Environment Canada Environnement Canada

Canada

Status of Lake Erie Waterbirds

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Outline

- Waterbird Population Trends
- Cormorant Management and Island Habitats
- Legacy Contaminant Trends
- Emerging Contaminants
- Research Needs

Population Trends

The Joint Canadian-U.S. Decadal Great Lakes Colonial Waterbird Census

Four surveys: 1970s-2000s

Population trends for the 9 common species nesting on Lake Erie

The Joint Canadian-U.S. Decadal Great Lakes Colonial Waterbird Census


Great Black-backed Gull


Herring Gull


Ring-billed Gull


Common Tern


Caspian Tern


Double-crested Cormorant


Great Blue Heron

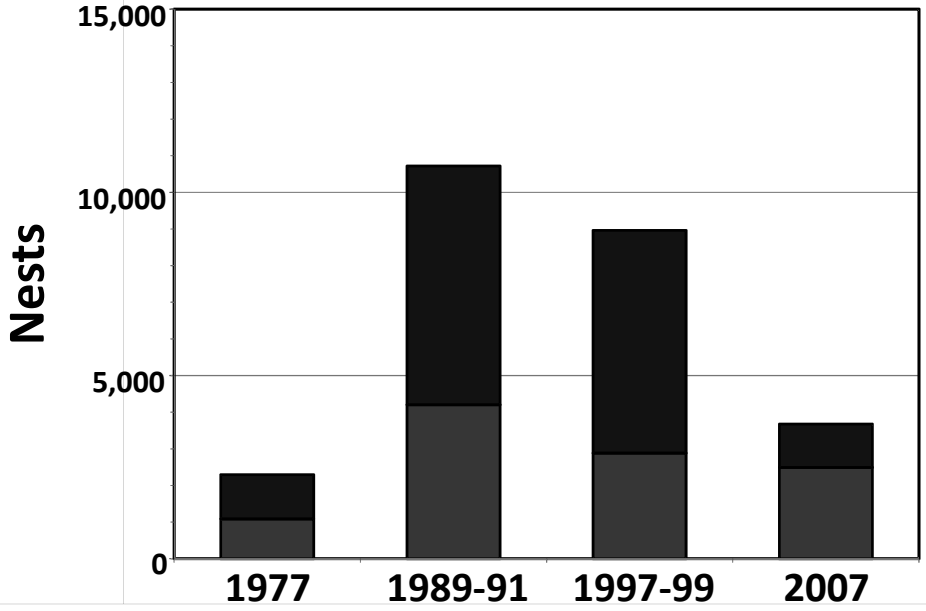

Great Egret


Black-crowned Night-Heron

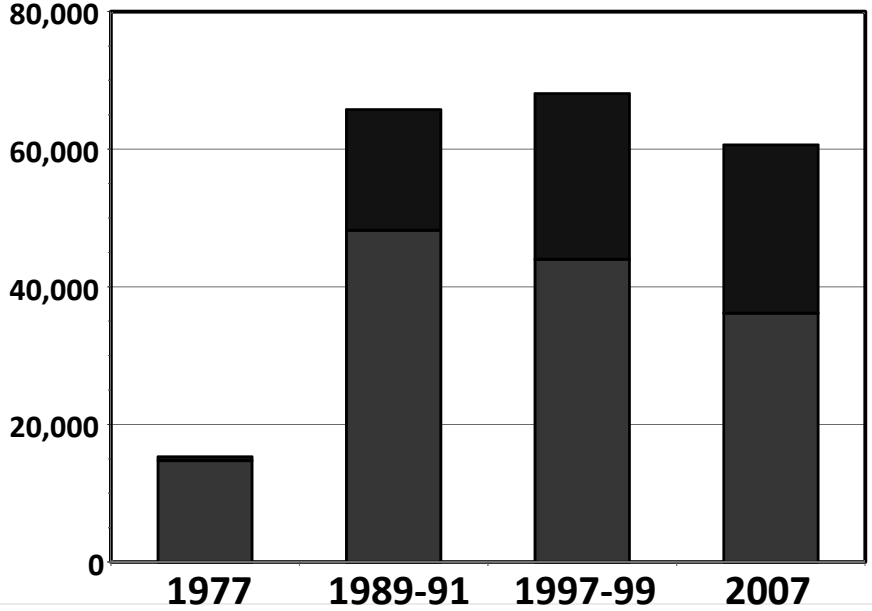
Gull Population Trends

U.S. Canada

Herring Gulls



Ring-billed Gulls



Survey period

Gulls

Great Black-backed Gulls

Great Lakes:

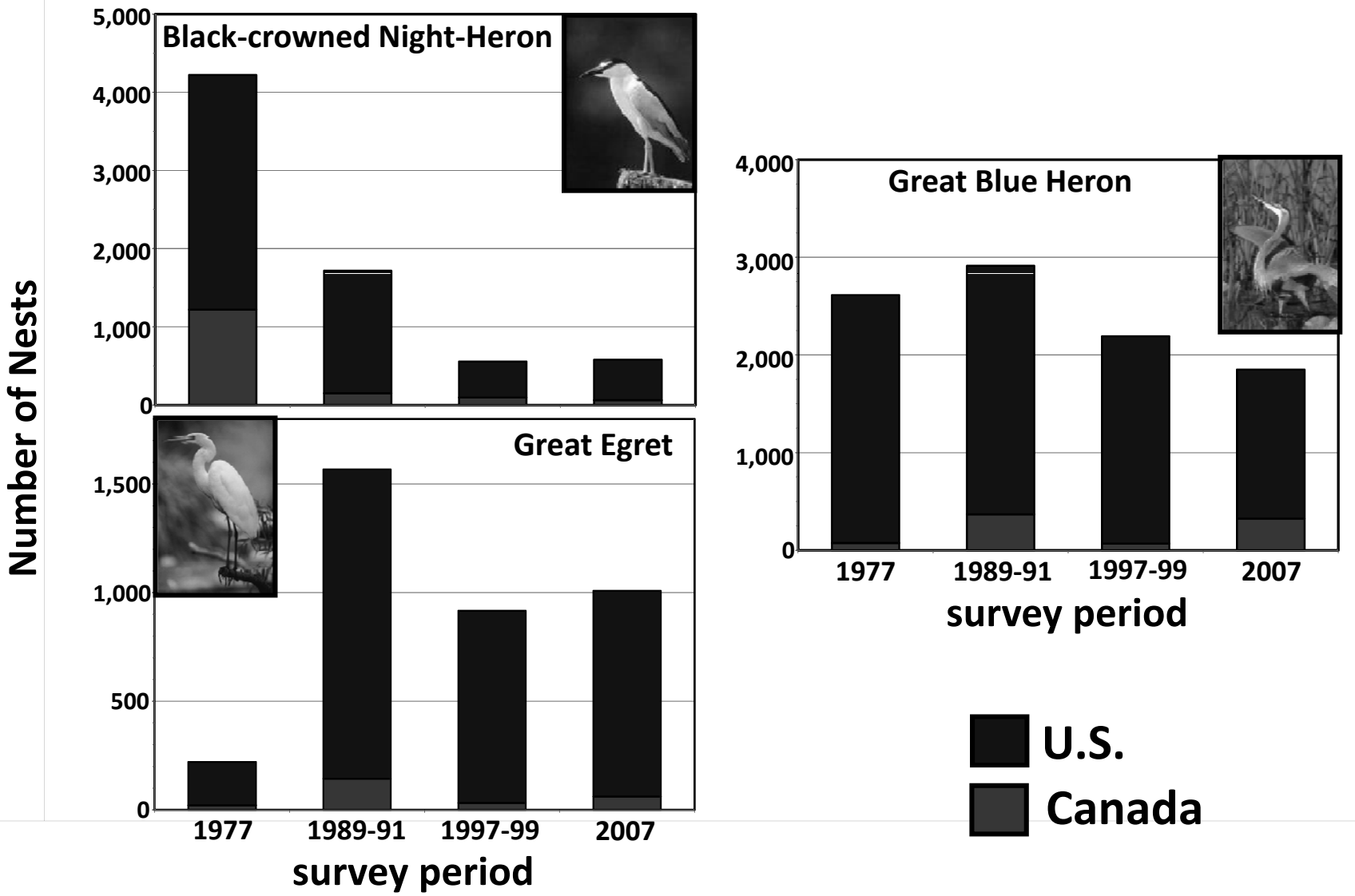
- 1st colonized in late 1950's
- Mid-1990s - ~50 pairs nesting in eastern Lake Ontario

Lake Erie:

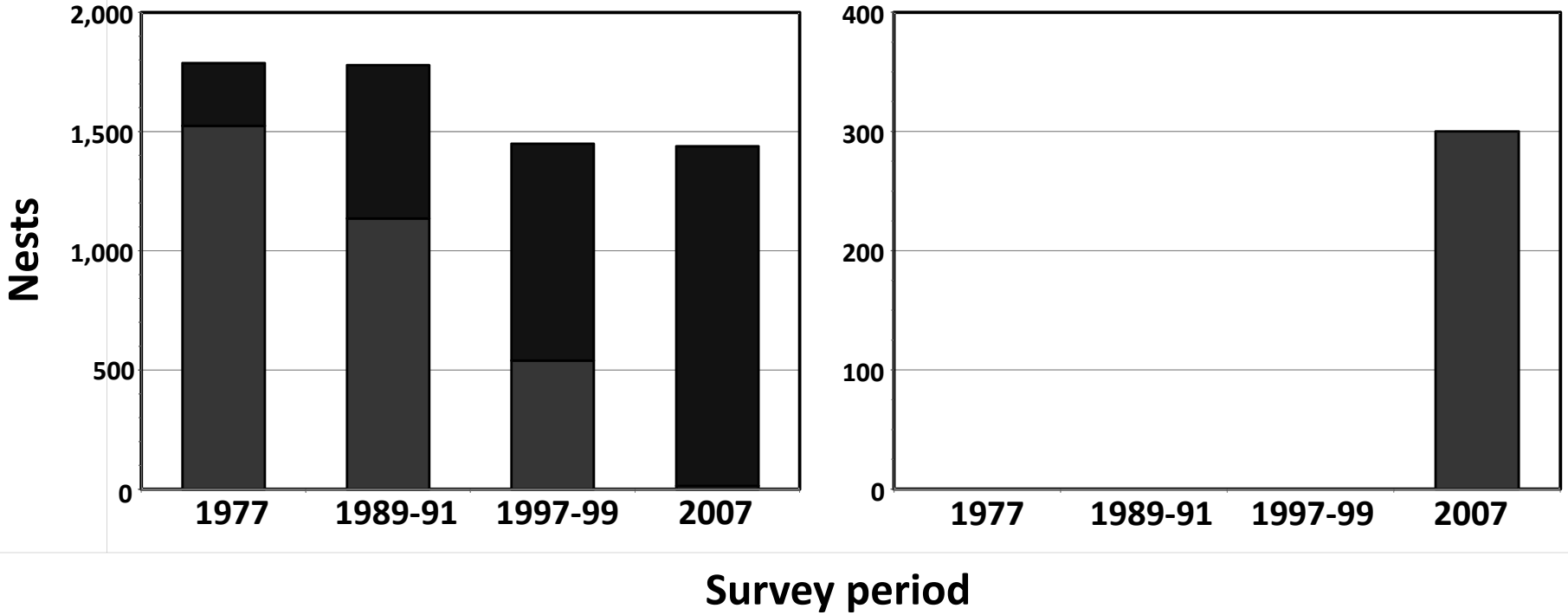
- 8 nests from 1991-2001
- Breeding population extirpated

    - Botulism type-E

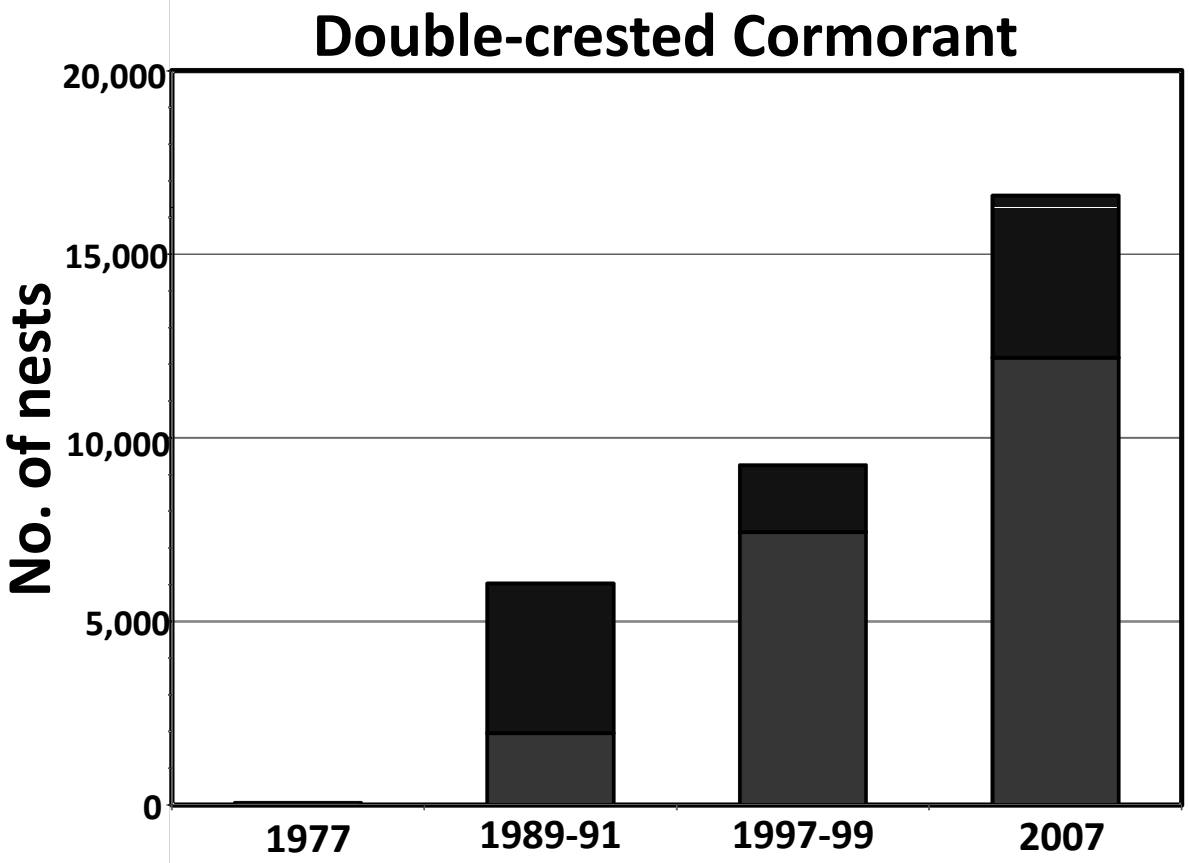
Wader Population Trends



Tern Population Trends



Cormorant Population Trends



U.S.

Canada

Summary – Erie Population Trends

Increasing:

- Double-crested Cormorants *(291 X increase)*
- Caspian Terns *(colonized in last decade)*

Stable:

- Ring-billed Gulls

Declining:

- Common Terns *(extirpated in Canada)*
- Black-crowned Night-Herons
- Great Blue Herons
- Great Egrets
- Herring Gulls
- Great Black-backed Gulls *(extirpated)*

Cormorant Management & Island Habitats

- Increasing double-crested cormorant populations
- North America 1-2 million birds

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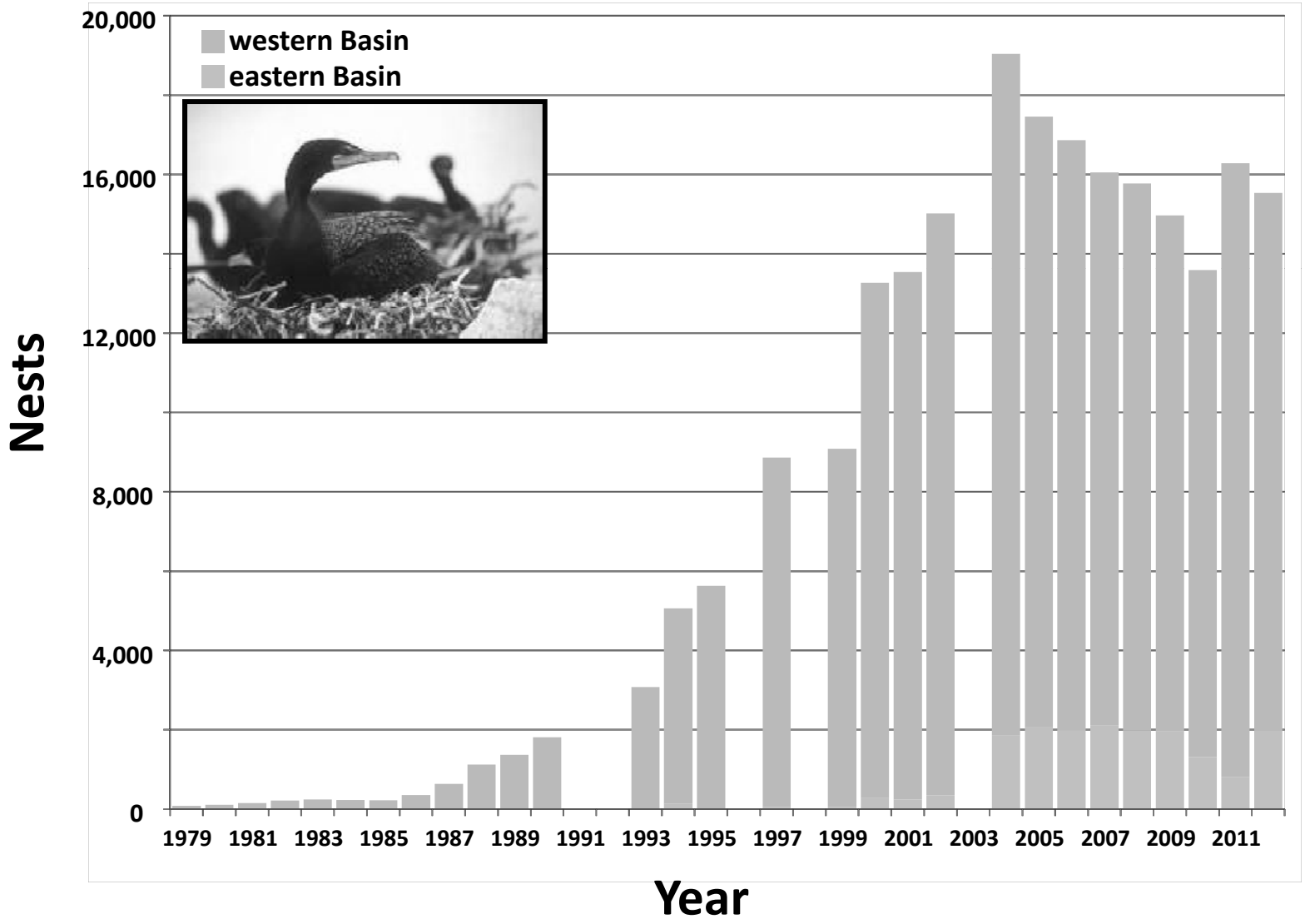
Cormorant Management & Island Habitats



Cormorant Impacts on Unique Island Habitats

- Impacts on breeding islands, habitat for rare species
- Lake Erie Islands are federal/provincial protected areas

- Previous Lake Erie research has linked cormorants to:

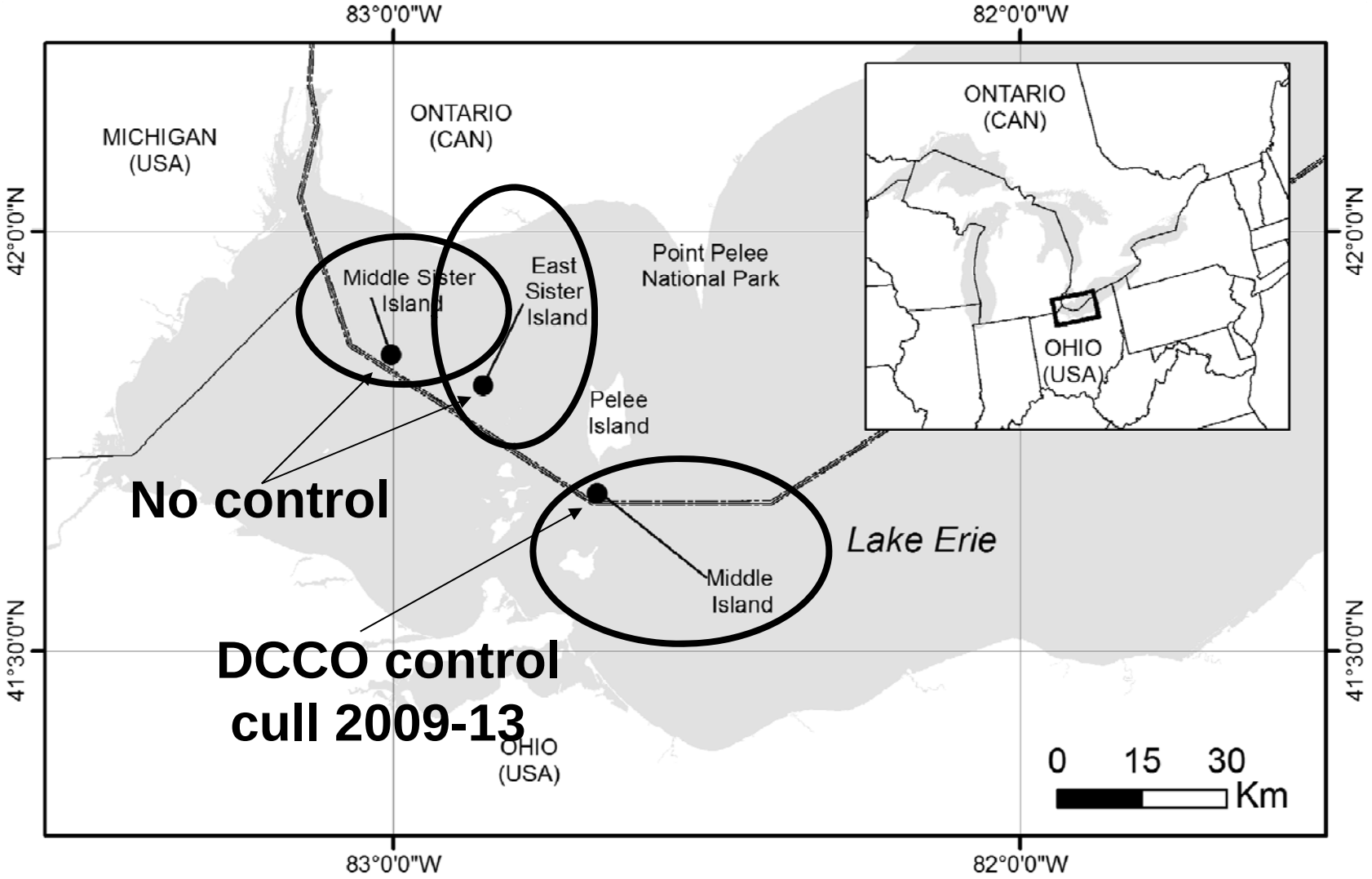
  1) declines in forest cover (Hebert et al. 2005, Duffe 2006)

  2) increased stress in trees (Duffe 2006)

  3) declines in understory vegetation (Boutin et al. 2011, McGrath and Murphy 2012)

  4) changes in soil chemistry (Duffe 2006, Boutin et al. 2011, Rush et al. 2011)

Cormorant Management in Lake Erie

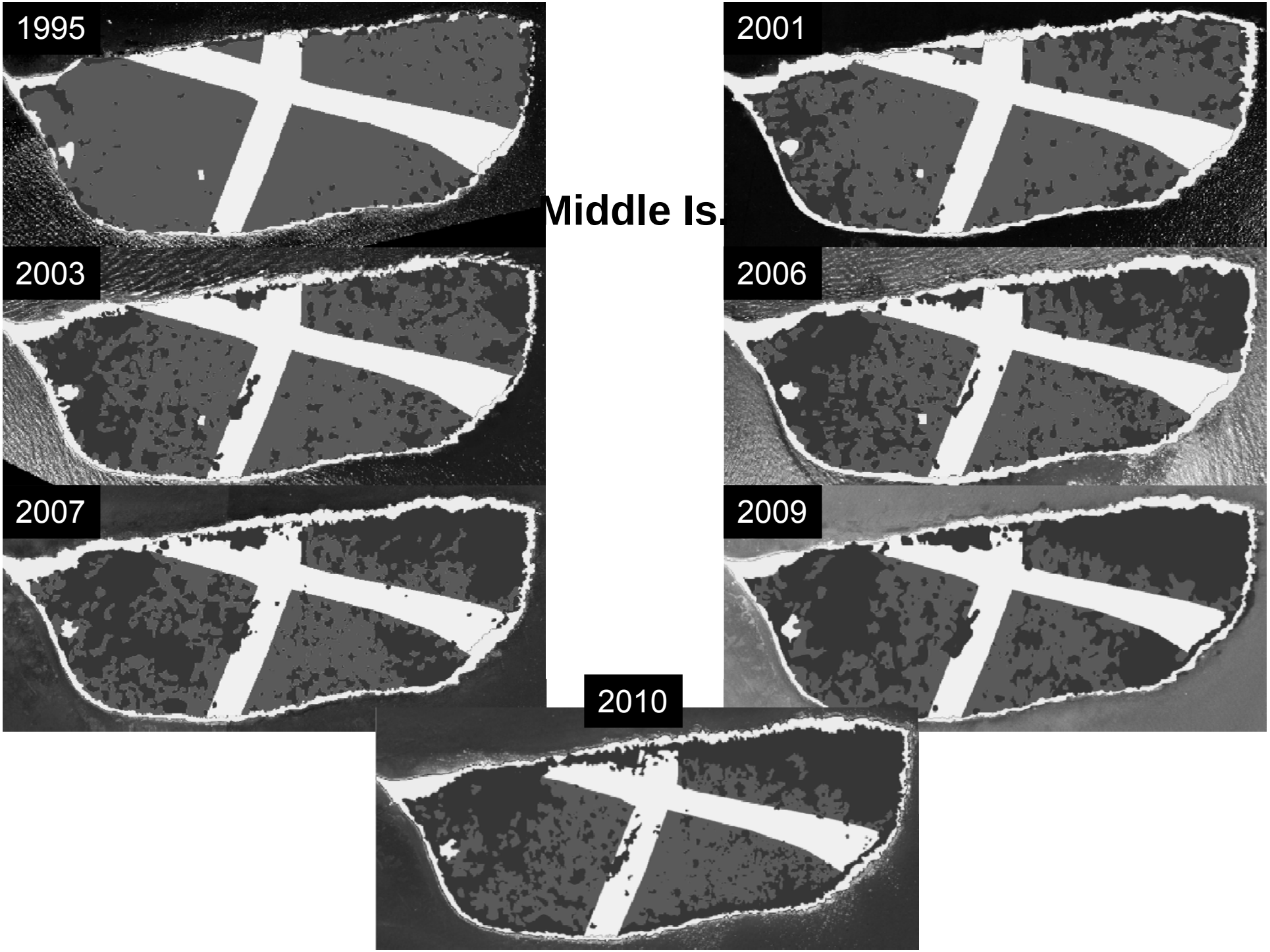


Assessing Impacts of Management

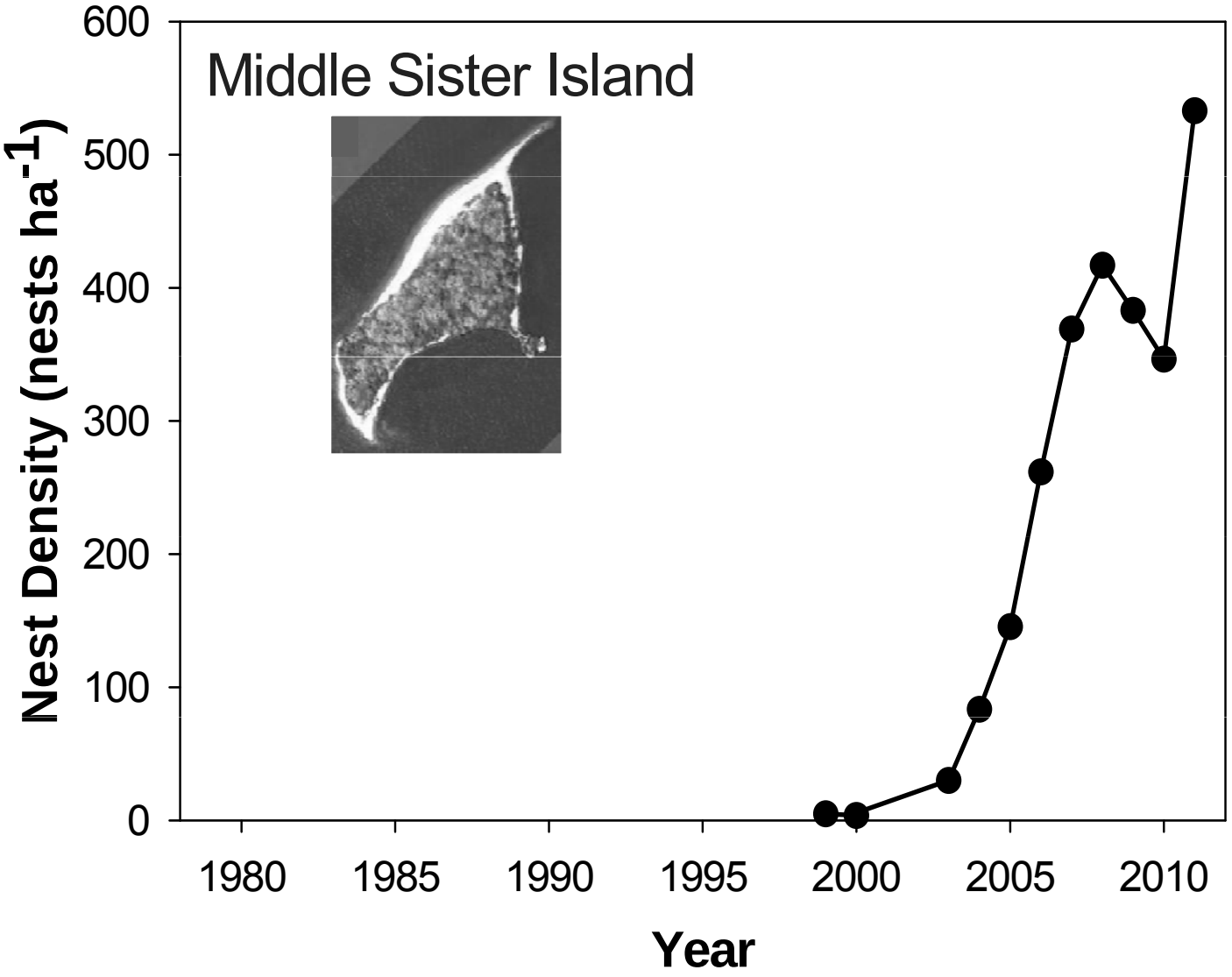
- Annual whole island DCCO nest counts allow estimates of nest density (nests ha^{-1})

- Aerial photos of islands
- Obtained through time:
  - Middle Sister Island
  - East Sister Island
  - Middle Island

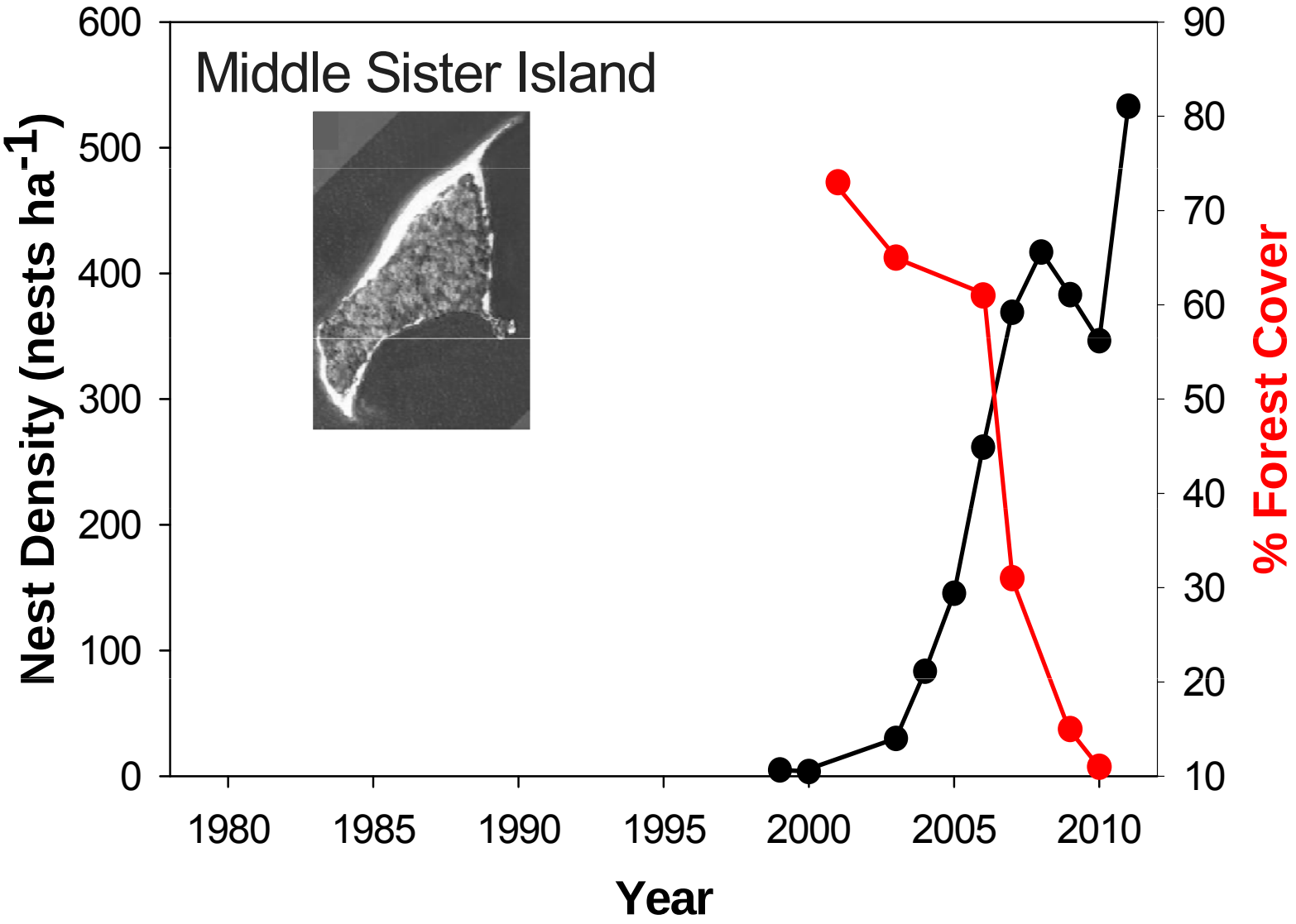
} 1995 (MI), 2001, ’03, ’06, ’07, ’09, ‘10, ‘13


1995
2001
Middle Is.
2003
2006
2007
2009
2010

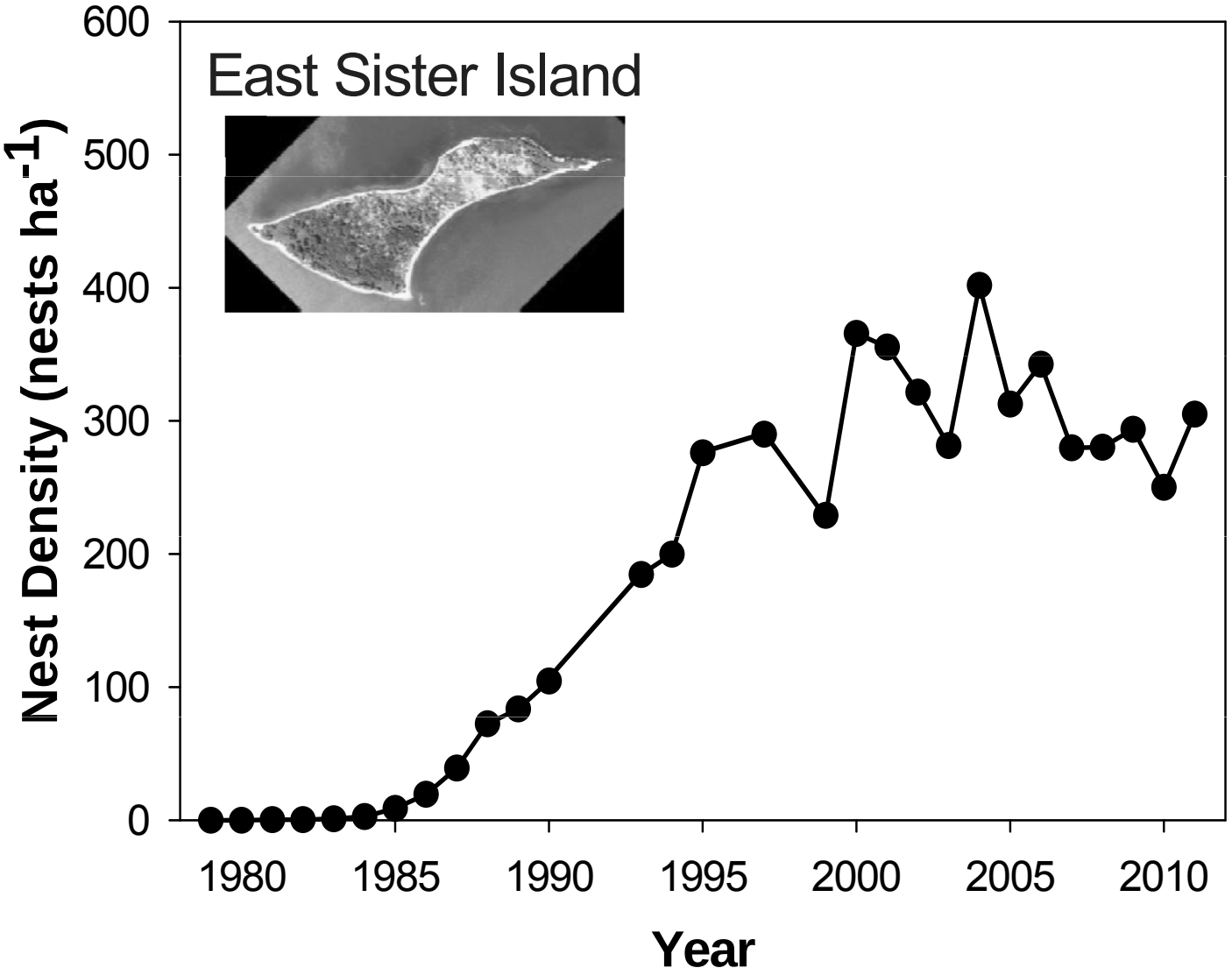
No DCCO Management



No DCCO Management



No DCCO Management



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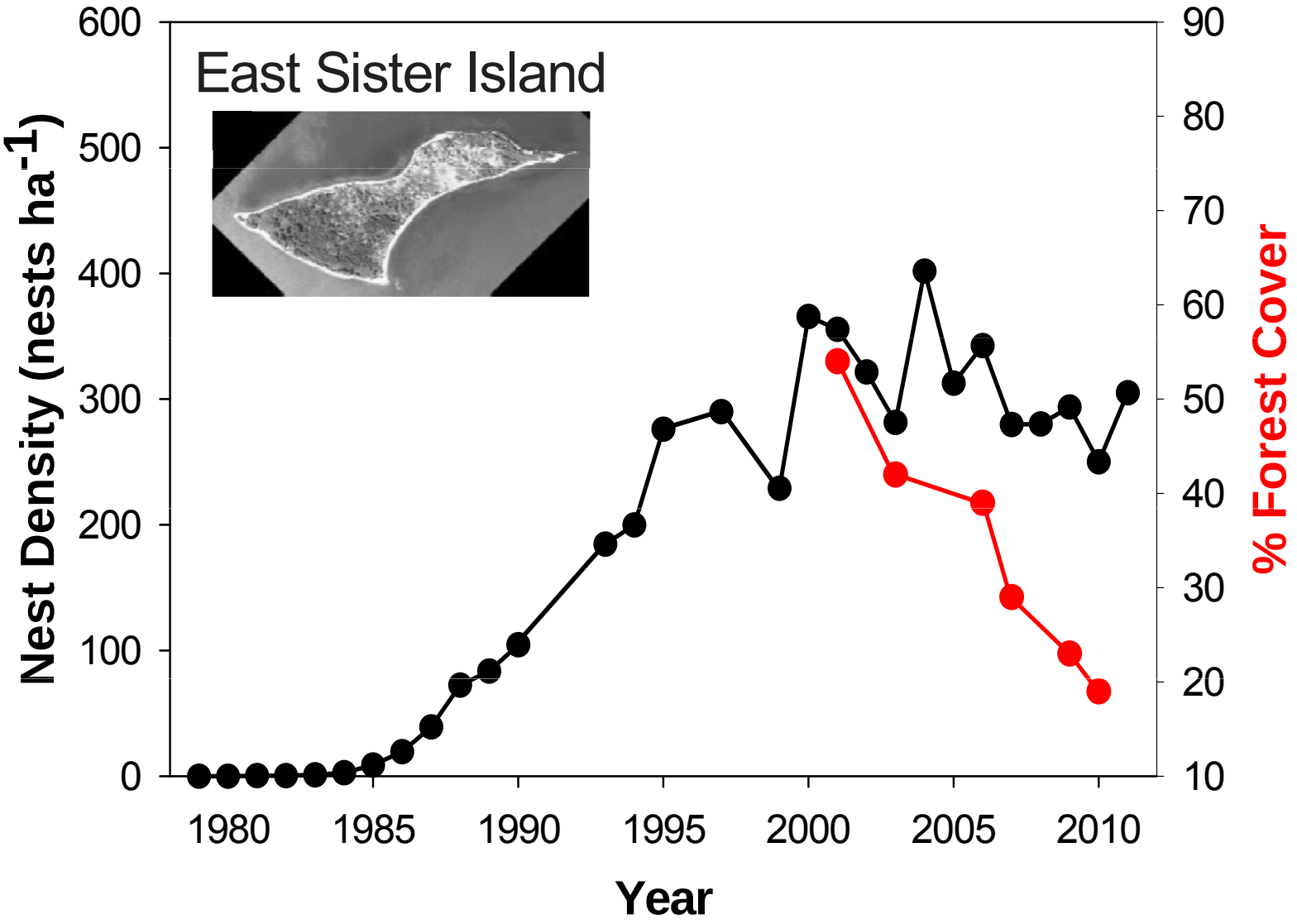
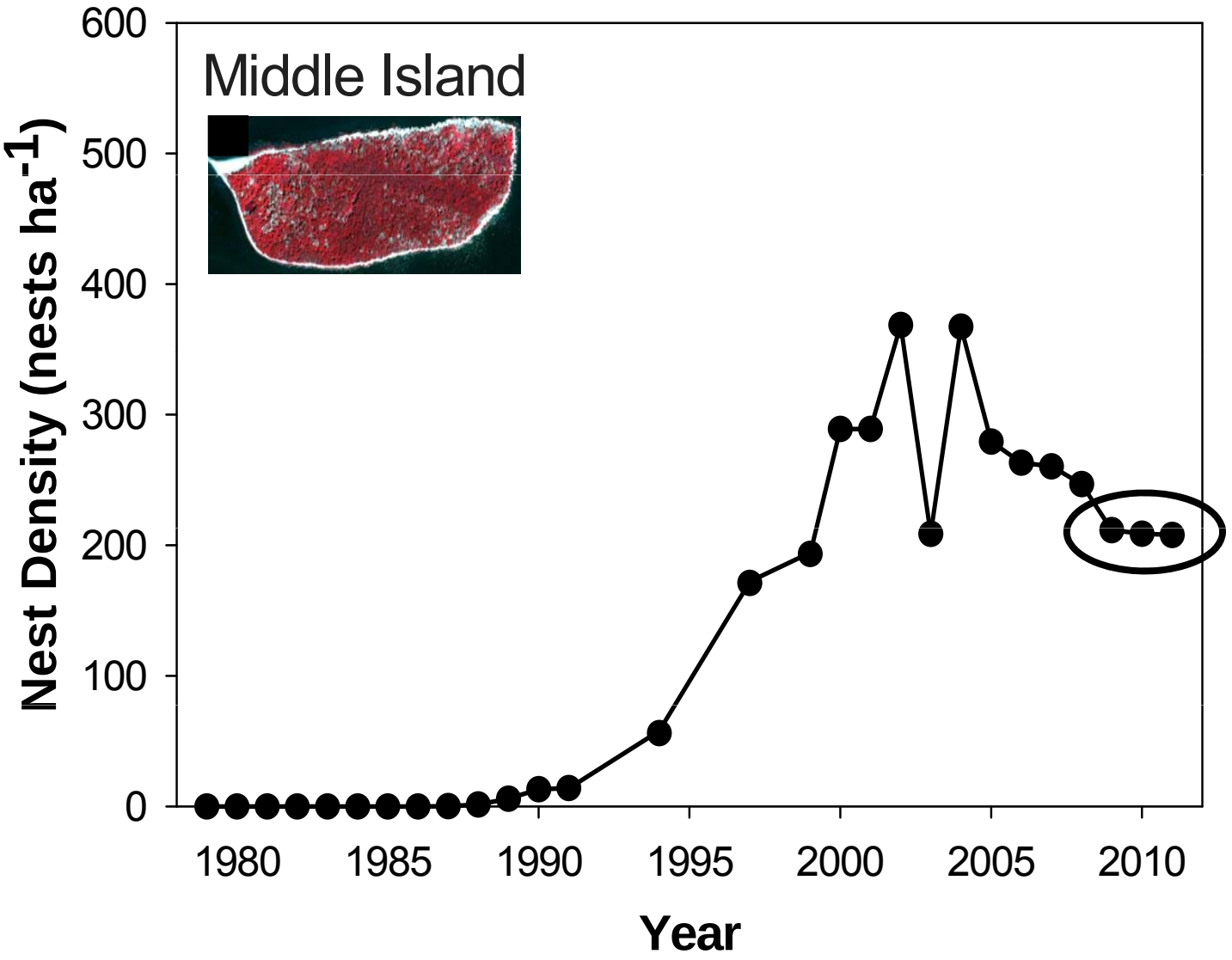
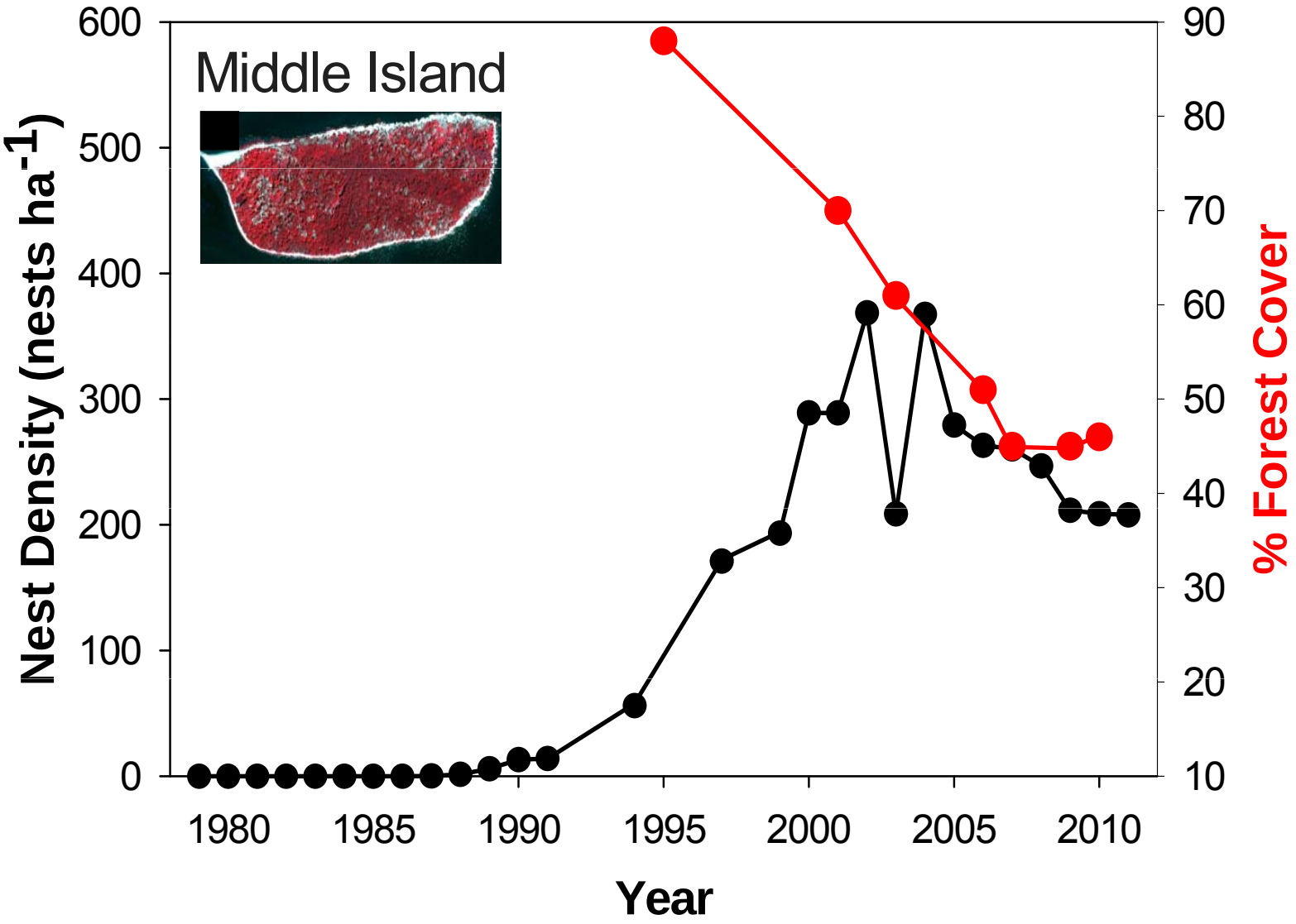


DCCO Management



DCCO Management



Cormorant Management & Island Habitats

- Vegetation on islands with no cormorant management continues to degrade

MSI May 2013

- Forest on Middle Island may be benefitting from cormorant management

- Benefits to other ecosystem components may be occurring on Middle Island

May 2013

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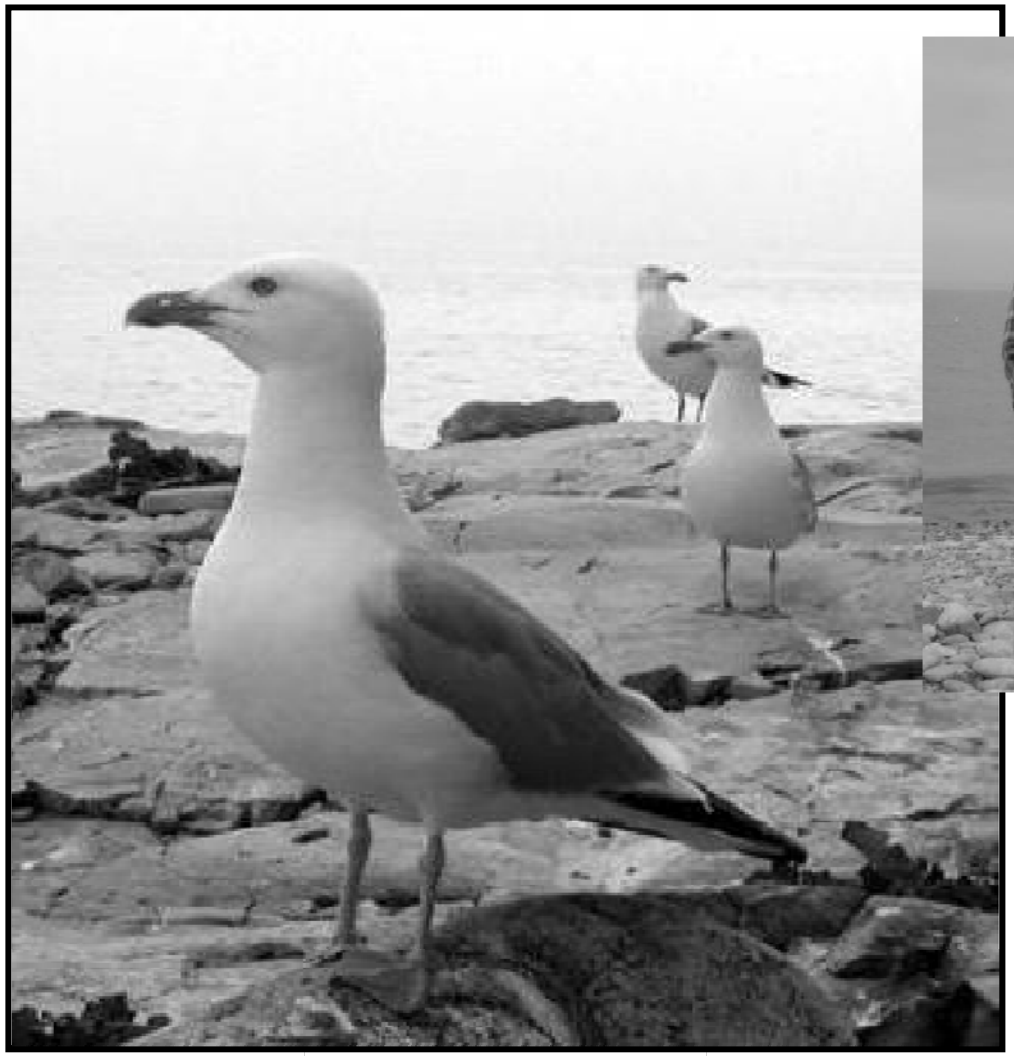
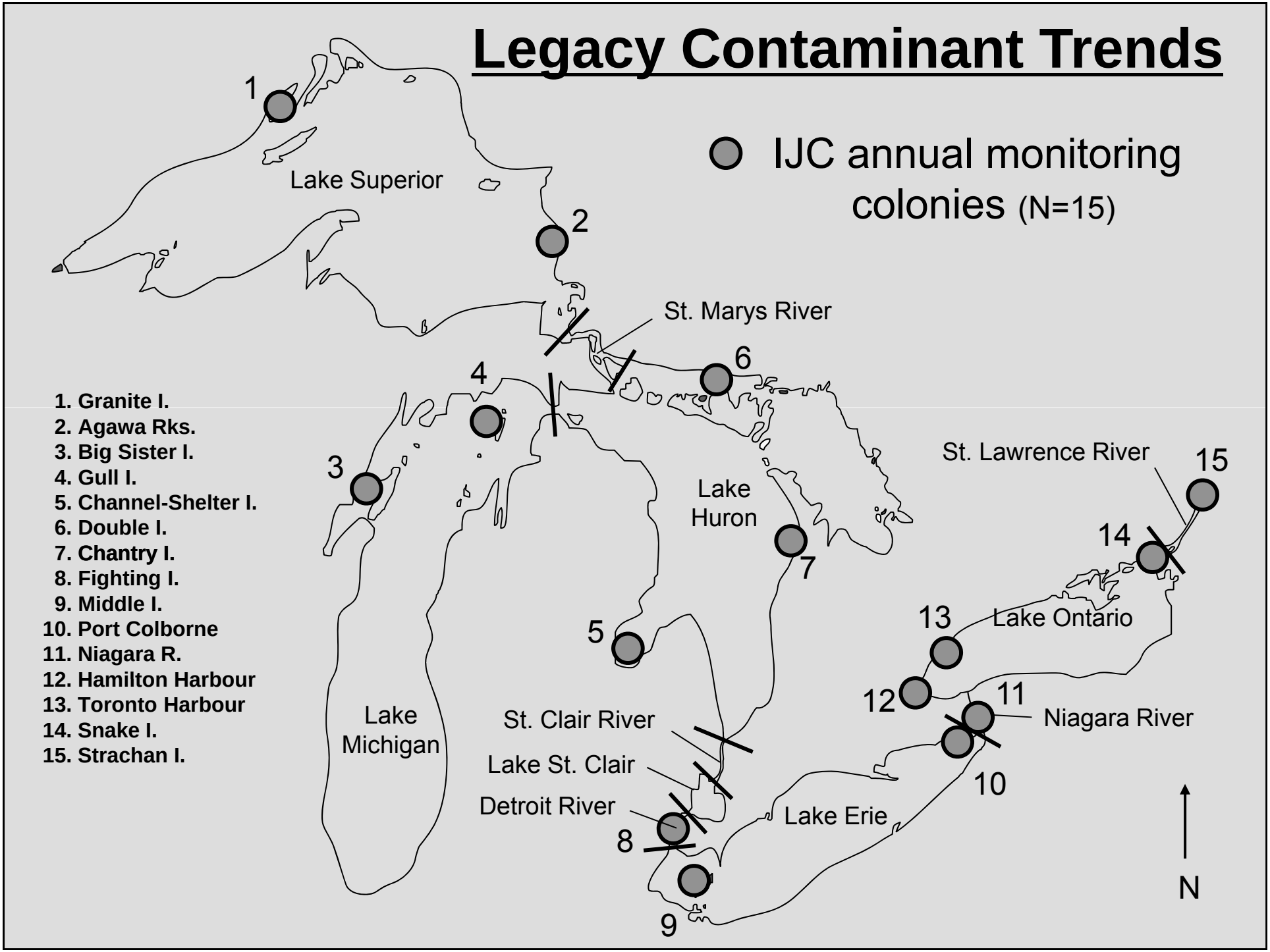
Great Lakes Herring Gull Monitoring Program

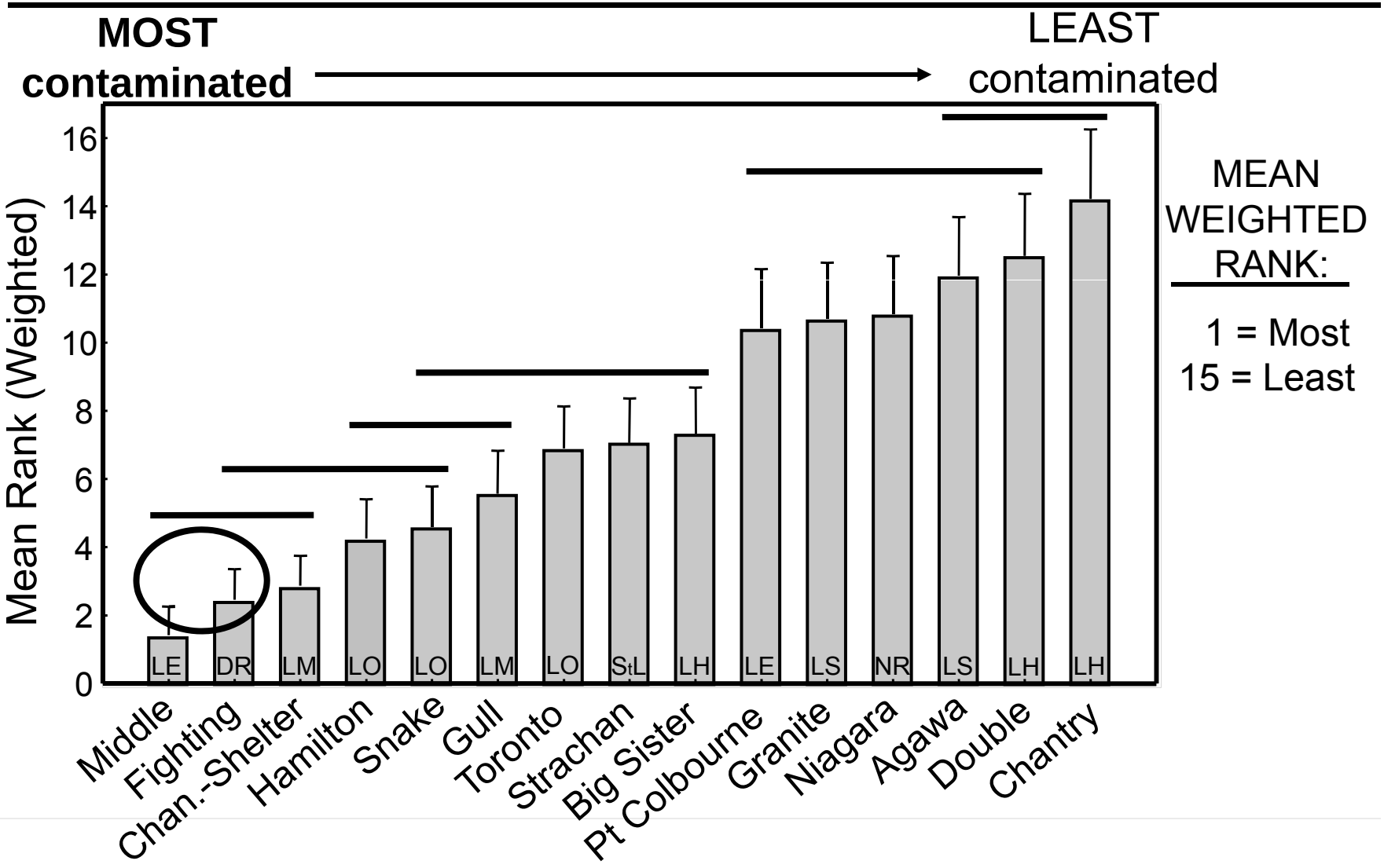


Legacy Contaminant Trends



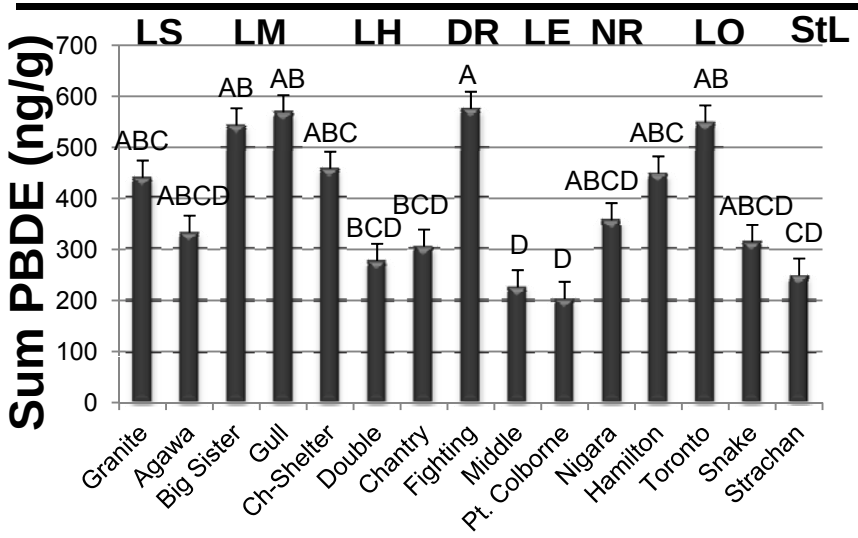
Overall Spatial Rankings (2003-2007)

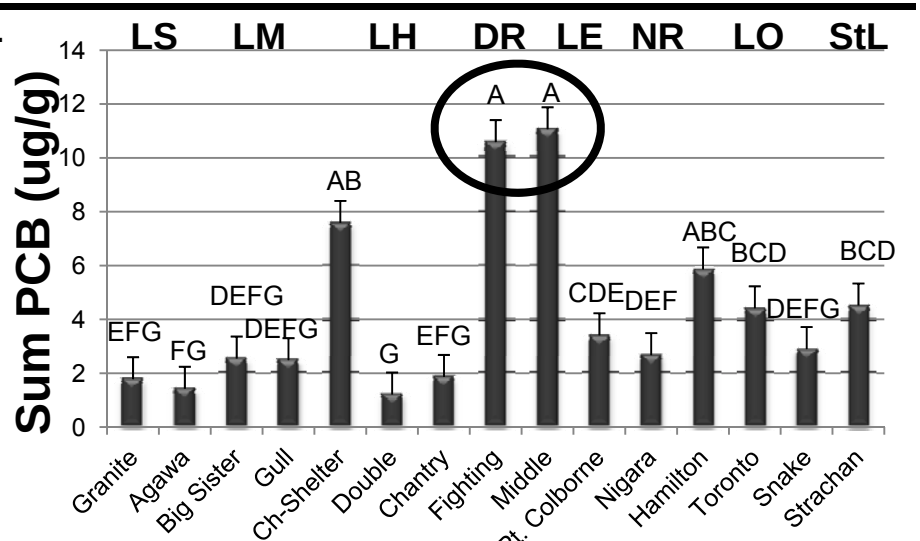
Sites ranked based upon levels of 9 legacy contaminants in eggs

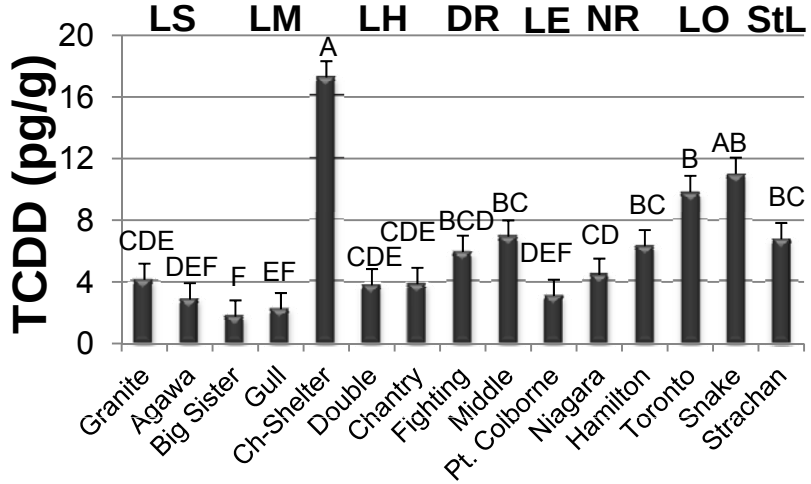


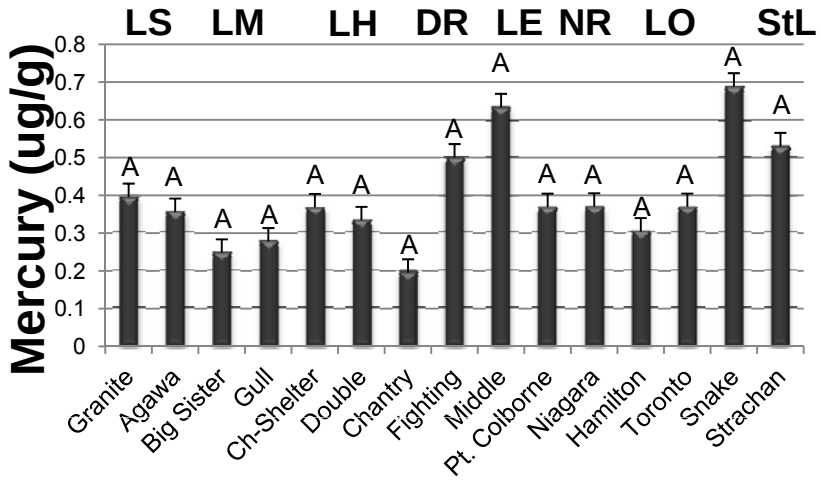
Contaminant spatial patterns, 2006-10

* Colonies with the same letter are not significantly different (SNK test, α = 0.05)





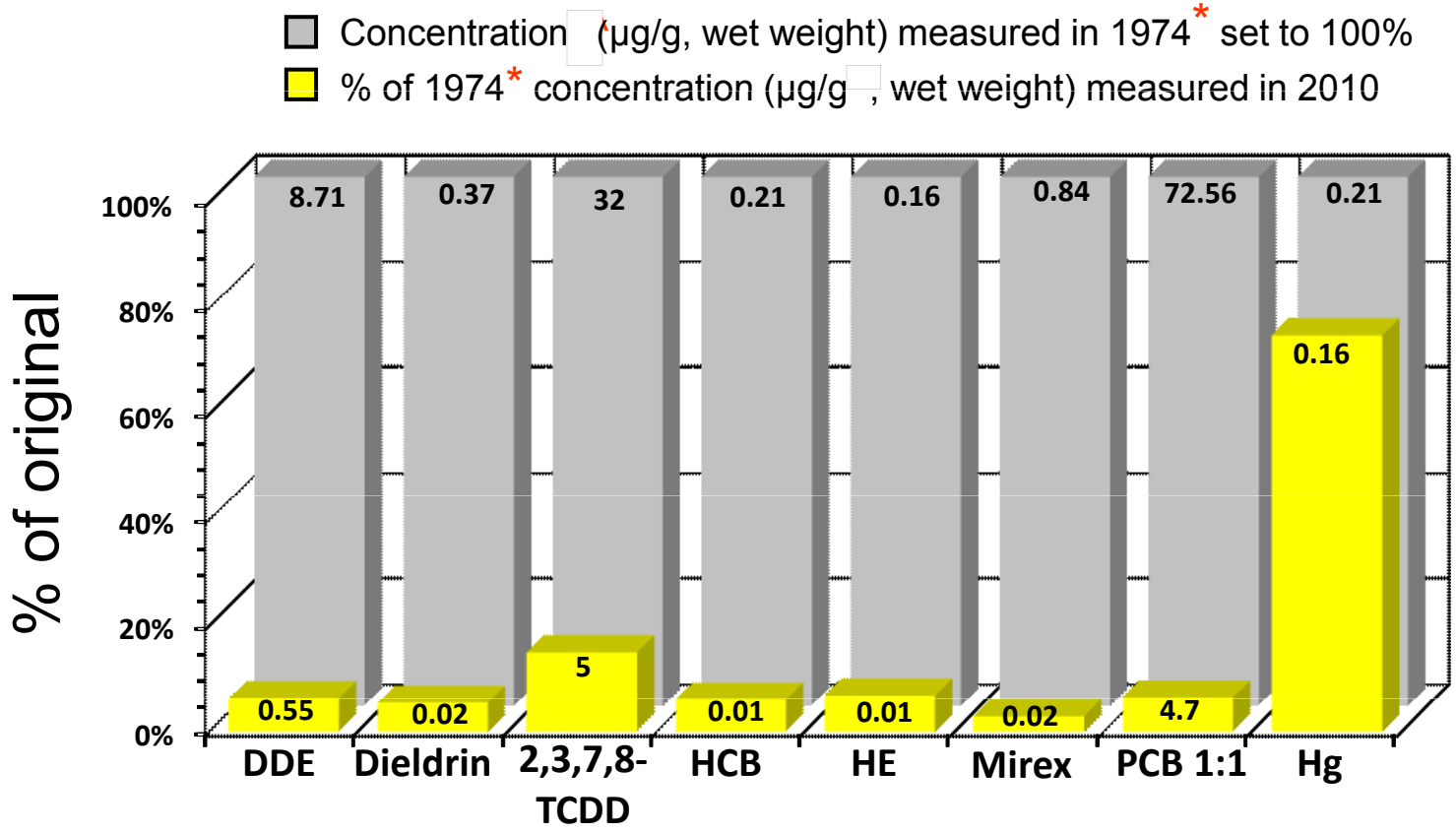




Colony (arranged West to East), units: wet weight

Temporal Trends – Long Term (1974-2010)

% decline, Port Colborne, Lake Erie (1974*- 2010)



	DDE	Dieldrin	2,3,7,8-TCDD	HCB	HE	Mirex	PCB 1:1	Hg	mean
Decline:	93.7%	94.5%	85.0%	93.9%	93.1%	97.1%	93.5%	25.2%	84.5%

* Dioxin (pg/g wet wt) first measured in 1984

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Legacy Contaminant Trends

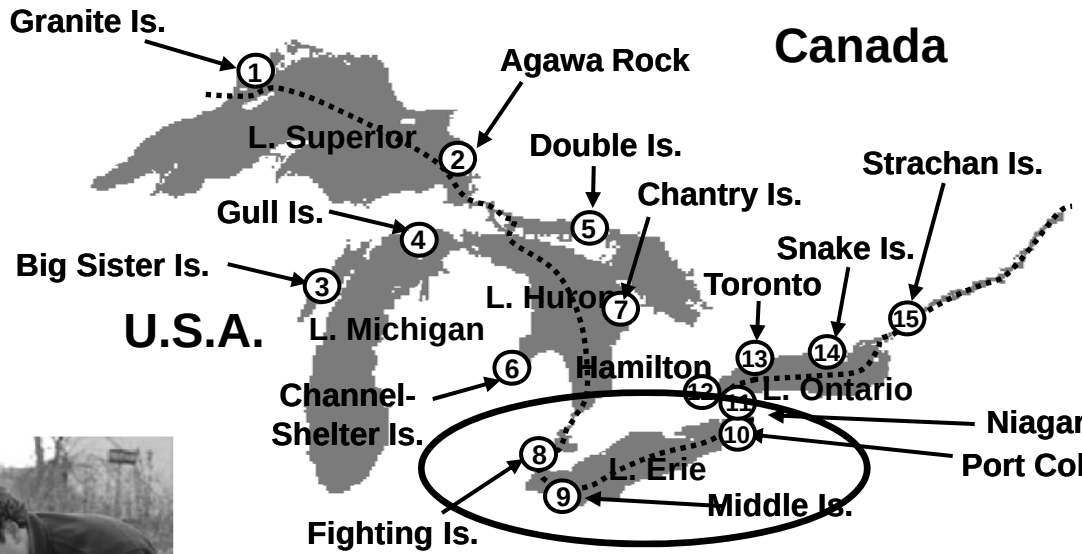
- Spatial analysis:
  - Most Contaminated: Detroit River and western Lk Erie
  - Least Contaminated: Lk Superior, Lk Huron

- Temporal analysis:
  - most contaminants have declined > 90% since 1974
  - Hg decline not as evident

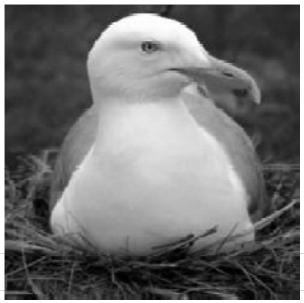
- National Wildlife Specimen Bank allows retrospective analysis of old eggs for new compounds

Emerging Contaminants

<u>Various emerging and current-use flame retardants, surfactants, etc.</u>



GLHGMP and POPs – Legacy and Emerging Research/Monitoring Including Flame Retardants



Perfluoroalkyl Acids and Precursors (PFAAs):
PFCs and precursors (21 compounds screened; 12 PFCAs (incl. PFOA) and PFSAs (incl. PFOS and isomers); ongoing (Gebbink *et al.* **2010**. *ES&T*. 44:3739-3745; Gebbink *et al.* **2009**. *ES&T.* 43:7443-7449; Gebbink *et al.* **2011a** (*Environ. Pollut.*), **2011b** (*J. Environ. Monit.*))

Organophosphate FRs (OPFRs)
(Chen, Chu, Letcher and Chu. **2012**. *J. Chromatogr. A.* 1220:169-174; Letcher *et al.* **2013**. *ES&T* in prep.)

Chlorinated and brominated phenolics (HPCs):
(e.g., OH-PCBs, OH-PBDEs in plasma samples from Hamilton Harbour and Scotch Bonnet Is. gulls
(Ucan-Marin *et al*. **2013**. In prep.)

Ongoing Research on Unknown Emerging Contaminants in Gulls From the Great Lakes (including Lake Erie)

1988 1993 1998

Back to the mid-1970's – LEGACY contaminants: OC pesticides, PCB, dioxins/furans, metals (Hg); temporal monitoring
(Weseloh *et al*.; Norstrom *et al*., etc.)

Brominated and Chlorinated Flame Retardants (FRs)

Penta-BDE derived PBDEs (25 di- to hepta-BDEs monitored, 1981-2000 trends at 7 sites)
(Norstrom *et al*. **2002**. *ES&T* 36:4783-4789)

TBBPA and derivatives
(Letcher and Chu. **2010**. *ES&T.* 44:8615-8621)

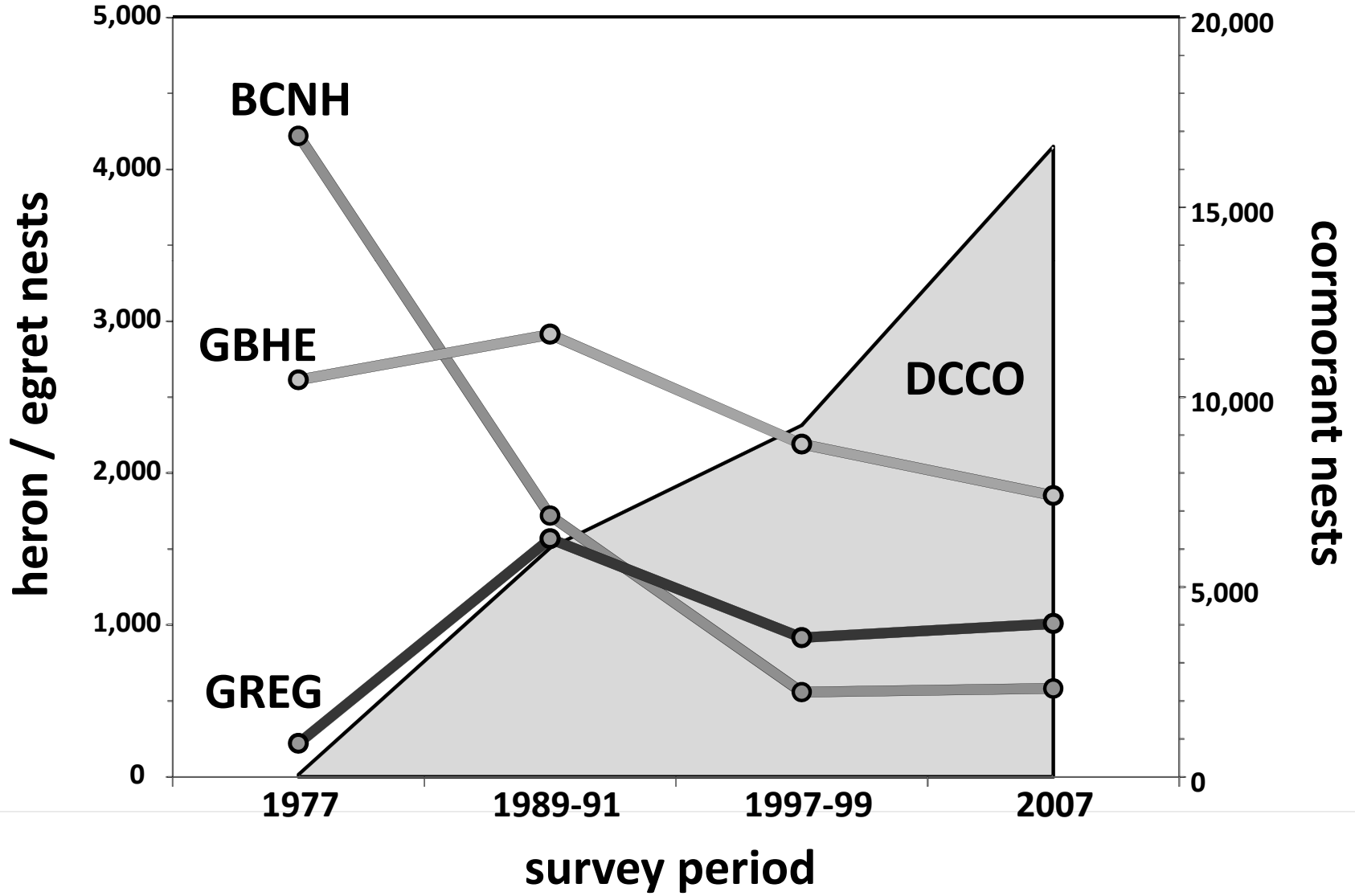
Penta-, Octa- and Deca-BDE derived PBDEs (43 di- to deca-BDEs monitored, 1982-2006 trends at 7 sites)
(Gauthier *et al*. **2008**. *ES&T* 42:1524-1530)

Non-PBDE BFRs and other FRs (26 compounds screened; 1982-2006 trends possible for 10 substances for 7 sites)
(Chen *et al*. **2012**. *Environ. Pollut*. 168:1-9; Gauthier *et al*. **2007**. *ES&T* 42:1524-1530; Gauthier *et al*. **2009**. *ES&T* 43:312-317; Gauthier and Letcher **2009**. *Chemosphere* 75:115-120; Letcher *et al*. **2013**. In prep.)

Research Needs

- Factors causing: declining populations of wading birds

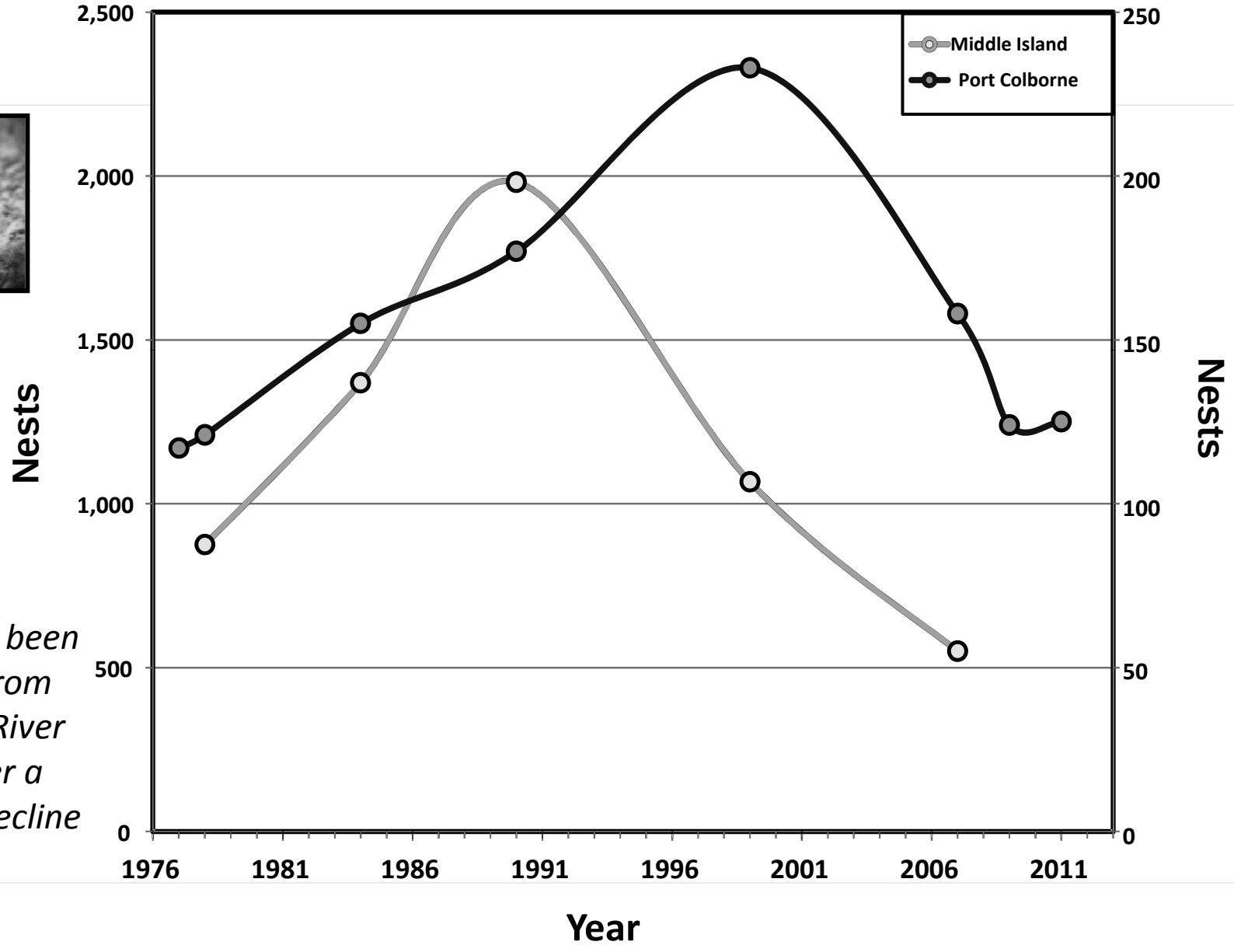
Cormorant & Wader Population Trends



Research Needs

- Factors causing:
  - declining Common Tern populations
  - declining Herring Gull populations
  - implications for IJC Herring Gull Monitoring Program

Herring gull trends – IJC collection sites



HERGs have been extirpated from the Detroit River (~2012) after a long-term decline

Research Needs

- Cormorant management for biodiversity conservation
  - opportunity to study ecosystem restoration
  - is long-term management sustainable?

Research Needs

- Botulism Type E mortality of waterbirds
- Extirpated Great Black-Backed Gull, mortality in other species including Autumn migrants, e.g. Common Loon, Long-tailed Duck

Confirmed Cases of Botulism E Waterbird Mortality on Lake Erie

- CCWHC diagnosis

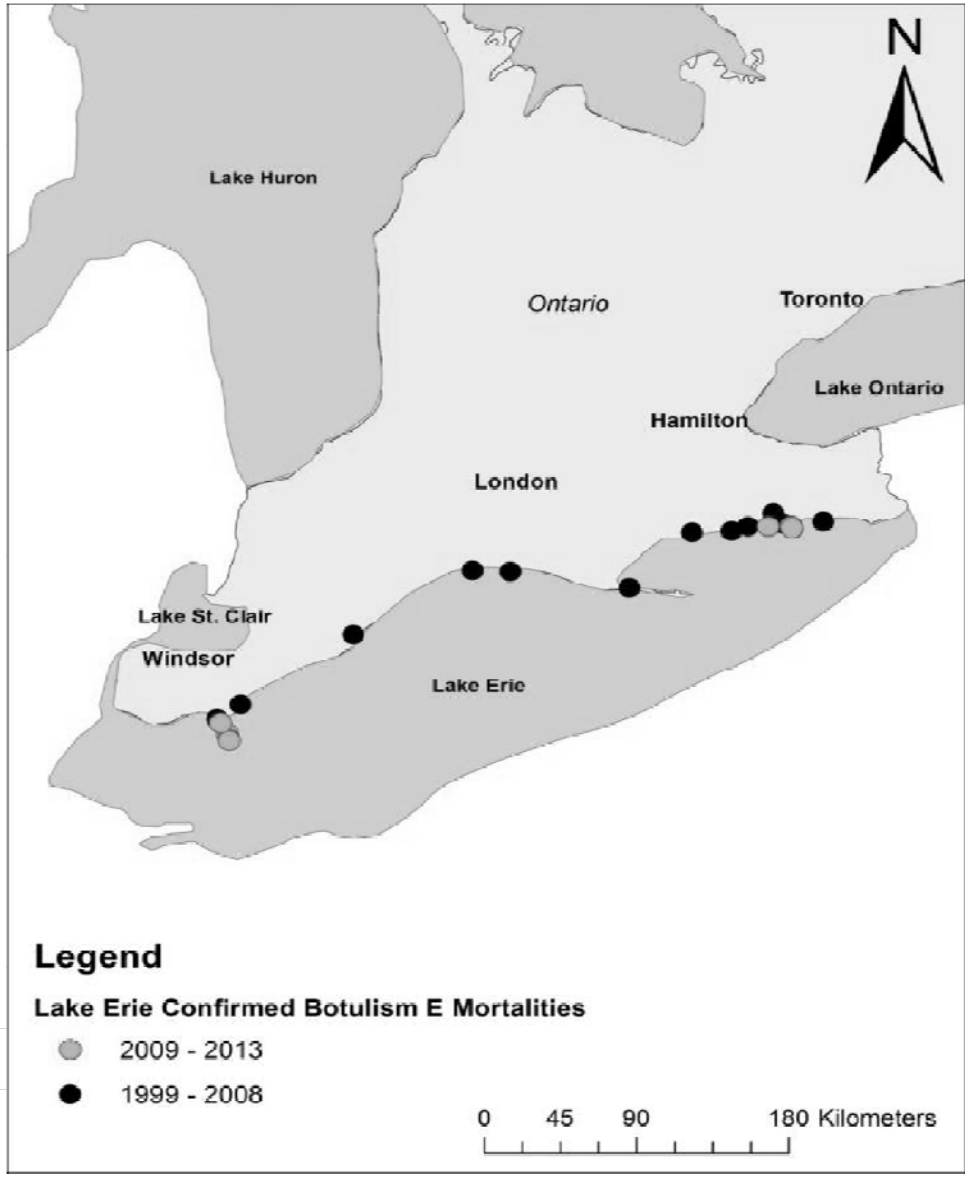
- Ongoing mortality
- Insufficient monitoring

e.g. # birds dying

- Insufficient research

e.g. role of invasives, algal blooms, abiotic factors

- No predictive ability



Research Needs

- 2012 GLWQA contains new annexes addressing invasive species, climate change, habitat etc.
- Addressing “whole ecosystem issues” such as these (and botulism) requires integration of research efforts and funding for LaMP-scale work

LAKE ERIE

LAKEWIDE MANAGEMENT PLAN