# Wetland Conservation and Economic Issues

1

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# Presentation Outline

1. What are wetlands?
2. Where are they?
3. Why are wetlands important?
4. Status of wetlands
   - Prairies
   - Southern Ontario
5. Factors causing wetland decline
   - Legal
   - Economic
6. Going forward

# What are wetlands?

Wetlands consist of land that has been saturated with water long enough to promote aquatic processes

They can be classified as:

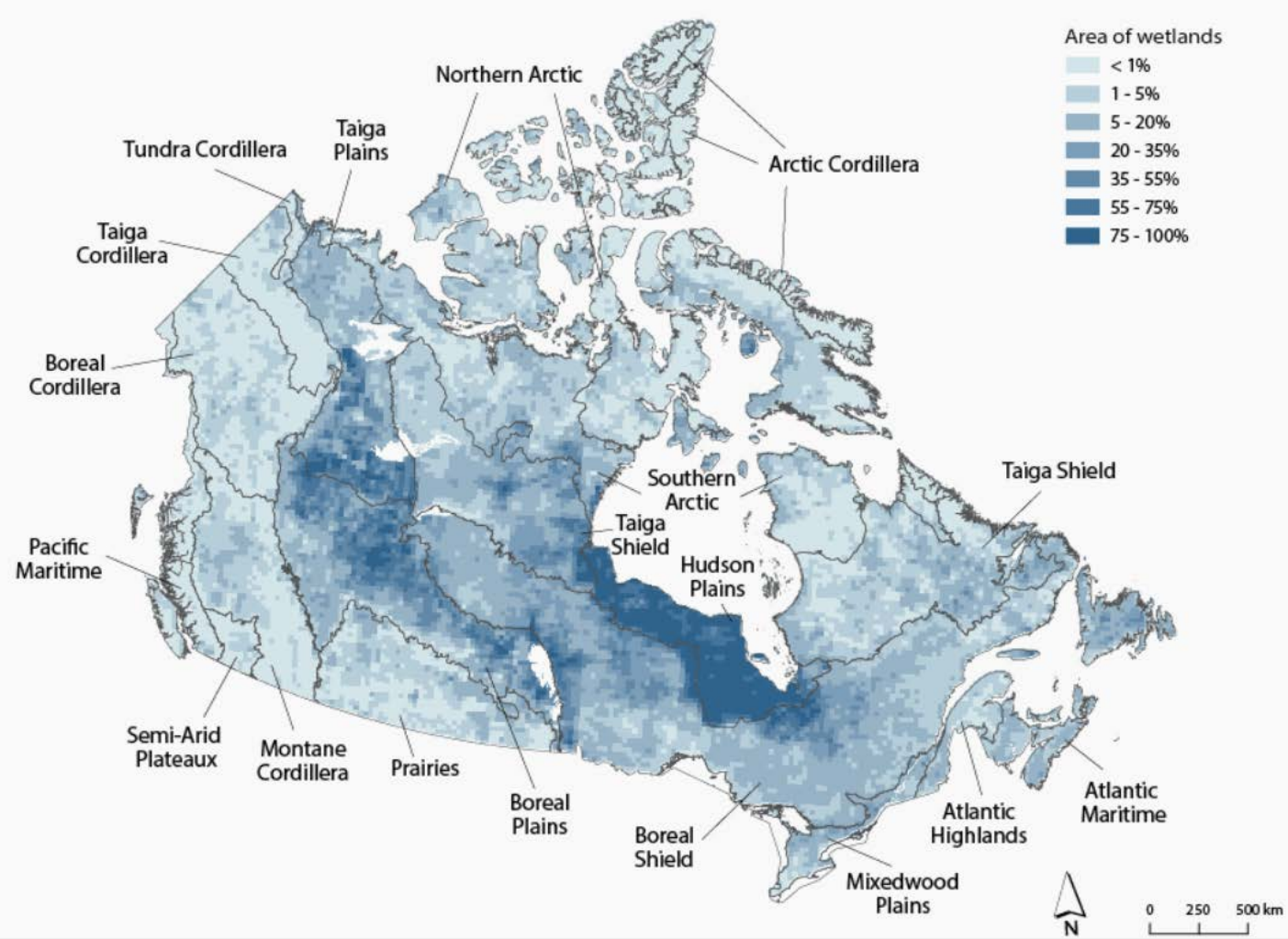
- Marsh
- Fen
- Peatland

They can be natural or artificial, permanent or temporary.

Water in wetlands can be static or flowing, fresh, brackish or salt.

In Canada, wetlands cover 1.29 million $km^2$ or 13% of its terrestrial areas

# Where are wetlands?




Boreal shield – 25%
Hudson's Plains – 21%
Boreal Plains – 18%

https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/extent-wetlands.html

# Why are wetlands important?

Historically, wetlands were considered extremely important for supporting populations of waterfowl

Wetlands of the Canadian and U.S. prairies are the most productive waterfowl habitat in the world:

- support 50 to 88% of the North American breeding populations of several species

# Why are wetlands important?

Importance of wetlands recognized by Ducks Unlimited Canada (DUC)

- Since 1938 and as of 2012, DUC has completed 9,111 habitat projects and has directly secured 2.54 million hectares (6.27 million acres) of wetlands and associated habitat through restoration and retention using land purchases, management agreements, conservation easements and leases
- Between 2008 and 2012, DUC spent an average of $97.1 million per year funded as follows:
  - 37% came from the US,
  - 16% from various levels of Canadian governments
  - 47% came from memberships and donations

Most current wetland management initiatives such as the North American Wetlands Conservation Council (NAWCC) still focus management activities on migratory bird populations.

# Why are wetlands important?

Provincial distribution of DUC projects and secured land as of 2012:

- 50.1% of this is wetland (natural [21.4%], complexes [4.4%] and engineered [24.3%])
- The remainder consists of is grassland and mixed natural land (35.6%) and forested land (14.3%) which support wetland ecosystem complexes

| PROVINCE | SECURED LAND (HA)* | HABITAT PROJECTS* | LANDOWNER PARTNERS |
|---|---|---|---|
| British Columbia | 169,116 | 585 | 1,011 |
| Alberta | 928,178 | 1,840 | 5,395 |
| Saskatchewan | 750,454 | 2,898 | 4,810 |
| Manitoba | 230,295 | 1,218 | 3,008 |
| Ontario | 383,811 | 1,175 | 2,494 |
| Quebec | 27,757 | 215 | 308 |
| Atlantic Provinces | 48,591 | 1,180 | 1,916 |
| National Totals | 2,538,202 | 9,111 | 18,942 |

# Why are wetlands important?

Many people still perceive wetlands to be “wastelands”

- Few tangible sources of benefits for private land owners other than aesthetics (wildlife) and possible source of water
- Seen as liability (odour, hazard, home to undesirable species)

Recent studies now show that wetlands can provide a broad range of benefits to people:

- “ecosystem goods and services” or EGS
- In 2003 the value of the EGS provided by wetlands to Canadians was estimated to be $20 billion annually

| Ecosystem Services | |
|---|---|
| Atmospheric regulation | Waste treatment |
| Climate regulation | Pollination |
| Disturbance regulation | Biological control |
| Water regulation | Refugia |
| Water supply | Food production |
| Erosion control and sediment retention | Raw materials |
| Soil formation | Genetic resources |
| Nutrient cycling | Recreation |

# Why are wetlands important?

- A review of four studies shows very wide range in EGS values per hectare of wetland
  - $187 to $161,420
  - Based on data "borrowed" from other studies ("benefits transfer" approach)
- Most important EGS functions are:
  - Disturbance avoidance (i.e. flood control)
  - Water stabilization (i.e. water supply)
  - Waste treatment (i.e. removal of nutrients and waste compounds)
  - Recreation
- Very few studies undertaken in Canada to determine what these values actually are
  - Many of these relate to potential benefits from wetlands engineered and constructed for specific purposes, like stormwater ponds

| Function | Southern Ontario – Urban | Southern Ontario – Non-Urban | Canadian Boreal Forest | Mackenzie Ecosystem |
|---|---|---|---|---|
| Atmospheric regulation | $14 | $14 | | |
| Climate regulation | | | $3,946 | $3,946 |
| Disturbance avoidance | $99,318 | | | $5,323 |
| Water stabilization and regulation | $48,929 | | | |
| Water supply | | | $555 | $555 |
| Erosion control and sediment retention | | | | |
| Waste treatment | $3,168 | $2,779 | | |
| Habitat/refugia | | 475 | $335 | $335 |
| Food production | | | $75 | $75 |
| Raw materials | | | $23 | $23 |
| Genetic resources | | | $356 | $356 |
| Recreation | $9,861 | $3,351 | $18 | $18 |
| Culture | | $2,286 | | |
| Aesthetic/ Amenity | $129 | $6,446 | | |
| TOTAL | $161,420 | $15,171 | $5,310 | $10,633 |

# Why are wetlands important?

Recent study (2018) in a representative area of pothole wetlands in SE Saskatchewan (Smith Creek) found that past wetland drainage for agricultural purposes:

- significantly increased peak discharge and total waters in extreme events, which seem to be occurring more frequently
  - high costs resulting from damages to infrastructure
- higher annual flow events (45% to 273% increases) even in moderate to low flow events
- higher nutrient loads that adversely affect downstream water bodies (Lake Winnipeg)

# Why are wetlands important?

Financial modelling in Smith Creek study showed that:

- Every $1 invested in wetland conservation yields $7.70 in flood control, nutrient removal, recreation and carbon sequestration
- Every $1 invested in 25% restoration of lost wetlands yields $3.32 over 10 years

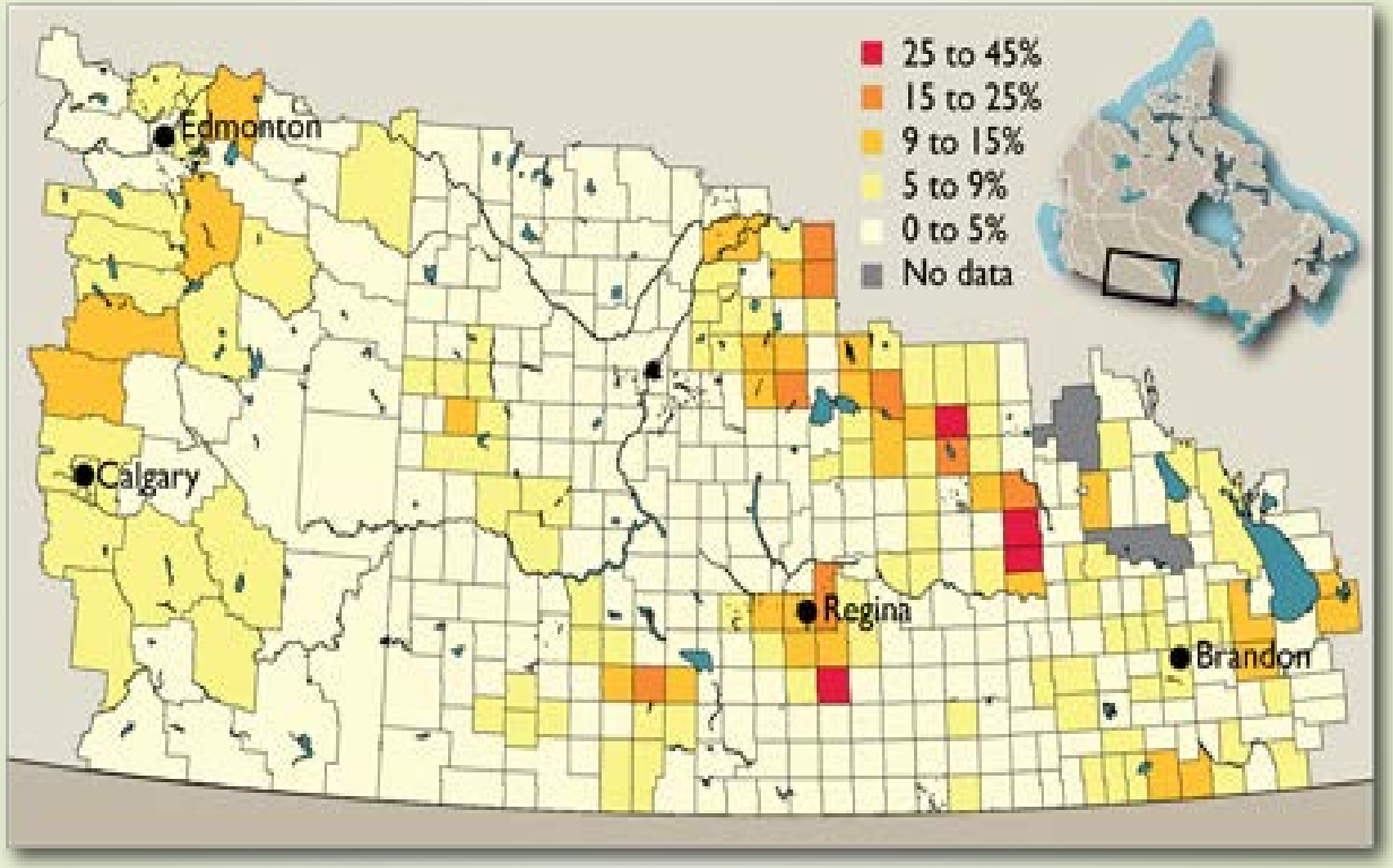
Key conclusion is that, in terms of the public interest, it is much more cost-effective to **preserve** wetlands than it is to try to restore damaged wetlands.

# Status of Wetlands

200,000 $km^2$ of wetlands in Canada have been lost since the 1800s

- Exact loss not known due to lack of reliable inventories or monitoring
  - Best information for prairies and southern Ontario
- Mainly due to agricultural development (wetland drainage)
  - 40% to 71% of wetlands in prairies were lost between settlement and the 1990s
  - Losses of wetlands continue despite conservation efforts
- Wetlands near large urban centres are particularly at risk and have suffered severe losses.
  - 0.2% of Canada's wetlands fall within 40 km of urban centres
  - 80 to 98% of wetlands in or adjacent to major urban centres have been lost.
- Other factors for wetland losses:
  - Climate change
  - Grazing

# Status of Wetlands: Prairies




Percentage of wetlands in the prairies lost between 1985 and 2001

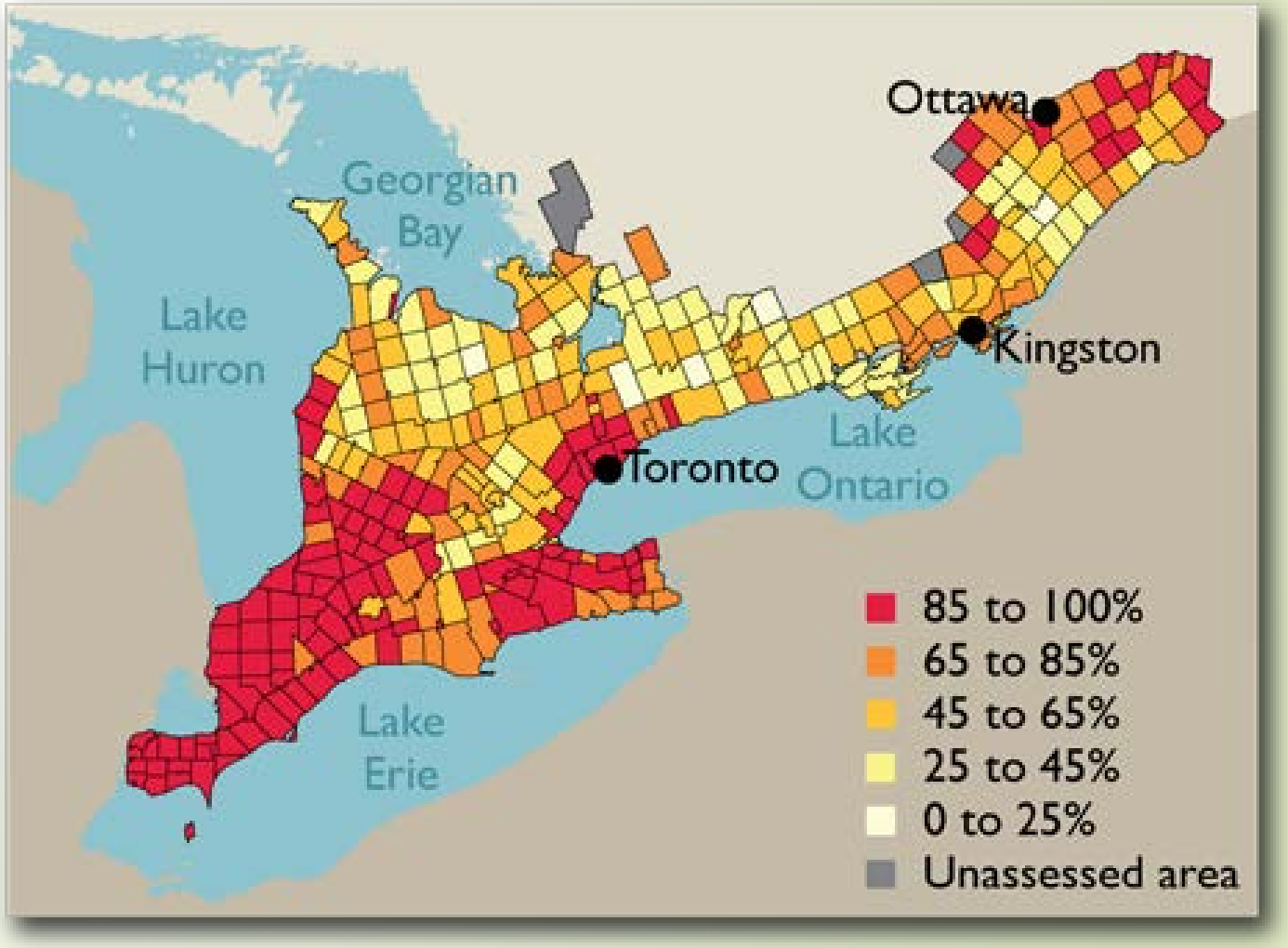
# Status of Wetlands: Southern Ontario

Percentage of wetlands lost between 1800 and 2002

- Prior to European settlement, southern Ontario had approximately 20,266 km$^2$ of wetlands.
- By 2002, 72% had been converted to other uses

Wetland loss is still occurring in southern Ontario.

- Between 2000 and 2011, another 597 hectares of wetlands in the Greenbelt area were lost:
  - 60% due to agricultural
  - 23% due to extraction of aggregates and peat/topsoil



# Factors Causing Wetland Decline - Legal

Confusion over who is legally responsible for wetlands

- Many different laws and policies related to wetlands at national, provincial and municipal levels

Provincial governments:

- Own the bed and shores of all naturally occurring permanent wetlands.
- Own the water in wetlands
- Can legislate with respect to wildlife, even on private lands

Federal government:

- has responsibility for natural commercial, sport or recreational fiery habitat in wetlands, including private wetlands.
- has legislative powers related to migratory birds and, to a limited degree, migratory bird habitat on public and private lands.

Municipal governments:

- have rights conferred in provincial legislation, such considering environmentally sensitive areas in terms of land-use by-laws.

# Factors Causing Wetland Decline - Legal

Private land owners also have rights related to wetlands under Common Law (riparian rights):

Owners of properties adjacent to or crossed by water bodies have the rights of:

- access,
- prevention of flooding,
- to use water for domestic purposes,
- to continued flow of water and to unpolluted water.

Landowners may also undertake additional activities in wetlands by obtaining prior authorization from:

- the federal government
  - Disturbances of fisheries habitat or migratory birds
- the provincial governments:
  - Disturbances of water in a natural state
  - Water drainage
  - Use water for other than household purposes

# Factors Causing Wetland Decline - Economic

Farmers (landowners) have no economic incentive to maintain wetlands

Trade-offs between public and private interests in wetlands on agricultural lands assessed in 1990

- Prairie pothole wetland areas in two parts of southern Saskatchewan
- Commissioned by Wildlife Habitat Canada and Environment Canada
- Compared social benefits of with private benefits to farmers of draining wetlands
  - Used primary data (surveys) and secondary data (agricultural studies)

Benefits to society of wetland retention:

| | |
|---|---|
| Increased duck populations for hunting in Saskatchewan | $18/ha |
| Other recreational use of wetlands: | $55/ha |
| Existence and preservation values: | $32/ha |
| **Total annual benefits of wetland protection:** | **$105/ha** |

- Other types of social benefits (EGS) described but not quantified

# Factors Causing Wetland Decline - Economic

Benefits of wetland drainage for agriculture

| | |
|---|---|
| Land can be used for crop production | $65/ha to $111/ha |
| Increased productivity on transitional lands | $14/ha |
| Improved field patterns | $22/ha |
| Annual gross benefits of wetland drainage: | $120/ha to $179/ha |
| Cost of wetland drainage: | $1605/ha |
| Net annual value of drainage<br>Discount rate of 10% over 30 years | -$19/ha to -$70/ha |

Conclusion at that time was that further drainage made no economic sense.

- Study areas had already seen some wetland drainage
- Some of remaining wetlands were saline

However, results very sensitive to changes in commodity prices, operating costs and discount rate.

- Changing economic conditions results in economic incentive for farmers to continue to drain wetlands

# Factors Causing Wetland Decline - Economic

"Dilemma of wetland management":

- Drainage may be good for individual farmers but may represent great cost to society at large
- Farmer is the land manager; wetlands and water are public goods
  - Many of the benefits fly south
- Benefits of drainage are tangible (market-based ,measured and reported) whereas social benefits of preservation are not (non-market, not measured and not reported)
- How can the interests of farmers be reconciled with the conflicting interest of society at large?

How do you make wetland preservation in best interests of farmers?

- Eliminate agricultural programs that supported drainage
- Secure wetlands through lease or purchase agreements

While the social and private values of wetlands have changed since 1990 (agricultural output and production costs; social perceptions of wetland roles and importance), this same fundamental question is still being asked today.

# Going Forward

**How do we solve the "Dilemma of Wetland Management"?**

Can't rely on DUC to solve the problem

- Majority of revenues (84%) through donations and memberships
- Annual revenues variable and declining in real terms
- Percent of Canadian population that hunted waterfowl is declining:
  - 3.6% in 1981
  - 2.5% in 1987
  - 1.9% in 1991
- While DUC is still securing wetlands and associated uplands through leases and purchase, it is being much more selective (rationalizing its assets)
  - Giving up projects or trying to find new owners
- Focus is on migratory bird populations with other EGS as ancillary benefits
  - May affect choice of projects

# Going Forward

How do we solve the “Dilemma of Wetland Management”?

One approach is the adoption of a “No Net Loss of Wetland Function” policy

- Premised on the idea that further degradation of wetlands in Canada is unacceptable
- Suggested actions:
  - Protect remaining wetlands (1st priority)
  - Rehabilitate degraded wetlands (2nd priority)
  - Compensation for lost functions through replacement or creation
- Challenges
  - Lack of wetland inventory and monitoring
  - Priority should be given to most important wetlands but how do you identify them?
  - Different regulatory regimes across the country
  - No clear understanding of the extent to which various activities affect different wetland functions
  - Uncertainty as to whether constructed wetlands function like natural wetlands
  - Lack of staff and financial resources for implementation

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