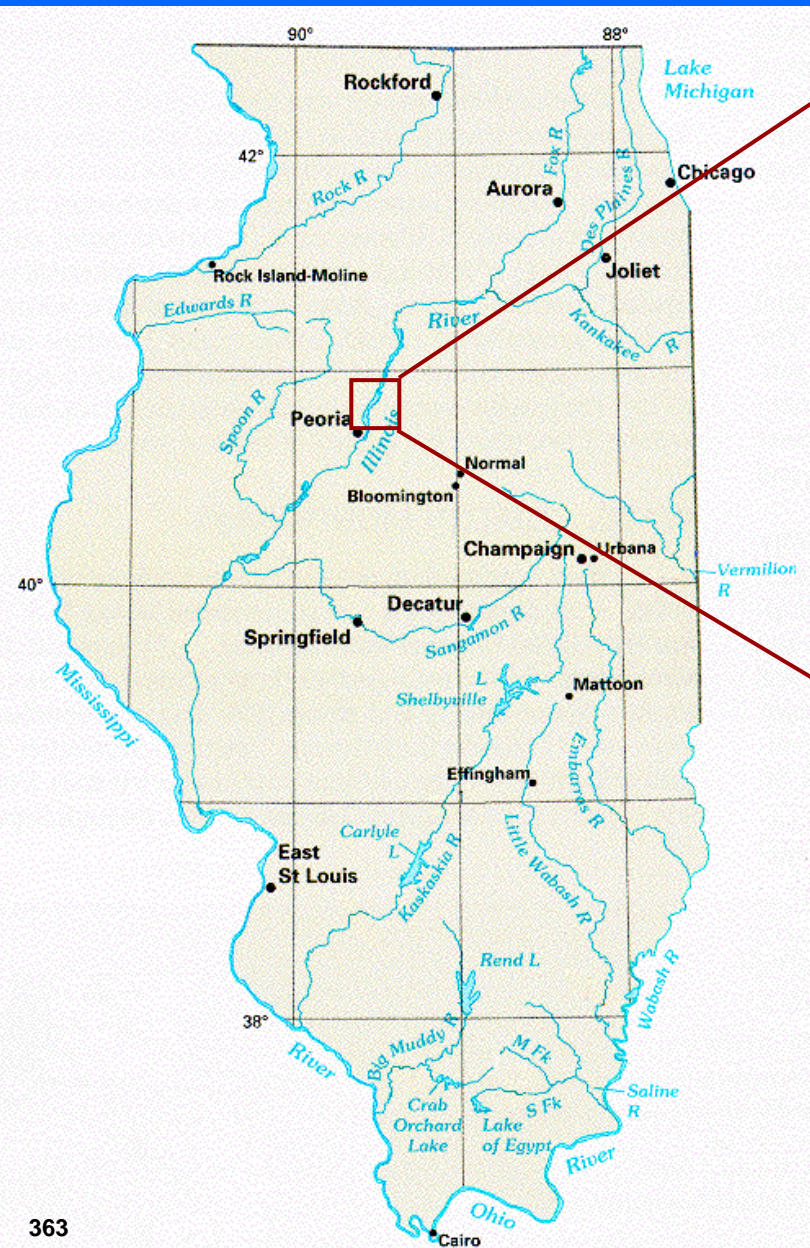
John C. Marlin

Waste Management and Research Center

Illinois Department of Natural Resources

January 2006

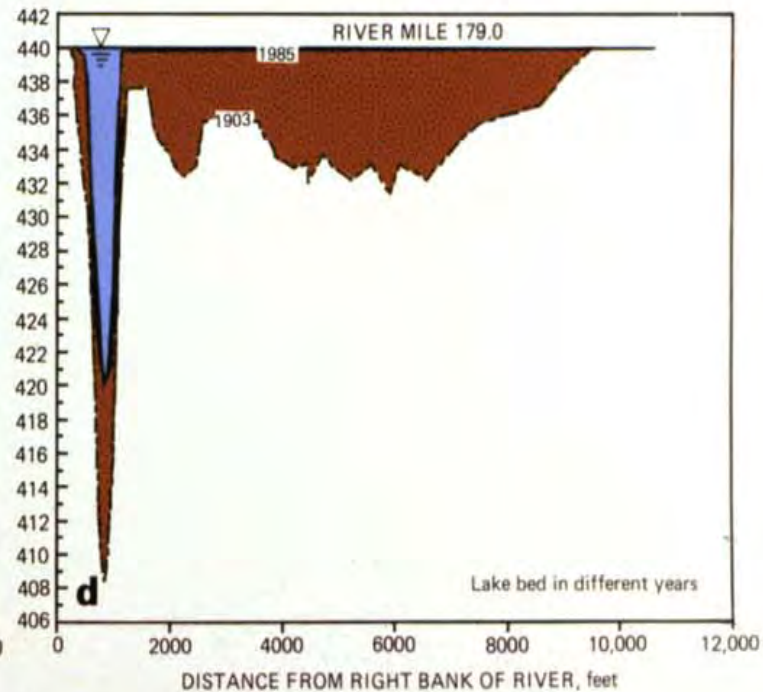
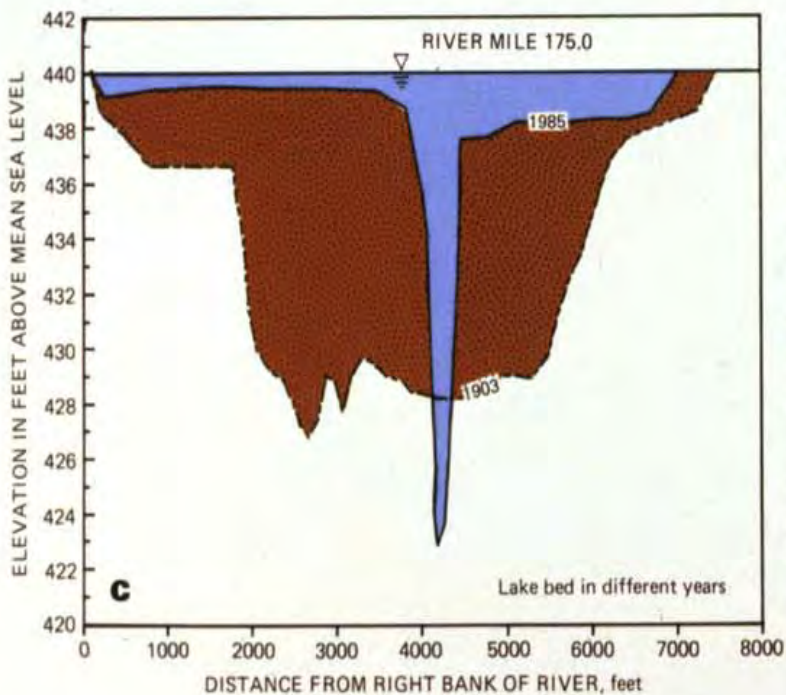
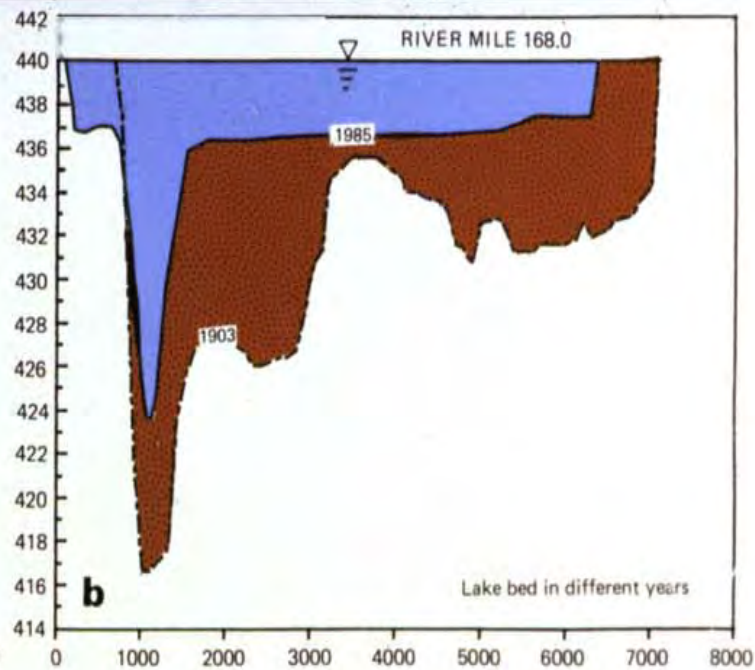
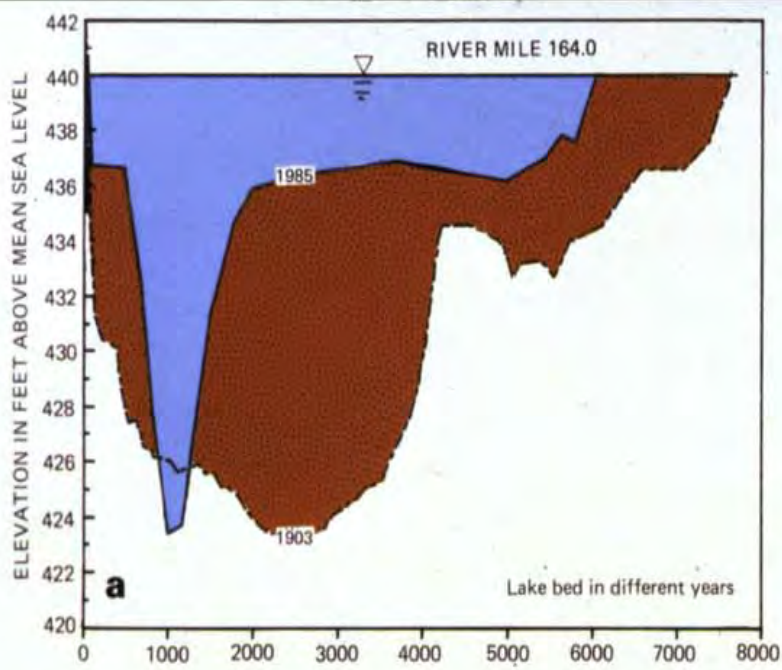
# Source of Sediment



Sediments were obtained from the Peoria Lake portion of the Illinois River (River mile 165).

# Lower Peoria Lake 1998





# Beneficial Use Considerations

- What is the sediment's quality
- Vast quantities of sediment
- Limited local placement sites
- Limited local demand for soil
- Shipping weight and distance issues
- High solids vs hydraulic dredging
- Multiple benefits

# DREDGE SPOIL ???

- Take the O out of SPOIL  
and you have SPIL

---D. Thomas, PhD.

- Take the P out of SPOIL  
and you have SOIL

---C. Lee, PhD.



Pontoon Boat with Vibra Core

<b>CHEMICAL CONTENT OF FOUR CORES IN EAST PORT CHANNEL AREA IN LOWER PEORIA LAKE</b>					
<b>Chemical</b>	<b>Units</b>	<b>SWS 199 LPL</b>	<b>SWS 200 LPL</b>	<b>SWS 196 LPL</b>	<b>SWS 195 LPL</b>
Mercury	mg/Kg	0.25	0.34	0.22	0.3
Arsenic	mg/Kg	9.6	9.2	6.8	8.4
Chromium	mg/Kg	42	65	25	57
Lead	mg/Kg	48	67	31	59
Benzo(a)pyrene	ug/Kg	250	340	200	320
Dieldrin	ug/Kg	16	16	15	16
Aroclor 1016	ug/Kg	32	31	30	31
Aroclor 1254	ug/Kg	74	210	32	180



# Soil Profile in Sediments at West Side Pit



# Greenhouse Experiment II

Sediments + Biosolids

Start of experiment

End of experiment



# Sand Farm Crop Harvest





Sept. 26, 2002.





10. 7. 2002

# Paxton 1, 2004





Paxton 1 Sediment Plot Feb. and Sept 2003



# Plant Roots on Sediment at Paxton, 9/2003





QUINN and LaHOOD, Apr. 6-04

# US STEEL SOUTH WORKS SITE

An aerial photograph of the US Steel South Works site in Pittsburgh, Pennsylvania. The image shows a dense urban grid on the left, transitioning into a large industrial complex on the right. The industrial site is divided into several sections, with two specific areas highlighted by white boxes and labels. The Allegheny River is visible at the bottom and right edges of the image.

**PROPOSED  
LAKEFRONT PARK  
NORTH EAST**

**PROPOSED  
LAKEFRONT PARK  
SOUTH EAST**





Mud to Parks Process 2004 short



# 12 Barge tow (salt, sand, mud)











April 22, 2004, (mud placed 4-13-04)



# 6-25-04 Looking South on Stacked Reclaimed Topsoil



USX Sept. 2, 2004



USX Sept. 26, 2004



USX April 11, 2005







Sept. 16, 2005



## Approximate Cost – Removal, Transport and Placement

USX –168 mi barge, <1 mi truck

– Air dried soil -- \$20.72 / cu yd

– Wet sediment -- 16.63 / cu yd

Banner Marsh -- 20 mi barge, 5 mi truck

-- Air dried soil -- \$12.85 / cu yd

-- Wet sediment -- \$10.31 / cu yd

# FUTURE CONSIDERATIONS

Find sites where drying time is not an issue

Identify locations to dry and stockpile

Sediment for quick application

Look into blends with other material such as  
biosolids and compost

Determine if sandy material from deltas and  
navigation channel is useful

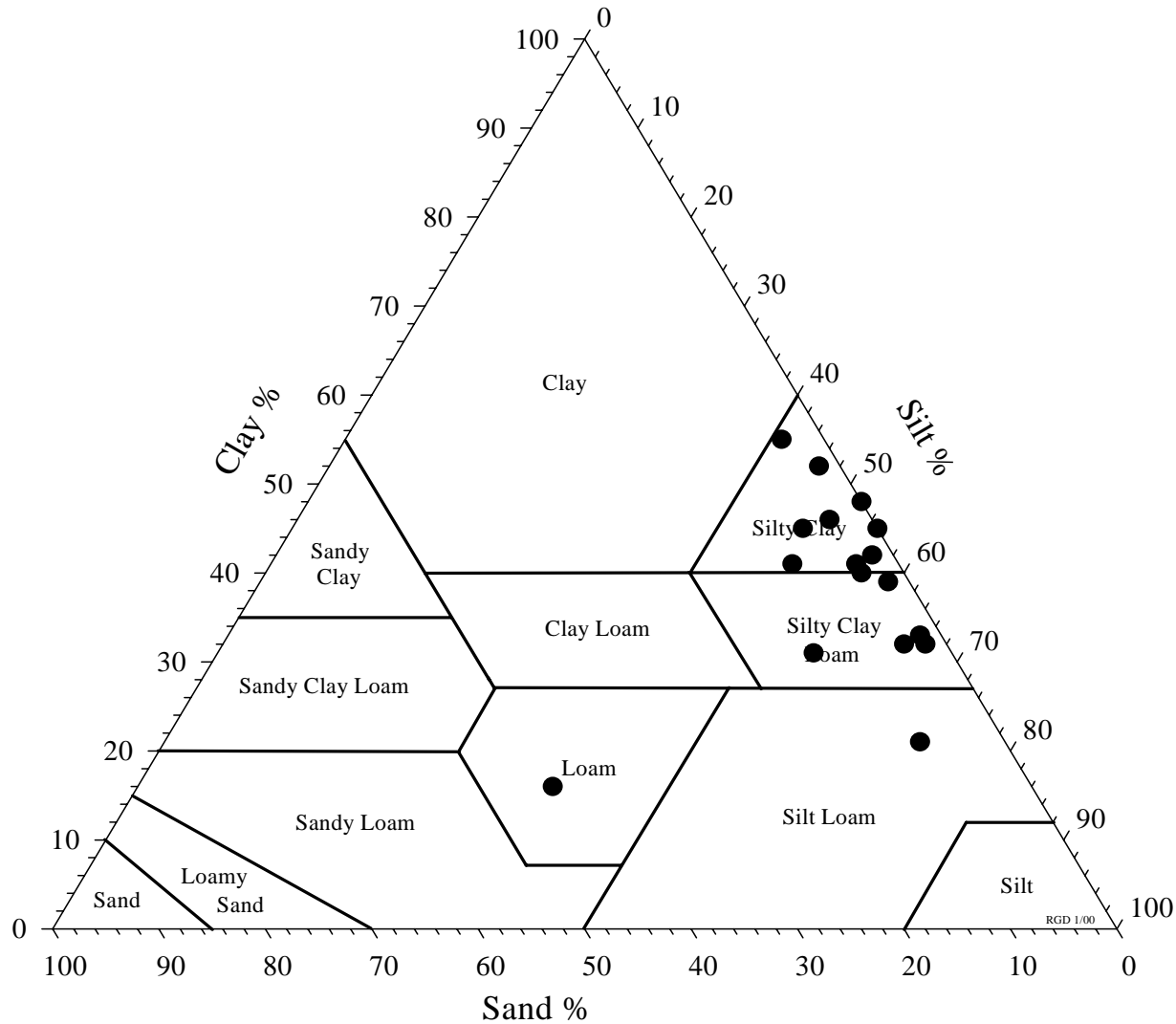
W W W. WMRC.UIUC.EDU

<http://ilrdss.sws.uiuc.edu/>

Some of the Many Collaborators:

Illinois State Water Survey; Illinois Geological Survey; Illinois Natural History Survey; Rock Island District, USACE, ARTCO Fleeting; Midwest Foundation; Caterpillar Inc; Kress Corp; Chicago Park District; Fon Du Lak Park District; Finch Trucking; numerous other private and government entities.





Representative samples from 2 m cores in Lower Peoria Lake on USDA texture triangle

# Metal Contents ( $\text{mg kg}^{-1}$ ) of Soil and Sediments Used in the Greenhouse Experiment I

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Material	Cd	Cr	Cu	Ni	Pb	Zn
<b>Drummer-Flanagan</b>	< 1	29	20	22	18	60
<b>Fresh Sediment</b>	3	48	43	38	40	241
<b>Weathered Sediment</b>	4	61	43	36	54	293

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# Metal Contents ( $\text{mg kg}^{-1}$ ) of Tomatoes Grown in Soils and Sediments in Greenhouse I

Material	Cd	Cr	Cu	Ni	Pb	Zn
<b>Drummer-Flanagan</b>	0.1	2	13	2	0.5	26
<b>Fresh Sediment</b>	0.4	< 2	12	1	0.4	25
<b>Weathered Sediment</b>	0.5	< 2	8	1	0.3	21
<b>Peoria</b>	0.4	< 2	10	1	0.2	20
<b>Champaign</b>	0.2	3	21	13	0.9	21



# Metals in Sand Farm Soybean Grain (mg / kg)

<b>Sediment (cm)</b>	<b>Zn</b>	<b>Mo</b>	<b>Cd</b>	<b>Pb</b>	<b>Hg</b>	<b>Cu</b>
<b>0</b>	<b>24</b>	<b>2</b>	<b>0.1</b>	<b>0.02</b>	<b>0.0005</b>	<b>4</b>
<b>15</b>	<b>40</b>	<b>22</b>	<b>0.3</b>	<b>0.03</b>	<b>0.0006</b>	<b>9</b>
<b>30</b>	<b>40</b>	<b>20</b>	<b>0.4</b>	<b>0.06</b>	<b>0.0008</b>	<b>8</b>

# Snapbean Metal Concentration, Greenhouse II

Treatment	Ti	Ni	Cu	Zn
	----- mg kg <sup>-1</sup> -----			
100-0 †	16	4	5	31
70-30	13	2	6	52
50-50	13	4	6	58
0-100	20	8	9	101
80-0-20 ‡	4	2	3	20
control	10	2	3	22

† Sediment %, Biosolid %

‡ Horse Manure

# Illinois BaP Background Levels

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Chicago Study 1.30 \*

EPRI Study \* :

- State wide 1.35
- Metro (SMA) 2.14
- Non Metro 0.98
  
- TACO Cleanup reg. 0.09 mg kg<sup>-1</sup>

\* Log normal 95% percentile mg kg<sup>-1</sup>

**Table1. Typical values for soil fertility from Illinois River sediments and Illinois agricultural topsoils.**

Material	pH	Organic matter (%)	Ca (mg / kg)	P (mg / kg)	K (mg / kg)	Na (mg / kg)
Illinois Topsoil	6.4	3	2758	13	137	26
IL River Sediment	7.5	3	7020	35	164	73

**Table2. Typical values for some heavy metals from Illinois River sediments and Illinois agricultural topsoils.**

Material	Cd (mg / kg)	Cr (mg / kg)	Cu (mg / kg)	Ni (mg / kg)	Pb (mg / kg)	Zn (mg / kg)
Illinois Topsoil	<1	29	20	22	18	60
IL River Sediment	3	48	43	38	40	241





Fall 2004



Wm. Powers St. Pk., 2005





USX Dec. 15, 2004









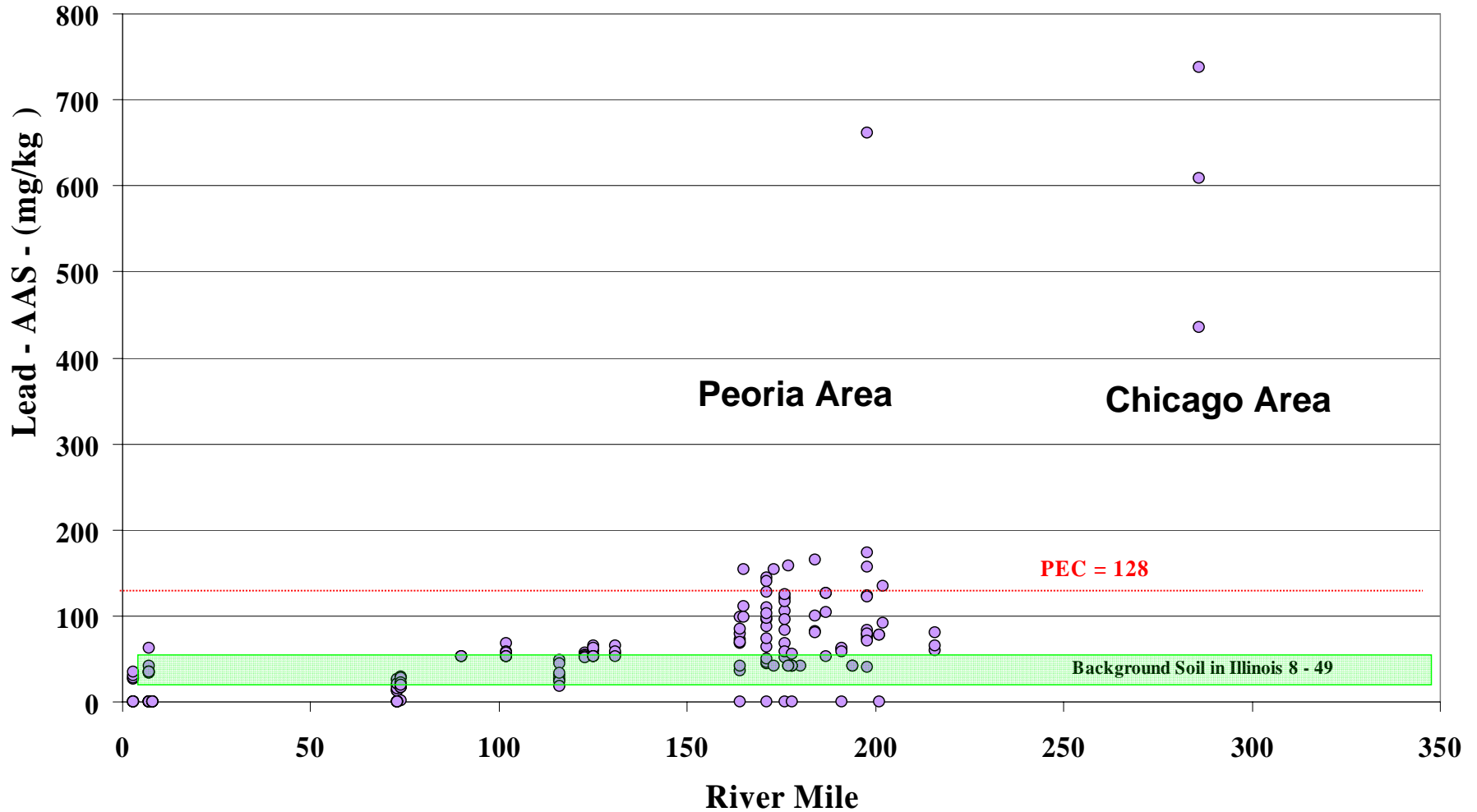


Lake Peoria Sediment  
Dried in Field  
May-Aug. 2000



Lake Peoria Sediment  
Spring 2001  
after Weathering

## Distribution of Lead in Sediments of the Illinois River Relative to Distance from Confluence with the Mississippi River



# Approximate Cost – Removal, Transport and Placement

USX – 270 km barge, <1.6 km truck

- Air dried soil -- \$27.11 / cu m (\$20.72 / cu yd)
- Wet sediment -- \$21.75 / cu m (16.63 / cu yd)

Banner Marsh -- 32.2 km barge, 8 km truck

- Air dried soil -- \$16.81 / cu m (\$12.85 / cu yd)
- Wet sediment -- \$13.50 / cu m (\$10.31 / cu yd)

# Other Placement Options

- Use on farms with poor soil
- Amend good farmland
- Place on strip mines
- Islands (limited)
- Stockpile nearby – big piles



# Some Remaining Issues

- Rights to sediment
- Funding and cost share issues
- Comfort level
- Regulatory matters
- Shallow cutting dredge technique
- Intergovernmental barriers
- Sample other areas (chem. and Agronomic)