Great Lakes Areas of Concern & Property Values

Presented to the Chicago Federal Reserve Bank (Detroit Branch) Seminar
Freshwater and the Great Lakes Economic Future
Detroit, MI
November 10, 2008

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Acknowledgements

USEPA/GLNPO # GL-96553601

Illinois-Indiana Sea Grant Program

AOM NA06 OAR4170079 R/CC-06-06

USDA-CREES/ IL Ag Exper Sta

MRF 470311 & # ILLU-470-316

Thanks to Xia Feng and DooHwan Won for their assistance. Any opinions, interpretations, conclusions, and recommendations are entirely the responsibility of the author and do not necessarily reflect the views of the sponsors or the Federal Reserve System.

Areas of Concern in the Great Lakes - St. Lawrence River Basin

Nipigon Bay
Jackfish Bay
Peninsula Harbour
Thunder Bay
Lake Superior
Torch Lake
St. Marys River
Spanish Harbour
St. Louis Bay/River
Deer Lake-Carp Creek/River
Manistique River
Georgian Bay
Severn Sound
Lake Huron
Menominee River
Collingwood Harbour
Fox River/Southern Green Bay
Saginaw River/ Saginaw Bay
Lake Michigan
Metro Toronto
Hamilton Harbour
Niagara River (Ontario)
Sheboygan River
White Lake
St. Clair River
Clinton River
Milwaukee Estuary
Muskegon Lake
Detroit River
Lake Erie
Rouge River
Waukegan Harbor
River Raisin
Maumee River
Grand Calumet River
Kalamazoo River
Wheatley Harbour
Cuyahoga River
Black River
Ashtabula River
Presque Isle Bay
Bay of Quinte
Port Hope
Lake Ontario
Oswego River
Rochester Embayment
Eighteen Mile Creek
Niagara River (New York)
Buffalo River
St. Lawrence River (Cornwall)
CANADA
U.S.A.
St. Lawrence River (Massena)

Legend
- Binational RAPs
- Canada
- U.S.A.
- Areas in Recovery
- Delisted Canadian AOCs
- Delisted U.S. AOCs

http://www.epa.gov/glnpo/aoc/index.html

The Remediation Agenda

- Cost of remaining remediation of U.S. AOCs ~ $1.5B - $4.5B (Great Lakes Regional Collaboration, 2005)
- Great Lakes Legacy Act - $250M authorized, $125 appropriated (’04 – ’08); $100 reauthorized

Are the benefits worth the costs??

Research Question

How much economic value has been lost due to legacy contamination of the Great Lakes?

- Ecosystem health impairment
- Human health impairment (e.g., fish ingestion)
- Reduced recreation & tourism
- Reduced property values

Methodology

1. *Meta-analysis*: Study of studies to identify points of agreement and difference. Applied to property value studies of contam. sites.

   120+ applications in environmental economics
   (Nelson & Kennedy 2008)

2. *Benefit function transfer:* Apply meta-analysis results functionally to Great Lakes Areas of Concern (AOCs)

Related Literature

7 economic studies of specific AOCs

3 qualitative reviews of waste site studies (Faber 1998, Kiel & Boyle 2001, and Simons 2006)

1 all-encompassing quantitative meta-analysis of localized amenities/disamenities (Simons & Saginor 2006)

2 cross-sectional studies of NPL sites: Kiel & Williams (2007) & Greenstone & Gallagher (forthcoming)

1. Meta-analysis

46 hedonic studies (1971 to 2007) of property value effects of nonhaz. landfills, hazardous sites (NPL, CERCLIS), aquatic contaminated sites, & nuclear sites

142 value estimates (129 after outliers)

% Price impact = f (*site characteristics, data characteristics, methodology)*

Explanatory Variables

Site Characteristics

Type (NonHaz, Haz, Nuc, Aquatic)

Region

Site size (mean distance)

Cleanup status (Haz)

NPL

Employment

Data Characteristics

Residential/commercial

Parcel/census/assessment

Single/multiple sites

Sample size

Neighborhood controls

Date of data

Mortgage rate

Methodology

Linear vs. nonlinear distance

Discrete vs. contin. environ.

Published

Significance of results

Spatial correlation control

Results – Explaining % Price Effect (+)

Base Case (in constant)

Nonhazardous sites

East North Central Region

Models (Adj R^2 0.47 – 0.57)

Robust OLS

Random-effects panel

Weighted LS (w/in studies) – Best

Consistently Significant Explanatory Variables

Constant (-)

Hazardous sites (+)

Aquatic sites (++)

NPL (-)

Residential (+)

Site Size (Distance) (-)

Parcel-level data (+)

Demograph. controls (+)

Access controls (+)

Published (+)

Significance (+)

Mountain (+)

Mid-Atlantic (+)

East South Central (+)

South Atlantic (+)

West North Central (-)

Canada (+)

Usually Insignificant Variables

Nuclear

On-site employment

Cleanup status

Sample size

Industry controls

Time

Mortgage rate

Linear

Discrete

Pacific

New England

West South Central

Spatial corr. control

2. Benefit Function Transfer

% Price impact = f (*site characteristics, data characteristics, methodology)*

Regional computed % discounts (from meta model)

- ***NE States: 17.6%***
- ***ENC States: 7.8%***
- ***WNC States: 4.6%***

 # Homes w/in 2 miles of each AOC

Median home prices for each AOC

Illustrative Transfer Data

Table 1. Data for Census Tracts within 2 Miles of AOCs

US AOC	Area (mi^2)	# Tracts	# Homes	Median Price ($2000)
Ashtabula River, OH	35	11	9,747	84,235
Buffalo River, NY	14	15	5,264	58,996
Deer Lake, MI	191	10	6,146	75,739
EighteenMile Creek, NY	4	1	690	84,100

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For 23 U.S. AOCs excluding Black, Clinton, Cuyahoga, Detroit, Maumee, & Rouge Rivers, and Saginaw Bay, due to size and overlap

Benefits Transfer Summary Results

Owner-occupied residential property values, 23 AOCs

	%	# Sites	$ Loss
Total loss of property value			$1,737,342,920
Mean loss per site	10.641	8,756	75,536,649
Std. dev. (sites)	4.766	4,043	105,994,835
Std. err.	0.994	843	22,101,451
95% up. conf. limit per site	12.589	10,408	118,855,492
95% low. conf. limit per site	8.693	7,103	32,217,805

Summary

1. Estimated the effect of noxious sites on surrounding residential property values
2. Calibrated meta-function to specific circumstances of AOCs (assuming meta-sample mean values for most variables)
3. For 23 U.S. AOCs (excepting very large and/or overlapping cases), using 2000 median home prices and quantities within 2 mile radius, estimated property value loss is $1.7 billion.

Outstanding Questions

1. Methodological:
   - ❖ Controls for confounding factors (e.g., RCRA sites and NPL status of AOCs)
2. Policy:
   - ❖ Property losses (> $1.7 B) alone are in the range of remediation costs ($1.5B - $4.5B)
   - ❖ Will remediation recover values?
   - ❖ Additional benefits through recreation, tourism, ecosystems, & commercial property values

Recovering Property Values

- Census-based comparison of tracts with and without NPL sites indicates clean-up makes little difference (Greenstone & Gallagher, forthcoming)
- Pre-post analysis of 57 NPL sites is inconclusive about effects of remediation (Kiel & Williams, 2007)
- Pre-post analysis of Dallas site suggests hysteresis due to neighborhood effects (McCluskey & Rausser, 2003)
- “Cleanup stage” insignificant in our analysis

Conclusions

1. Studies of aquatic sites estimate largest property value impacts; NPL status moderates the effects

2. "Benefit transfer" forecasts $1.7B losses in residential values at 23 U.S. AOCs -- within range of estimated remediation costs

3. Remediation may not fully recover values. What else is required?