

# RECLAIMED WASTEWATER, WTP AND ENDOGENOUS FREE-RIDING BELIEFS

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CANADIAN WATER NETWORK  
RÉSEAU CANADIEN DE L'EAU

# Overview

- 1. Background
- 2. Literature
- 3. Survey and Data
- 4. Model and WTP Estimates
- 5. Future

# 1. Background

## World's Perception of Canada

THE WONDER THAT NATURE CREATED!



Photo from Niagara Falls Tourism



CANADIAN WATER NETWORK  
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- Canadian experience with summer water restrictions?
  - 42% - each of last five years
  - 22% - either 2 or 3 of last five years
- Believe Future Droughts?
  - 63% - Yes

## 2. Literature

- WTP to Avoid Water Restrictions
  - Stated Preference (SP)
  - Revealed Preference (Hedonic)

- Australian SP Studies
  - Blamey et al (1999)
  - Hensher et al (2006)
  - Tapsuwan et al (2007)
  - Cooper and Crase (2009)
  
  - WTP: \$12-\$59 **per year** (2011)
  - \$258 per year to avoid all restrictions

- American SP Studies
  - Howe and Smith (1994)
  - Griffin and Mjelde (2000)
  - Koss and Khawaja (2001)
  
  - WTP \$9-\$20 **per month** (2011 \$)

# 3. Survey and Data

- Internet: April-June 2009
- Over 1100 Canadians
  - 1. Acceptability of Reclaimed Water
  - 2. WTP to avoid summer outdoor water restrictions through supply augmentation



# Scenario

- Option A:
  - summer outdoor water restrictions
- Option B:
  - augment water supply with reclaimed water to be used for toilet flushing

# Use of Reclaimed Water for...

	STRONGLY AGREE (%)	AGREE (%)
– Golf Courses –	69	20
– Flowers in Garden –	60	25
– <b>Toilet Flushing</b> –	<b>59</b>	<b>21</b>
– Veg in Garden –	36	28
– Tap Water –	11	13



# DB-DC WTP

- “Yes, I am willing to pay \$XX more on my water bill every month to pay for Option B that uses reclaimed water to supplement water supplies so that summer water use by myself and member of my community does NOT need to be reduced by 10% {30%}.

# 4. Model and WTP Estimates

- 2 Models
  - Interval Censored
  - Mixed Process: Probit and Interval Censored

# Interval Censored

- Factors that ↑ probability of saying yes
  - Previously heard of RW
  - Believe drought predictions
  - **Believe others in community will NOT reduce water use under Option A (free riding)**
- Factors that ↓ probability of saying yes
  - Household Cost and Age
  - Distrust in utility to handle risk
  - Disagree with use of RW for toilet flushing

# Mixed Process Model

- Account for possible endogeneity of free riding belief by allowing errors to be correlated
- Recursive (multi-stage process)
  - Probit to explain belief in other's free riding
  - Interval Censored to obtain WTP (with belief as explanatory variable)



- Errors neg correlated but not significant
- Endogeneity not a problem for this specification

- WTP to avoid 30% reduction in summer outdoor water use
  - **\$9 per month (2011)**
- \$8 per month to avoid 10% reduction



# 5. Future

- Include health concerns
- Investigate other factors in probit
- Climate information to investigate differences between dry and wet places

# Thank you...

- Questions or suggestions?