

LECTURE 19:
JUNE 11, 2014

URBAN ENVIRONMENTAL MANAGEMENT

ENVIRONMENTAL ISSUES IN CITIES

Text Reference: Dearden and Mitchell (2012), Ch. 13, pp. 466-473

Outline

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Upcoming:

- ❑ June 12 (Thurs, Presentations)
- ❑ June 12 (**Papers Due – change!**)
- ❑ June 13 (Fri, Last Class)
 - **Complete lectures 16 (agriculture) and 19 (environmental issues in cities)**
 - **Cancel lectures related to chapters 14 and 15**
 - **Review for Exam**
- ❑ June 16 (Mon, Final Exam)

Today:

- ❑ (map quiz: 11 to 11:45)
- ❑ break
- ❑ (lecture)
 - Complete June 10 lec 18: Part 2: Sustainable Development II: 4 factors needing our attention to meet the challenges of SUD
 - Lec 19: Environmental Issues in Cities

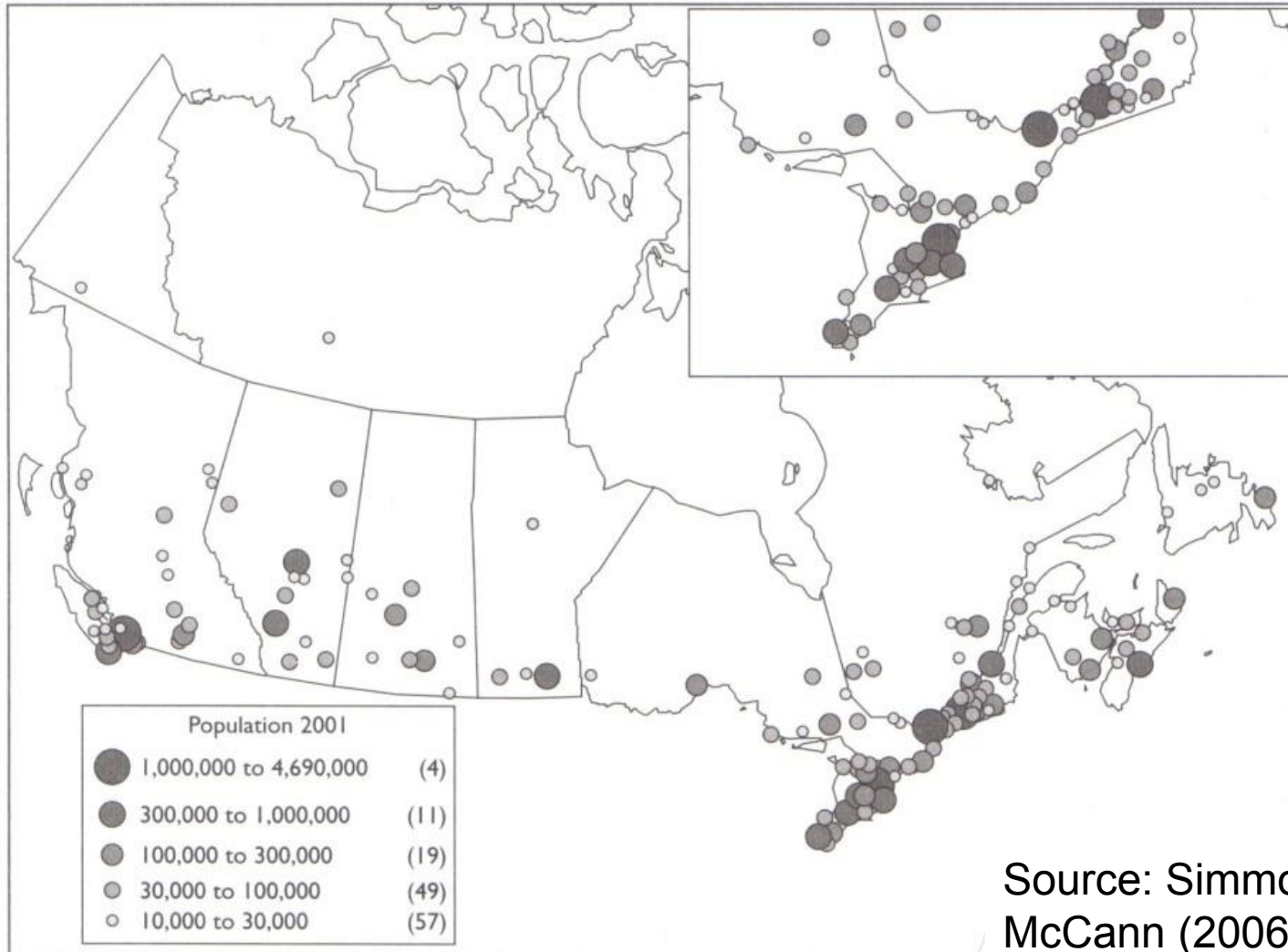


Source: Dearden and Mitchell (2012)

Canadian Urban Places in 2001

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Figure 3.1 Urban Places in the Canadian Urban System, 2001



Source: Simmons and McCann (2006)

Topics

4

- **Definitions:** urban forms (*v. brief recap*)
- Urban issues (**physical**)
 - Sprawl
 - Farmland loss
 - Air pollution
 - Air quality
 - Urban heat island
 - Hydrological impacts
- Urban issues (**socio-economic**)
 - Changing economic functions
 - Declining and aging cities vs Rising cities
 - Immigration to and within cities
 - Gentrification
 - School closures

Topics cont'd

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- **Urban issues (political)**
 - Urban growth boundaries
 - Farmland protection vs development rights (e.g., Ontario Green Belt)
 - Neighbourhood preservation vs freeway construction
 - Transit

- **Urban issues (environmental / solutions)**
 - Sustainability
 - Transit-oriented developments (e.g., Vancouver's Regional Town Centres)
 - Walkability
 - Intensification
 - Smart Growth
 - Brownfield Development

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Recall from earlier lectures

Urban vs Suburban vs Exurban forms



□ Madrid and Granada





- **Postwar sprawl:**

car-oriented, segregated land use, suburban sprawl around many cities (Photo: sprawl in Colorado)

- non-farmers/non-loggers/non-fishers living in rural settings;

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larger-lots – often estate-sized lots;

increased commuting distance – more distal bedroom communities

Exurban Development



© 2011 Google
Image © 2011 GeoEye

Cadallie Circle near Thunder Bay (~10 km from LU), c/o Google Earth 2011



← *Near Winnipeg, photo credit: T.Randall*

Urban Issues (physical)

- Sprawl (land, energy consumption, commuting)
- Farmland Loss
- Air Pollution
- Air Quality (smog, health connections)
- Urban Heat Island
- Hydrological Impacts

Suburb-Farmland Interface

11



University of Guelph

1954



1963



1976



2008

South Richmond, BC

Photo credits: *Alternatives Journal* Vol. 34 Issue 3, 2008

Land pressures (e.g., Stoney Creek on Niagara fruit belt / escarpment)

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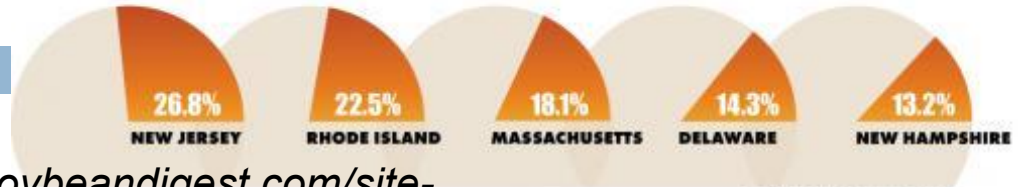


East Stoney Creek, c/o Google Earth 2011

Farmland Losses

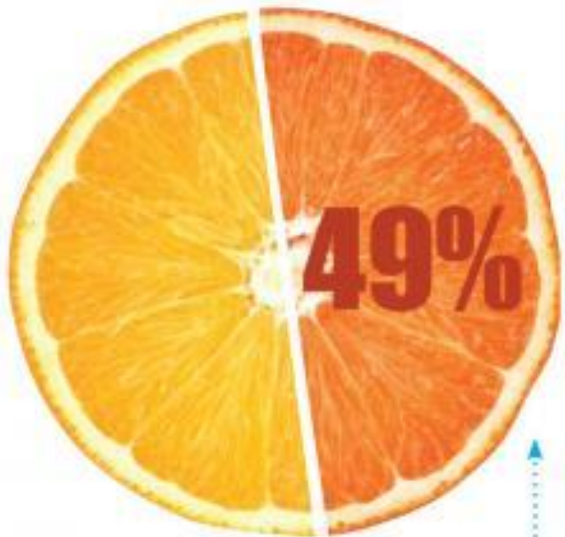
13

States that developed the largest percentage of their agricultural land:



http://cornandsoybeandigest.com/site-files/cornandsoybeandigest.com/files/imagecache/galleryformatter_slide_per_n/gallery_images/aglanddev.jpg

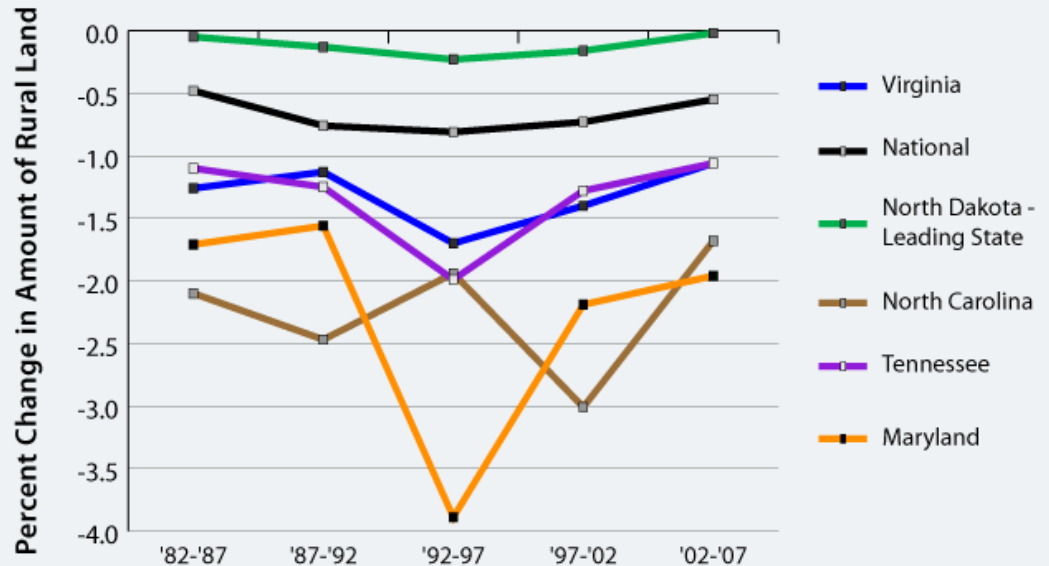
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www.farmland.org/eri



California and Florida, two of the three states that lost the most agricultural land, account for nearly half of the acreage devoted to growing fruit and vegetables nationwide.

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Rate of Rural Land Lost, by State



<http://vaperforms.virginia.gov/indicators/naturalResources/landPreservation.php>

“Pressure builds on Agricultural Land Reserve”

Vancouver’s Georgia Straight, Dec. 2008

<http://www.straight.com/pressure-builds-agricultural-land-reserve>

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Concern that the **municipality of Delta (in BC’s Lower Mainland)** may be the next Richmond

<https://stephenrees.wordpress.com/tag/agricultural-land-reserve/>

Car is the mode of choice in *most* North American cities....

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Table 2.1 **Modal Choice and the Journey to Work: Metropolitan Areas in Canada and the US**

	United States (2002–3)	Canada (2001)
	(%)	(%)
Driving self	80.4	70.8
Carpool	9.2	6.6
Mass transit	6.1	14.8
Walking	2.6	5.7
All other	1.7	2.1
	89.6	77.4

Note: Mass transit refers to bus, streetcar, subway, elevated road, and railroad; carpool includes those who are pas-

Source: England and Mercer (2006)

Table 3.6: Calculated commuting times for three hypothetical commute types

Commute Type	Time on each leg of Home-Work-Home Trip (min/day)	Total Time Spent Commuting	
		(hour/year)	(weeks/year)
light	15	183	1.1
medium	30	365	2.2
heavy	60	730	4.3

sizeable

From: Randall (2002)



Approach to Manhattan Bridge (Nov 2011); Photo Credit: T.R.

Gasoline use per capita versus urban density in 1990

($R^2 = 0.8594$)

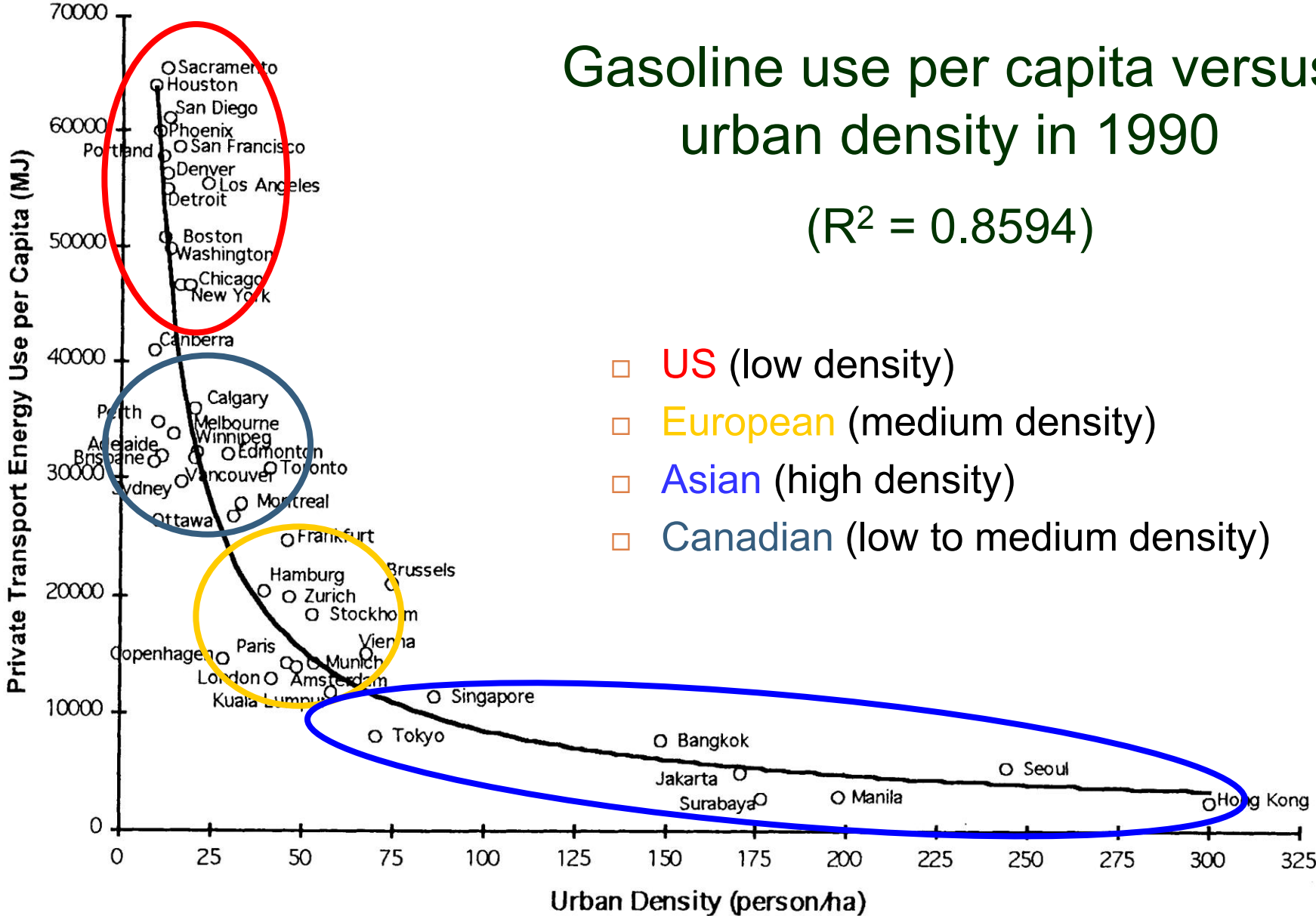


Figure 3.2. Energy use per capita in private passenger travel versus urban density in global cities, 1990.

Source: Newman and Kenworthy (1999)



Typical Commercial Strippart of the *sprawl* problem; not conducive to pedestrians or cyclists.

Photo: North end of Memorial Ave *circa* 2004 (Thunder Bay)

Air Quality / Air Pollution

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- Air pollution does not respect international borders (the atmosphere is a ‘commons’ – shared resource) – recall “acid rain” issues of 1980s;
- Air pollution from both point and mobile sources;
- Poorer air quality in cities versus countryside;
- Improving AQ trends in recent years ...
- Related ‘downstream’ health impacts ... and costs ...



Sarnia, ON

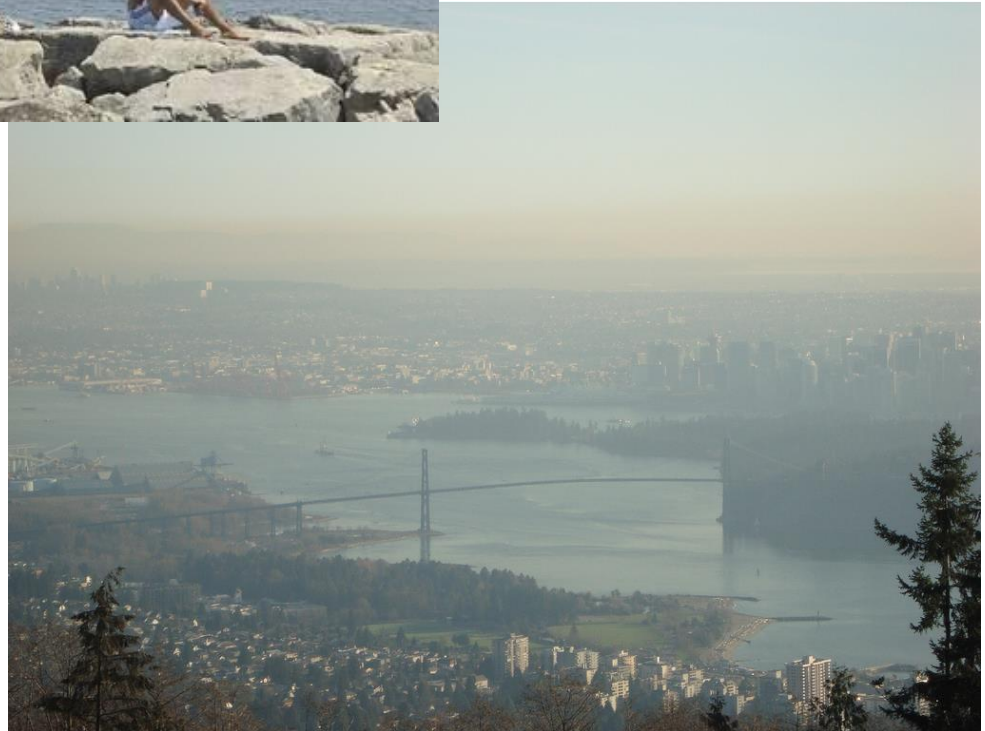


Burlington, ON



Toronto
From: Globe and Mail.com 2012

Vancouver



<http://www.vancitybuzz.com/2012/07/vancouver-smog-due-to-russian-wildfires/>

Air Pollution trends (Canada)

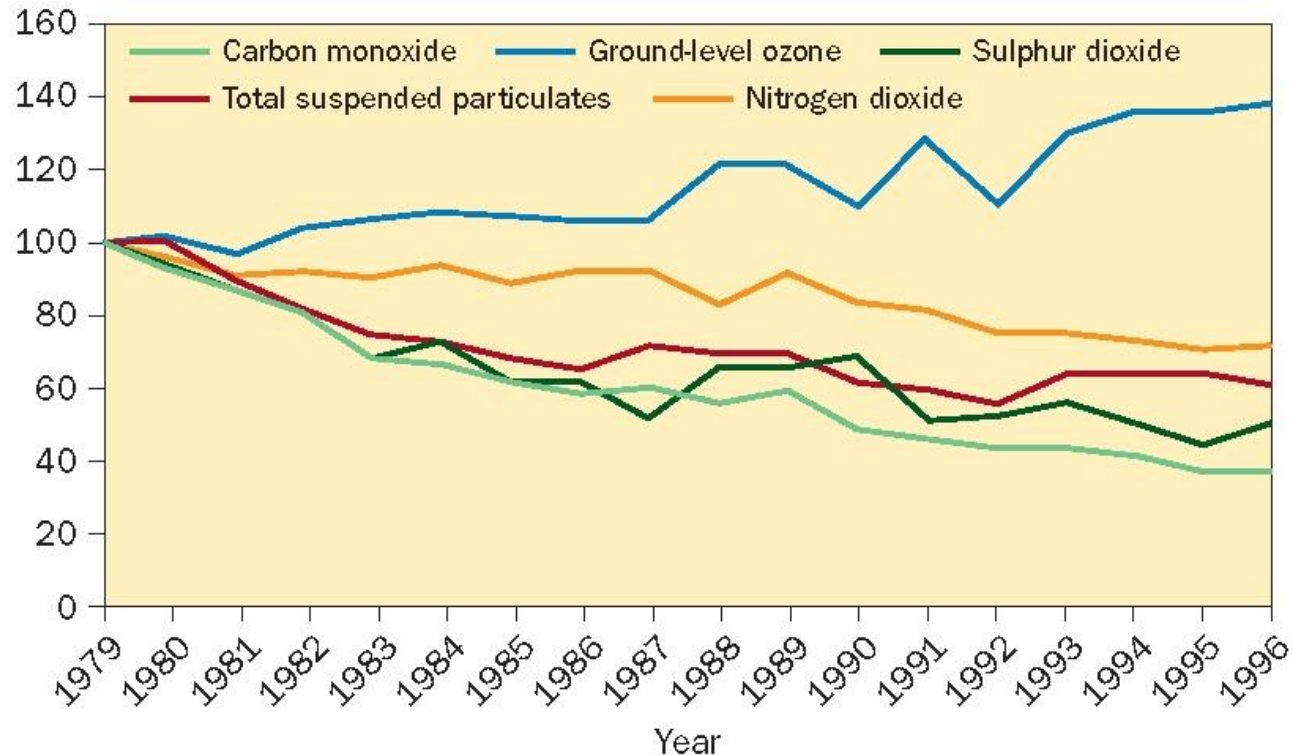


Figure 13.1 | Concentration of common air pollutants, Canada, 1979–96. Source: Centre for Sustainable Transportation. 2002. Sustainable Transportation Indicators, Report on Phase 3, 39. © Environment Canada 2002.

Air Quality Index – Smog Days

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Four Reasons Why Shanghai Just Had Its Worst Smog Day Of All Time

12/06/2013 <http://www.bullfax.com>

1) Pressure & Wind; 2) the Cold (more coal burned) 3) Cars; 4) Christmas Season (industrial production)

<http://www.citywindsor.ca/residents/environment/Environmental-Master-Plan/Goal-A-Improve-Our-Air-and-Water-Quality/Pages/Air-Quality-Index-Indicator.aspx>

“Air filters and face masks offer little protection to big city air pollution”

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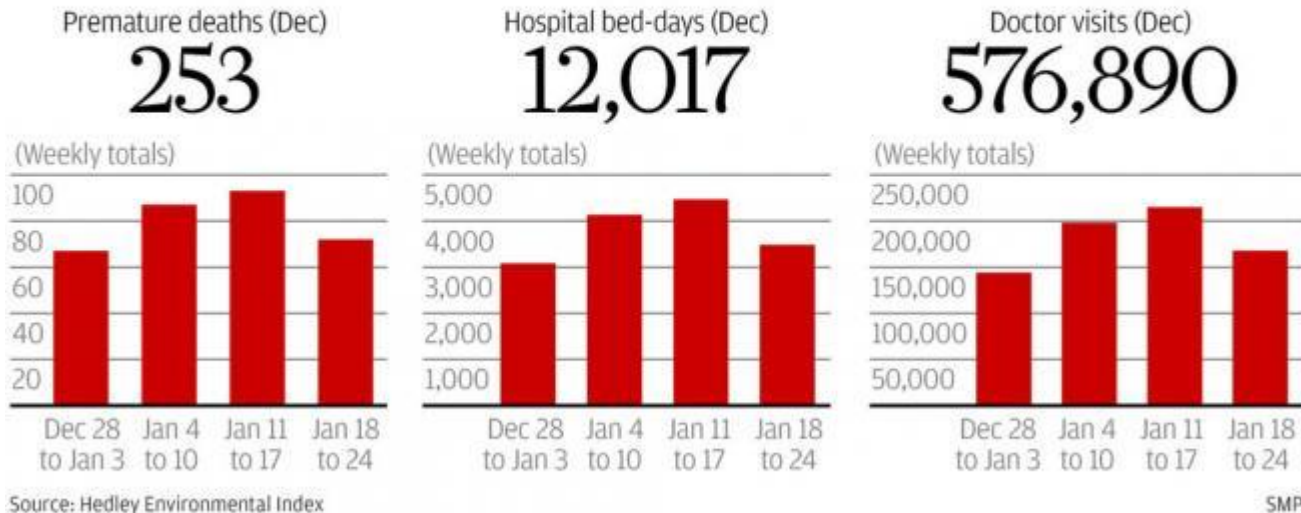


South China Morning Post (Mar 17, 2014) – raising awareness
(distributing masks to pedestrians)

<http://www.scmp.com/lifestyle/technology/article/1136763/air-filters-and-face-masks-offer-little-protection-big-city-air>

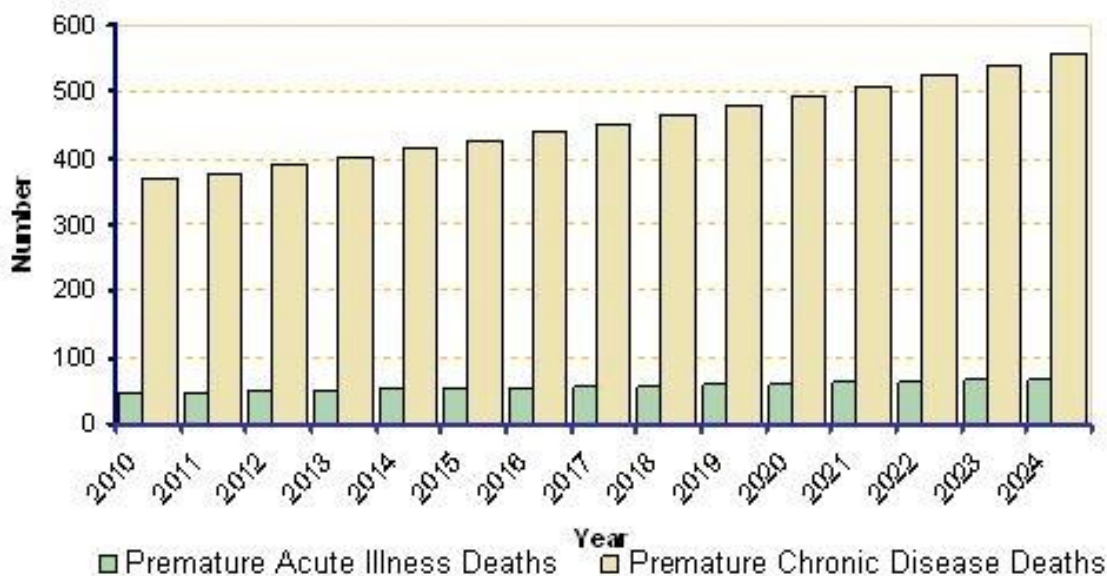
Avoidable harm

The University of Hong Kong School of Public Health has devised a formula to calculate the number of Hong Kong deaths, hospital stays and doctor visits that could have been avoided in a given period with proper pollution-control measures.



South China Morning Post (Mar 17, 2014)
<http://www.scmp.com/lifestyle/technology/article/1136763/air-filters-and-face-masks-offer-little-protection-big-city-air>

Estimated Annual Number of Premature Deaths Attributable to Air Pollution (O₃, PM_{2.5}) Simcoe Muskoka, 2010-2024



Data Source: ICAP, Version 3, 2008, Canadian Medical Association

<http://www.simcoemuskokahealthstats.org/Topics/Environment/OutdoorAir/AirPollutionICAP.aspx>

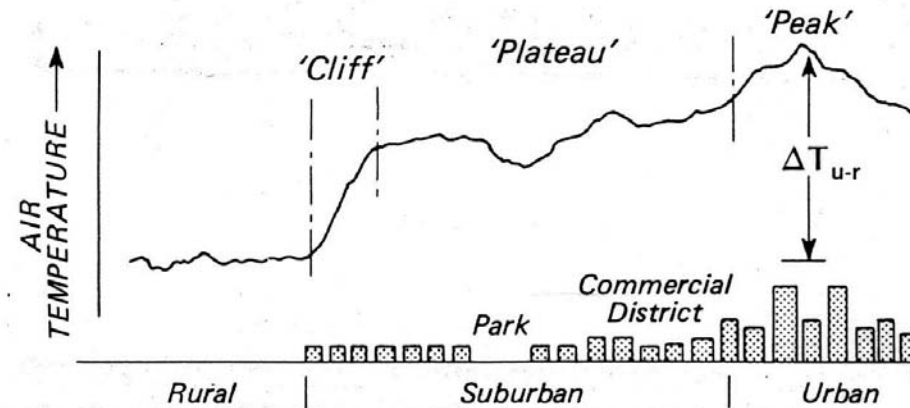
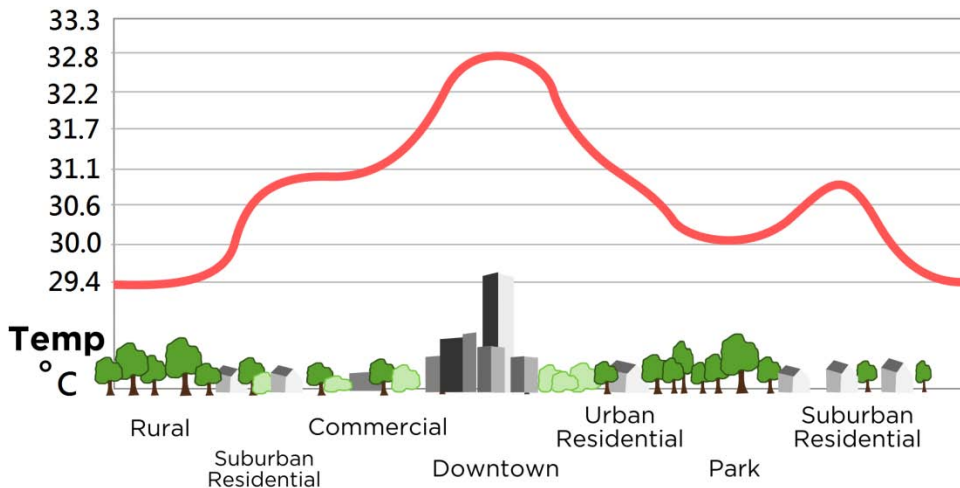
Figure (above) shows the projected increases in premature mortality over the next 15 years in Simcoe Muskoka. The **number of premature chronic disease deaths attributable to air pollution** is expected to increase from an estimated 320 deaths in 2010 to around 550 deaths in 2024. The number of premature acute illness deaths attributable to air pollution is also expected to increase over the same 15 year time period, from around 50 in 2010 to 70 in 2024.

Urban Heat Island

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- Caused by:
 - ▣ Thermal properties of built up (buildings, paved surfaces) versus rural areas;
 - ▣ Air pollution (localized enhanced greenhouse effect)
 - ▣ Lack of vegetation

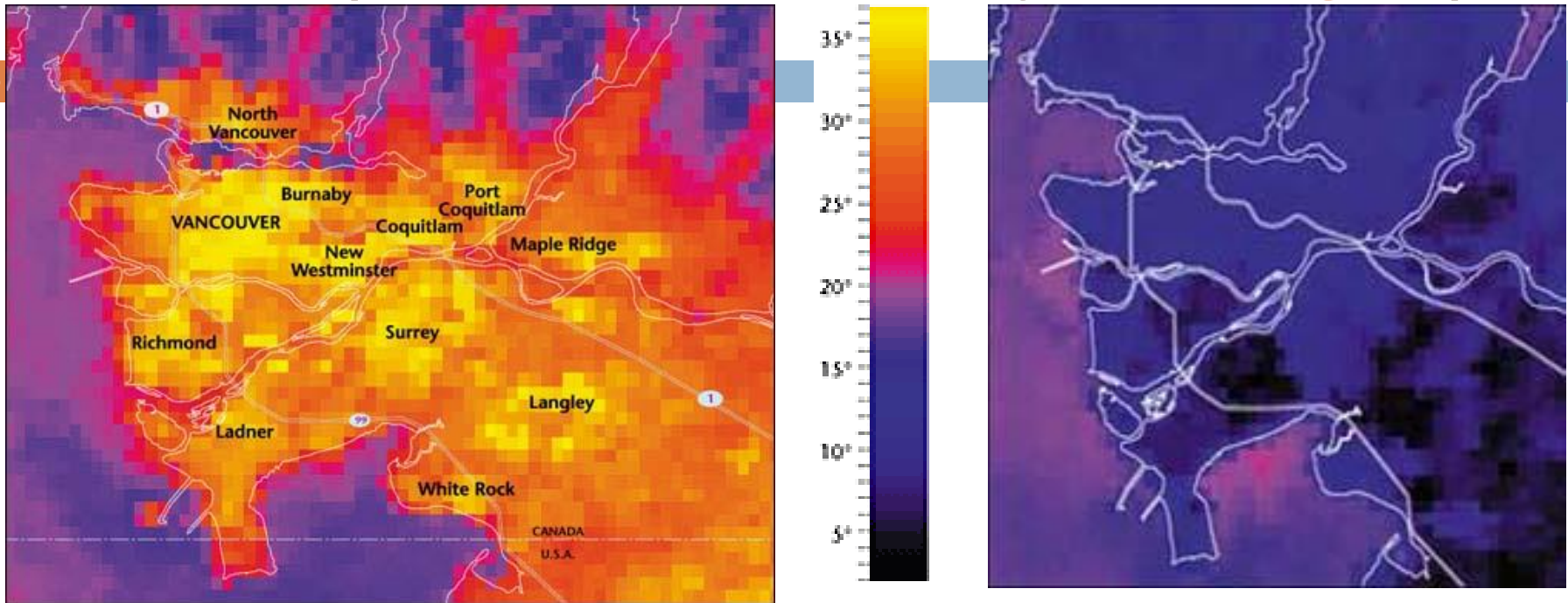
URBAN HEAT ISLAND PROFILE



Source: Tim Oke (1978; 1987)

UHI (Vancouver, day vs night)

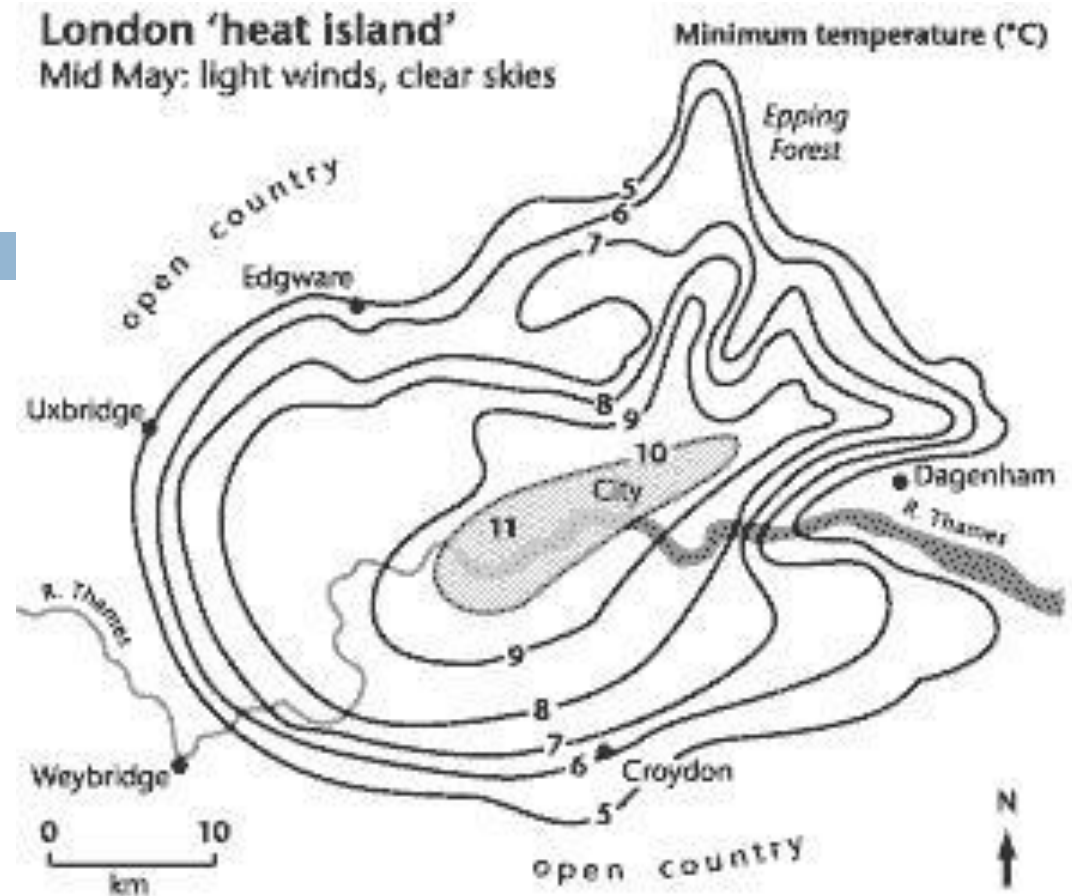
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... from satellite sensors ... surface temperatures in the city core at 3:30 p.m. on an August day are higher than the rural surroundings and that industrial and commercial zones, major highway intersections, shopping malls and airports tend to be hottest. ... At 5:30 a.m. the next day, urbanized areas remain warmer than rural surroundings, due to a slower release of heat from building materials and paved surfaces. The ocean, meanwhile, acts as a heat sink, where temperatures barely change from day to night.

Sensed images credit to Canadian Geographic (2002)

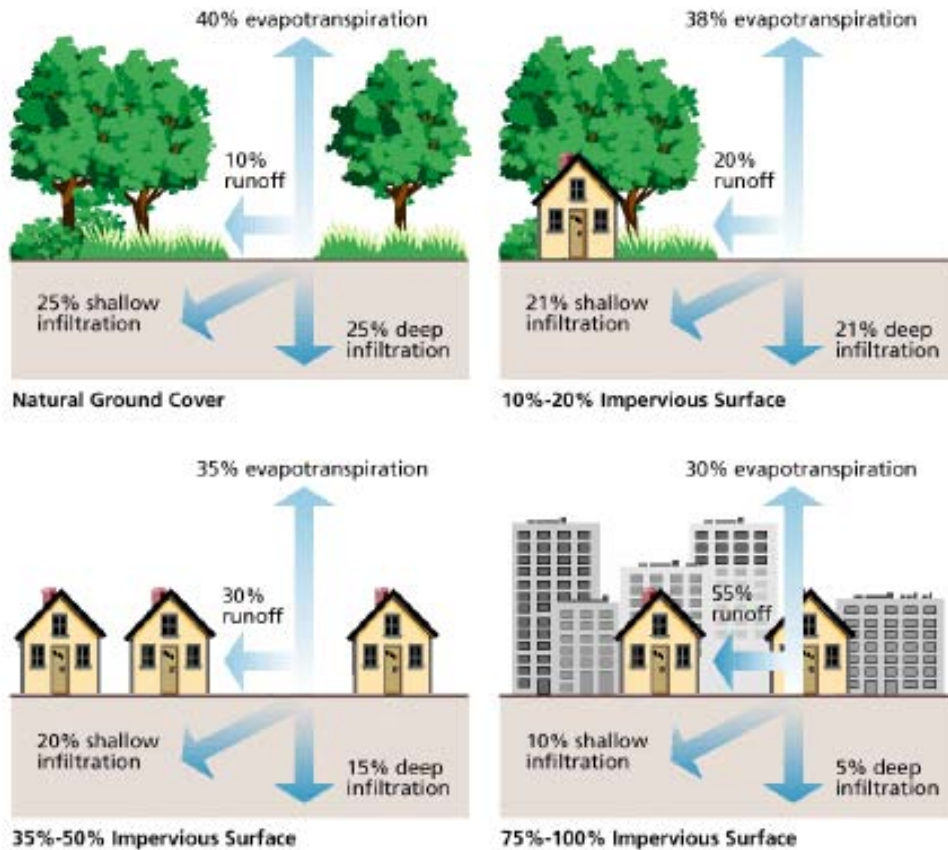
Urban Heat Island, London



London, UK Urban Heat Island ...the mean winter temperatures are on average 1-2 degrees Celsius higher in urban areas, in comparison to rural areas. The mean summer temperature may be on average 5 degrees Celsius higher than surrounding rural areas. This can be seen in London's Heat Island (see image) http://www.coolgeography.co.uk/A-level/AQA/Year%2013/Weather%20and%20climate/Microclimates/Urban_climates.htm

Hydrological Impacts – urban areas

Figure 5-4: Typical Impact of Imperviousness on Surface Runoff.



1. Precipitation → surface runoff more quickly – less likely to infiltrate / soak into the soil;
2. Greater potential for surface flooding;
3. Decreased recharge of groundwater aquifers (ie. Less infiltration)

Source: GVRD (Oct. 1999) Stormwater Management Plan

Urban Issues (socio-economic)

- Changing Economies
- Demographic Changes / Aging Cities
- Declining Cities
- Immigration (to and within cities)
- Gentrification
- School Closures

Economic changes ...

Decline of manufacturing centres of the NE

American Manufacturing Belt

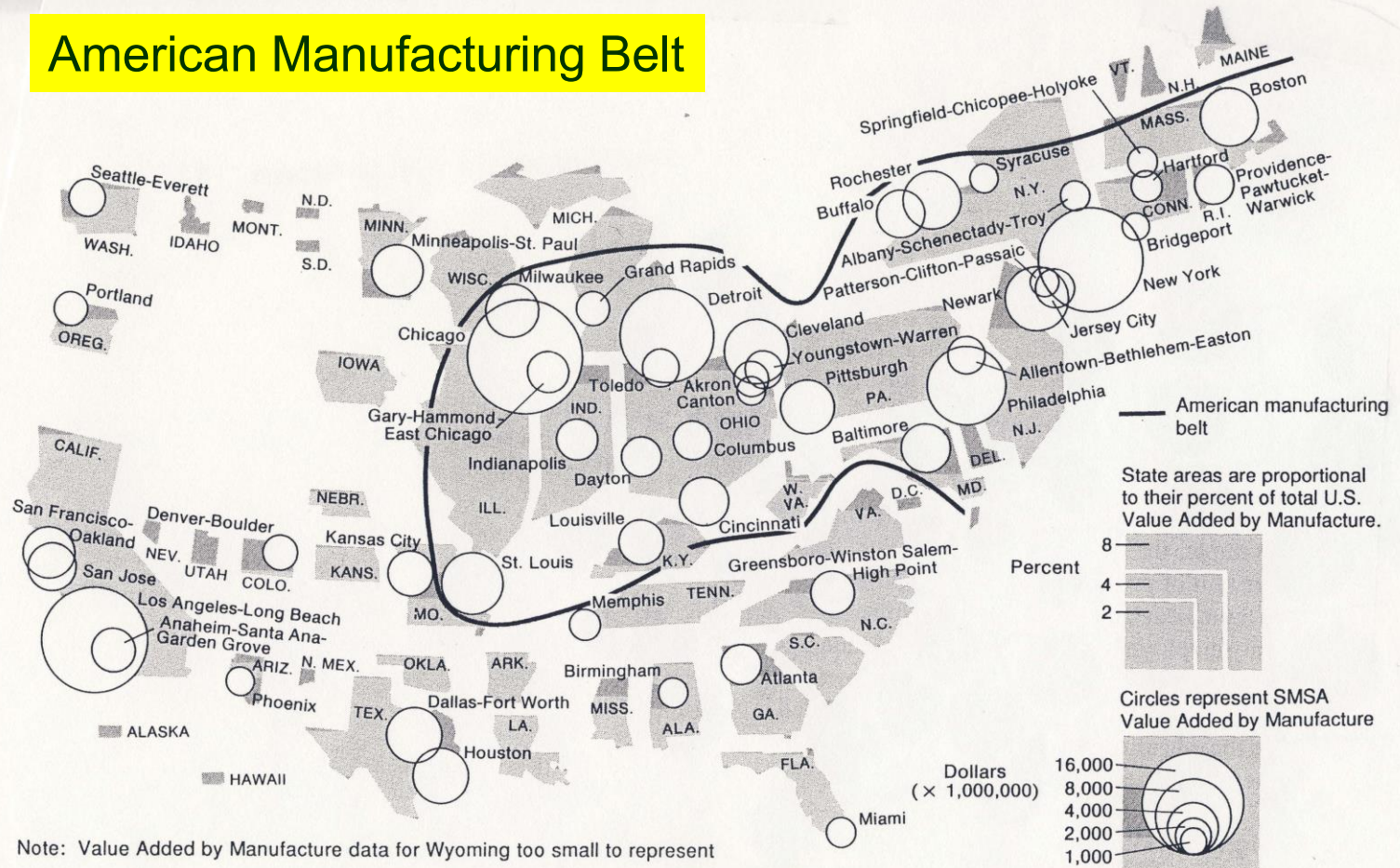


Figure 7-6. American Manufacturing Belt. First identified in 1919, the manufacturing belt in the Northeastern United States remains the core area of manufacturing activity in the country, but has declined in dominance since World War II. The top 6 of 10 manufacturing centers in the country today are identified with the manufacturing belt. Source: Red

Source: Hartshorn (1992)

Changes in Manufacturing / Service Employment Mix in the US (from Hartshorn, 1992)

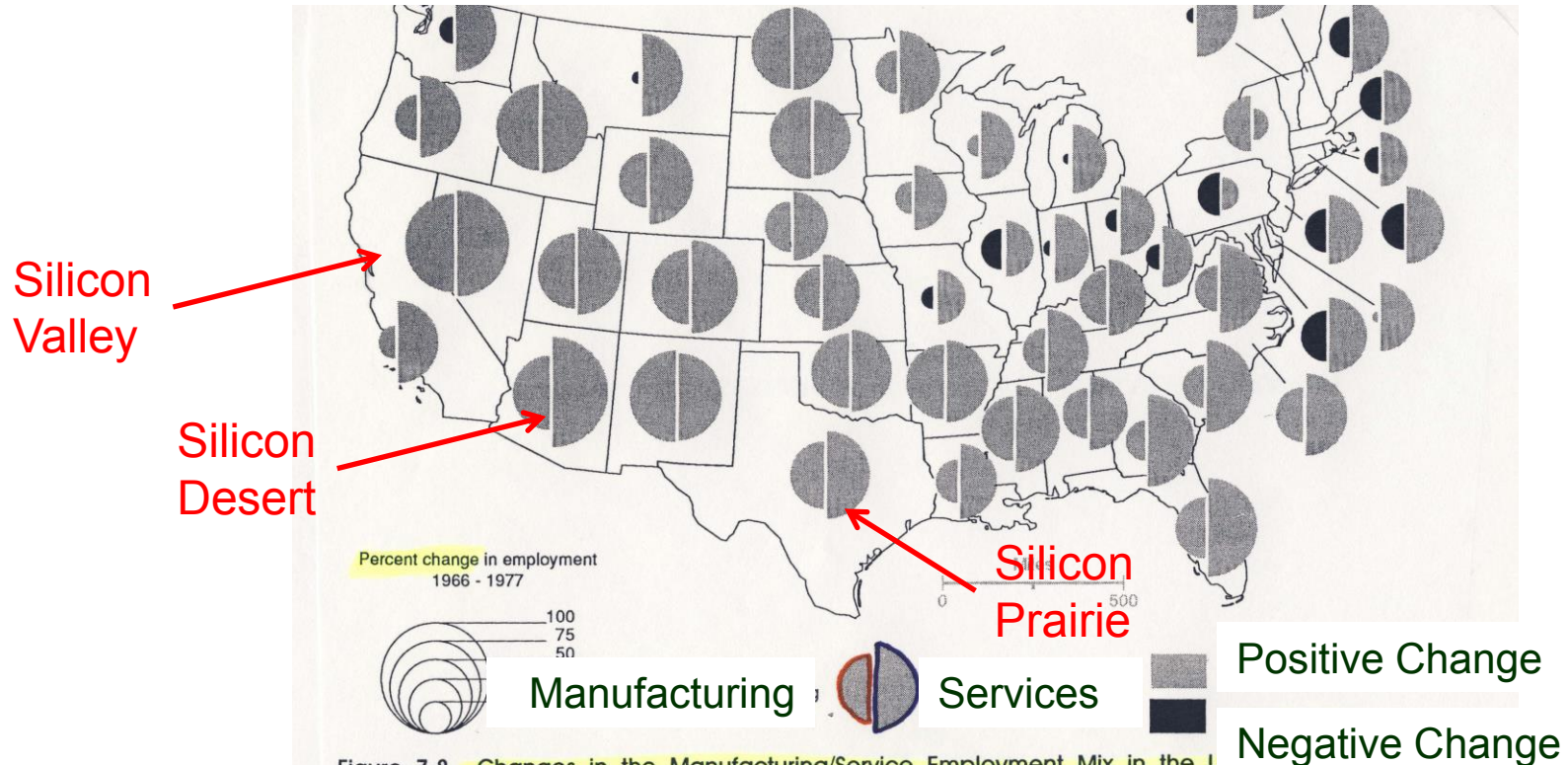


Figure 7-8. Changes in the Manufacturing/Service Employment Mix in the U.S. The post-industrial service economy gained momentum in the 1970s, a fundamental change occurred in the manufacturing/service employment mix. While the biggest shifts occurred in the northeast, where there was a decline in manufacturing employment, the modest gains in manufacturing employment in the rest of the country were far overshadowed by service economy growth. *Source:* Modified after Allen J. Scott, *Metropolis: From the Division of Labor to Urban Form*, University of California Press, Berkeley, 1988, p. 21. Used by permission.

Urban Change in Canada

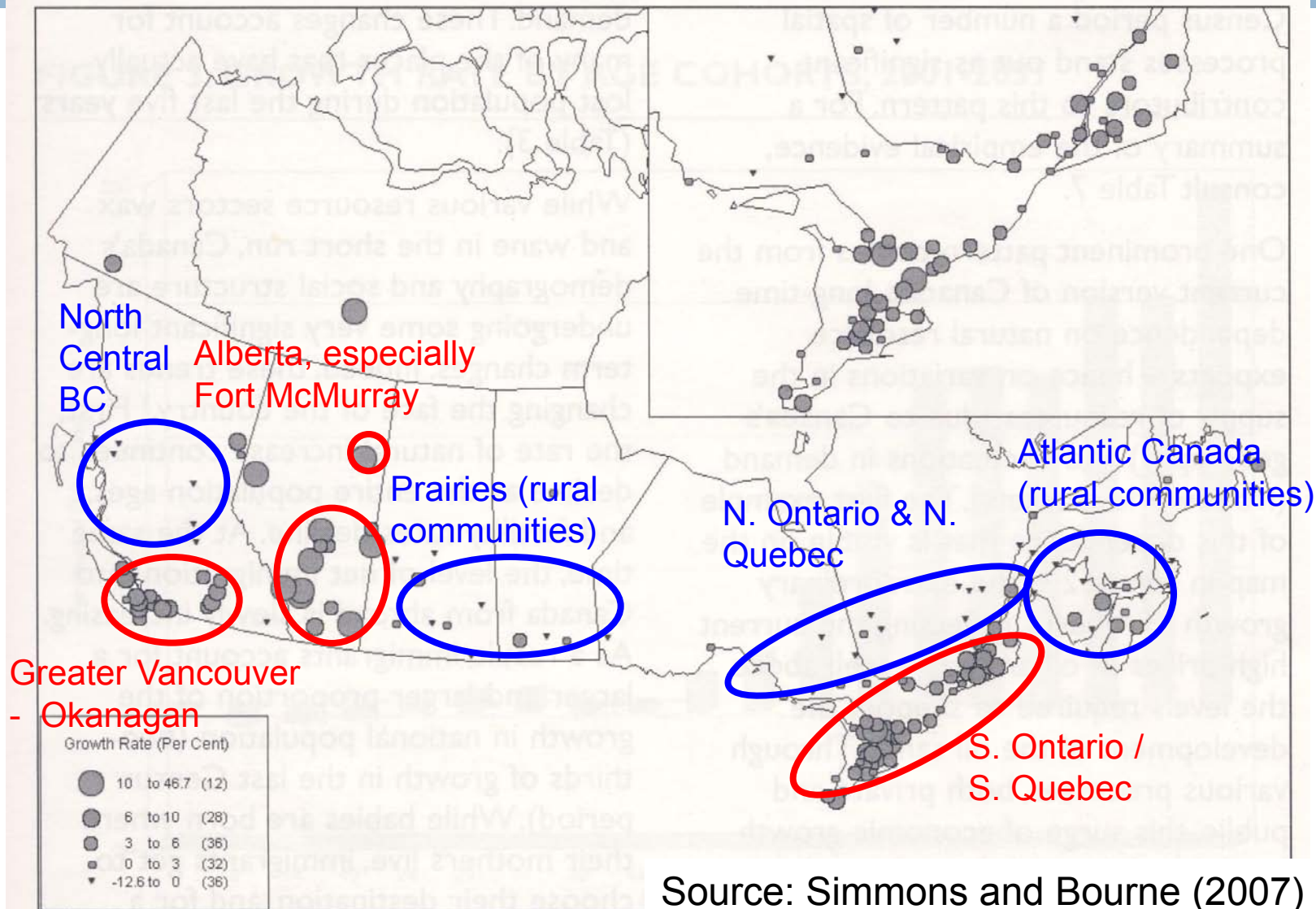
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- **dramatic urbanization** over the 20th century;
- From census data:

	1921	1996
urban / suburban	49%	78 %
rural – farm	51%	2.5 %
rural – non-farm / exurban	n/a	20 %

[StatsCan's definition of rural centres < 1000 pop'n]

FIGURE 2: POPULATION GROWTH RATE, 2001 TO 2006



Source: Simmons and Bourne (2007)

Demographic Change in Cities

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a) *Demographic Changes*

- ▣ ↓ in number and proportion of children & youth
- ▣ Rapid ↑ in elderly population

- ▣ *Boom, Bust & Echo*
by D. Foote (1996)

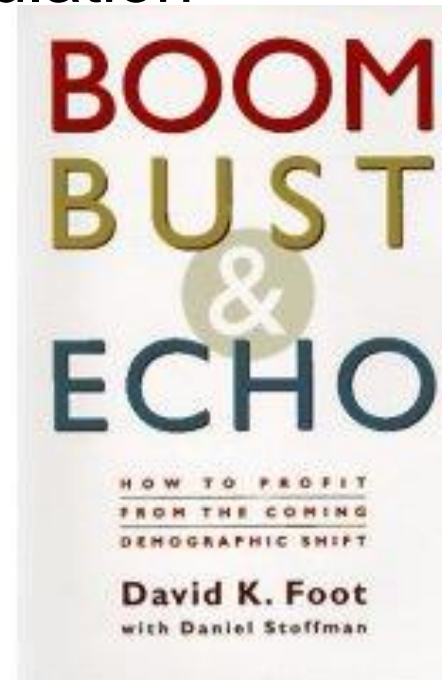
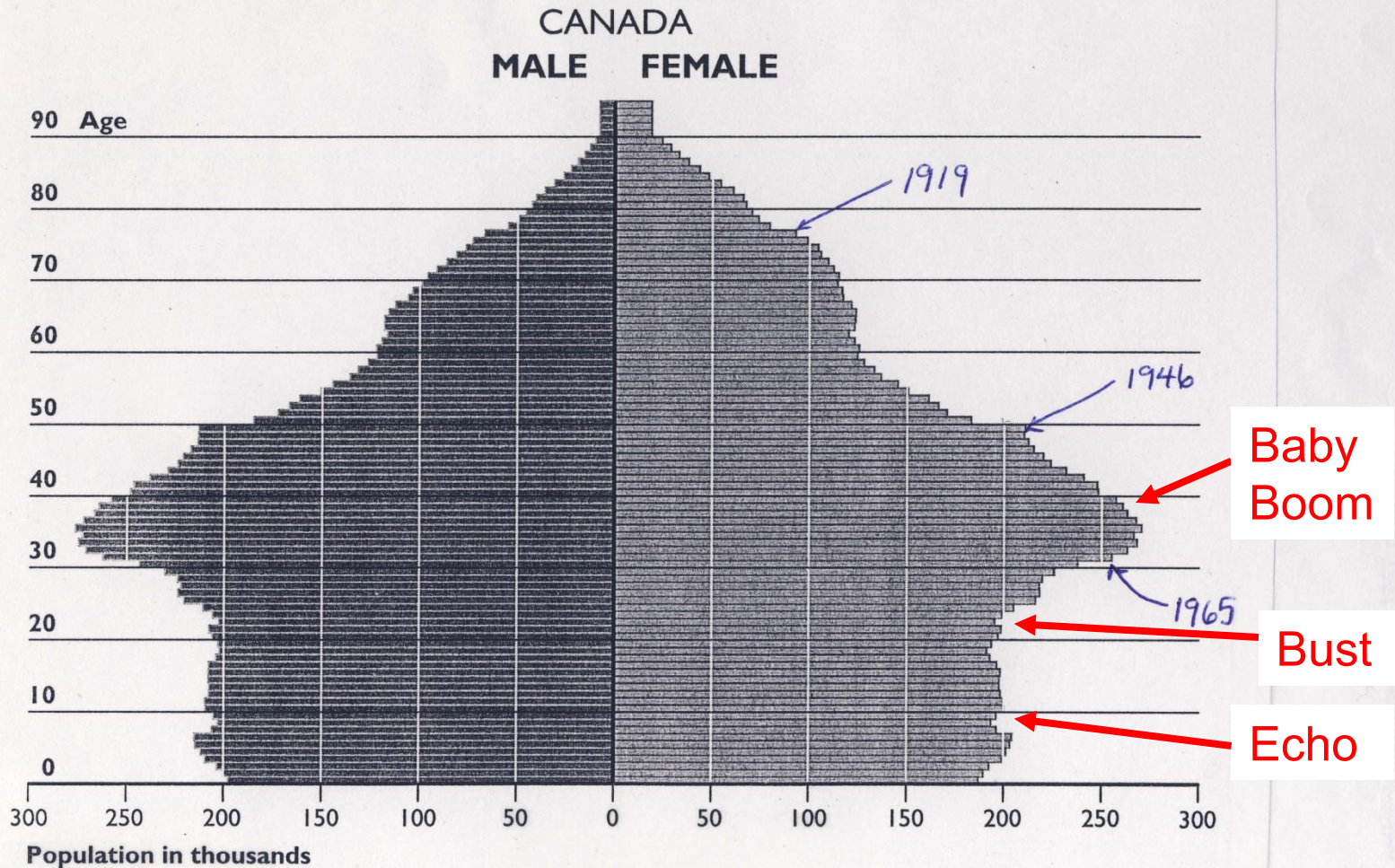


FIGURE 1: CANADA'S POPULATION PYRAMIDS, 1996



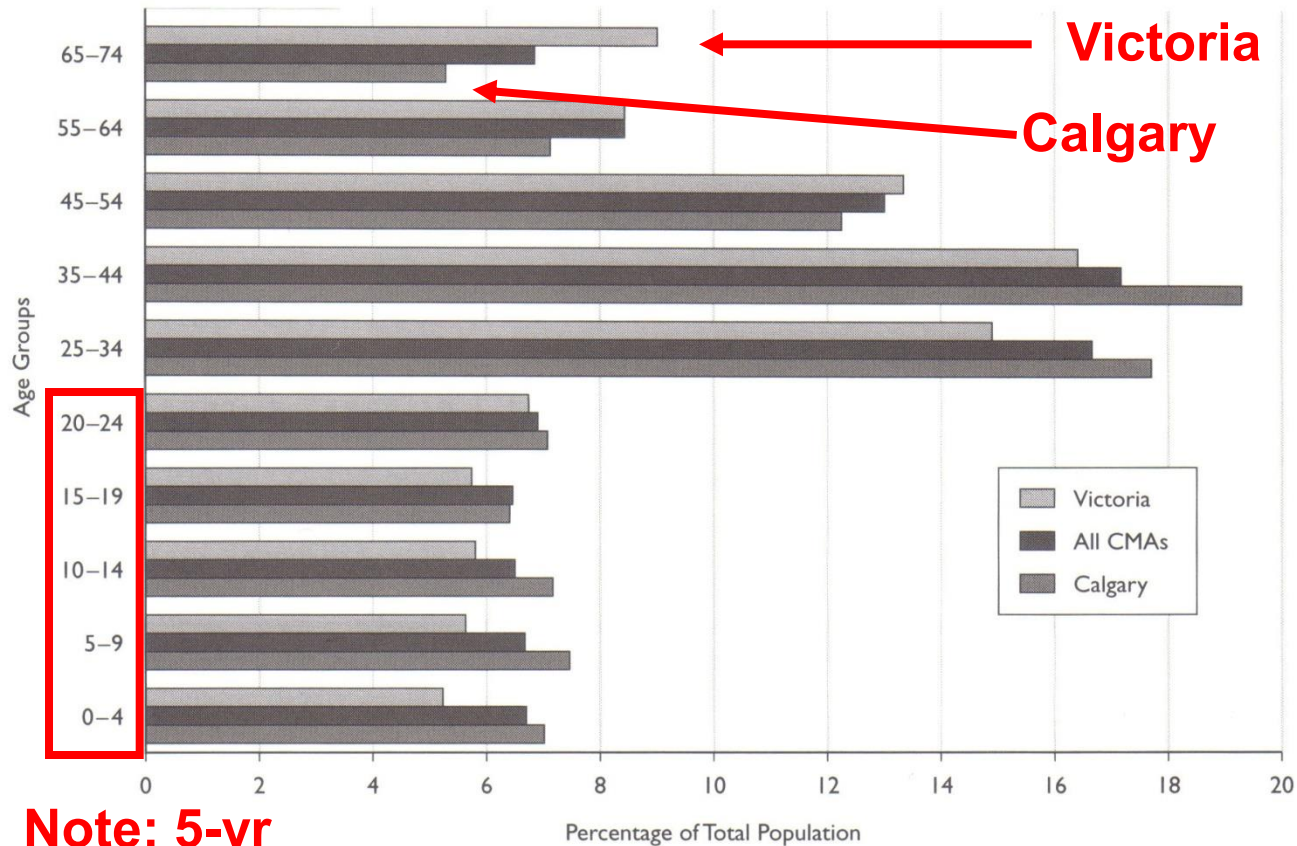
Boomers born 1946-1965 (aged 47 to 66 years in 2012)

From: Foote (1996) *Boom, Bust and Echo*

Aging City populations?

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Figure 9.1 Age Distribution: Calgary, Victoria, and All CMA, 1996



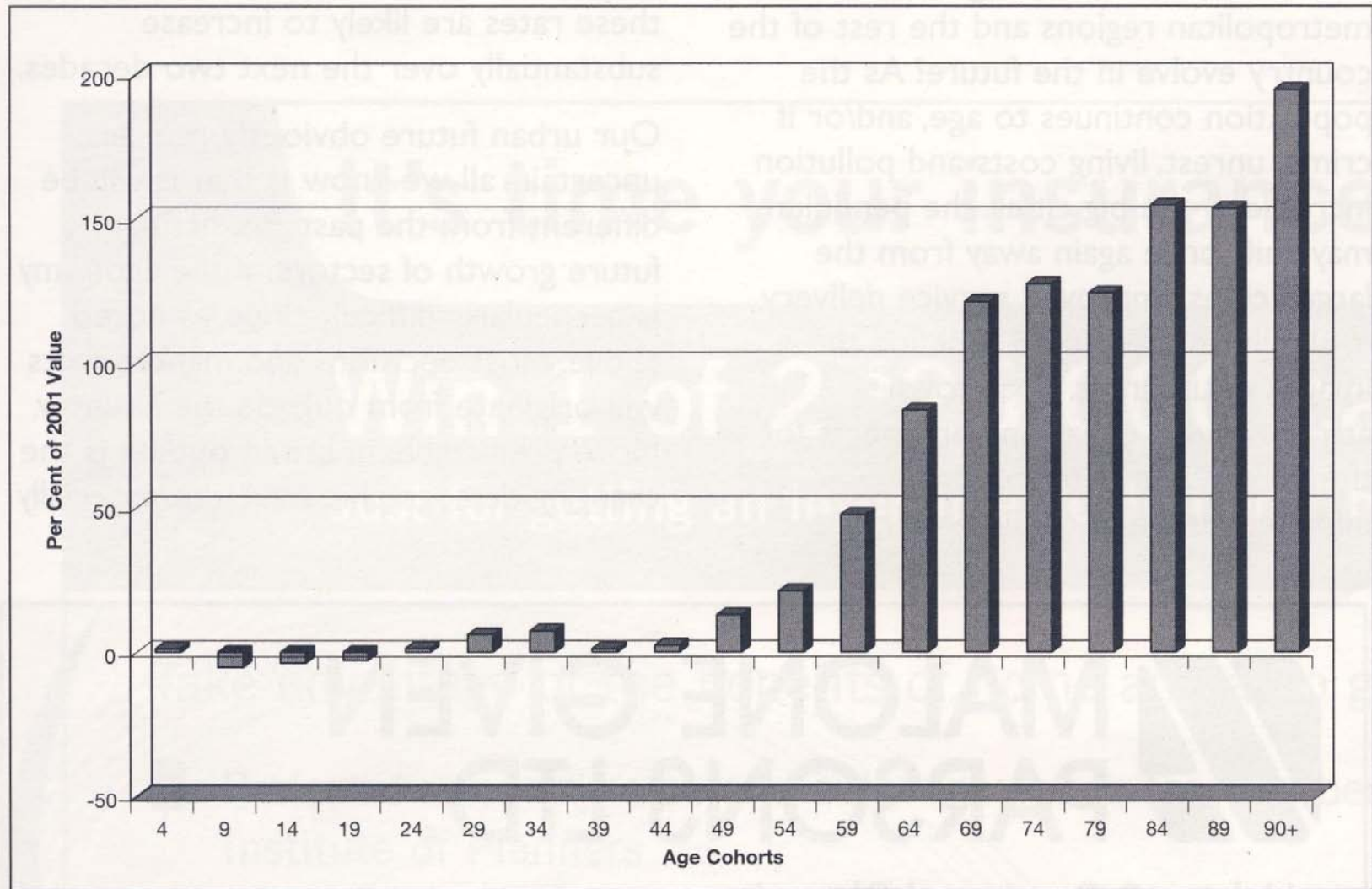
Source: Statistics Canada, *Census of Canada*, 1996.

From: Murdie and Teixeira (2000)

Canada's projected aging ...

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FIGURE 3: GROWTH RATE BY AGE COHORTS, 2001-2031



Source: Simmons and Bourne (2007)

Demographic Changes...

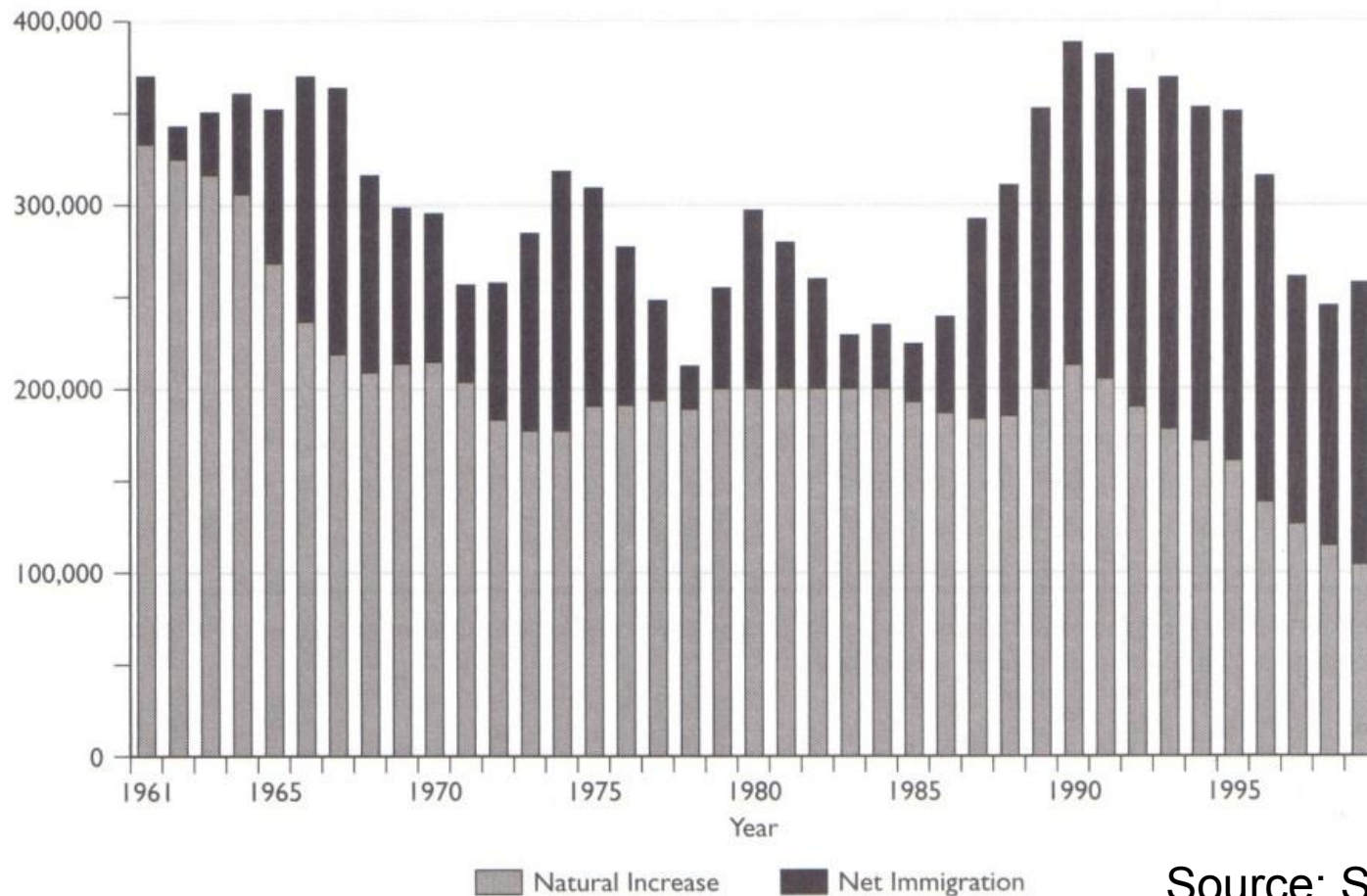
40

- What might we expect as baby boomers retire and age?
 - Aging cities ... types of services
 - Need for family houses
 - Need for public transit (mobility becomes a challenge sans license!!)
 - Investment opportunities (seniors' care, recreation)

Continued internationalization of our cities, especially the “gateway cities” ...

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Figure 3.6 Sources of Population Growth, 1961–99

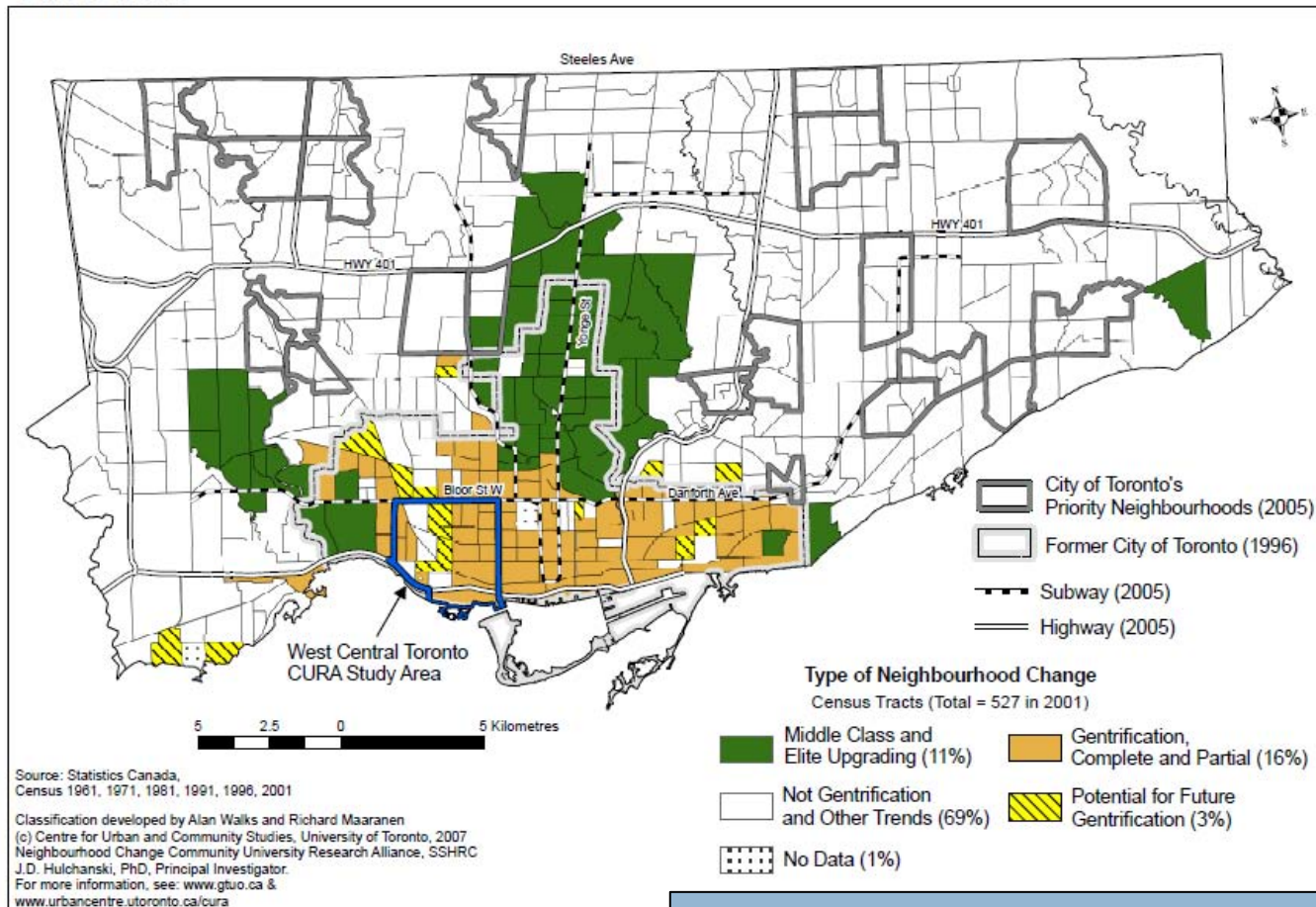


Source: Simmons and McCann (2006)

□ **gentrification**: residential rejuvenation of urban core, often displaces low income residents; “upscaling”

Neighbourhood Gentrification in Toronto, 1961 to 2001

Census Tracts



From Hulchanski (2007) – see map caption

School Closures in Thunder Bay

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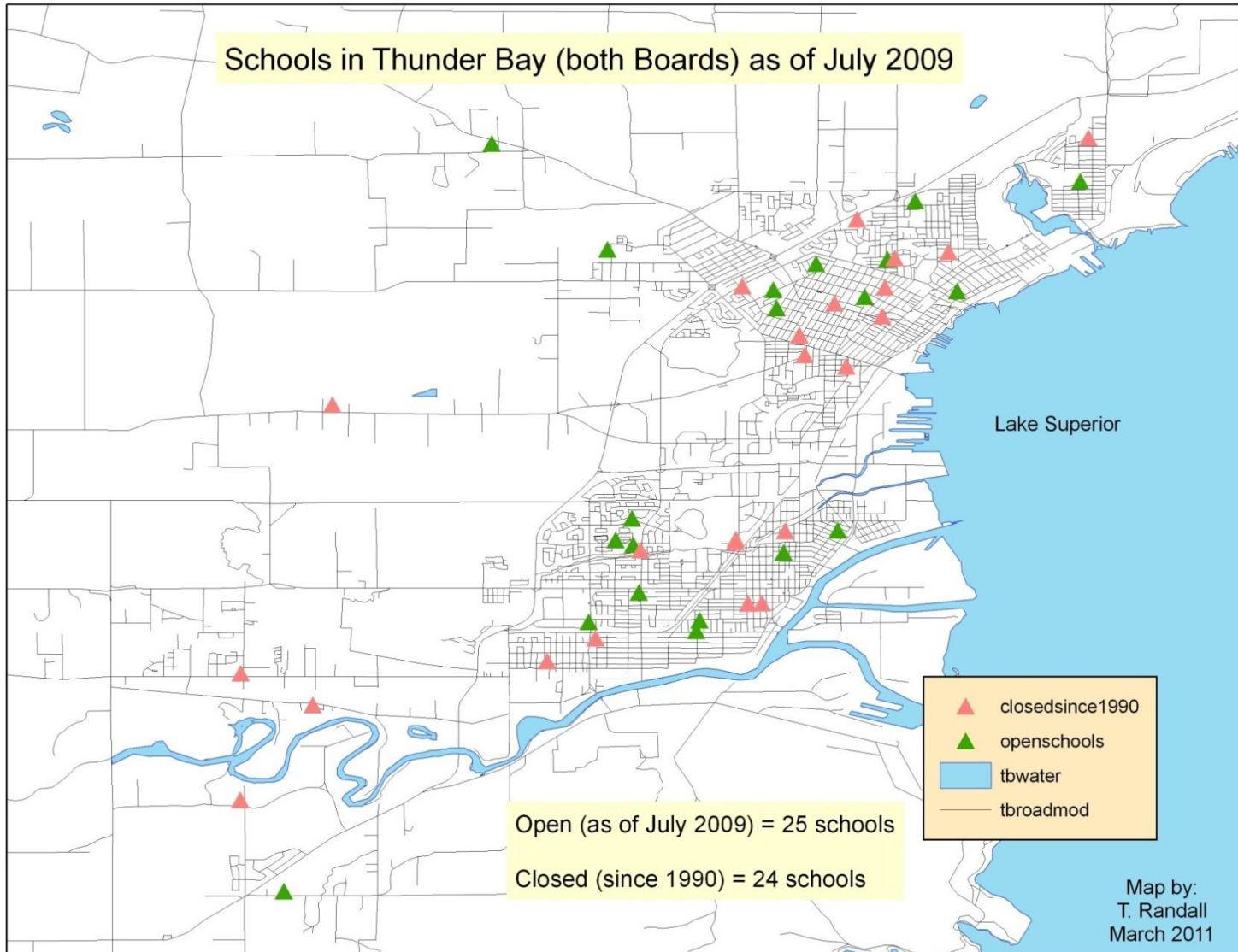
- **22 schools** closed by Lakehead Public School Board between 1991 and 2007 (B. Sauder, pers. Comm, Aug. 2007)
- **higher rate of closure** (e.g. versus Windsor and Saskatoon, see Phipps 2006)



*Former Green Acres Public School,
Southward Thunder Bay ~ Nov. 2008*

School Closures in Thunder (since 1990)

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Reasons for School Closures

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□ Demographic changes

- a -2.1% population change in Thunder Bay (1991-2001)
- aging of neighbourhood populations rather than rejuvenation

□ Suburbanization of the population

- Closure of inner city schools (e.g., Cornwall, Oliver Road, Isabella, Forest Park, Fort William Collegiate)
- New schools (e.g., Woodcrest)

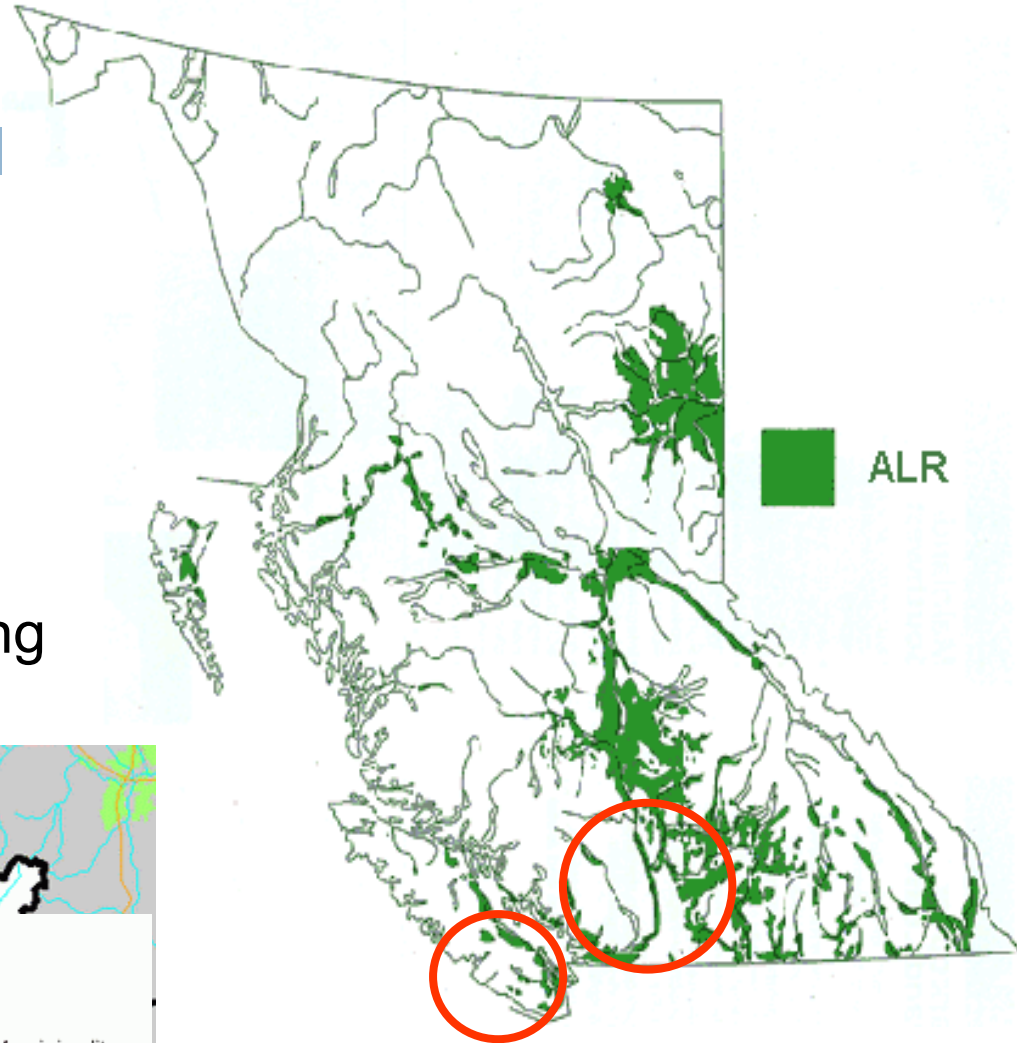
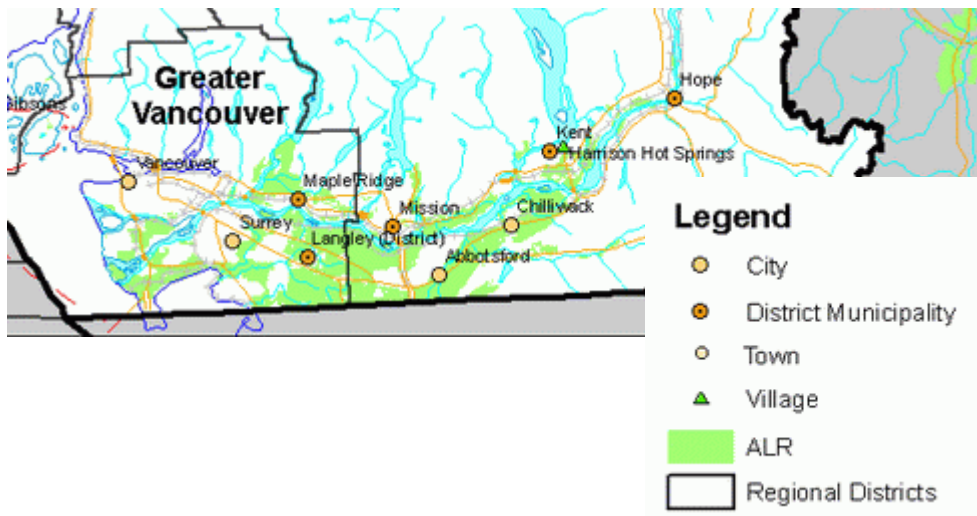


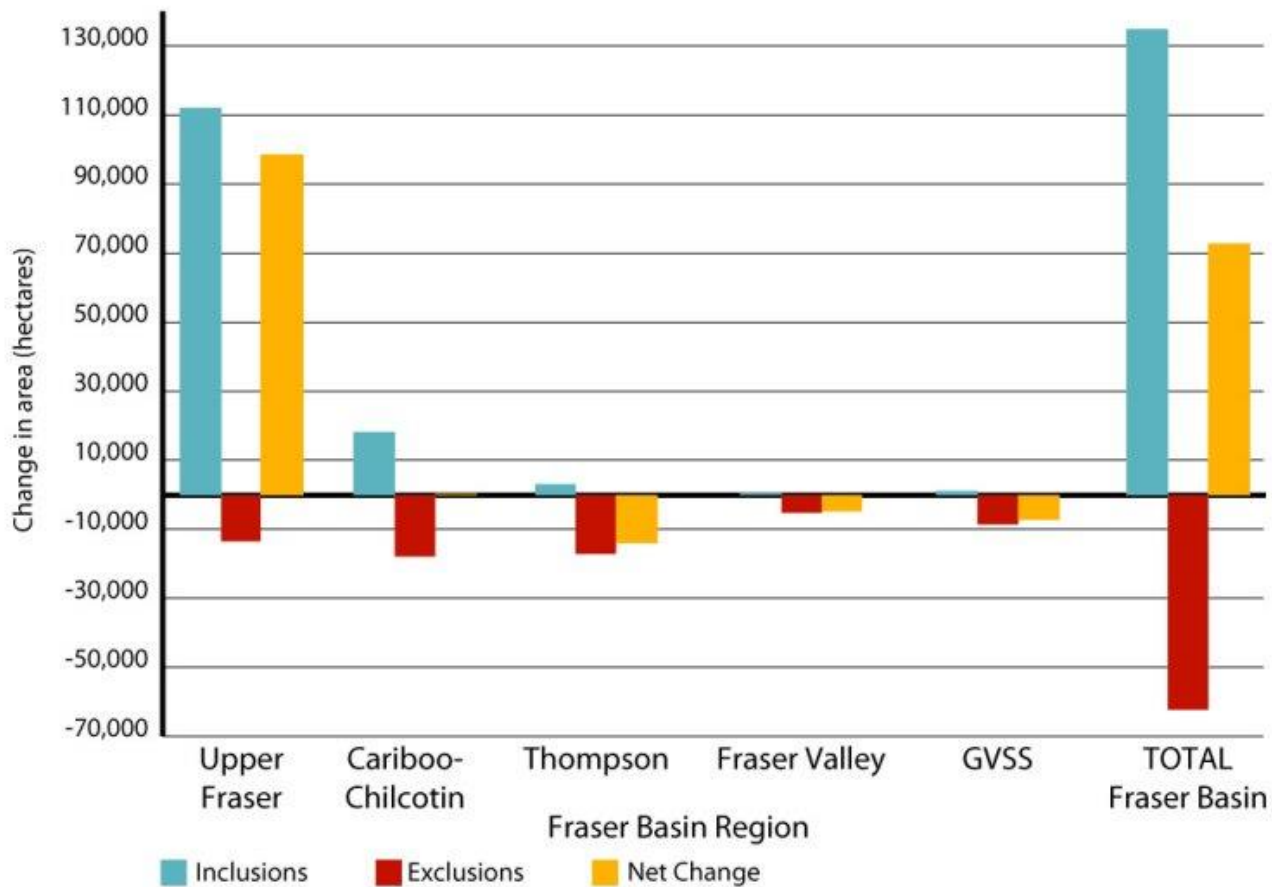
Former Fort William Collegiate, Southward Thunder Bay ~ Nov. 2008

Urban Issues (political)

- Urban growth boundaries
- Farmland protection vs development rights (Green Belt, ALR)
- Neighbourhood preservation
- Toronto's Transit City (2011 Mayoral election issue)

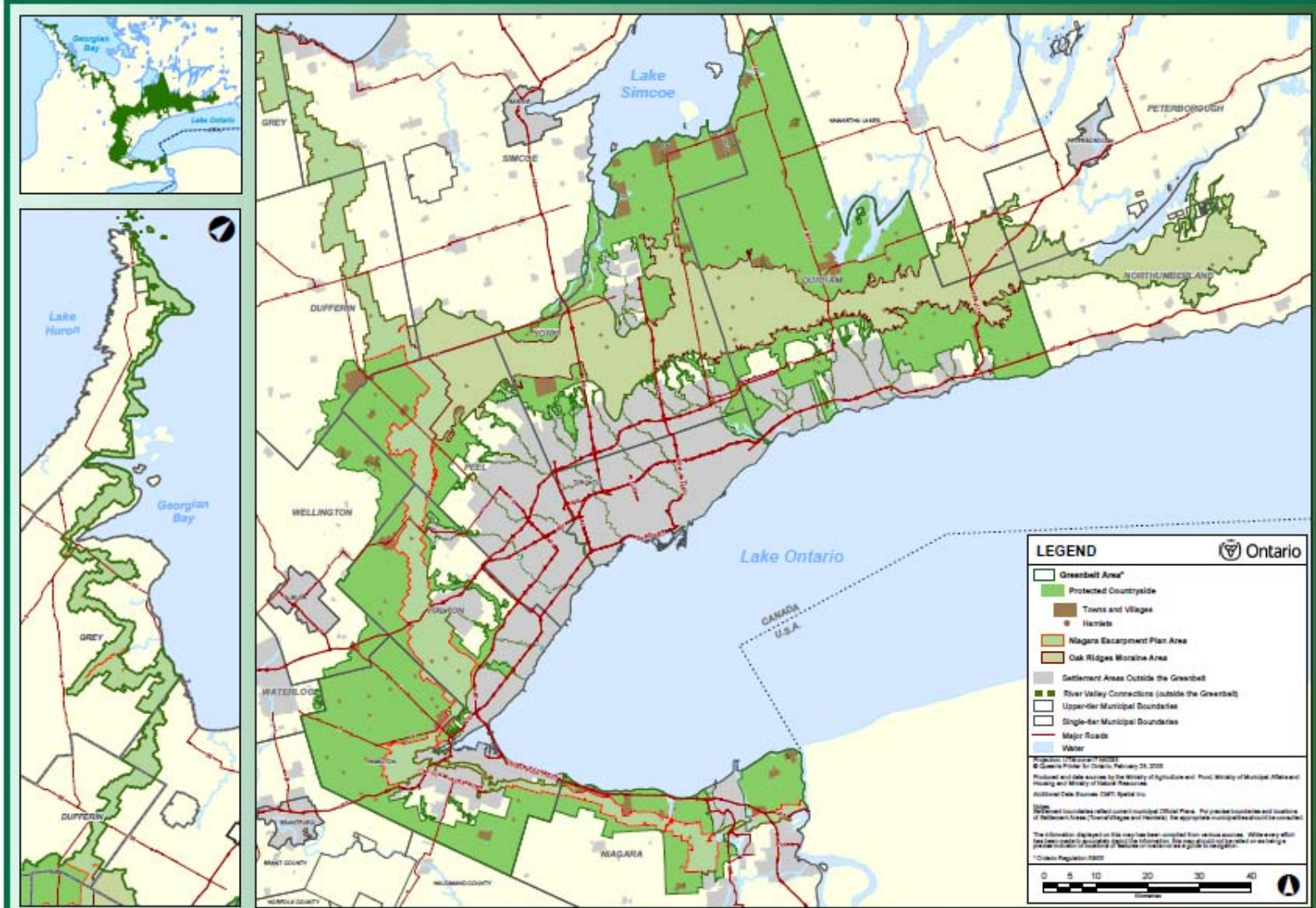
- British Columbia's Agricultural Land Reserve (**ALR**) – since 1974
- Has been strong tool to constraint physical sprawl in Greater Vancouver ... how long will the political will last ...



Change in ALR Area in Fraser Basin Regions (1974-2005)²

Ontario's Green Belt – since 2005

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greenbelt
PLAN 2005

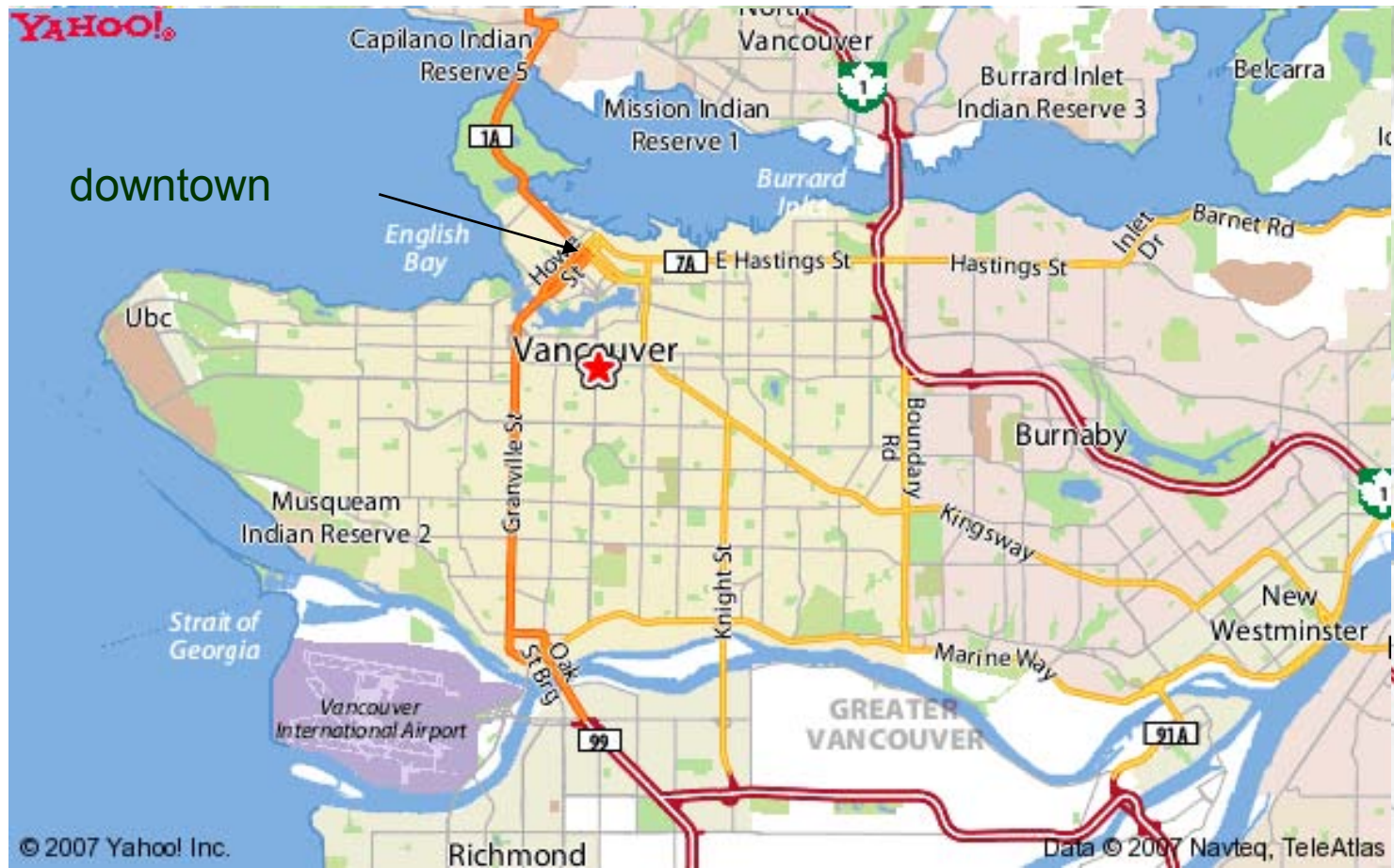
Schedule 1:
Greenbelt Plan Area

Freeway Resistance / Neighbourhood Preservation

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strong opposition occurred in:

- ▣ **Toronto** (Spadina Expressway defeated in 1971)
- ▣ **Vancouver** (municipal election issue in early 1970s)





Transit City Map (Toronto) as of August 2010

- Key election issue in Mayoral election (Fall 2010) – Mayor Ford elected on pro-suburban, somewhat anti-Transit City platform

Concluding Thoughts – Urban Issues

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- Physical Issues
- Socio-Economic Issues
- Political Issues

Urban Issues (environmental solutions)

- Sustainability
- Transit-oriented developments (e.g., Vancouver's Regional Town Centres)
- Walkability
- Intensification
- Smart Growth
- Brownfield Development

Sustainability Concept

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- Reduced consumption of ENERGY, RAW MATERIALS and LAND
- Achieved via:
 - ▣ Use of Renewable Forms of Energy
 - ▣ Use of Recycled (rather than Virgin) Materials
 - ▣ Re-Use of Urban Land (rather than Continued Expansion onto Greenfields)
- Sustainable Community Design

Brownfield Development – land re-use

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Bethlehem Steel Warehouse

Photo Credit: Sean M.L. Galbraith Photography

Density Spectrum

- what intensification is appropriate?



West End, Vancouver (2001)

City Density	146.3 du/ha
	203.0 persons/ha
Occupancy	1.4 persons/du

Source: Canada Census 2001



River Terrace, Thunder Bay (2001)

City Density	10.6 du/ha
Net Residential Density	14.3 du/ha
Occupancy	3.1 persons/du

Examples of Photos Shown in VPS

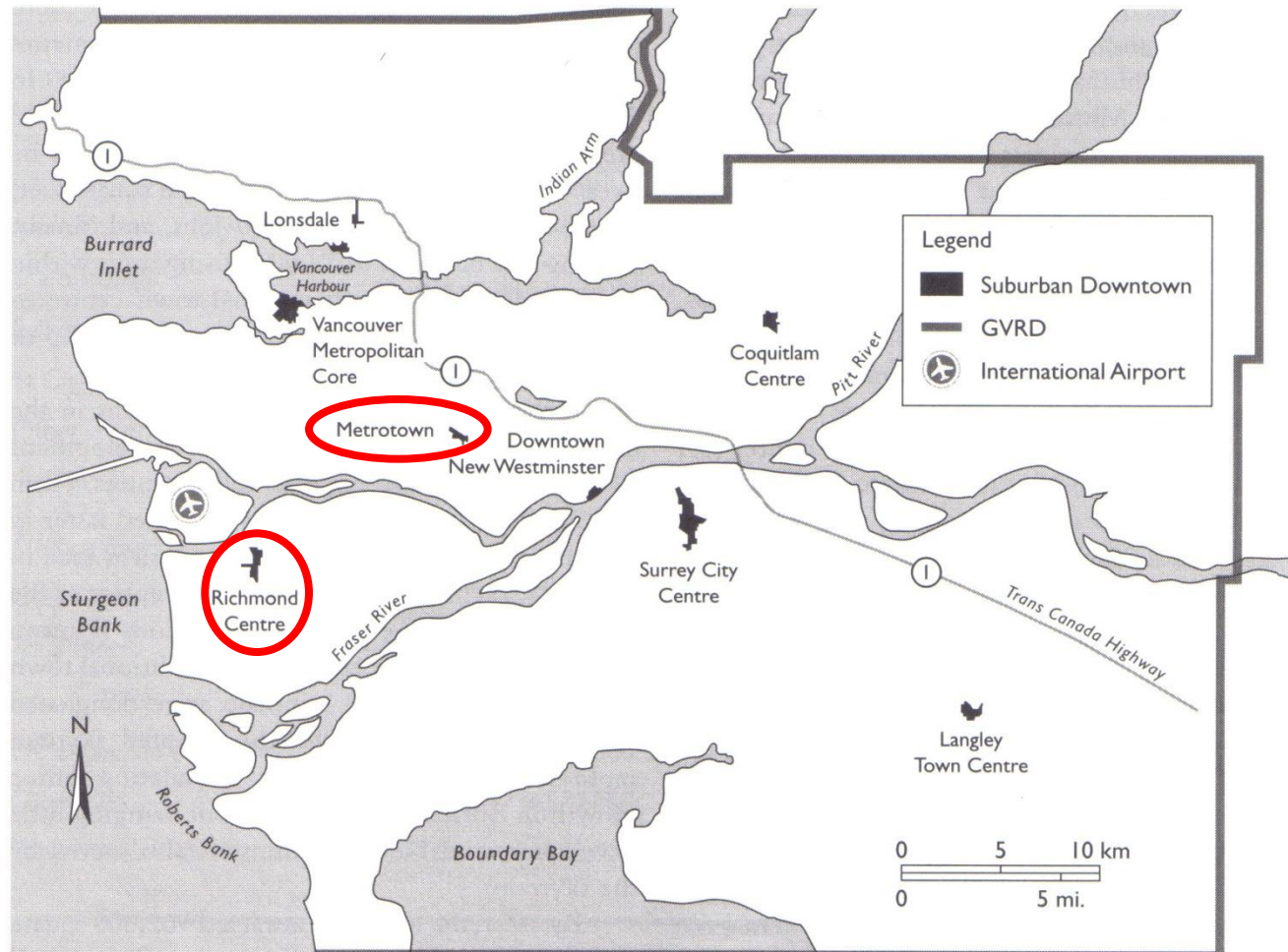
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Vancouver's Regional Town Centres (RTCs)

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Figure 11.5 Location of Vancouver Suburban Downtowns



From: Gad and Matthews (2000)

Vancouver's Regional Town Centres (RTCs)

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- were part of the **Livable Region Strategy** (1976→), included 4 measures ...
 1. *encourage increased housing density near CBD*



Vancouver's Regional Town Centres (RTCs)

2. decentralize jobs to four RTCs in the suburbs

Table 11.3 Vancouver's Regional Town Centres

	Office Space (sq. m.)		Retail Space (sq. m.) 1991	Employment 1991-2
	1983	1991-2		
CBD	1,596,000	2,183,000	1,305,000	173,000
Broadway	318,000	418,000		
Metrotown	77,000	223,000	227,000	17,000
Richmond	52,000	139,000	281,000	20,400
Lonsdale	30,000	111,000	92,000	15,300
Other 3 RTCs	129,000	182,000	362,000	27,400
Total RTCs	288,000	655,000	962,000	80,100
Other	1,285,000	1,770,000	3,700,000	561,000
Total GVRD	3,487,000	5,026,000	5,967,000	814,100

Sources: GVRD (1991, 1993a, 1993b).

50%
in
CBD

40%
in
CBD

From: Gad and Matthews (2000)

3. *improve public transportation*

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Express Bus (B-line), Richmond
Town Centre Photo Credit: J.
Jorgensen



SkyTrain Extension (**Canada Line** to
airport) Under Construction June 2006

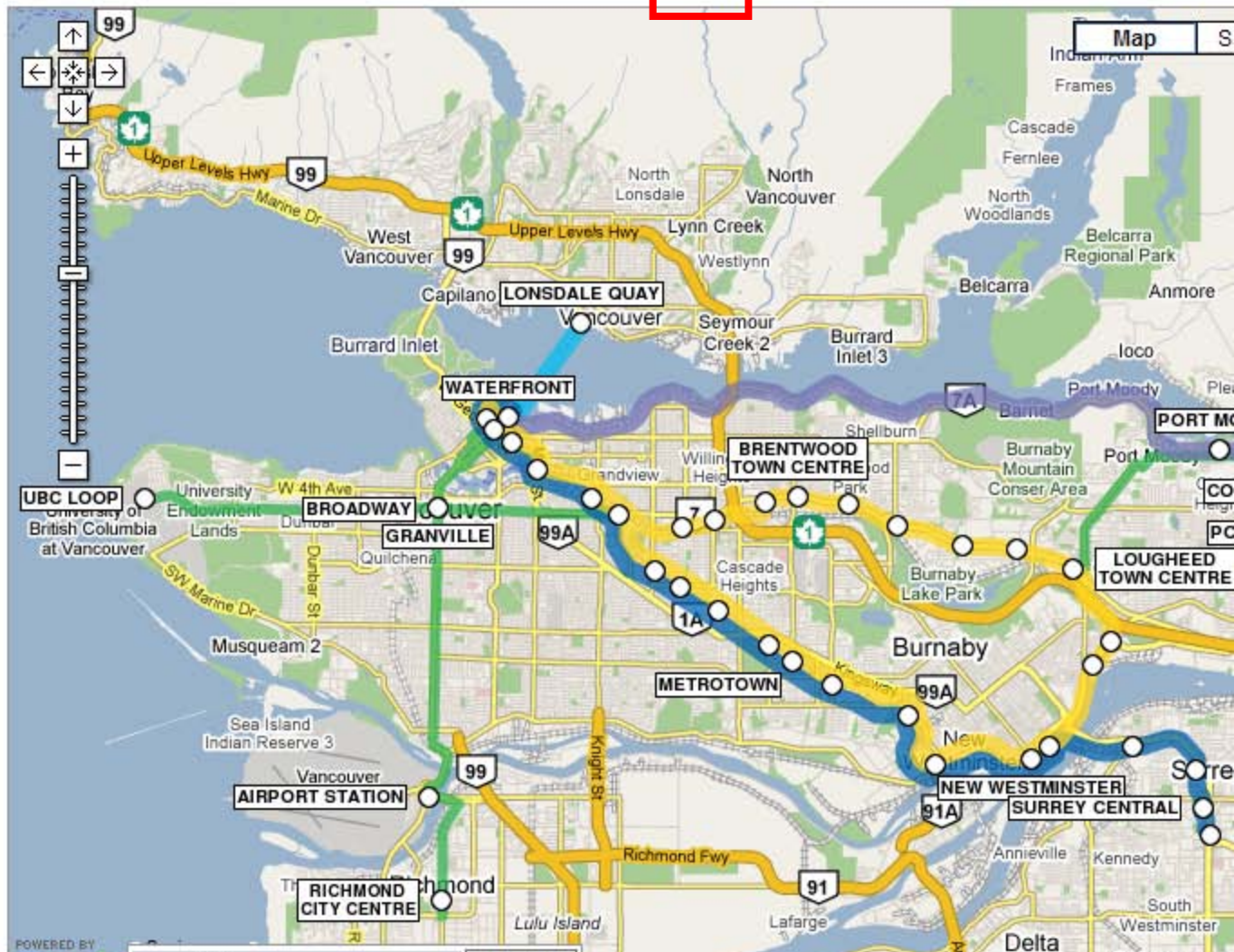
Vancouver Transit with Google Maps

Route [today] [future] KML [today | future] Link

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- Expo Line (SkyTrain)
- Millenium Line (SkyTrain)
- Canada Line (SkyTrain, 2010)
- Evergreen Line (Light Rail, future)
- B-Line (Rapid Bus)
- SeaBus (Ferry)
- West Coast Express (Suburban Rail)
- Bus
- Bike Lockers
- Park and Ride

Bus routes may not be up-to-date. Visit [TransLink](#) for the real maps, schedules, etc.



Vancouver Transit with Google Maps

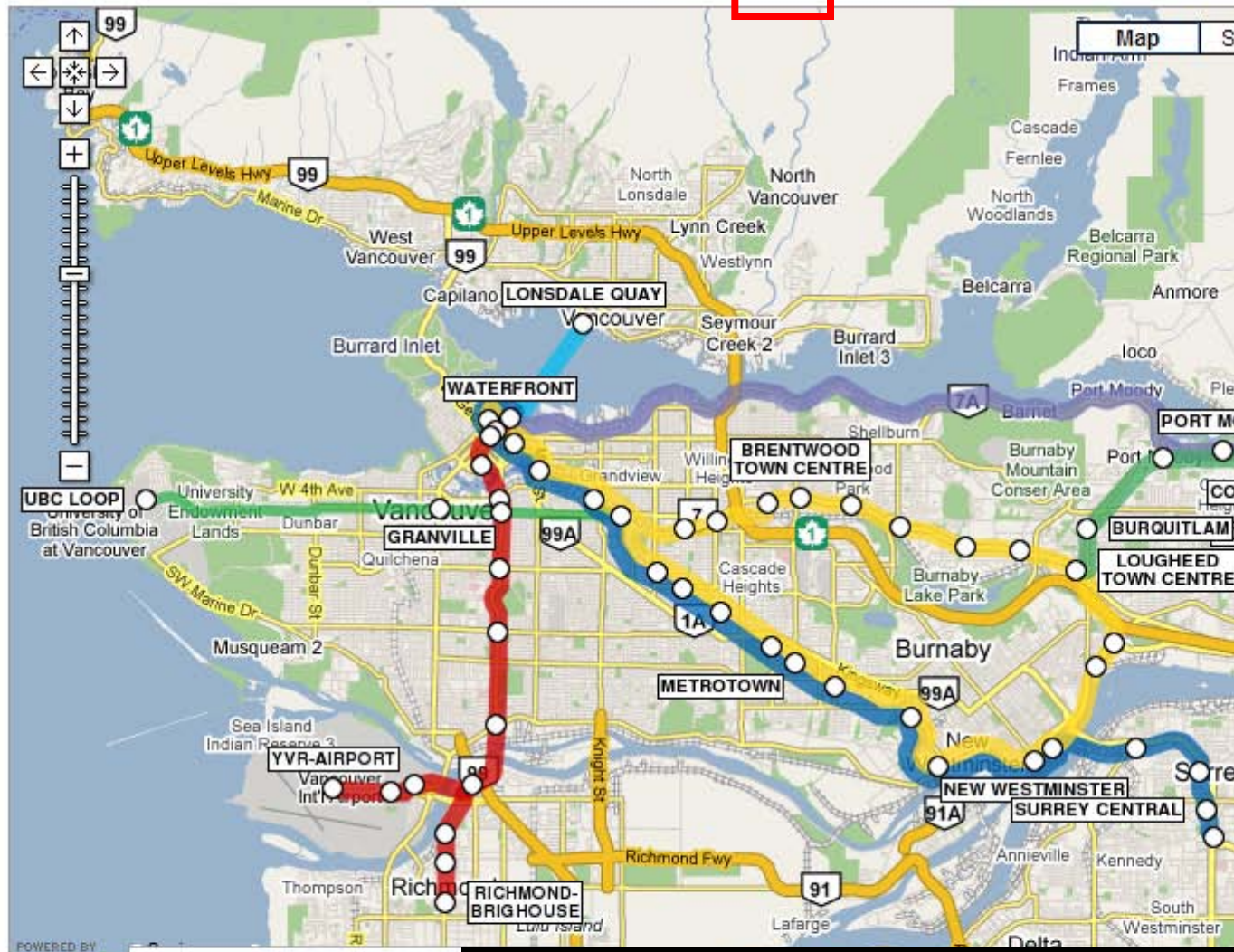
Routes [today] **future**

KML [today | future] Link

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- Bus
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- Park and Ride

Bus routes may not be up-to-date. Visit [TransLink](#) for the real maps, schedules, etc.



Vancouver's Regional Town Centres (RTCs)

4. seek to balance jobs and housing in each part of the GVRD

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Sources: GVRD (1991, 1993a, 1993b).

50%
in
CBD

40%
in
CBD

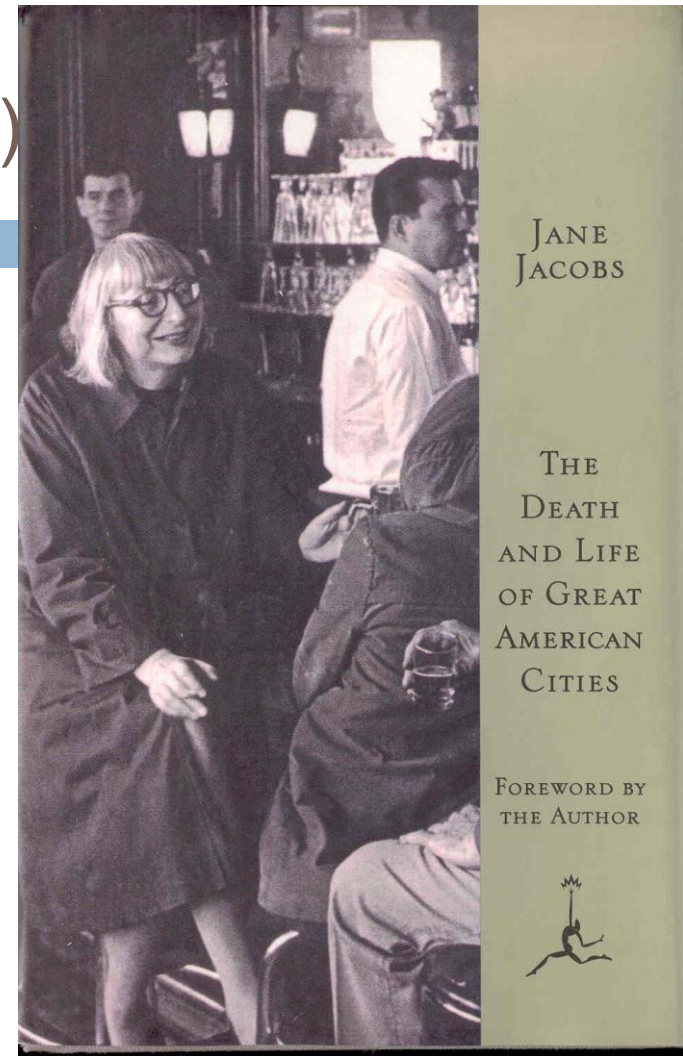
From: Gad and Matthews (2000)



Exuberant Diversity (J. Jacobs)

65

- Aged buildings, small blocks, mix of uses (all characteristics of traditional urbanism)

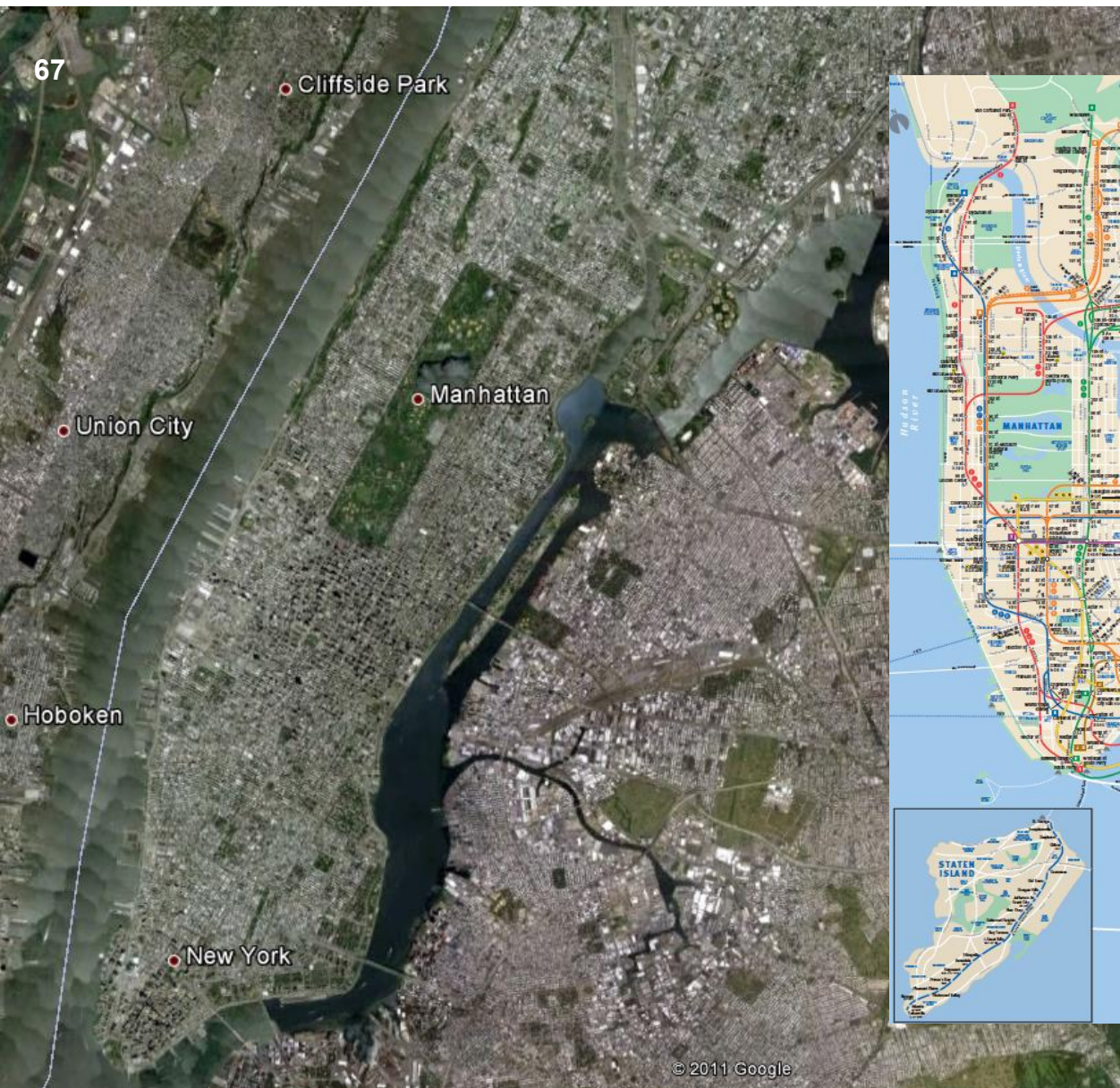


Jane Jacobs (1961)

**The Death and Life of
Great American Cities**



Urban Form (urban) – NYC's Manhattan



Selected References

- Hartshorn, T. 1992. *Interpreting the City: An Urban Geography*. Second Edition. New York: J. Wiley.
- Jacobs, J. 1961. *The Death and Life of Great American Cities*, New York: Random House, 458 pp.
- Lorch, B.J. and Jordan, D.A. 1995. The Geography of a century of residential development, pp. 57-74, In: Tronud, T. and Epp, E., *Thunder Bay: From Rivalry to Unity*. Thunder Bay Historical Museum Society, 278 pp.
- Newman P. and Kenworthy J. 1989. Gasoline consumption in cities: a comparison of US cities with a global survey, *Journal of American Planning Association*. 55: 24-37
- Oke, T.R. 1973. City size and the urban heat island. *Atmospheric Environment* 7: 769-779.
- Simmons, J. and Bourne, L.S. 2007. Living with population growth and decline. *Plan Canada* 47 (2): 13-21.

- **Upcoming:**
 - **June 12 (Thurs, Presentations)**
 - **June 12 (**Papers Due – change!**)**
 - **June 13 (Fri, Last Class)**
 - **Complete lectures 16 (agriculture) and 19 (environmental issues in cities)**
 - **Cancel lectures related to chapters 14 and 15**
 - **Review for Exam**
 - **June 16 (Mon, Final Exam)**
 - **9 am to noon, in RC 2003**
 - **Covers post-midterm material and related field trips;**